
ATUDER
1999
Acil Tıp Uzmanları Derneği
MALATYA TURGUT ÖZAL ÜNİVERSİTESİ
2018
MALATYA TURGUT ÖZAL ÜNİVERSİTESİ
ACİL TIP
ANABİLİM DALI
TIP FAKÜLTESİ
1. ULUSLARARASI
PEDİATRİK ACİLLER
KONGRESİ
28-30 AĞUSTOS 2026, MALATYA
KONUŞMA VE SÖZLÜ BİLDİRİ
ÖZET VE TAM METİN KİTABI
EDİTÖRLER
Doç. Dr. Turgut DOLANBAY
Doç. Dr. Bilgehan DEMİR
Dr. Öğr. Üyesi Süleyman NOGAY
Dr. Öğr. Üyesi Mehmet SEZER

1.ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ KONUŞMA VE SÖZLÜ BİLDİRİ ÖZET VE TAM METİN KİTABI

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1. Uluslararası Pediatrik Aciller Kongresi
Konuşma ve Sözlü Bildiri Özet ve Tam Metin Kitabı © 2026

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Bu kitap, 28-30 Ağustos 2026 tarihleri arasında Malatya Turgut Özal Üniversitesinde düzenlenen 1.Uluslararası Pediatrik Aciller Kongresi'nde konuşmacı olarak görev alanlardan ve/veya sözlü bildiri oturumlarında sözlü bildiri sunan yazarlardan; tam metinlerini veya özet metinlerini gönderenlerin metinlerinden oluşturulmuştur.

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Metin Kitabı Editörü: *Doç. Dr. Bilgehan DEMİR*

Ağustos 2026, MALATYA

KONGRE DAVET YAZISI

1. ULUSLARARASI PEDİATRİK ACİLLER VE ACİL TIP KONGRESİ

Değerli Meslektaşlarımız,

Sizleri, Malatya Turgut Özal Üniversitesi ev sahipliğinde düzenlenecek olan **1. Uluslararası Pediatrik Aciller ve Acil Tıp Kongresi'nde** ağırlamaktan büyük onur ve mutluluk duyuyoruz.

28–30 Ağustos 2026 tarihlerinde gerçekleştirilecek kongremiz; pediatrik aciller, travma yönetimi, afet ve acil sağlık hizmetleri, güncel tanı ve tedavi yaklaşımları ile multidisipliner iş birlikleri başta olmak üzere acil tıbbın önemli başlıklarında bilimsel bilgi ve deneyim paylaşımını güçlendirmeyi amaçlamaktadır.

Alanında uzman ulusal ve uluslararası konuşmacıların katkılarıyla gerçekleştirilecek bilimsel oturumlar, sözlü bildiri sunumları ve uygulamalı eğitim programları sayesinde katılımcılarımıza güncel bilimsel gelişmelerin ele alınacağı verimli ve nitelikli bir akademik ortam sunmayı hedefliyoruz.

Bilimsel birikimlerin paylaşılacağı, mesleki deneyimlerin aktarılacağı, yeni fikirlerin ve iş birliklerinin gelişeceği bu önemli organizasyonda sizleri de aramızda görmekten büyük memnuniyet duyacağız.

Tarih, bilim ve kültürün buluştuğu kadim şehir Malatya'da sizleri ağırlamayı sabırsızlıkla bekliyoruz.

Saygılarımızla,

Kongre Düzenleme Kurulu

BİLİMSEL KOMİTE

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Prof. Dr. Recep BENTLİ	Prof. Dr. Başar CANDER
Sekreterya	
Doç. Dr. Turgut DOLANBAY Doç. Dr. Bilgehan DEMİR	
Bilimsel Komite Üyeleri (Unvan sırası ve alfabetik sıra ile)	

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ORGANİZASYON KOMİTESİ

Alfabetik sıra ile

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ALİ İHSAN KİNCİ
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BAHADIR TAŞLIDERE
BAŞAR CANDER
BEHÇET AL
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ÖZLEM GÜLER
SELAMİ GÜRKAN
SERDAR DERYA
SERHAT ÖRÜN
SEVGİ YUMRUTEPE
SUAT ZENGİN
SÜLEYMAN NOGAY
ŞÜKRÜ GÜRBÜZ
TUĞRUL ÇİÇEK
TURGUT DOLANBAY
UĞUR LÖK
YASEMİN PİŞGİN
YILMAZ ÖNGÜN

PANEL MODERATÖRLERİ

(Gün, Salon ve Panel sırasına göre)



SAAT	KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
09:00-09:50	OTURUM 1	KAFA TABANI KIRIKLARI VE MAKSİLLOFASİYAL TRAVMALAR	DOÇ.DR. FATMA ÇAKMAK DR.ÖĞR.ÜYESİ MEHMET SEZER
		FASİYAL TRAVMALARDA MULTİDİSİPLİNER YAKLAŞIM: NE ZAMAN HANGİ BRANŞ ? — DR.ÖĞR.ÜYESİ SEVİLAY HANÇER TECİMER	
		MANDİBULA VE MAXİLLA KIRIKLARINDA ERKEN DÖNEM HAVAYOLU GÜVENLİĞİ — UZM. DR. PINAR TEKİN	
		TRAVMATİK OPTİK NÖROPATİ VE ORBİTA KIRIKLARI — UZM.DR. MUHAMMED M.DEMİR	
09:50-10:00	KAHVE MOLASI		
10:00 - 10:50	OTURUM 2	ŞÜPHELİ KIRIKLAR VE ÇOCUK İSTİSMARINDA ADLİ SÜREÇLER	DOÇ. DR. MÜCAHİT ORUÇ DR.ÖĞR.ÜYESİ SÜLEYMAN NOGAY
		FİZİKSEL İSTİSMAR DÜŞÜNDÜREN BULGULAR — DR.ÖĞR.ÜYESİ ERKAL GÜMÜŞBOĞA	
		PEDİATRİK ACŞLDE ADLİ OLGUYA YAKLAŞIM VE YASAL BULGULAR — DR.ÖĞR.ÜYESİ MESUT YILMAZ	
		PEDİATRİK ACİLLERDE DENTAL TRAVMALARIN YÖNETİMİ — DR.ÖĞR.ÜYESİ ZEKİYE ŞEYMA GÜMÜŞBOĞA	
10:50 - 11:00	KAHVE MOLASI		
11:00 - 11:50	OTURUM 3	TRAVMADA İLETİŞİM VE DEFANSİF TIP	PROF..DR.UĞUR LÖK DOÇ.DR.LEVENT ŞAHİN
		HUKUKİ KAYGILARLA İSTENEN "GEREKSİZ" TRAVMA TOMOGRAFİLERİ VE KONSÜLTASYON İSTEME — DOÇ.DR. MUHAMMED EKMEKYAPAR	
		HASTANE İÇİ VE DIŞI TRANSFERLERDE HEKİMİN ROLÜ — UZM. DR. MUZAFFER ÖZTÜRK	
		ACİL SERVİSTE ŞİDDET RİSKİ ALTINDA KRİZ YÖNETİMİ — UZM. DR. TUĞRUL TOPAL	
		KRİTİK PEDİATRİK HASTA TRANSFERİNDE HUKUKİ RİSKLER VE DEFANSİF TIP OTURUMU — Uzm. DR. DİLAN AKGÜN ÜNLÜ	
12:00 - 01:30	KAHVE MOLASI		
01:30 - 03:30	AÇILIŞ TÖRENİ		





SAAT	KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
09:00-09:50	OTURUM 4	**STATUS EPİLEPTİKUS VE İLK NÖBET YÖNETİMİ**	PROF. DR. BEHÇET AL DOÇ. DR. CÜNEYT ARIKAN
	STATUS EPİLEPTİKUSTA BASAMAKLI MEDİKAL TEDAVİ PROTOKOLLERİ	DOÇ. DR.GÜL YÜCEL	
	ACİL SERVİSTE FEBRİL KONVÜLSİYON YÖNETİMİ	DOÇ. ABDULGANİ GÜLYÜZ	
	YENİDOĞAN KONVÜLZİYONLARINA ACİL YAKLAŞIM	UZM. DR. MERAL ALAGÖZ	
09:50-10:00	KAHVE MOLASI		
10:00 - 10:50	OTURUM 5	**RİTİM BOZUKLUKLARI VE ACİL SERVİSTE EKG YORUMLAMA**	PROF. DR. ERTUĞRUL KURTOĞLU PROF. DR. ERDAL AKTÜRK
	SVT (SUPRARVENTRİKÜLER TAŞİKARDİ) ATAĞINA YAKLAŞIM	DR.ÖĞR.ÜYESİ YAKUP YİĞİT	
	MİYOKARDİT ŞÜPHESİNDE ACİL EKOKARDİYOGRAFİ İHTİYACI.	UZM. DR. HÜSEYİN EMRE KULOĞLU	
	ACİL SERVİSTE PEDİATRİK EKG'NİN DOĞRU YORUMLANMASI	UZM. DR. SERDAR AKIN MARAŞ	
10:50 - 11:00	KAHVE MOLASI		
11:00 - 11:50	OTURUM 6	**NON-TRAVMATİK ACİLLERDE POCUS VE BATIN USG**	PROF. DR. M. GÖKHAN TURTAY DOÇ. DR. BÜLENT PETİK
	KÜÇÜK HASTADA BÜYÜK RİSK-PEDİATRİK BEYİN BT'DE KRİTİK NOKTALAR	DOÇ.DR. SERKAN ÜNLÜ	
	PEDİATRİK HASTADA PAN CT ENDİKASYONLARI	DOÇ. DR. MEHMET AKÇİÇEK	
	TRAVMATİK BEYİN HASARINDA KONTRASTSIZ BT BULGULARI	UZM.DR. AYLA ÖZAYDOĞDU ÇİMEN	
	PEDİATRİK TRAVMALARDA GİRİŞİMSEL CERRAHİNİN YERİ	UZM.DR.SERKAN SEVGİ	
12:00 - 01:30	KAHVE MOLASI		
01:30 - 03:30	AÇILIŞ TÖRENİ		



1. ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ Malatya

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ ACİL TIP ANABİLİM DALI TIP FAKÜLTESİ

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ

ATUDER 1999 Acil Tıp Uzmanları Derneği

SALON 1 (TRAVMA) 29.08.2026

SAAT	KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
09:00-09:50	OTURUM 9	**MİNÖR VE MAJÖR KAFA TRAVMALARINA CERRAHİ YAKLAŞIM**	PROF. DR.ÇAĞATAY ÖNAL DOÇ.DR. HAYRİ CANBAZ
		BOS SIZINTISI (RİNORE/OTO-RE) YÖNETİMİ VE MENENJİT RİSKİ — DOÇ. DR. BORA TETİK	
		PEDİATRİK KAFA TRAVMALARINDA CERRAHİ MÜDAHALE KRİTERLERİ — DR.ÖĞR.ÜYESİ FERHAT ARSLAN	
		MİNÖR KAFA TRAVMASI SONRASI GELİŞEN KOMPLİKASYONLAR: NE ZAMAN BEYİN CERRAHİSİ? — DR.ÖĞR.ÜYESİ DURMUŞ EMRE KARATOPRAK	
		VERTEBRA TRAVMALARINDA İKİNCİL HASARI ÖNLEME STRATEJİLERİ — UZM. DR. BERKE YILDIRIM	
09:50-10:00	KAHVE MOLASI		
10:00 - 10:50	OTURUM 10	**ZOR HAVA YOLU, SEDASYON VE ANALJEZİ**	PROF. DR. SUAT ZENGİN DOÇ. DR. BURAK KATİPOĞLU
		PEDİATRİK TRAVMA HASTASINDA KETAMİN GÜVENLİĞİ VE YAN ETKİLERİ — DOÇ. DR HAVVA SERİN YİĞİT	
		BAŞARISIZ HAVA YOLU: KURTARICI MANEVRALAR VE KRİKOTİROİDOTOMİ — DOÇ.DR. ÖZLEM GÜLER	
		SERVİKAL BOYUNLUKLU HASTADA ENTÜBASYON TEKNİKLERİ — UZM. DR. ALANUR TARHAN	
10:50 - 11:00	KAHVE MOLASI		
11:00 - 11:50	OTURUM 11	**ALT EKSTREMİTE TRAVMALARI VE KOMPARTMAN SENDROMU**	PROF.DR. M. GÖKHAN TURTAY PROF. DR. MEHTAP GÜRGER
		PEDİATRİK KIRIKLARDA CERRAHİ ZAMANLAMASI — DR.ÖĞR.ÜYESİ KÜRŞAT BULUT	
		AKUT ÖN ÇAPRAZ BAĞ VE MENİSKÜS YIRTIKLARINA YAKLAŞIM — DR. ÖĞR. ÜYES KADİR BİÇER	
		PEDİATRİK FEMUR ŞAFT KIRIKLARINDA YAŞA ÖZEL TEDAVİLER — UZM. DR.SEFA KEY	
12:00 – 13.00	ÖĞLE ARASI		
13:00 - 13:30	UYDU SEMPOZYUMU	**AKUT AĞRIDAN ANALJEZİYE: ACİL SERVİSTE GÜNCEL YAKLAŞIMLAR**	ABDİİBRAHİM
		14 YAŞINDAN BERİ KULLANILABİLEN AĞRI KESİCİLER — UZM.DR. AHMET ŞENEL	



SALON 1 (TRAVMA) 29.08.2026

SAAT		KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
13:30 - 14:30	OTURUM 12	CONTEMPORARY CHALLENGES İN PEDİATRİC TRAUMA EVALUATİON AND DİAGNOSİS		PROF. DR. BEHÇET AL PROF. DR. KASIM TURGUT
		FROM SCENE TO DEFİNİTİVE CARE: MODERN APPROACH TO PEDİATRİC TRAUMA ASSESSMENT AND EARLY DECİSİON	KHİKMAT ANVAROV	
		EFFİCİENT USE OF DİAGNOSTİCS İN ACUTE CARE CHAİN	PRABATH NANAYAKKARA	
		THE LİVER İN THE PEDİATRİC EMERGENCY ROOM	NEELAM MOHAN	
14:30 - 14:40		KAHVE MOLASI		
14:40 - 15:30	OTURUM 13	ACİL SERVİS TRAVMA KRİZLERİ		PROF. DR. ÖZLEM BİLİR DR.ÖĞR.ÜYESİ MUSTAFA OĞUZ CUMAOĞLU
		TRAVMA EKİBİ LİDERLİĞİ: KARAR VERME SÜREÇLERİ VE İLETİŞİM	DOÇ. DR. EMRE KARSLI	
		ÇOKLU TRAVMA HASTASINDA ÖNCELİKLENDİRME: NEYDEN BAŞLAMALIYIZ?	DOÇ. DR. OSMAN LÜTFİ DEMİRCİ	
		TRİYAJDA GÖZDEN KAÇAN MİNÖR GÖRÜNÜMLÜ MAJÖR TRAVMALAR	DOÇ. DR. CÜNEYT HOCAGİL	
15:30 - 15:40		KAHVE MOLASI		
15:40 - 16:20	OTURUM 14	ACİL SERVİSTE P VALUE YANILGILARI VE MAKALE DEĞERLENDİRME		PROF. DR. TUGAY TARTAR DOÇ. DR. TURGUT DOLANBAY
		KLİNİK ARAŞTIRMALARDA P-DEĞERİNİN AŞIRI YORUMLANMASI VE KLİNİK ANLAMLILIK	DOÇ. DR. ABDUSSAMED VURAL	
		TIP LİTERATÜRÜNDE YAPAY ZEKA METİNLERİ: ORİJİNALLİK VE TESPİT EDİLEBİLİRLİK	DOÇ. DR. BORA ÇEKMEN	
		ACİL HASTALIKLARINDA RETROSPEKTİF ÇALIŞMA TASARIMI (KLİNİK VERİ ANALİZİ)	DR.ÖĞR.ÜYESİ MUSTAFA OĞUZ CUMAOĞLU	
16:20 - 16:30				
16:30- 17:10	OTURUM 15	KÜNT VE PENETRAN BATIN TRAVMALARI		PROF. DR. ATIF BAYRAMOĞLU PROF. DR.ÖZLEM BİLİR
		KÜNT DALAK VE KARACİĞER YARALANMALARINDA NON-OPERATİF YÖNETİM	DOÇ.DR. BİRSEN TEKİN	
		BATIN TRAVMALI HASTADA HEMODİNAMİK STABİLİZASYON STRATEJİLERİ	PROF. DR. SUAT ZENGİN	
		EMNİYET KEMERİ SENDROMU VE MEZENTERİK YARALANMALAR	DOÇ DR. İBRAHİM HALİL YASAK	
		PENETRAN BATIN TRAVMALARINDA LAPAROTOMİ ENDİKASYONLARI	UZM. DR. YASEMİN PİŞGİN	
17:10- 17:20				
17:20- 18:10	OTURUM 16	TORAKS TRAVMALARI		DOÇ. DR. CÜNEYT ARIKAN DOÇ. DR. EMRE KARSLI
		TRAKEOBRONŞİYAL ARALANMALARDA CERRAHİ ONARIM	DR.ÖĞR.ÜYESİ İLHAM GÜLÇEK	
		PULMONER KONTÜZYON VE AKUT SOLUNUM SIKINTISI SENDROMU (ARDS)	DR.ÖĞR.ÜYESİ EBRU KARA	
		TANSİYON PNOMOTORAKS VE TRAVMATİK HEMOTORAKSTA TÜP TORAKOSTOMİ ENDİKASYONLARI	UZM.DR. DAVUT KAYA	

1. ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ Malatya

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ ACİL TIP ANABİLİM DALI TIP FAKÜLTESİ

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ

ATUDER Acil Tıp Uzmanları Derneği

SALON 2 (NON-TRAVMA) 29.08.2026

SAAT		KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
09:00-09:50	OTURUM 17	DİRENÇLİ ASTIM ATAĞI VE SOLUNUM SIKINTISI		DOÇ. DR. TURGUT DOLANBAY DOÇ.DR. M.MURAT OKTAY
		YABANCI CİSİM ASPİRASYONUNU TAKLİT EDEN ASTIM OLGULARI	DR.ÖĞR.ÜYESİ ALİ İHSAN KILCI	
		AKUT AĞIR ASTIM ATAĞINDA BASAMAKLI İLAÇ TEDAVİSİ	UZM. DR. RIDVAN SELEN	
		BRONŞİYOLİT VE PNÖMONİDE SOLUNUM DESTEĞİ OPTİMİZASYONU	UZM. DR. EGEMEN TAVRAK	
09:50-10:00	KAHVE MOLASI			
10:00 - 10:50	OTURUM 18	GİS KANAMALARI VE MECKEL DİVERTİKÜLÜ		DOÇ. DR. İBRAHİM ÖZLÜ DR.ÖĞR.ÜYESİ ALİ İHSAN KILCI
		PEDİATRİK HASTADA ÜST VE ALT GİS KANAMASI AYRIMI	DOÇ. DR. ŞÜKRÜ GÜNGÖR	
		AKUT ÖZOFAGUS VARİS KANAMALARINDA HALP SKORUNUN PROGNOSTİK DEĞERİ	DOÇ.DR. OĞUZHAN BOL	
		MECKEL DİVERTİKÜLÜ KANAMALARINDA ACİL CERRAHİ YAKLAŞIM	DOÇ. DR. FATMA ÇAKMAK	
10:50 - 11:00	KAHVE MOLASI			
11:00 - 11:50	OTURUM 19	MENENJİT VE YÖNETİMİ		PROF.DR. HAKAN OĞUZTÜRK DOÇ. DR. AYLA MOLLAOĞLU
		AKUT BAKTERİYEL MENENJİTTE VE VİRAL ENSEFALİTTE AMPİRİK TEDAVİ PROTOKOLLERİ	PROF. DR. MEHTAP GÜRGER	
		LOMBER PONKSİYON KONTRENDİKASYONLARI VE DOĞRU TEKNİK	DOÇ. DR. M.MURAT OKTAY	
		MENENGOKOKAL SEPSİS VE PURPURA FULMİNANS YÖNETİMİ	DR. ÖĞR. ÜYESİ BÜŞRA BİLDİK	
12:00 – 13.00	ÖĞLE ARASI			
13:00 - 13:30				





SAAT		KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
13:30 - 14:20	OTURUM 20	DKA (DİYABETİK KETOASİDOZ) VE HİPOGLİSEMİ		DOÇ. DR. HAVVA SERİN YİĞİT DOÇ. DR. CÜNEYT HOCAGİL
		DKA'DA SIVI VE İNSÜLİN TEDAVİSİ GÜNCEL PROTOKOLLERİ	DOÇ. DR. İSMAİL DÜNDAR	
		ACİL SERVİSTE YENİDOĞAN VE SÜT ÇOCUĞUNDA DİRENÇLİ HİPOGLİSEMİ YÖNETİMİ	DOÇ. DR. AYHAN TABUR	
		DKA KOMPLİKASYONU OLARAK BEYİN ÖDEMİ: ERKEN TANI VE MÜDAHALE	UZM. DR. ERKUT EROL	
14:20 - 14:30		KAHVE MOLASI		
14:30 - 15:20	OTURUM 21	MANAGEMENT OF PEDİATRİC PATİENTS WİTH DAMAGED AİRWAYS AND SEVERE İLLNESSES.		PROF. DR. BAŞAR CANDER PROF. DR. ZEYNEP ÇAKIR
		UNVEILING THE PROBLEMS OF CRITICALLY ILL CHILDREN IN INDONESIA	KURNAWAN TAUFIG KADAFI	
		DECİSİON MAKİNG & ERRORS İN PEDİATRİC EMERGENCY MEDİCİNE: LEARNİNG FROM MİSTAKES	MANU MADHOK	
		REAL-LİFE VS RED HERRİNG: UNMASKİNG PEDİATRİC PAİN	PARİKH YOGESH NARENDRABHAİ	
15:20 - 15:30		KAHVE MOLASI		
15:30 - 16:20	OTURUM 22	AKUT GASTROİNTESTİNAL ENFEKSİYONLAR VE TETANOZ PROFLAKSİSİ		DOÇ. DR. HİLAL HOCAGİL DR. ÖĞR. ÜYESİ BÜŞRA BİLDİK
		AKUT GASTROENTERİTTE DEHİDRATASYON DERECESİNİN BELİRLENMESİ VE TEDAVİSİ (ORT KULLANIMI)	UZM. DR. HASAN GÖKÇE	
		İNTRAVENÖZ SIVI SEÇİMİNDE GÜNCEL KILAVUZLAR VE HATALAR	UZM. DR. FATİH CEMAL TEKİN	
		KÖPEK VE KEDİ ISIRIKLARINDA KUDUZ VE TETANOZ PROFİLAKSİSİ	UZM. DR. AZİZE YETİŞGEN	
16:20 - 16:30		KAHVE MOLASI		
16:30- 17:20	OTURUM 23	HEPATOTOKSİSİTE VE KANAMA		DOÇ. DR. BİRSEN HARMA DR. ÖĞR. ÜYESİ SERDAR DERYA
		AKUT KARACİĞER YETMEZLİĞİYAKLAŞIM KOAGÜLOPATİLERİ	DOÇ. DR. FATMA İLKNUR VAROL	
		TROMBOSİT VE TAZE DONMUŞ PLAZMA ENDİKASYONLARI	DR. ÖĞR. ÜYESİ SERDAR DERYA	
		PEDİATRİK MASİF TRANSFÜZYON PROTOKOLLERİ	UZM. DR. FETHİ AHMET ATILGAN	
17:20- 17:30		KAHVE MOLASI		
17:30- 18:10	OTURUM 24	AKUT BATIN		PROF. DR. TURAN YILDIZ DOÇ. DR. İBRAHİM HALİL YASAK
		OLUNUM YOLU YABANCI CİSİM ASPİRASYONALRI	PROF. DR. TUGAY TARTAR	
		İLEUS VE VOLVULUS: ACİL SERVİSTE SAATLERİN ÖNEM TAŞIDIĞI OLGULAR	DR. ÖĞR. ÜYESİ NECMETTİN AKPINAR	
		NEKROTİZAN ENTEROKOLİT (NEK) EVRELEMESİNDE DİREKT GRAFİ BULGULARI	DR.ÖĞR.ÜYESİ İBRAHİM AKDENİZ	
		2. TORSİYON VE İNVAJİNASYONDA REDÜKSİYON VE CERRAHİ		



1. ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ Malatya

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ ACİL TIP ANABİLİM DALI TIP FAKÜLTESİ

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ

ATUDER 1999 Acil Tıp Uzmanları Derneği

SALON 1 (TRAVMA) 30.08.2026

SAAT		KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
09:00-09:50	OTURUM 25	ÜROGENİTAL TRAVMALAR VE TESTİS TORSİYONU ŞÜPHESİ		DOÇ. DR. BAHADIR TAŞLIDERE DOÇ.DR. ABDUSSAMED VURAL
		TRAVMATİK RENAL YARALANMALARDA KONSERVATİF TEDAVİNİN SINIRLARI	DOÇ. DR. M.İKBAL ŞAŞMAZ	
		PELVİS KIRIKLARINA EŞLİK EDEN MESANE VE ÜRETRA RÜPTÜRLERİ	DOÇ. DR. SERHAN ÇİMEN	
		PERİNEAL YARALANMALARDA ERKEN CERRAHİ MÜDAHALE	DR. ÖĞR. ÜYESİ ENDER AKDEMİR	
09:50-10:00	KAHVE MOLASI			
10:00 - 10:50	OTURUM 26	RESÜSİTASYON VE NONİNVAZİV MEKANİK VENTİLASYON		DOÇ. DR. LEMAN ACUN DELEN DOÇ.DR. ÖZLEM GÜLER
		NON-İNVAZİV VENTİLASYONUN BAŞARISIZLIK BELİRTİLERİ	DOÇ.DR. AHMET AYDIN	
		CPAP VE BİPAP ARASINDAKİ TERCİH KRİTERLERİ	DOÇ. DR. ZELİHA KORKMAZ DİŞLİ	
		YÜKSEK AKIŞLI NAZAL KANÜL (HFNC) KULLANIM ENDİKASYONLARI	UZM. DR. AYŞE YILKINÇ TEKİRDAŞ	
10:50 - 11:00	KAHVE MOLASI			
11:00 - 11:50	OTURUM 27	AFETZEDEYE PSİKOSOSYAL YAKLAŞIM		DOÇ. DR. TURGUT DOLANBAY DR. ÖĞR. ÜYESİ ÖZGÜR AYTAÇ
		DEPREM SONRASI YETİŞKİNLER VE ÇOCUKLU AİLELERDE TRAVMA: PSİKOSOSYAL DEĞERLENDİRME VE MÜDAHELE	PROF. DR. E. ERDAL ERŞAN	
		DEPREM SONRASI ÇOCUK VE ERGENLERDE PSİKİTARİK ACİLLER: TANI, TRİAJ, MÜDAHELE VE SÜREÇ	DOÇ. DR. ARZU ÇALIŞKAN DEMİR	
		AFETLERDE RUH SAĞLIĞI YÖNETİMİ: İLK MÜDAHALECİDEN TOPLUMSAL İYİLEŞMEYE	DR. ÖĞR. ÜYESİ ÖZGÜR AYTAÇ	
12:00 – 13.00	ÖĞLE ARASI			



1. ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ Malatya

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ ACİL TIP ANABİLİM DALI TIP FAKÜLTESİ

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ

ATUDER Acil Tıp Uzmanları Derneği

SALON 1 (TRAVMA) 30.08.2026

SAAT		KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
13:00 - 13:50	OTURUM 28	YANIKLAR VE TEDAVİLERİ		PROF. ŞÜKRÜ GÜRBÜZ DOÇ. DR. SERHAT ÖRÜN
		ACİL SERVİSLERDE YANIKLARDA İLK YARA BAKIMI	UZM. DR. AYTAÇ TAŞÇI	
		YANIKLARINDA SIVI RESÜSİTASYONU	DOÇ. DR. BİSEN HARMA	
		PEDİATRİK YANIK SINIFLANDIRMASI VE TRİAJ	DR. ÖĞR. ÜYESİ TUĞRUL ÇİÇEK	
13:50 - 14:00		KAHVE MOLASI		
14:00 - 14:50	OTURUM 29	SERVİKAL VE TORAKOLOMBER VERTEBRA YARALANMALARI		UZM. DR. HASAN GÖKÇE DOÇ. DR.M. İKBAL ŞAŞMAZ
		VERTEBRA TRAVMALARINDA İKİNCİL HASARI ÖNLEME STRATEJİLERİ	DOÇ. DR. GÖKSEL GÜNARHAN	
		SERVİKAL VE TORAKOLOMBER KIRIKLARDA KONSERVATİF TEDAVİ VE CERRAHİ KARAR	UZM. DR. CANBERK BİRET	
		SERVİKAL TRAVMALARDA DİREKT GRAFİ Mİ, BT Mİ?	UZM. DR. YILMAZ ÖZGÜL	
14:50 - 15:00		KAHVE MOLASI		
15:00 - 15:50	OTURUM 30	HEMORAJİK ŞOK VE DİC		PROF. DR. ŞÜKRÜ GÜRBÜZ DOÇ. DR. EVREN EKİNGEN
		ALTIN SAAT İÇİNDE HEMORAJİK ŞOK YÖNETİMİ VE PERMİSİF HİPOTANSSİYON	UZM. DR.HAZAL NUR KILIÇ	
		RESÜSİTASYONDA KANITA DAYALI YENİ YAKLAŞIMLAR VE LAKTAT KLİRENSİ	UZM. DR. ÖZLEM ALBAY	
		YILAN SOKMALARINDA ANTİVENOM ENDİKASYONLARI	UZM. DR. KEZİBAN ERENLER	
15:50 - 16:00		KAHVE MOLASI		
16:00 - 16:50	OTURUM 31	PEDİATRİK ACİL BAŞVURALARINA AİLE HEKİMLİĞİ PERSPEKTİFİ		PROF. DR. BURCU KAYHAN TETİK UZM. DR. NUR KAPLAN DEMİR
		BİRİNCİ BASAMAKTA YÖNETİLEBİLECEK ÇOCUK HASTALAR: ACİLİN YÜKÜNÜ NASIL AZALATIRIZ	PROF. DR. BURCU KAYHAN TETİK	
		AŞILAMA DURUMUNUN ÇOCUK ACİL KLİNİK SEYRİNE ETKİSİ	DR. ÖĞR. ÜYESİ YAVUZ KORKMAZ	
		GEREKSİZ PEDİATRİK ACİL BAŞVURULARININ ÖNLENMESİ: KANITA DAYALI YAKLAŞIM	DR. ÖĞR. ÜYESİ ADEM TAHA ÖZDEMİR	
16:50 - 17:30		KAPANIŞ		



1. ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ Malatya

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ ACİL TIP ANABİLİM DALI TIP FAKÜLTESİ

MALATYA TURGUT ÖZAL ÜNİVERSİTESİ

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SALON 2 (NON-TRAVMA) 30.08.2026

SAAT	KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
09:00-09:50	OTURUM 32 — PEDİATRİK SEPSİS VE ŞOKTA İLK 1 SAAT		PROF. DR. ŞÜKRÜ GÜRBÜZ DOÇ. DR. BİLGEHAN DEMİR
	SEPTİK ŞOKTA İNOTROP VE VAZOPRESÖR SEÇİMİ	DOC. DR. MESUT ÖTERKUŞ	
	GÜNCEL SEPSİS KILAVUZLARINA GÖRE HASTA YÖNETİMİ	DR.ÖĞR.ÜYESİ MEHMET SEZER	
	SEPSİS TANISINDA LAKTAT, CRP, PROKALSİTONİN VE YENİ BİYOBELİRTEÇLER	UZM. DR. HACI OSMAN TOPLU	
09:50-10:00	KAHVE MOLASI		
10:00 - 10:50	OTURUM 33 — SIK KARŞILAŞILAN TOKSİKOLOJİK ACİLLER		PROF. DR. E.ERDAL ERŞAN DR. ÖĞR. ÜYESİ İBRAHİM AKDENİZ
	ACİLDE KARBONMONOKSİT ZEHİRLENMESİ VE HİPERBARİK OKSİJEN”	DOÇ. DR. İBRAHİM ÖZLÜ	
	PARASETAMOL İNTOKSİKASYONUNDA NAC TEDAVİSİ VE NOMOGRAM	UZM. DR. FAZIL AHMET KARABULUT	
	TRİSİKLİK ANTİDEPRESAN ZEHİRLENMESİNDE EKG BULGULARI VE YÖNETİM	UZM. DR. İSMAİL ATAŞ	
10:50 - 11:00	KAHVE MOLASI		
11:00 - 11:50	OTURUM 34 — KARDİYAK SİYANOTİK ACİLLER VE SENKOP		PROF. DR. ÖZLEM ELKIRAN DR. ÖĞR. ÜYESİ MEHMET SEZER
	PEDİATRİK ARİTMİLERDE HAYAT KURTARAN İPUÇLARI	PROF. DR. ÖZLEM ELKIRAN	
	SİYANOTİK ÇOCUĞA YAKLAŞIM	DR. ÖĞR. ÜYESİ MEHMET ÖNCÜL	
	PEDİATRİK HASTALARDA SENKOP: KARDİYAK NEDENLERİ NASIL AYIRT EDELİM?	UZM. DR. EDİP BURAK KARAASLAN	
12:00 – 13.00	ÖĞLE ARASI		
13:00 - 13:30			





SAAT		KONU VE KONUŞMACILAR		OTURUM BAŞKANLARI
13:00 - 13:50	OTURUM 35	YENİDOĞAN RESÜSİTASYONU VE ALLERJİ		DOÇ. DR. NURİYE ASLI MELEKOĞLU DOÇ. DR. FATMA İLKNUR VAROL
		ÇOCUKLARDA ASTIM ATAĞI VE ACİL SERVİSTE YÖNETİMİ?	PROF. DR. ERDEM TOPAL	
		YENİDOĞANIN RESÜSİTASYONU	DOÇ. DR. NURİYE ASLI MELEKOĞLU	
		ALLERJİ PRATİĞİNDE ACİLLER	UZM. DR. ERCAN YILMAZ	
13:50 - 14:00	KAHVE MOLASI			
14:00 - 14:50	OTURUM 36	FEBRİL NÖTROPENİ VE TÜMÖR LİZİS SENDROMU		DOÇ. DR. MUHAMMED EKMEKYAPAR DR.ÖĞR.ÜYESİ SÜLEYMAN NOGAY
		FEBRİL NÖTROPENİK HASTADA İLK 60 DAKİKA İÇİNDE YAPILMASI GEREKENLER	UZM. MÜSLİME KABA	
		TÜMÖR LİZİS SENDROMU TANISI VE BÖBREK KORUMASI	UZM. DR. HAKAN ZENGİN	
		YENİDOĞAN SEPSİSİNE YAKLAŞIM	UZM. DR. ALPER DEMİRKAYA	
14:50 - 15:00	KAHVE MOLASI			
15:00 - 15:50	OTURUM 37	ANAFİLAKSİ YÖNETİMİ VE DERMATOLOJİK ACİLLER		PROF. DR. ERDEM TOPAL DR.ÖĞR.ÜYESİ MEHMET SEZER
		ACİL SERVİSE SIK BAŞVURAN AKUT ÜRTİKER VE ANJİYOÖDEM TEDAVİ VE UYGULAMA	DOÇ. DR. LEVENT ŞAHİN	
		STEVENS-JOHNSON SENDROMU (SJS) VE TEN AYIRICI TANISI	DR. ÖĞR. ÜYESİ NESLİHAN ALTUNKAYA	
		BİFAZİK ANAFİLAKTİK REAKSİYONLAR VE GÖZLEM SÜRESİ	UZM. DR. SEVGİ YUMRUTEPE	
15:50 - 16:00	KAHVE MOLASI			
16:00 - 16:50	OTURUM 38	AKUT BÖBREK HASARI VE HİPERKALEMİ		DOÇ. DR. BORA ÇEKMEN DR.ÖĞR.ÜYESİ SÜLEYMAN NOGAY
		PEDİATRİK AKUT BÖBREK HASARINDA (AKI) TANI KRİTERLERİ	UZM. DR. HÜSEYİN YILDIRIM	
		HAYATI TEHDİT EDEN HİPERKALEMİDE ACİL MEDİKAL YAKLAŞIM	UZM. DR. SIDIKA NUR TAYFUR	
		HÜS (HEMOLİTİK ÜREMİK SENDROM) OLGULARINDA ACİL SERVİS FARKINDALIĞI	UZM. DR. GÖKAY SÜLÜ	
16:50 - 17:30	OTURUM 39	AKILCI İLAÇ KULLANIMI	PROF. DR. ŞÜKRÜ GÜRBÜZ	DR.ÖĞR.ÜYESİ SÜLEYMAN NOGAY DR.ÖĞR.ÜYESİ MEHMET SEZER
		AKILCI İLAÇ KULLANIMI		



1. ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ MALATYA

28-30 AĞUSTOS 2026

SÖZLÜ SUNUMLAR



CUMARTESİ – A SALONU

OTURUM	SAAT	OTURUM BAŞKANLARI
1. OTURUM	09:00 – 09:55	HASAN GÖKÇE – BORA ÇEKMEN
2. OTURUM	10:00 – 10:55	ABDUSSAMET VURAL – HASAN GÖKÇE
3. OTURUM	11:00 – 11:55	DAVUT KAYA – BÜŞRA BİLDİK
4. OTURUM	13:30 – 14:25	LEVENT ŞAHİN – MUHAMMED İKBAL ŞAŞMAZ
5. OTURUM	14:30 – 15:25	HAKAN OĞUZTÜRK – ZELİHA KORKMAZ
6. OTURUM	15:30 – 16:25	GÖKHAN TURTAY – FATMA ÇAKMAK

CUMARTESİ – B SALONU

OTURUM	SAAT	OTURUM BAŞKANLARI
1. OTURUM	09:00 – 09:55	NURİ BOZDEMİR – EVREN EKİNGEN
2. OTURUM	10:00 – 10:55	MUSTAFA MAKAV – TUĞBA MENEKLİ
3. OTURUM	11:00 – 11:55	ÖZLEM GÜLER – ŞÜKRÜ GÜRBÜZ
4. OTURUM	13:30 – 14:25	ÖZLEM BİLİR – SUAT ZENGİN
5. OTURUM	14:30 – 15:25	BURAK KATİPOĞLU – GÖKSAL GÜNERHAN
6. OTURUM	15:30 – 16:25	ALİ İHSAN KİNCİ – YILMAZ ÖZGÜL

PAZAR – A SALONU

OTURUM	SAAT	OTURUM BAŞKANLARI
1. OTURUM	09:00 – 09:55	FATİH TAN – SÜLEYMAN NOGAY
2. OTURUM	10:00 – 10:55	DAVUT KAYA – GÖKHAN TURTAY
3. OTURUM	11:00 – 11:55	LEVENT ŞAHİN – TUĞBA MENEKLİ
4. OTURUM	13:30 – 14:25	FATİH TAN – LEMAN ACUN DELEN

M4401-Tam Metin

APPROACH TO IDIOPATHIC HYPERTROPHIC CARDIOMYOPATHY IN THE PEDIATRIC EMERGENCY DEPARTMENT

Turgut Dolanbay[1]; Bilgehan Demir[1]; Süleyman Nogay[1]; Mehmet Sezer[1]
[1] Malatya Turgut Özal University, Faculty of Medicine, Department of Emergency Medicine , Malatya, Türkiye

ABSTRACT

Background

Hypertrophic cardiomyopathy is a myocardial disease characterized by thickening of the cardiac muscle that cannot be explained by pressure or volume overload. Hypertrophy most commonly involves the left ventricle and interventricular septum. The term idiopathic hypertrophic cardiomyopathy is used for cases in which the cause of myocardial hypertrophy cannot be identified despite comprehensive evaluation. However, genetic testing may reveal variants affecting sarcomeric proteins in some children whose condition was initially considered unexplained.

Discussion

Increased myocardial thickness may impair left ventricular relaxation and filling. In some patients, septal hypertrophy and systolic anterior motion of the mitral valve may cause dynamic left ventricular outflow tract obstruction. Hypovolemia, tachycardia, strenuous exercise, and reduced systemic vascular resistance may exacerbate this obstruction.

Children may be asymptomatic or may present with exertional dyspnea, chest pain, palpitations, dizziness, presyncope, or syncope. In rare cases, the first manifestation of the disease may be a serious ventricular arrhythmia or cardiac arrest. Syncope occurring during exercise, a family history of sudden death at a young age, and abnormal electrocardiographic findings should raise suspicion of a cardiac cause.

The initial assessment in the pediatric emergency department should be guided by the patient's clinical and hemodynamic status. In patients with suspected hypertrophic cardiomyopathy, electrocardiography, cardiac monitoring, and echocardiography may contribute to the diagnostic evaluation. Management should focus on maintaining ventricular filling, correcting hypovolemia in a controlled manner, and preventing tachycardia. Pediatric advanced life support protocols should be applied in cases of arrhythmias causing hemodynamic instability.

Conclusion

This presentation aims to discuss the pathophysiological mechanisms, clinical manifestations, diagnostic evaluation in the emergency department, and fundamental management principles of idiopathic hypertrophic cardiomyopathy in children.

Keywords: Hypertrophic cardiomyopathy, child, syncope, ventricular arrhythmia, sudden cardiac death

INTRODUCTION

Hypertrophic cardiomyopathy is a myocardial disease characterized by increased ventricular wall thickness. Myocardial hypertrophy may not be fully explained by abnormal loading conditions. The disease most commonly involves the left ventricle and interventricular septum; however, different morphological patterns may also occur (1,2).

In children, ventricular wall thickness varies according to age and body size. Therefore, echocardiographic measurements should be compared with pediatric reference values. Assessment of wall thickness using z-scores adjusted for body surface area may contribute to the diagnosis. However, the diagnostic evaluation should not be based on a single measurement alone. Clinical findings, family history, genetic data, and imaging results should be considered collectively (1,2).

Pediatric hypertrophic cardiomyopathy may be associated with various etiologies. In some patients, variants in genes encoding sarcomeric proteins can be identified. Metabolic diseases, mitochondrial disorders, and genetic syndromes may also be associated with a similar cardiac phenotype (3).

The term idiopathic hypertrophic cardiomyopathy may be used for cases in which the cause of myocardial hypertrophy cannot be identified despite comprehensive evaluation. Nevertheless, advanced genetic testing may reveal sarcomeric gene variants in some patients. Therefore, the term idiopathic may indicate that the cause cannot be established using currently available investigations rather than representing a definitive etiological classification (2,3).

Metabolic and syndromic causes may be particularly important in patients diagnosed during infancy. Pompe disease, mitochondrial disorders, storage diseases, and RASopathies may be associated with myocardial hypertrophy. In these patients, cardiac findings may be accompanied by neuromuscular, developmental, or systemic manifestations (4).

The clinical course of the disease may vary among children. Some patients may remain asymptomatic for prolonged periods, whereas others may experience exertional dyspnea, chest pain, palpitations, or syncope. Heart failure, ventricular arrhythmias, and sudden cardiac death are among the serious clinical outcomes of the disease (1,3,4).

In the pediatric emergency department, syncope occurring during exercise should be evaluated carefully. The presence of accompanying chest pain or palpitations may increase the likelihood of a cardiac cause. A family history of hypertrophic cardiomyopathy or sudden death at a young age should also raise concern. A detailed medical history, physical examination, and electrocardiography are essential during the initial evaluation. In patients with clinical suspicion, echocardiography may contribute to the diagnostic assessment (1,2).

ETIOLOGY AND PATHOPHYSIOLOGY

Pediatric hypertrophic cardiomyopathy may be associated with various genetic and non-genetic causes. Variants in genes encoding sarcomeric proteins are identified in a substantial proportion of patients. These variants may affect cardiomyocyte structure, contractile function, and energy utilization. Although autosomal dominant inheritance is most commonly observed in familial cases, the absence of a family history does not exclude a genetic cause (1,3).

Metabolic and syndromic disorders may also produce a hypertrophic cardiomyopathy phenotype during childhood. Pompe disease, mitochondrial disorders, glycogen storage

diseases, and fatty acid oxidation disorders are among the possible causes. Myocardial hypertrophy may also occur in Noonan syndrome and other RASopathies. Particularly in patients diagnosed during infancy, the assessment of extracardiac manifestations may be important for etiological differentiation (2–4).

Hypertrophy of myocardial cells may lead to thickening of the ventricular wall and a reduction in ventricular cavity size. The relaxation capacity of the hypertrophied myocardium may be impaired. This may contribute to impaired diastolic filling and increased ventricular filling pressures. Diastolic dysfunction may occur even when the ejection fraction is normal or elevated (1,2).

In some patients, hypertrophy may be more pronounced in the interventricular septum. The combination of septal hypertrophy and systolic anterior motion of the mitral valve may produce dynamic left ventricular outflow tract obstruction. The severity of the obstruction may vary according to hemodynamic conditions. Tachycardia, dehydration, reduced venous return, and systemic vasodilation may exacerbate outflow tract obstruction (1,2).

The oxygen demand of the hypertrophied myocardium may increase. Inadequate coronary microcirculation may, in turn, contribute to the development of myocardial ischemia. Cardiomyocyte disarray and myocardial fibrosis may be associated with heterogeneous electrical conduction. These changes may increase the risk of ventricular arrhythmias and sudden cardiac death (1,3).

These pathophysiological changes may contribute to clinical manifestations such as exertional dyspnea, chest pain, palpitations, and syncope. In particular, reduced preload or an increased heart rate may adversely affect left ventricular filling and cardiac output. Therefore, fluid loss, fever, and strenuous physical activity may be associated with worsening symptoms (1,2).

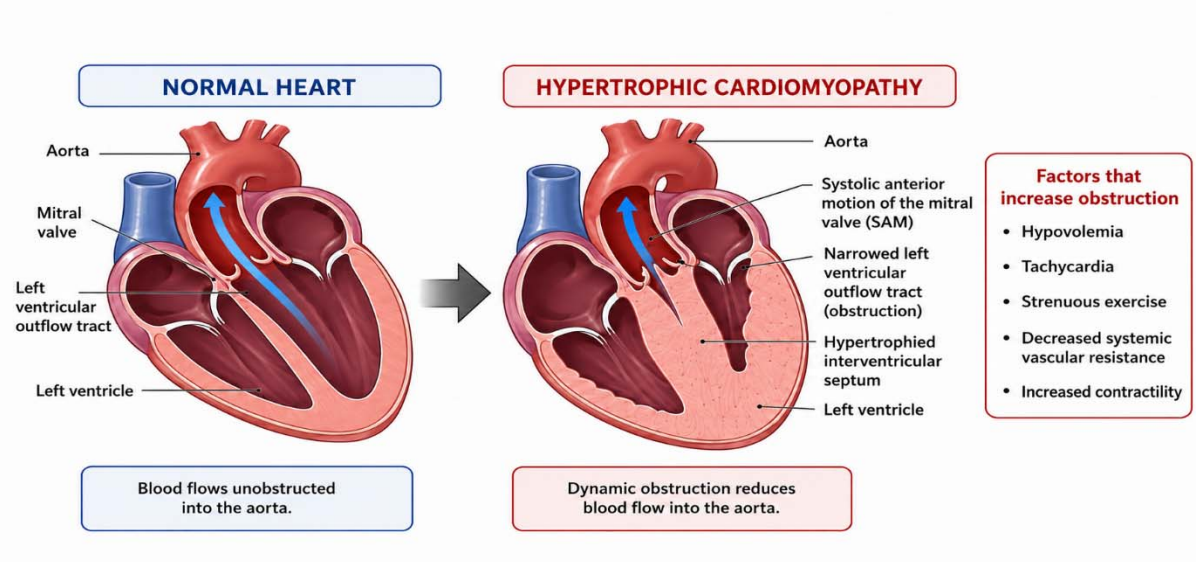


Figure 1. Schematic illustration of septal hypertrophy, systolic anterior motion of the mitral valve, and dynamic left ventricular outflow tract obstruction in children with hypertrophic cardiomyopathy.

CLINICAL MANIFESTATIONS AND EVALUATION IN THE PEDIATRIC EMERGENCY DEPARTMENT

The clinical presentation of hypertrophic cardiomyopathy may vary according to the patient's age, the degree of myocardial hypertrophy, and the presence of left ventricular outflow tract obstruction. Some children may remain asymptomatic for prolonged periods. In these patients, the diagnosis may be established during family screening or routine cardiological evaluation (1,3).

Symptomatic children may present with exertional dyspnea, chest pain, palpitations, easy fatigability, and syncope. In infants, tachypnea, feeding difficulties, excessive sweating, and poor weight gain may be more prominent. These findings may be associated with diastolic dysfunction, reduced cardiac output, or heart failure (3,4).

In the pediatric emergency department, the timing of syncope onset and the circumstances under which it occurred should be evaluated in detail. Although most cases of syncope during childhood are vasovagal in origin, syncope occurring during exercise should raise concern for a cardiac cause. The presence of accompanying chest pain or palpitations may also increase the likelihood of a cardiac etiology (5).

Sudden syncope without prodromal symptoms, known heart disease, and a family history of sudden death at a young age may be considered risk indicators. New-onset syncope in a child with known hypertrophic cardiomyopathy may be associated with an arrhythmia or hemodynamic compromise (1,5).

The initial assessment should follow the ABCDE approach, including airway, breathing, circulation, disability, and exposure. The patient's level of consciousness, heart rate, respiratory rate, blood pressure, oxygen saturation, and peripheral perfusion should be assessed. In patients with hemodynamic instability, life-saving interventions should be initiated without delay (6).

The medical history should explore the relationship between symptoms and physical activity, their duration, and whether they have recurred. Current medications, recent fluid loss, and a family history of cardiomyopathy should also be investigated. This information may help differentiate cardiac from non-cardiac causes of syncope (1,5).

The physical examination should include assessment of heart rate, rhythm, peripheral pulses, and blood pressure. Heart sounds should be evaluated, and the presence of a murmur should be investigated. A systolic ejection murmur may be heard in patients with left ventricular outflow tract obstruction. However, the absence of a murmur does not exclude hypertrophic cardiomyopathy (1,2).

A 12-lead electrocardiogram is recommended in patients with clinical suspicion. Electrocardiographic findings may include left ventricular hypertrophy, pathological Q waves, ST-segment changes, and T-wave inversion. Atrial enlargement, conduction abnormalities, and ventricular arrhythmias may also be detected. Normal electrocardiographic findings do not completely exclude the disease (1,2).

Echocardiography is one of the principal imaging modalities used to evaluate cardiac structure and function. Ventricular wall thickness, the distribution of hypertrophy, and left ventricular cavity dimensions can be assessed. Doppler echocardiography may be used to evaluate the left

ventricular outflow tract gradient. Systolic anterior motion of the mitral valve and mitral regurgitation may also be investigated (1,2).

Cardiac magnetic resonance imaging may be used when echocardiographic assessment is inadequate. This modality may provide additional information regarding the distribution of hypertrophy and the presence of myocardial fibrosis. Holter electrocardiography may help identify intermittent cardiac arrhythmias (1,2).

Laboratory investigations may be planned according to the patient's clinical condition. Blood glucose, serum electrolytes, renal function, and cardiac troponin levels may be assessed. In patients with suspected heart failure, measurement of natriuretic peptide levels may contribute to the diagnostic evaluation. Metabolic investigations may be considered in infants or children with systemic manifestations (2,4).

The risk of sudden cardiac death should be assessed individually for each patient. Unexplained syncope, non-sustained ventricular tachycardia, marked left ventricular hypertrophy, and left atrial enlargement are among the variables considered during risk assessment. The use of pediatric-specific risk models may contribute to clinical evaluation (7).

Patients with exertional syncope, documented ventricular arrhythmia, hemodynamic instability, or signs of heart failure should be evaluated in consultation with pediatric cardiology. Cardiac monitoring and hospital admission may be considered in these patients. Children with a history of cardiac arrest should be referred to an experienced center for further evaluation (1,7).

EMERGENCY TREATMENT AND MANAGEMENT

Emergency treatment should be planned according to the patient's hemodynamic status and presenting clinical findings. The fundamental management approach is based on maintaining ventricular filling, an appropriate heart rate, and systemic perfusion. Reduced preload, tachycardia, and increased contractility may exacerbate left ventricular outflow tract obstruction (1,2).

Cardiac monitoring may be performed in hemodynamically stable patients. Correction of conditions that affect hemodynamic balance, such as fever, pain, fluid loss, and tachycardia, may be beneficial. Patients with a history of exertional syncope or significant palpitations should be evaluated by pediatric cardiology (1,2).

In patients with dehydration or hypovolemia, fluid therapy should be administered in a controlled manner. However, excessive fluid administration should be avoided in the presence of heart failure or pulmonary congestion. Medications that reduce systemic vascular resistance should be used cautiously because they may exacerbate obstruction and hypotension (1,2).

Beta-blockers may reduce heart rate and myocardial oxygen demand. They may also contribute to prolonging diastolic filling time. During the acute period, medication selection should take the patient's blood pressure and circulatory status into consideration (1,2).

Pediatric advanced life support protocols should be followed in patients with tachyarrhythmias causing hemodynamic instability. Synchronized cardioversion may be considered for unstable tachycardia with a pulse. In cases of pulseless ventricular tachycardia or ventricular fibrillation, cardiopulmonary resuscitation and defibrillation should be performed without delay (6,8).

Hospital admission and further cardiological evaluation may be considered for patients with exertional syncope, ventricular arrhythmia, heart failure, or a history of cardiac arrest. The need for an implantable cardioverter-defibrillator should be assessed individually in patients at high risk of sudden cardiac death (1,7).

CONCLUSION

Idiopathic hypertrophic cardiomyopathy may present with a wide spectrum of clinical manifestations in children, ranging from an asymptomatic course to serious arrhythmias. Particular attention should be paid to exertional syncope, palpitations, chest pain, and a family history of sudden death at a young age.

Early clinical assessment, electrocardiography, and echocardiography in appropriately selected patients are important in the pediatric emergency department. Treatment should be planned according to the patient's hemodynamic status. Maintaining ventricular filling and controlling tachycardia may help prevent the worsening of left ventricular outflow tract obstruction.

In patients initially classified as having idiopathic disease, possible genetic, metabolic, and syndromic causes should be reconsidered. Long-term follow-up should be continued by pediatric cardiology. Family screening and an individualized assessment of sudden cardiac death risk should be incorporated into the follow-up plan.

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M4402-Tam Metin

PEDIATRIC BURNS IN THE PEDIATRIC EMERGENCY DEPARTMENT: DEMOGRAPHIC CHARACTERISTICS AND SEASONAL VARIABILITY

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ABSTRACT

Objective: Pediatric burns are common and largely preventable injuries, particularly among young children. This study aimed to determine the demographic and clinical characteristics of pediatric patients presenting to the pediatric emergency department with burn injuries and to evaluate the monthly and seasonal distribution of these presentations.

Methods: The data of patients who presented to the Pediatric Emergency Department of Malatya Training and Research Hospital between January 1 and December 31, 2024, and were registered with the ICD-10 diagnostic code T31 were retrospectively reviewed. Patients with incomplete data were excluded, and a total of 657 patients were included in the study.

Results: The median age of the patients was 3 years (IQR: 1-10), and 365 (55.6%) were male. Children aged 0-5 years accounted for 63% of all cases. Mild burns were observed in 98% of the patients, while 2% required hospitalization. The highest number of presentations occurred in November (12.5%), whereas the lowest occurred in September (5.6%). Presentations were most frequent during summer (30.1%). Significant differences were observed in the distribution of presentations across both months ($\chi^2 = 40.735$; $p < 0.001$) and seasons ($\chi^2 = 19.706$; $p < 0.001$).

Conclusion: Pediatric burns were found to occur predominantly among preschool-aged children and to exhibit a temporal distribution pattern. Strengthening preventive measures targeting high-risk age groups and periods is important for increasing parental awareness regarding burn prevention.

Keywords: Pediatric burns; Pediatric emergency department; Epidemiology; Seasonal distribution

INTRODUCTION

Burn injuries are an important cause of mortality and morbidity in childhood and are preventable injuries that can lead to long-term physical, psychological, and socioeconomic consequences. Pediatric burns remain a major global public health concern and impose a substantial burden of disease, particularly in low- and middle-income countries. A large-scale study evaluating data from the World Health Organization Global Burn Registry reported that children accounted for 42% of all burn cases, 60% of pediatric cases were male, and children aged 1-5 years constituted 62% of all pediatric cases [1].

Age-related motor development, a limited ability to recognize environmental hazards, and exposure to household risks increase susceptibility to burn injuries in children, particularly among younger age groups. Recent multicenter data have also shown that male sex and the 1–2-year age group are predominant among pediatric burn cases, with scalds caused by hot liquids

representing the leading mechanism of burn injury [2]. Similarly, a systematic review and meta-analysis evaluating pediatric emergency department presentations reported that most cases involved male and younger children, while the hospitalization rate remained approximately 2.5% [3].

The epidemiological characteristics of pediatric burns may vary according to geographical, socioeconomic, and environmental factors and may also exhibit seasonal variations [4]. Therefore, establishing regional epidemiological data and identifying high-risk age groups and periods are important for the development of effective preventive health strategies.

This study aimed to determine the demographic and clinical characteristics of pediatric burn patients presenting to a pediatric emergency department over a one-year period and to evaluate the monthly and seasonal distribution of these presentations.

MATERIALS AND METHODS

Participant Selection

In this study, the data of patients who presented to the Pediatric Emergency Department of Malatya Training and Research Hospital between January 1 and December 31, 2024, were retrospectively reviewed. A total of 700 patients registered in the hospital information system with the ICD-10 diagnostic code T31 (burns classified according to the extent of body surface involvement) were identified. The discharge summaries available in the hospital information system were reviewed in detail. Forty-three patients with incomplete data were excluded from the study. The final study population consisted of 657 patients who met the eligibility criteria.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA). The normality of data distribution was assessed using the Kolmogorov–Smirnov test. Descriptive statistics were presented as mean, median, standard deviation, percentage, interquartile range (IQR; 25th-75th percentiles), and frequency, as appropriate. The chi-square (χ^2) test was used to assess associations between categorical variables. A p value < 0.05 was considered statistically significant.

RESULTS

A total of 657 pediatric patients with burn injuries were included in the study. The median age was 3 years (IQR: 1-10). Of the patients, 365 (55.6%) were male and 292 (44.4%) were female. A total of 300 patients (45.7%) were aged 0-2 years, while children aged 0-5 years accounted for 63% (n = 414) of all presentations. Regarding nationality, 608 patients (92.5%) were Turkish citizens and 49 (7.5%) were foreign nationals.

According to burn severity coding, 644 patients (98.0%) had mild burns (code 1), 6 (0.9%) had moderate burns (code 2), and 7 (1.1%) had severe burns (code 3). A total of 13 patients (2.0%) were hospitalized for further management.

The monthly distribution of presentations differed significantly ($\chi^2 = 40.735$; $p < 0.001$). The highest number of presentations occurred in November (n = 82, 12.5%), whereas the lowest number occurred in September (n = 37, 5.6%).

Regarding seasonal distribution, 143 presentations (21.8%) occurred in winter, 130 (19.8%) in spring, 198 (30.1%) in summer, and 186 (28.3%) in autumn. Pediatric burn presentations were

most frequent during summer, and the distribution of presentations differed significantly across seasons ($\chi^2 = 19.706$; $p < 0.001$).

DISCUSSION

Although pediatric burns are largely preventable, they remain among the most common traumatic injuries encountered during childhood.

In our study, the median age of the 657 patients who presented to the pediatric emergency department with burn injuries was 3 years, and children aged 0-5 years accounted for 63% of all cases. This finding is consistent with the current literature. In young children, limited developmental ability to recognize and avoid hazards, increased mobility, and easy access to potential burn hazards within the home may explain the high frequency of burn-related presentations in this age group.

A study evaluating data from the World Health Organization Global Burn Registry included 8,640 children from 20 countries and reported that 62% of pediatric burn cases occurred in children aged 1-5 years [1]. In another retrospective study, pediatric patients younger than 18 years who were hospitalized with a primary diagnosis of burn were evaluated using data from the Kids' Inpatient Database (KID) between 2003 and 2016. The study examined trends in pediatric burn-related hospitalizations in the United States over time and described the demographic characteristics of patients hospitalized in 2016. Children aged 1-4 years constituted the largest age group among hospitalized pediatric burn patients (49.7%) [5].

In our study, male patients accounted for 55.6% of burn cases, representing a higher proportion than female patients. This distribution is consistent with international data. This finding may be related to differences in physical activity levels and exposure to environmental hazards among boys. The WHO Global Burn Registry study reported that 60% of pediatric burn cases were male [1], while a large systematic review and meta-analysis reported that the proportion of male patients across the included studies ranged from 53% to 83% [3]. Similarly, a multicenter epidemiological study conducted in China reported a clear predominance of male patients among pediatric burn cases [2].

One of the notable findings of our study was the temporal distribution of burn-related presentations. Pediatric burn presentations differed significantly according to both month and season ($p < 0.001$ for both), with the highest proportion of cases occurring in summer (30.1%), followed by autumn (28.3%). November had the highest proportion of monthly presentations (12.5%). In the literature, the seasonal distribution of pediatric burns has been associated with geographical region, climate, daily lifestyle patterns, and changes in children's indoor and outdoor activities. Therefore, different seasonal patterns may be expected across different geographical regions and healthcare centers. Studies evaluating epidemiological changes during the pandemic have also demonstrated that the amount of time children spend at home and changes in their daily routines may influence the epidemiology of pediatric burns [5].

The fact that 98% of our patients had mild burns and only 2% required hospitalization indicates that the majority of burn injuries presenting to the pediatric emergency department were of low clinical severity. Consistent with our findings, a recent systematic review and meta-analysis involving 828.538 pediatric patients reported a hospitalization rate of approximately 2.5% [3].

In contrast, studies conducted in tertiary burn centers have reported larger total body surface areas affected by burns and longer hospital stays [6].

The majority of pediatric burn patients are infants and boys. The percentage of total body surface area affected and the length of hospital stay increase with patient age. Childhood burn injuries are predominantly scald injuries occurring indoors while parents are nearby. In a retrospective study conducted in Türkiye involving 1.442 patients, the majority of whom were infants and boys, most burn injuries occurred in the home environment, and hot-liquid scalds were the most common etiology across all age groups [7].

Our findings demonstrate that pediatric burns are particularly concentrated among preschool-aged children and exhibit marked temporal variability. Given that burn injuries are largely preventable, identifying their epidemiological characteristics and high-risk periods may contribute to the development of regional preventive strategies. Current evidence suggests that structured educational programs targeting parents and caregivers may reduce the incidence of pediatric burn injuries [8].

Preventing pediatric burns requires not only the identification of high-risk age groups but also increasing awareness among parents and caregivers regarding appropriate first-aid practices following a burn injury. A recent study reported that public knowledge regarding burn prevention and first aid may be inadequate and suggested that school-based health education and social and electronic media could be used to disseminate accurate information [9]. Similarly, a systematic review involving caregivers of children with burn injuries found that their overall level of first-aid knowledge was moderate and that higher educational attainment and previous first-aid training were associated with greater knowledge [10]. A study conducted in Ethiopia also identified substantial gaps in caregivers' knowledge and practices regarding burn first aid [11]. Considering the high frequency of burns observed among younger children in our study, these findings suggest that preventive educational interventions targeting parents and caregivers should focus not only on burn prevention but also on improving appropriate first-aid practices following burn injuries.

The main limitations of our study include its single-center, retrospective design and the lack of data regarding burn mechanisms and detailed total body surface area involvement. Nevertheless, this study provides valuable insight into the current regional epidemiological characteristics of pediatric burn cases presenting to the pediatric emergency department.

CONCLUSION

Our study demonstrated that pediatric burns were more common among preschool-aged children and boys, and that burn-related presentations varied significantly across months and seasons. Notably, the vast majority of cases involved mild burns, and the hospitalization rate was low. Given that pediatric burns are largely preventable injuries, strengthening household safety measures, particularly for young children, and increasing parental awareness of burn prevention are essential.

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M4403-Tam Metin

CLINICAL EVALUATION AND THERAPEUTIC APPROACH TO NEONATAL HYPERBILIRUBINEMIA

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Abstract

Introduction

Neonatal jaundice is a clinical finding characterized by the deposition of bilirubin in the skin and mucous membranes. It is highly prevalent during the neonatal period. While most cases follow a self-limiting course, significant elevations in bilirubin concentrations may confer a risk of neurological impairment.

Body / Pathophysiology

Augmented bilirubin synthesis, restricted hepatic conjugation capacity, and amplified enterohepatic circulation in neonates facilitate the pathogenesis of indirect hyperbilirubinemia. The chronologic onset of clinical jaundice, precise bilirubin concentrations, and concomitant risk factors are critical components of the clinical assessment.

The onset of jaundice within the first 24 hours of life necessitates a thorough investigation for underlying pathological causes. Serum bilirubin concentrations must be interpreted in conjunction with the infant's postnatal age, gestational week, and neurotoxicity risk factors. Visual estimation is inherently inadequate as a sole modality for quantifying bilirubin levels.

Phototherapy is the primary therapeutic modality utilized for indirect hyperbilirubinemia that exceeds established treatment thresholds. Bilirubin levels approaching the threshold for exchange transfusion, or the development of clinical findings suggestive of acute bilirubin encephalopathy, necessitate urgent evaluation.

Conclusion

The objective of this presentation is to elucidate the pathophysiological mechanisms, clinical assessment protocols, and contemporary therapeutic strategies regarding neonatal hyperbilirubinemia.

Keywords: Neonatal jaundice, hyperbilirubinemia, phototherapy, bilirubin encephalopathy, kernicterus.

INTRODUCTION

Neonatal jaundice is defined by the yellowish discoloration of the skin and sclerae secondary to elevated serum bilirubin concentrations. It is highly prevalent during the first few days of life. Although often related to physiological processes, it may also manifest as a clinical sign of underlying pathological conditions. The clinical significance of jaundice varies based on its chronological onset, precise bilirubin levels, and concomitant risk factors (1,2).

Physiological features unique to the neonatal period can predispose to the development of hyperbilirubinemia. Prematurity, hemolysis, suboptimal feeding, and infection may be

correlated with elevated bilirubin concentrations. Consequently, the clinical characteristics of the neonate must be evaluated comprehensively (1,3).

Significant elevations in indirect bilirubin concentrations can heighten the risk of neurotoxicity. Acute bilirubin encephalopathy may develop in certain cases. The risk of permanent neurological deficit, however, may be associated with the clinical status and the duration of bilirubin exposure (1,4).

Visual estimation may not provide a reliable reflection of bilirubin concentrations. It is recommended that clinical examination be corroborated by transcutaneous bilirubinometry or total serum bilirubin quantification. The measurement outcomes must be interpreted in the context of postnatal age, gestational week, and the presence of neurotoxicity risk factors (1,2).

BILIRUBIN METABOLISM AND THE PATHOGENESIS OF HYPERBILIRUBINEMIA

Bilirubin is an end-product generated during the catabolism of heme-containing proteins. Heme is a porphyrin-based moiety residing within the hemoglobin structure, characterized by a central iron atom. The principal source of bilirubin is the hemoglobin derived from senescent erythrocytes. Heme undergoes initial enzymatic conversion to biliverdin, followed by subsequent reduction to indirect bilirubin (3,5).

Indirect (unconjugated) bilirubin is inherently water-insoluble; consequently, it is transported in the systemic circulation tightly bound to albumin. Upon reaching the liver, bilirubin is taken up by hepatocytes. The enzyme uridine diphosphate-glucuronosyltransferase 1A1 mediates the conjugation of bilirubin. This metabolic pathway culminates in the formation of water-soluble conjugated bilirubin (3,5).

Conjugated bilirubin is excreted into the intestinal tract via the biliary system. A fraction of the intestinal bilirubin can undergo deconjugation back into indirect bilirubin, mediated by the enzyme beta-glucuronidase. The subsequent intestinal reabsorption of this indirect bilirubin is termed enterohepatic circulation (3,5).

Neonates possess a greater erythrocyte mass relative to adults, coupled with a diminished erythrocyte lifespan. These physiological traits can augment bilirubin production. Furthermore, hepatic uptake and conjugating capacity for bilirubin may be restricted during the postnatal period. Amplified enterohepatic circulation can additionally contribute to the pathogenesis of indirect hyperbilirubinemia (3,5).

CLASSIFICATION OF NEONATAL JAUNDICE

Neonatal jaundice can be classified according to its chronologic onset, duration, and the specific bilirubin fraction. Clinical evaluation necessitates the differentiation among physiological jaundice, pathological jaundice, prolonged jaundice, and conjugated hyperbilirubinemia. This framework can facilitate the investigation of the underlying etiology (1,2).

Physiological Jaundice

Physiological jaundice generally manifests after the initial 24 hours of life. In term infants, serum bilirubin concentrations predominantly peak between the third and fifth days postpartum. Conversely, in preterm neonates, this escalation may exhibit a delayed onset and a more prolonged clinical course (2,3).

In physiological jaundice, the general clinical status of the neonate remains predominantly unremarkable. Bilirubin concentrations must be interpreted in consideration of the gestational week and postnatal age. Furthermore, the probabilities of hemolysis, infection, and underlying hepatobiliary pathology should be rigorously evaluated (1,3).

Pathological Jaundice

Jaundice presenting within the first 24 hours of life warrants thorough evaluation for pathological etiologies. A rapid escalation in bilirubin concentrations or the attainment of established treatment thresholds may necessitate comprehensive investigation. Impairment in the neonate's general clinical status may additionally be indicative of an underlying pathology (1,2).

Anemia, pallor, hepatosplenomegaly, and feeding difficulties may correlate with underlying hemolysis or infection. Pronounced weight loss, conversely, may be indicative of suboptimal nutritional intake. Dark urine and acholic stools hold significant clinical relevance in the context of conjugated hyperbilirubinemia (2,6).

Prolonged Jaundice

The persistence of jaundice beyond 14 days of life in term infants, and exceeding 21 days in preterm neonates, is defined as prolonged jaundice. In such clinical scenarios, the simultaneous quantification of both total and direct serum bilirubin concentrations is highly recommended (2,6).

Prolonged indirect hyperbilirubinemia may be correlated with breast milk consumption. Nevertheless, hypothyroidism, hemolysis, infections, and metabolic disorders must also be systematically evaluated. Attributing jaundice exclusively to breast milk may result in the failure to identify other significant etiologies (2,6).

Conjugated Hyperbilirubinemia

An elevation in direct bilirubin is not regarded as a characteristic of physiological jaundice. This clinical finding may correlate with underlying hepatobiliary, infectious, or metabolic disorders. The early detection of biliary atresia holds significant importance for subsequent therapeutic management (6).

Acholic stools, dark urine, and hepatomegaly may indicate an underlying cholestasis. In the presence of these clinical signs, the concurrent evaluation of total and direct serum bilirubin concentrations is imperative. Where clinically appropriate, consultation with a pediatric gastroenterologist or neonatologist should be sought (2,6).

ETIOLOGY, RISK FACTORS, AND CLINICAL ASSESSMENT

Neonatal hyperbilirubinemia may be attributed to augmented bilirubin production or impaired hepatic clearance. In certain clinical scenarios, multiple pathogenic mechanisms may operate concurrently (1,3).

Rh or ABO incompatibility may be associated with elevated bilirubin levels secondary to hemolysis. Glucose-6-phosphate dehydrogenase deficiency and hereditary spherocytosis are also implicated in hemolytic etiologies. Polycythemia, cephalohematoma, and extensive ecchymosis can additionally augment bilirubin synthesis (1,3).

Prematurity, sepsis, clinical instability, and hypoalbuminemia may elevate the risk of neurotoxicity. Furthermore, suboptimal enteral feeding can enhance the intestinal reabsorption of bilirubin. This pathophysiological state can contribute to a more pronounced clinical course of hyperbilirubinemia (1,2).

During clinical assessment, the chronologic onset and the progression of jaundice must be meticulously investigated. Gestational age, birth weight, nutritional status, and family history should be documented. The physical examination must encompass the evaluation of sucking vigor, overall activity, muscle tone, hydration status, and the presence of hepatosplenomegaly (1,2).

Dark urine, acholic stools, and hepatomegaly may indicate a potential conjugated hyperbilirubinemia. Visual estimation may fail to reliably reflect bilirubin concentrations. Consequently, clinical assessment must be corroborated by transcutaneous or total serum bilirubin quantification (2,6).

DIAGNOSTIC AND THERAPEUTIC APPROACH

Transcutaneous bilirubinometry may be utilized for screening purposes. Values approaching or exceeding the therapeutic threshold must be corroborated by total serum bilirubin quantification. The outcomes should be interpreted in conjunction with the postnatal age in hours, gestational week, and the presence of neurotoxicity risk factors (1,2).

When hemolysis is suspected, a complete blood count, reticulocyte count, and peripheral blood smear may be evaluated. Maternal and neonatal blood typing, alongside a direct antiglobulin test, may additionally be ordered. In instances of prolonged jaundice, the concurrent quantification of total and direct bilirubin concentrations is imperative (1,2,6).

In the presence of inadequate nutritional intake, breastfeeding technique and feeding frequency must be systematically evaluated. Urinary output and weight loss require close monitoring. The promotion of effective breastfeeding can facilitate bilirubin clearance. The decision to initiate supplementary feeding must be predicated upon the neonate's clinical status (1,2).

Phototherapy may be initiated when the total serum bilirubin concentration reaches the respective therapeutic threshold. The maximal possible surface area of the neonate's skin should be exposed to irradiance. Ocular protection must be ensured, and thermoregulation should be continuously monitored. Serum bilirubin levels must be quantified at intervals dictated by the clinical status (1,7).

Serum bilirubin concentrations approaching the exchange transfusion threshold may necessitate advanced therapeutic interventions. Bilirubin elevation may persist despite the administration of intensive phototherapy. Clinical manifestations of acute bilirubin encephalopathy may also emerge. Under such circumstances, intensive phototherapy must be maintained, and preparations for an exchange transfusion should be proactively initiated (1,2).

BILIRUBIN ENCEPHALOPATHY

Unbound indirect bilirubin can traverse the blood-brain barrier and accumulate within cerebral tissue. This deposition may be associated with neurotoxic sequelae. The neurological implications of bilirubin can be modulated by the specific clinical characteristics of the neonate, in addition to serum concentrations (1,8).

During the early stages of acute bilirubin encephalopathy, feeding difficulties, lethargy, and hypotonia may be observed. A high-pitched cry may also develop. As the clinical syndrome advances, irritability, hypertonia, retrocollis, and opisthotonos may manifest (9,10).

In the advanced phase, apnea, seizures, and altered levels of consciousness may manifest. The presence of intermediate or advanced clinical signs necessitates emergent intervention. Intensive phototherapy must be initiated, and emergent exchange transfusion should be systematically evaluated (1,9).

Kernicterus defines the permanent neurological sequelae induced by bilirubin toxicity. Auditory neuropathy, choreoathetoid movement disorders, alterations in muscle tone, and upward gaze paresis may be observed. The severity of these clinical manifestations may correlate with the magnitude and duration of bilirubin exposure (9,10).

CONCLUSION

Neonatal jaundice may be associated with physiological mechanisms in the majority of cases. Nevertheless, severe hyperbilirubinemia can precipitate a risk of neurological impairment in certain neonates. Consequently, the chronologic onset, the pattern of progression, and concomitant risk factors of jaundice must be systematically evaluated in conjunction.

Bilirubin concentrations must be interpreted in consideration of the neonate's postnatal age, gestational week, and neurotoxicity risk factors. Supplementing clinical assessment with appropriate bilirubin measurements can facilitate the early identification of high-risk neonates.

The therapeutic approach must be tailored according to the bilirubin concentration and the neonate's clinical characteristics. The timely initiation of phototherapy can facilitate the reduction of serum bilirubin levels. In the presence of severe hyperbilirubinemia or clinical manifestations of acute bilirubin encephalopathy, exchange transfusion should be systematically considered.

Ultimately, systematic clinical assessment, meticulous monitoring, and prompt therapeutic intervention hold paramount importance in mitigating the risk of bilirubin-induced permanent neurological sequelae.

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PEDİATRİK KLAVİKULA KIRIKLARINA RETROSPEKTİF İNCELENMESİ

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ABSTRACT

Amaç: Bu çalışmada, pediatrik klavikula kırığı olgularının demografik ve klinik özelliklerinin, başvurdukları birimlerin ve klinik yönetim süreçlerinin değerlendirilmesi amaçlandı.

Gereç ve Yöntem: Bu tek merkezli, retrospektif ve gözlemsel çalışmaya, üçüncü basamak bir hastanede Ocak 2021–Temmuz 2026 tarihleri arasında klavikula kırığı tanısı alan 0–18 yaş aralığındaki 59 hasta dahil edildi. Hastaların yaş, cinsiyet, başvuru birimi, konsültasyon, hastaneye yatış, laboratuvar incelemesi, cerrahi girişim ve hastane içi mortalite verileri incelendi. İstatistiksel anlamlılık düzeyi $p<0,05$ olarak kabul edildi.

Bulgular: Hastaların yaş ortancası 3 yıl (çeyrekler arası aralık: 1–8; min–maks: 0–18) olup 31'i (%52,5) kadın

cinsiyetti. Olguların 50'si (%84,7) acil serviste, 9'u (%15,3) yenidoğan yoğun bakım ünitesinde değerlendirildi. Acil servisteki olgular travmatik klavikula kırıklarından oluşurken yenidoğan yoğun bakım ünitesindeki kırıkların tamamı doğum travmasıyla ilişkiliydi. Hastaların 43'ü (%72,9) için konsültasyon istendi, 6'sı (%10,2) hastaneye yatırıldı, 4'üne (%6,8) laboratuvar incelemesi yapıldı ve birine (%1,7) cerrahi girişim uygulandı. Konsültasyon durumuna göre yaş, cinsiyet, başvuru birimi ve hastaneye yatış bakımından anlamlı farklılık saptanırken (sırasıyla $p=0,015$, $p=0,048$, $p<0,001$ ve $p=0,023$), laboratuvar incelemesi bakımından anlamlı farklılık bulunmadı ($p=0,922$). Hastane içi mortalite gözlenmedi.

Sonuç: Pediatrik klavikula kırıkları çoğunlukla acil servise başvuran ve cerrahi girişim gerektirmeden yönetilebilen yaralanmalardır. Yaş ve başvuru biriminin konsültasyon gerekliliği ve klinik karar vermede etkiili olabileceği görülmüştür. Acil serviste travma mekanizmasının ve eşlik eden yaralanmaların belirlenmesi amacıyla hasta ve ebeveynlerinden ayrıntılı anamnez alınması ve sistematik fizik muayene yapılması önem taşımaktadır.

Anahtar kelimeler: Acil servis, klavikula kırığı, pediatrik hasta

GİRİŞ:

Çocuklarda klavikula kırıkları yaygındır ve yıllık görülme sıklığı 100.000'de 29-100 olarak bildirilmiştir [1]. Pediatrik klavikula kırıkları küçük çocuklarda çoğunlukla ev içi veya oyun sırasında meydana gelen düşük enerjili düşmelerden, adölesanlarda ise bisiklet kazaları ve temas sporlarından kaynaklanmaktadır. En sık yaralanma mekanizması lateral omuz üzerine düşme veya omuza alınan doğrudan darbedir. Yenidoğan döneminde ise klavikula kırıkları çoğunlukla doğum travmasıyla ilişkilidir. En yaygın yaralanma nedenleri bisiklet (%15,1), futbol (%10,7), yatak/yatak çerçevesi (%6,8), merdiven (%5,4) ve zemin (%4,0) olmuştur [2]. Klavikula kırıkları erkeklerde daha sık görülmekte ve insidansı özellikle adölesan dönemde artmaktadır. Erkeklerde en yüksek insidans 10–19 yaşta, kızlarda ise 0–9 yaşta bildirilmiştir

[2]. Pediatrik ve adölesan klavikula kırıklarında travma mekanizması ve önceki ipsilateral kırık öyküsü sorgulanmalı; cilt bütünlüğü ve nörovasküler durum dikkatle değerlendirilmelidir. Kırık fragmanının ciltte belirgin gerilme, beyazlaşma ve hipoperfüzyona yol açtığı skin tenting, yumuşak doku nekrozu ve açık kırığa ilerleme riski nedeniyle cerrahi değerlendirme gerektiren önemli bir muayene bulgusudur. Nörovasküler muayenede brakiyal pleksus fonksiyonları ile subklavyen-aksiller dolaşım değerlendirilmelidir. Açık kırık, nekroz tehdidi oluşturan skin tenting ve ciddi nörovasküler bozukluk cerrahi tedavinin başlıca klinik endikasyonlarıdır. Adölesanlarda kaynamama nadir olmakla birlikte, önceki ipsilateral klavikula kırığı öyküsü potansiyel risk faktörü olarak klinik ve radyolojik takipte dikkate alınmalıdır [3,4]. Pediatrik klavikula kırıklarında anatomik yakınlığı nedeniyle en sık etkilenen arter subklavyen arterdir. Pediatrik klavikula kırıkları ile ilişkili nörolojik komplikasyonlar nadir olmakla birlikte, brakiyal pleksustur sık yaralanan sinir olarak öne çıkmaktadır. Pediatrik nörovasküler komplikasyonlar çok nadir olduğu için literatür büyük ölçüde olgu sunumlarına dayanmaktadır [5-8]. Pediatrik klavikula kırıklarının tanısında ilk basamak görüntüleme yöntemi direkt radyografidir. Bununla birlikte, radyografide saptanamayan bazı pediatrik klavikula kırıklarının ultrasonografi ile gösterilebildiğini bildiren olgular bulunmaktadır [3,9]. Pediatrik ve adölesan klavikula kırıklarında konservatif tedavi sonrasında semptomatik malunion, nonunion ve refraktür düşük oranlarda görülmektedir. Cerrahi tedavide ise implant belirginliği ve yumuşak doku irritasyonu en sık bildirilen komplikasyonlar olup implant çıkarılması amacıyla ikincil cerrahi gereksinimine yol açabilmektedir. Güncel prospektif veriler, nonunion ve semptomatik malunionun oldukça nadir olduğunu ve cerrahi ile konservatif tedavi arasında uzun dönem fonksiyonel sonuçlar bakımından belirgin fark bulunmadığını göstermektedir [10-13]. Klavikula kırıklarında hekimin deneyim düzeyine göre tanı doğruluğunu ve tanının atlanma oranını gösteren yeterli çalışma bulunmamaktadır. Genel acil servis çalışmalarında kırıkların yaklaşık %1,1–3,7'sinin başlangıç değerlendirmesinde atlanabildiği bildirilmiştir. Bu nedenle klinik muayenenin uygun radyografik görüntüleme, sistematik görüntü değerlendirmesi ve gerektiğinde radyoloji görüşüyle desteklenmesi önemlidir [14-16].

İzole pediatrik klavikula kırıklarında mortaliteyi değerlendiren yeterli epidemiyolojik veri bulunmamaktadır ve ölüm oldukça beklenmedik bir sonuçtur. Multitravmalı hastalardaki mortalite ise klavikula kırığının kendisinden çok eşlik eden yaşamsal organ yaralanmaları ve genel travma şiddetiyle ilişkilidir. Pediatrik izole ve multitravmatik klavikula kırıklarında mortaliteyi doğrudan karşılaştıran çalışmaların bulunmaması nedeniyle kesin bir oran vermek mümkün değildir. Erişkinlerin ağırlıkta olduğu bir travma kayıt çalışmasında, klavikula kırıklarının multitravma hastalarında görülen tüm kırıkların %10,4'ünü oluşturduğu bildirilmiştir. Çalışmamız, pediatrik klavikula kırıklarında eşlik eden yaralanmalar ve mortalite sonuçlarını birlikte değerlendirmesi bakımından literatürdeki bu sınırlı veri alanına katkı sağlamaktadır [17].

MATERYAL-METOD:

Çalışmamız 3.basamak bir acil serviste ocak 2021 temmuz 2026 arasındaki pediatrik hastalar çalışmaya dahil edilmiştir. Çalışmaya 59 hasta dahil edilmiştir.

Bu çalışma, üçüncü basamak bir hastanenin acil servisinde gerçekleştirilen retrospektif, gözlemsel bir araştırma olarak planlandı.

Çalışmaya, 2021-2026 yılları arasında klavikula kırığı tanısı alan pediatrik hastalar dahil edildi.

Çalışma Popülasyonu ve Kriterler:

Çalışmaya 59 pediatrik klavikula kırığı dahil edilmiş olup çalışmanın tek dışlama kriteri erişkin yaş grubudur.

Çalışmada hastaların yaş cinsiyet değerlendirildiği birim konsültasyon yatış cerahi mortalite ve kan tetkikleri istenip istenmediği gibi demografik veriler ve klinik yaklaşım kaydedilmiştir.

- Hastalara ait veriler Hastane Bilgi Yönetim Sistemi Üzerinden retrospektif olarak elde edildi.
- Çalışmada hastaların yaş, cinsiyet, değerlendirildiği birim, konsültasyon, yatış, cerahi, mortalite ve kan tetkikleri istenip istenmediği gibi demografik veriler ve klinik yaklaşım kaydedilmiştir.

İstatistiksel Analiz

- İstatistiksel analizler IBM SPSS Statistics yazılımı kullanılarak gerçekleştirildi.
- Sürekli değişkenlerin dağılımı Kolmogorov–Smirnov testi ile değerlendirildi.
- Gruplar arası karşılaştırmalarda; Ki-kare testi, Man Whitney U testi,Spearman korelasyon analizi ile değerlendirildi.

İstatistiksel anlamlılık düzeyi $p < 0.05$ olarak kabul edildi.

Bulgular

Tablo 1. Baseline demographic and clinical characteristics of the study population (n = 59)

Variable	Value
Age, years	**3 (1–8)**
Range	0–18
Sex, n (%)	
Male	28 (47.5)
Female	31 (52.5)
Department, n (%)	
Emergency Department	50 (84.7)
Neonatal Intensive Care Unit	9 (15.3)
Consultation, n (%)	
Yes	43 (72.9)
No	16 (27.1)
Hospitalization, n (%)	
Yes	6 (10.2)
No	53 (89.8)
Laboratory testing, n (%)	
Yes	4 (6.8)
No	55 (93.2)
Operation, n (%)	
Yes	1 (1.7)
No	58 (98.3)
Mortality, n (%)	
Yes	0 (0.0)
No	59 (100.0)

Çalışmaya toplam 59 hasta dahil edildi. Hastaların yaş ortancası 3 yıl (IQR: 1–8; min–maks: 0–18) olup, 31'i (%52,5) kadın ve 28'i (%47,5) erkekti. Olguların 50'si (%84,7) acil serviste, 9'u (%15,3) ise yenidoğan yoğun bakım ünitesinde tanı aldı. Acil serviste tanı alan hastalarda travmatik klavikula kırıkları saptanırken, yenidoğan yoğun bakım ünitesindeki tüm olgular doğum travmasına bağlı klavikula kırığı tanısı almıştı. Hastaların 43'ü (%72,9) için ilgili branşlardan konsültasyon istendi. Altı hasta (%10,2) hastaneye yatırılırken, 53 hasta (%89,8) ayaktan izlem sonrası taburcu edildi. Laboratuvar tetkiki yalnızca 4 hastada (%6,8) gerçekleştirildi ve bir hastaya (%1,7) cerrahi girişim uygulandı. Çalışma süresince hiçbir hastada hastane içi mortalite gözlenmedi.

Tablo 2. Comparison of patient characteristics according to consultation status using the Mann–Whitney U test

Variable	Mean rank (Consultation Yes, n = 43)	Mean rank (Consultation No, n = 16)	Mann–Whitney U	Z	*p* value
Sex	32.34	23.72	243.5	-1.981	**0.048**
Age	33.30	21.13	202.0	-2.437	**0.015**
Department	26.87	38.41	209.5	-3.682	**<0.001**
Hospitalization	31.63	25.63	274.0	-2.279	**0.023**
Laboratory testing	29.94	30.16	341.5	-0.098	0.922

Konsültasyon durumuna göre yapılan Mann–Whitney U analizinde cinsiyet, yaş, başvuru birimi ve hastaneye yatış durumu açısından gruplar arasında istatistiksel olarak anlamlı farklılık saptandı (sırasıyla p=0,048, p=0,015, p<0,001 ve p=0,023). Konsültasyon istenen hastaların yaş sıralama ortalaması daha yüksek olup, bu hastaların daha ileri yaşta olduğu görüldü (33,30'a karşı 21,13). Ayrıca başvuru birimi açısından da anlamlı farklılık bulundu; konsültasyon istenmeyen grupta başvuru birimi sıralama ortalaması daha yüksekti (38,41'e karşı 26,87). Buna karşın laboratuvar tetkiki uygulanması bakımından konsültasyon istenen ve istenmeyen hastalar arasında anlamlı fark saptanmadı (p=0,922).

Tablo 3:Değişkenlerin Korelasyon Analizi

Variables	1	2	3	4	5	6	7
1. Sex	1						
2. Age	0.237	1					
3. Department	-0.069	-0.589**	1				
4. Consultation	-0.260*	-0.320*	0.483**	1			
5. Hospitalization	0.017	0.303*	-0.637**	-0.299*	1		
6. Operation	-0.125	-0.202	0.056	0.080	0.390**	1	
7. Laboratory testing	-0.121	-0.233	-0.073	0.013	0.355**	0.487**	1

Spearman korelasyon analizinde yaş ile başvuru birimi arasında orta düzeyde negatif korelasyon saptandı ($\rho = -0.589$, $p < 0.001$). Bu bulgu, yaş arttıkça hastaların daha çok acil servisten başvurduğunu, daha genç hastaların ise yenidoğan yoğun bakım ünitesinden konsülte edildiğini göstermektedir.

Yaş ile konsültasyon gereksinimi arasında zayıf düzeyde negatif korelasyon bulundu (ρ = -0.320, p = 0.013). Ayrıca yaş ile hastaneye yatış arasında zayıf düzeyde pozitif korelasyon saptandı (ρ = 0.303, p = 0.020), ileri yaştaki hastalarda yatış gereksiniminin daha fazla olduğunu düşündürmektedir.

Başvuru birimi ile konsültasyon gereksinimi arasında orta düzeyde pozitif korelasyon mevcuttu (ρ = 0.483, p < 0.001). Bununla birlikte başvuru birimi ile hastaneye yatış arasında orta-güçlü düzeyde negatif korelasyon saptandı (ρ = -0.637, p < 0.001). Bu bulgular, acil servisten başvuran hastalarda hastaneye yatışın daha sık olduğunu göstermektedir.

Konsültasyon gereksinimi ile hastaneye yatış arasında zayıf düzeyde negatif korelasyon bulundu (ρ = -0.299, p = 0.021). Hastaneye yatış ile operasyon uygulanması (ρ = 0.390, p = 0.002) ve laboratuvar tetkiki yapılması (ρ = 0.355, p = 0.006) arasında orta düzeyde pozitif korelasyon saptandı. Ayrıca operasyon uygulanması ile laboratuvar tetkiki yapılması arasında da orta düzeyde pozitif korelasyon mevcuttu (ρ = 0.487, p < 0.001).

Cinsiyet ile yalnızca konsültasyon gereksinimi arasında zayıf düzeyde negatif korelasyon izlendi (ρ = -0.260, p = 0.047). Çalışma süresince mortalite gözlenmediğinden mortalite değişkeni korelasyon analizine dahil edilemedi.

Tartışma

Bu çalışmanın başlıca bulguları, pediatrik klavikula kırıklarının büyük bölümünün acil serviste değerlendirildiğini, olguların çoğunda ilgili branş konsültasyonu istendiğini, buna karşın hastaneye yatış, laboratuvar incelemesi ve cerrahi girişim gereksiniminin düşük olduğunu göstermiştir. Ayrıca yaş, cinsiyet, başvuru birimi ve hastaneye yatış durumu ile konsültasyon istemi arasında istatistiksel ilişki saptanmıştır. Çalışma süresince hastane içi mortalite görülmemiştir. Bu bulgular, pediatrik klavikula kırıklarının çoğunlukla konservatif ve ayaktan yönetilebildiğini desteklemekle birlikte, farklı yaş gruplarının ve başvuru özelliklerinin klinik yönetim süreçlerini etkileyebileceğini düşündürmektedir.

Çalışmamızda yaş ortancası 3 yıl olarak bulunmuştur. Pediatrik klavikula kırıklarının yaş dağılımı; çalışmaya yenidoğanların dahil edilmesi, merkezlerin hasta profili ve incelenen travma mekanizmalarına göre önemli ölçüde değişebilmektedir. Nitekim yalnızca adölesan klavikula kırıklarının değerlendirildiği FACTS kohortunda ortalama yaş 14,1 yıl olarak bildirilmiştir [18]. Çalışmamızdaki daha düşük yaş ortancasının, olguların %15,3'ünü oluşturan ve tamamında kırığın doğum travmasıyla ilişkili olduğu yenidoğan grubundan etkilenmiş olması muhtemeldir. Yaş ile başvuru birimi arasındaki belirgin ilişkinin de büyük ölçüde yenidoğanların yenidoğan yoğun bakım ünitesinde, daha büyük çocukların ise acil serviste değerlendirilmesinden kaynaklandığı düşünülmektedir. Bu nedenle söz konusu ilişki bağımsız bir klinik belirleyiciden çok, çalışma popülasyonunun iki farklı etiyolojik gruptan oluşmasını yansıtıyor olabilir.

Çalışmamızda olguların %52,5'i kız, %47,5'i erkekti. Buna karşılık adölesan klavikula kırıklarını inceleyen FACTS kohortunda hastaların %79'unun erkek olduğu bildirilmiştir [18]. Adölesan erkeklerde temas sporları ve bisiklet gibi atletik etkinliklerle ilişkili yaralanmaların daha sık görülmesi, literatürde bildirilen erkek predominansını açıklayabilecek etkenlerden biridir [2,19]. Çalışmamızda belirgin bir erkek predominansı görülmemesi; yenidoğan olgularının çalışmaya dahil edilmesi, örneklem büyüklüğünün sınırlı olması ve travma

mekanizmalarının yaş ve cinsiyete göre ayrıntılı olarak sınıflandırılmamasıyla ilişkili olabilir. Bu nedenle cinsiyet dağılımındaki farklılık, toplum düzeyindeki epidemiyolojik yapıdan çok merkezimizin başvuru profilini yansıtıyor olabilir.

Hastaların %72,9'u için konsültasyon istenmesine karşın yalnızca %10,2'sinin hastaneye yatırılmış olması, konsültasyon isteminin doğrudan yatış veya cerrahi tedavi gereksinimini göstermediğini düşündürmektedir. Konsültasyon kararı; hastanın yaşı, başvuru birimi, travmanın şiddeti, kırığın radyografik özellikleri, cilt bütünlüğü ve nörovasküler muayene bulgularının yanı sıra kurumun klinik işleyişinden de etkilenebilir [3,5]. Bununla birlikte çalışmamızda kırığın lokalizasyonu, deplasman ve kısalık miktarı, parçalanma durumu, açık kırık, skin tenting ve nörovasküler yaralanma gibi konsültasyon kararını doğrudan etkileyebilecek değişkenlerin bulunmaması, saptanan ilişkilerin mekanizmasını açıklamayı sınırlandırmaktadır.

Çalışmamızda cerrahi girişim oranı %1,7 olarak bulunmuştur. Bu düşük oran, pediatrik klavikula kırıklarının büyük bölümünün konservatif tedaviyle başarılı biçimde yönetilebildiğini bildiren literatürle uyumludur [3,11,20]. Prospektif FACTS çalışmasında tamamen deplase adölesan orta şaft kırıklarında cerrahi tedavinin iki yıllık fonksiyonel sonuçlar açısından belirgin üstünlük sağlamadığı; cerrahi grupta beklenmeyen ek cerrahi ve klinik olarak anlamlı komplikasyon oranlarının daha yüksek olduğu gösterilmiştir [12]. Bununla birlikte çalışmamızda kırık lokalizasyonu, deplasman, kısalık ve parçalanma gibi cerrahi kararı belirleyen radyolojik özellikler kaydedilmediğinden, cerrahi oranının diğer serilerle doğrudan karşılaştırılması mümkün değildir.

Çalışma süresince hastane içi mortalite gözlenmemiştir. İzole pediatrik klavikula kırığına bağlı ölüm son derece beklenmedik bir sonuçtur; multitravmalı hastalarda mortalite, klavikula kırığının kendisinden çok genel travma şiddeti ve eşlik eden yaşamsal organ yaralanmalarıyla ilişkilidir [17]. Bununla birlikte örneklem büyüklüğünün sınırlı olması ve eşlik eden yaralanmaların ayrıntılı olarak sınıflandırılmamış olması nedeniyle, mortalite görülmemesi çalışmanın güvenliğe ilişkin kesin bir sonucu olarak değerlendirilmemelidir. Bu bulgu yalnızca incelenen örneklemde hastane içi ölüm meydana gelmediğini göstermektedir.

Bu çalışmanın bazı kısıtlılıkları bulunmaktadır. Öncelikle tek merkezli ve retrospektif tasarım, kayıt eksikliği ve seçilim yanlılığı olasılığını beraberinde getirmektedir. Örneklem büyüklüğünün sınırlı olması, özellikle cerrahi girişim ve hastaneye yatış gibi seyrek sonuçlar için ileri istatistiksel değerlendirmeyi kısıtlamıştır. Yenidoğan doğum travmaları ile daha büyük çocuklardaki travmatik kırıkların aynı popülasyonda değerlendirilmesi yaş, başvuru birimi ve klinik yönetim arasındaki ilişkilerde karıştırıcı etki oluşturmuş olabilir. Ayrıca travma mekanizması, kırığın anatomik lokalizasyonu, deplasman ve kısalık miktarı, eşlik eden yaralanmalar, uygulanan konservatif tedavi yöntemi, takip süresi ve uzun dönem fonksiyonel sonuçlar kaydedilmemiştir. Bu nedenle elde edilen ilişkiler nedensel olarak yorumlanmamalı ve sonuçların farklı merkezlere genellenmesinde dikkatli olunmalıdır.

Çalışmamız, yenidoğan döneminden adölesan yaş grubuna kadar geniş bir pediatrik popülasyonda klavikula kırıklarının başvuru birimi, konsültasyon, laboratuvar kullanımı, yatış, cerrahi girişim ve hastane içi mortalite gibi acil sağlık hizmeti süreçlerini birlikte değerlendirmesi bakımından literatüre gerçek yaşam verisi sunmaktadır.

Sonuç:
Pediatrik klavikula kırıkları, çocukların fiziksel aktivitelerinin arttığı dönemlerde daha sık görülen; çoğunlukla acil servise başvuran, eşlik eden yaralanma ve komplikasyon oranı düşük, konservatif tedaviyle başarılı sonuçlar elde edilen kırıklardır. Acil serviste travma mekanizmasının ve eşlik eden yaralanmaların belirlenmesi amacıyla hasta ve ebeveynlerinden ayrıntılı anamnez alınmasının ve sistematik fizik muayene yapılmasının önemli olduğu düşünülmektedir.

Key words: Acil Servis-Klavikula Kırıkları-Pediatrik Hastalar

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M4405-Tam Metin

ÜÇÜNCÜ BASAMAK BİR HASTANEDE BİR YIL İÇİNDE BAŞVURAN PEDİATRİK YANIK OLGULARININ DEMOGRAFİK, KLİNİK VE MEVSİMSEL İNCELEMESİ

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ÖZET

Amaç: Bu çalışmada, çocuk acil servise 2024 ve 2025 yıllarında başvuran pediatrik yanık olgularının demografik, klinik ve mevsimsel özelliklerinin karşılaştırılması amaçlandı.

Yöntem: Çalışmada Malatya Eğitim ve Araştırma Hastanesi Çocuk Acil Servisine başvuran pediatrik yanık olguları retrospektif olarak değerlendirildi. Toplam 1.160 hasta çalışmaya dahil edildi. Hastaların demografik özellikleri, yanık şiddeti, hastaneye yatış ve mevsimsel dağılımları yıllara göre karşılaştırıldı. Kategorik verilerin analizinde Ki-kare ve Fisher-Freeman-Halton Exact testleri kullanıldı.

Bulgular: Hastaların 657'si (56.6%), 2024; 503'ü (43.4%), 2025 yılında başvurdu. Erkek hasta oranı sırasıyla 55.6% ve 53.1% olup cinsiyet dağılımında anlamlı farklılık saptanmadı ($p=0.402$). Her iki yılda da olguların çoğunluğunu 0-5 yaş grubu oluşturdu. Hafif yanık oranı her iki yılda 98.0%, hastaneye yatış oranı ise 2.0% idi. Yanık şiddeti yıllar arasında farklılık göstermedi ($p=0.512$). Mevsimsel dağılımda anlamlı farklılık saptandı ($p<0.001$). Her iki yılda en fazla başvuru yaz mevsiminde görülürken, sonbahar başvuruları 2024'te 28.3%'ten 2025'te 6.2%'ye geriledi.

Sonuç: Pediatrik yanıkların demografik ve klinik özellikleri iki yılda benzer kalırken mevsimsel dağılım belirgin değişiklik göstermiştir. Bulgular, bölgesel özelliklere uygun mevsime özgü koruyucu stratejilerin geliştirilmesinin önemini göstermektedir.

Anahtar Kelimeler: Pediatrik yanıklar, çocuk acil servis, epidemiyoloji, mevsimsel dağılım.

GİRİŞ

Pediatrik yanıklar, çocukluk çağında önemli morbidite ve uzun dönemli fonksiyonel kayıplara neden olabilen, ancak büyük ölçüde önlenebilir travmatik yaralanmalardır. Yanıkların epidemiyolojik özellikleri; çocukların yaş ve cinsiyet dağılımının yanı sıra çevresel koşullar, yaşam biçimi, sosyoekonomik özellikler ve sağlık hizmetlerine erişim gibi birçok faktörden etkilenmektedir. Küresel hastalık yükü verilerinin değerlendirildiği güncel bir çalışmada, çocuk ve adölesanlarda yanık insidansının 1990-2021 döneminde genel olarak azalma eğilimi gösterdiği; buna karşın yaş, cinsiyet, coğrafi bölge ve sosyoekonomik gelişmişlik düzeyine göre önemli farklılıkların devam ettiği bildirilmiştir [1].

Pediatrik yanıkların epidemiyolojik özellikleri zaman içerisinde değişebilmektedir. Hollanda'daki üç yanık merkezinin 2009-2022 yılları arasındaki verilerini değerlendiren bir kohort çalışmasında, pediatrik yanık başvurularının yıllar içerisinde değişim gösterdiği, buna karşılık hasta ve yanığa ilişkin temel özelliklerin görece stabil kaldığı belirtilmiştir [2]. Benzer

şekilde, Japonya'da ev ortamında meydana gelen pediatrik yanıkların 30 yıllık değişiminin incelendiği bir çalışmada, olgu sayısında belirgin bir değişiklik görülmemesine karşın alev yanıklarının ve yanık yüzey alanının zaman içerisinde azaldığı, haşlanma yanıklarının ise önemini koruduğu gösterilmiştir [3]. Bu bulgular, toplam olgu sayılarındaki değişimin yanı sıra yanıkların demografik ve klinik özelliklerinin zamansal olarak karşılaştırılmasının da önemli olduğunu göstermektedir.

Pediatrik yanıkların zamansal değerlendirilmesinde mevsimsel değişkenlik de dikkate alınması gereken bir faktördür. Güncel epidemiyolojik veriler, yanıkların mevsimsel dağılımının bölgesel özelliklere göre değişebildiğini ve belirli dönemlerde başvuruların yoğunlaşabildiğini göstermektedir [4]. Bu nedenle aynı merkezde ardışık dönemlerin karşılaştırılması, demografik ve klinik özelliklerin sürekliliğinin yanı sıra başvuru paternlerindeki değişimin ortaya konmasına katkı sağlayabilir.

Bu çalışmada, çocuk acil servise 2024 ve 2025 yıllarında başvuran pediatrik yanık olgularının demografik, klinik ve mevsimsel özelliklerinin karşılaştırılması amaçlandı.

MATERYAL METOD

Katılımcıların Seçimi

Çalışmada, Malatya Eğitim ve Araştırma Hastanesi Çocuk Acil Servisine 1 Ocak 2024-31 Aralık 2024 tarihleri arasında başvuran hastaların verileri retrospektif olarak incelendi. Hastane bilgi sisteminde ICD-10 kodlamasına göre T31 (vücut yüzeyinin tutulumunun yaygınlığına göre sınıflandırılan yanıklar) tanı koduyla kayıtlı toplam 1200 hastanın verilerine ulaşıldı. Hastane bilgi sistemindeki epikriz raporları detaylıca incelendi. Eksik veri içeren 40 hasta çalışma dışı bırakıldı. Kriterleri sağlayan 1160 hasta ile çalışmamız yapıldı.

İstatistiksel Analiz

İstatistiksel analizler için IBM SPSS Statistics for Windows, version 27.0 (IBM Corp.; Armonk, New York USA) programı kullanıldı. Parametrelerin normal dağılıma uygunluğu Kolmogorov-Smirnov testi ile değerlendirildi. Tanımlayıcı istatistiksel metodlar; ortalama, ortanca, standart sapma, yüzde [25-75% (Inter Quantile Range-IQR)] ve frekans olarak verildi Kategorik verilerin analizinde Ki-kare ve Fisher-Freeman-Halton Exact testleri kullanıldı. $P<0.05$ istatistiksel olarak anlamlı kabul edildi.

BULGULAR

Çalışmaya toplam 1.160 pediatrik yanık hastası dahil edildi. Hastaların 657'si (56.6%) 2024, 503'ü (43.4%) 2025 yılında çocuk acil servise başvurmuştu. 2024 yılında hastaların yaş medyan ve 25-75% (IQR) değerleri 3 (1-10) yıl iken, 2025 yılında 4 (1-9) yıl olarak saptandı. 2024 yılında hastaların 365'i (55.6%) erkek ve 292'si (44.4%) kadın iken, 2025 yılında 267'si (53.1%) erkek ve 236'sı (46.9%) kadındı.

Yaş grupları değerlendirildiğinde, 2024 yılında hastaların 300'ü (45.7%) 0-2, 114'ü (17.4%) 3-5, 112'si (17.0%) 6-11 ve 131'i (19.9%) 12-17 yaş grubundaydı. 2025 yılında ise 216 (42.9%) hasta 0-2, 94 (18.7%) hasta 3-5, 101 (20.1%) hasta 6-11 ve 92 (18.3%) hasta 12-17 yaş

grubunda yer almaktaydı. **0-5 yaş grubu,** 2024 yılında olguların 414'ünü (63.0%), 2025 yılında ise 310'unu (61.6%) oluşturdu.

2024 yılında hastaların 608'i (92.5%) Türk, 49'u (7.5%) yabancı uyruklu iken; 2025 yılında 455'i (90.5%) Türk ve 48'i (9.5%) yabancı uyrukluydu. Yanık şiddeti açısından 2024 yılında 644 (98.0%) hafif, 6 (0.9%) orta ve 7 (1.1%) ağır yanık; 2025 yılında ise 493 (98.0%) hafif, 7 (1.4%) orta ve 3 (0.6%) ağır yanık saptandı. Hastaneye yatış oranı her iki yılda da **2.0%** olup, 2024 yılında 13, 2025 yılında 10 hasta hastaneye yatırıldı.

Mevsimsel dağılım incelendiğinde, 2024 yılında başvuruların 143'ü (21.8%) kış, 130'u (19.8%) ilkbahar, 198'i (30.1%) yaz ve 186'sı (28.3%) sonbaharda gerçekleşti. 2025 yılında ise 158 (31.4%) başvuru kış, 129 (25.6%) ilkbahar, 185 (36.8%) yaz ve 31 (6.2%) başvuru sonbahar döneminde gerçekleşti. Mevsimsel dağılım incelendiğinde, her iki yılda da en yüksek başvuru oranı yaz mevsiminde saptandı. Sonbahar başvurularının oranı 2024 yılında 28.3% iken, 2025 yılında 6.2% olarak belirlendi. Mevsimsel dağılım açısından yıllar arasında istatistiksel olarak anlamlı farklılık saptandı ($p<0.001$).

Çalışmaya 2024 yılında 657 (56.6%) ve 2025 yılında 503 (43.4%) olmak üzere toplam 1.160 pediatrik yanık hastası dahil edildi. 2024 yılında hastaların 365'i (55.6%), 2025 yılında ise 267'si (53.1%) erkekti. Cinsiyet dağılımı açısından iki yıl arasında istatistiksel olarak anlamlı farklılık saptanmadı ($\chi^2=0.703$; $p=0.402$). Yabancı uyruklu hasta oranı 2024 yılında 7.5% (n=49), 2025 yılında 9.5% (n=48) olup, uyruk dağılımı açısından yıllar arasında anlamlı farklılık bulunmadı ($\chi^2=1.616$; $p=0.204$).

Yanık şiddeti değerlendirildiğinde, hafif yanıkların oranı her iki yılda da 98.0% idi. Orta ve ağır yanık oranları 2024 yılında sırasıyla 0.9% ve 1.1%, 2025 yılında ise 1.4% ve 0.6% olarak saptandı. Yanık şiddetinin dağılımı yıllar arasında anlamlı farklılık göstermedi (Fisher-Freeman-Halton Exact Test, $p=0.512$).

Mevsimsel dağılımda ise yıllar arasında istatistiksel olarak anlamlı farklılık saptandı ($\chi^2=93.103$; $p<0.001$). Yaz mevsimi her iki yılda da en fazla başvurunun gerçekleştiği dönem olmakla birlikte, yaz başvurularının oranı 2024 yılında 30.1% iken 2025 yılında 36.8% olarak saptandı. Kış başvuruları 21.8%'den 31.4%'e, ilkbahar başvuruları 19.8%'den 25.6%'ya yükselirken, **sonbahar başvuruları 28.3%'ten 6.2%'ye geriledi.**

TARTIŞMA

Pediatrik yanıkların epidemiyolojik özellikleri yaş, cinsiyet, çevresel koşullar ve bölgesel farklılıklardan etkilenmekte, bu özellikler zaman içerisinde değişebilmektedir. Çalışmamızda 2024 ve 2025 yıllarında sırasıyla 657 ve 503 pediatrik yanık başvurusu değerlendirilmiş ve her iki yılda da olguların çoğunluğunu 0-5 yaş grubundaki çocukların oluşturduğu görülmüştür. Dünya Sağlık Örgütü Global Burn Registry verilerinde de pediatrik yanıkların 62%'sinin 1-5 yaş grubunda olduğu ve 60%'ının erkeklerden oluştuğu bildirilmiştir [5]. Güncel bir sistematik derlemede de erkek cinsiyetin ve 0-4 yaş grubunun pediatrik yanıklarda belirgin olarak öne çıktığı gösterilmiştir [6]. Çalışmamızda erkek hasta oranının 2024'te 55.6%, 2025'te 53.1% olması ve cinsiyet dağılımının yıllar arasında değişmemesi ($p=0.402$), bu demografik yapının iki yıllık dönemde korunduğunu göstermektedir.

Yanıkların klinik şiddeti açısından da iki yıl arasında belirgin bir değişim görülmemiştir. Hafif yanıkların oranı her iki yılda 98.0% olup, yanık şiddeti yıllara göre anlamlı farklılık

göstermemiştir (p=0.512). Türkiye'den bildirilen güncel bir çalışmada pediatrik yanıkların büyük bölümünün ayaktan takip edilebildiği belirtilmiş ve ayaktan tedavinin pediatrik yanık yönetimindeki önemli yeri vurgulanmıştır [7]. Buna karşılık hastaneye yatırılan pediatrik olguların değerlendirildiği çalışmaların daha yüksek yanık yüzey alanı ve komplikasyon oranlarına sahip seçilmiş hasta gruplarını içerdiği görülmektedir [8]. Bu durum, çalışmamızdaki 2.0%'lik yatış oranının çocuk acil servise başvuran ve büyük ölçüde hafif yanıklardan oluşan hasta popülasyonuyla ilişkili olabileceğini düşündürmektedir.

Çalışmamızın en dikkat çekici sonucu, demografik ve klinik özelliklerin iki yılda benzer kalmasına rağmen başvuruların **mevsimsel dağılımının anlamlı biçimde değişmesidir (p<0.001).** Her iki yılda da yaz en sık başvuru yapılan mevsim olmakla birlikte, yaz başvuruları 30.1%'den 36.8%'e yükselmiştir. Daha belirgin olarak sonbahar başvuruları 2024'te 28.3% iken 2025'te 6.2%'ye gerilemiştir. Pediatrik yanıkların zamansal paternlerinin çevresel koşullar ve günlük yaşam değişikliklerinden etkilenebileceği, COVID-19 dönemindeki değişimleri de değerlendiren güncel bir derlemede vurgulanmıştır [9]. Elektronik cihaz ilişkili 21.962 pediatrik yanığın değerlendirildiği başka bir çalışmada da yanık sıklığının zaman içerisinde ve toplumsal koşullardaki değişikliklerle farklılaşabildiği gösterilmiştir [10].

Türkiye'de gerçekleştirilen bir çalışmada geleneksel çaydanlık ve çay bardağı kullanımının çocukluk çağı haşlanma yanıkları açısından önemli bir risk oluşturduğu bildirilmiş, bölgesel ve kültürel faktörlerin önleyici yaklaşımlarda dikkate alınması gerektiği vurgulanmıştır [11]. Ayrıca geniş ölçekli güncel veriler pediatrik yanıkların klinik sonuçlarının yaş ve yanık etiyolojisine göre farklılaşabileceğini göstermektedir [12].

Bu nedenle çalışmamızda saptanan belirgin mevsimsel değişimin nedenlerinin ortaya konabilmesi için yanık mekanizması, yaralanma ortamı ve çevresel faktörleri içeren ileri çalışmalar gereklidir. Çalışmanın tek merkezli ve retrospektif olması ile bu değişkenlerin değerlendirilememesi başlıca kısıtlılıklarıdır.

SONUÇ

Çalışmamızda pediatrik yanık olgularının demografik ve klinik özelliklerinin 2024 ve 2025 yıllarında büyük ölçüde benzer kaldığı, buna karşın başvuruların mevsimsel dağılımında belirgin değişiklik olduğu saptandı. Her iki yılda da yaz mevsimi başvuruların en yoğun olduğu dönem olurken, özellikle sonbahar başvurularında belirgin azalma gözlendi. Bu bulgular, pediatrik yanıklarda dönemsel değişimlerin izlenmesinin ve bölgesel özelliklere göre mevsime özgü koruyucu stratejilerin geliştirilmesinin önemini ortaya koymaktadır.

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M4406-Tam Metin

ACUTE COMPARTMENT SYNDROME FOLLOWING IODINATED CONTRAST EXTRAVASATION IN A PEDIATRIC HIGH-ENERGY TRAUMA PATIENT: A CASE REPORT

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Introduction / Aim

Iodinated contrast extravasation is typically self-limited; however, in rare cases, it may result in acute compartment syndrome and neurovascular injury. This report details the recognition and management of such a complication in a pediatric patient with high-energy trauma.

Methods

This case report covers the emergency assessment, repeated neurovascular checks, surgery, and follow-up care.

Results

A 2-year-old child presented following a vehicle-related high-energy injury in which a lower extremity was run over. Although vital signs were stable, contrast-enhanced computed tomography was performed due to limited examination resulting from the patient's age and lack of cooperation. Twenty milliliters of iohexol (Omnipaque; concentration not documented) was administered via a pediatric peripheral intravenous catheter on the dorsum of the right hand. The entire 50 mL dose was presumed to have extravasated, resulting in significant swelling and ecchymosis extending to the wrist. The patient exhibited severe pain, pallor indicating impaired perfusion, paresthesia, and reduced motor function. The injection was discontinued, and elevation, cold application, and serial neurovascular examinations were initiated. As symptoms persisted over two hours of observation, acute compartment syndrome was diagnosed clinically without intracompartmental pressure measurement. Urgent dorsal hand fasciotomy was performed to decompress the four dorsal and three palmar interosseous compartments. The wound was closed two days later. Follow-up revealed full joint range of motion without flexion deficit or functional sequelae.

Conclusion

Contrast extravasation at distal intravenous sites in pediatric patients can rapidly become limb-threatening. Persistent pain, swelling, sensory changes, impaired perfusion, or reduced movement necessitate repeated examination and prompt surgical evaluation. Timely fasciotomy may result in complete functional recovery.

Keywords

pediatric trauma; contrast extravasation; acute compartment syndrome; fasciotomy; case report

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M4408-Özet Metin

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF PEDIATRIC PATIENTS REFERRED TO THE OPHTHALMOLOGY DEPARTMENT FROM THE EMERGENCY DEPARTMENT DUE TO ORBITAL AND PERIORBITAL TRAUMA

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Purpose: To evaluate the demographic characteristics, clinical findings, trauma mechanisms, imaging requirements, consultations, and treatment approaches of pediatric patients referred to the ophthalmology department following orbital and periorbital trauma.

Materials and Methods: This retrospective study included 115 patients aged 0–18 years who presented to the emergency department with ocular trauma or trauma-related ocular findings over the past year. Electronic medical records were reviewed for age, sex, affected eye, clinical findings, trauma mechanism, imaging studies, consultations, treatment, and follow-up visits. Continuous variables were expressed as mean±standard deviation and categorical variables as frequencies and percentages.

Results: The mean age was 11.12±4.58 years, and 83 patients (72.2%) were male. The right eye was affected in 50.4% of cases, the left eye in 41.7%, and bilateral involvement was present in 7.8%. The most common clinical findings were conjunctival hyperemia (63.5%), periorbital edema (39.1%), corneal epithelial defects (33.0%), subconjunctival hemorrhage (25.2%), iridocyclitis (23.5%), periorbital ecchymosis (22.6%), hyphema (13.9%), and ocular foreign bodies (1.7%). The leading trauma mechanisms were ball-related injuries, falls, traffic accidents, and penetrating injuries caused by sharp objects. Imaging was required in 31.3% of patients, while radiology (33%), neurosurgery (13%), pediatric surgery (8.7%), otorhinolaryngology (3.5%), and orthopedics (3.5%) consultations were obtained. Sixteen patients (13.9%) underwent surgery. All penetrating globe injuries with a risk of permanent vision loss occurred as isolated ocular trauma.

Conclusion: Conjunctival hyperemia, periorbital edema, and corneal epithelial defects were the most common findings after pediatric ocular trauma. Although surgical intervention was required in a limited number of patients, prompt ophthalmic assessment, multidisciplinary management, and close follow-up are essential to prevent vision-threatening complications.

M4409-Tam Metin

SEROGROUP W MENINGOCOCCEMIA PROGRESSING FROM MILD SYMPTOMS TO SEPTIC SHOCK WITHIN HOURS: A PEDIATRIC CASE REPORT

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Introduction: Serogroup W *Neisseria meningitidis* infections have increasingly been associated with aggressive clinical progression and high mortality. Early diagnosis may be challenging in children presenting with initially nonspecific symptoms. We present a previously healthy child who rapidly developed fulminant meningococcemia and septic shock.

Case Presentation: A previously healthy 7-year-8-month-old boy presented to the pediatric emergency department with fatigue and low-grade fever. His medical history was unremarkable, and routine childhood vaccinations were complete except for meningococcal vaccination. During emergency department observation, he rapidly developed diffuse purpuric skin lesions, hypotension, and tachycardia. He was transferred to the pediatric intensive care unit with septic shock.

Management included two 20 mL/kg crystalloid boluses, blood cultures, empiric intravenous ceftriaxone, and norepinephrine infusion for persistent hypotension. Laboratory evaluation revealed thrombocytopenia and coagulopathy requiring fresh frozen plasma therapy. Lumbar puncture performed after hemodynamic stabilization demonstrated normal cerebrospinal fluid glucose and protein levels without significant pleocytosis. Blood and cerebrospinal fluid cultures remained sterile. However, cerebrospinal fluid polymerase chain reaction confirmed *Neisseria meningitidis* serogroup W infection. Norepinephrine was discontinued on day 3, and intravenous antibiotic therapy was completed for 10 days. Immunological evaluation, including complement pathway assessment, was normal. Chemoprophylaxis was administered to close contacts.

Conclusion: This case highlights that serogroup W meningococcemia may progress rapidly even in immunocompetent children. Normal cerebrospinal fluid findings and negative cultures do not exclude invasive meningococcal disease. Early aggressive resuscitation, prompt antibiotic therapy, and molecular diagnostic methods are critical for survival and diagnosis.

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M4410-Tam Metin

AIRWAY MANAGEMENT WITH TRACHEOSTOMY IN A NEWBORN WITH TYPE 1 VAN MALDERGEM SYNDROME: A CASE REPORT

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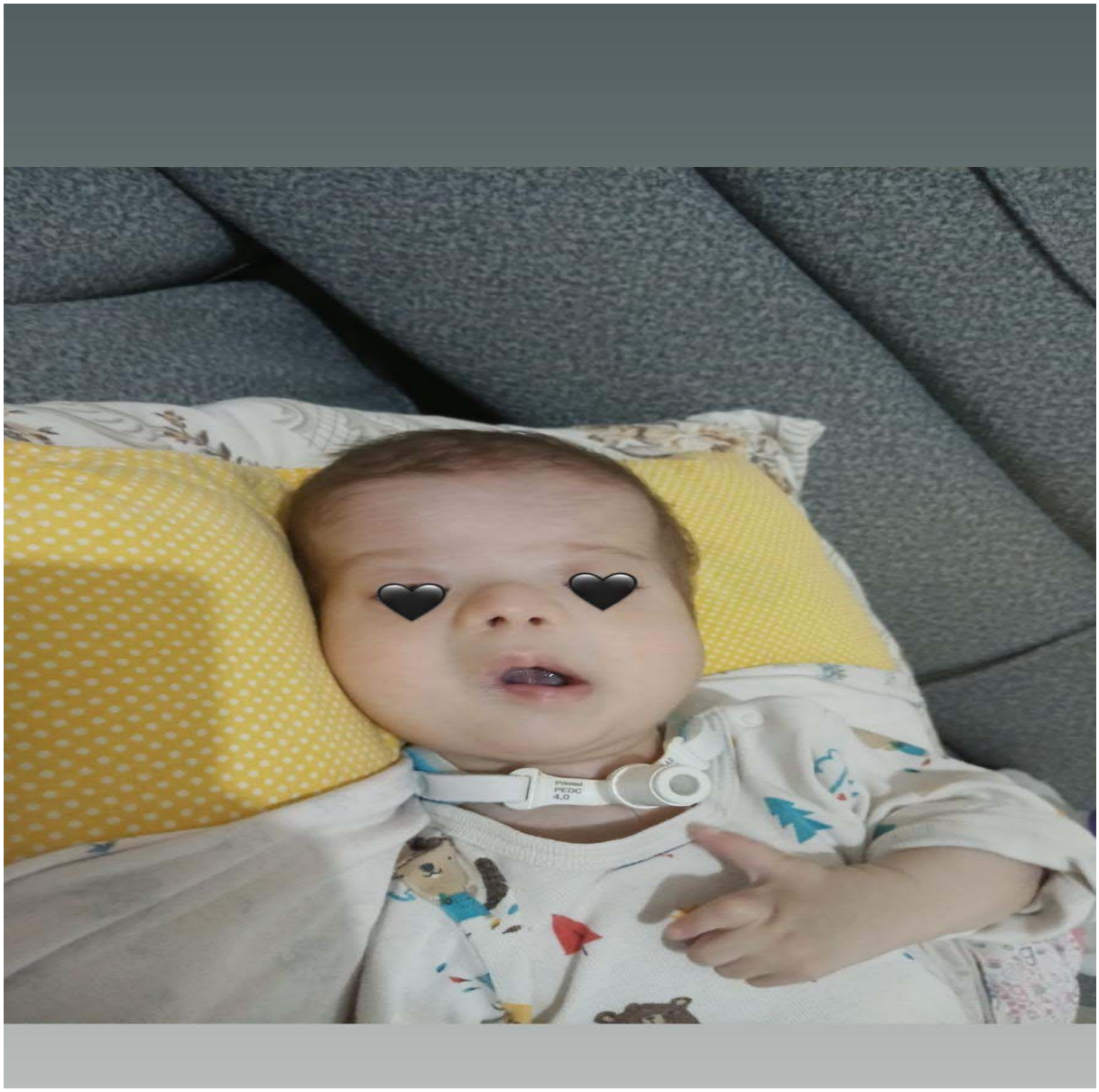
Introduction: Van Maldergem syndrome (VMS) is an ultra-rare autosomal recessive developmental disorder caused by biallelic variants in the DCHS1 or FAT4 genes. It is characterized by craniofacial dysmorphism, ear anomalies, neurodevelopmental impairment, and variable multisystem involvement. Neonatal diagnosis is exceptionally rare. We report a newborn with genetically confirmed type 1 VMS requiring tracheostomy because of complex airway abnormalities.

Case Presentation: A term male infant born to consanguineous parents with a family history of unexplained sibling deaths required prolonged mechanical ventilation after birth. Physical examination revealed craniofacial dysmorphism, bilateral auricular hypoplasia, external auditory canal stenosis, congenital hypotonia, bilateral pes equinovarus and limb asymmetry. Persistent ventilator dependence was attributed to unilateral choanal atresia and subglottic stenosis, necessitating tracheostomy. The infant was subsequently weaned from respiratory support and remained stable in room air. Echocardiography demonstrated a ventricular septal defect, secundum atrial septal defect, and mild pulmonary stenosis. Clinical exome sequencing identified a homozygous DCHS1 c.2947C>T (p.Arg983Ter) variant, classified as likely pathogenic according to ACMG criteria, confirming type 1 VMS.

Conclusion: VMS should be considered in neonates presenting with craniofacial dysmorphism, ear anomalies, congenital hypotonia, and prolonged ventilator dependence. Complex airway abnormalities may require tracheostomy for successful respiratory management. Early genomic testing facilitates diagnosis, multidisciplinary management, genetic counseling, and long-term follow-up.

Key Words: Van Maldergem syndrome, DCHS1gene, newborn, craniyofasial dysmorphism, tracheostomy





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M4411-Tam Metin

PEDİATRİK ACİLLERDE SIK KARŞILAŞILAN BİR TRAVMA: RADİAL BAŞI SUBLUKSASYONU (DADI DİRSEĞİ) GÜNCEL DERLEMESİ

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Özet:
Yaygın olarak "dadı dirseği" olarak bilinen radius başı subluksasyonu, çocuk acil servislerinde en sık karşılaşılan üst ekstremite yaralanmalarından biridir ve ağırlıklı olarak 1 ila 5 yaş arasındaki çocukları etkiler. Genellikle ekstansiyon ve pronasyondaki kola uygulanan ani aksiyel traksiyon sonucu gelişir; bu durum henüz olgunlaşmamış (immatür) anüler ligamanın kayarak radyokapitellar eklem içine sıkışmasına yol açar. Tanı esas olarak kliniktir; klasik bir traksiyon öyküsüne ve çocuğun etkilenen kolu hafif fleksiyon ile pronasyonda tuttuğu karakteristik psödoparalizi tablosuna dayanır. Odaklanmış hassasiyet, belirgin ödem veya deformite bulunmayan klasik olgularda rutin radyografik görüntüleme gereksizdir ve bundan kaçınılmalıdır. Tedavi, hızlı manuel redüksiyondan oluşur. Geleneksel olarak supinasyon-fleksiyon tekniği öğretilmiş olsa da güncel kanıta dayalı literatür, ilk seçenek yaklaşım olarak hiperpronasyon manevrasını güçlü bir şekilde desteklemektedir. Hiperpronasyon, ilk denemede anlamlı derecede daha yüksek başarı oranı ve daha düşük ağrı profili ile ilişkilidir. Bu derleme, çocuk acil bakımında klinik sonuçları optimize etmek amacıyla patofizyolojiyi, tanı prensiplerini ve güncel kanıta dayalı redüksiyon stratejilerini özetlemektedir.

Anahtar Kelimeler: Radius başı subluksasyonu, dadı dirseği, çocuk acil, hiperpronasyon, eklem redüksiyonu.

Giriş

Çocukluk çağında acil servislere ortopedik başvuru nedenleri arasında dirsek yaralanmaları önemli bir yer tutar. Radial başı subluksasyonu (RBS), pediatrik acil pratiğinde en sık karşılaşılan dirsek yaralanmasıdır [1]. Acil tıp hekimleri tarafından klinik olarak kolayca tanınıp hızlıca tedavi edilebilen bu durum, gereksiz radyolojik tetkiklerin ve uzun acil servis bekleyişlerinin önüne geçilmesi açısından hekimin klinik tecrübesinin ön plana çıktığı bir tablodur.

Epidemiyoloji ve Patofizyoloji

RBS, sıklıkla 1 ile 5 yaş arasındaki çocuklarda görülür ve pik insidansı 2-3 yaş arasındadır [2]. Altı yaşından büyük çocuklarda annüler ligamentin kalınlaşması ve kuvvetlenmesi nedeniyle görülme sıklığı dramatik şekilde düşer. Kız çocuklarında ve sol kolda (genellikle bakım verenin sağ elini kullanmasına bağlı olarak) daha sık rastlanmaktadır [3].

Patofizyolojik temel, annüler ligamentin henüz tam gelişmemiş ve laksitesinin yüksek olmasıdır. Çocuğun kolu ekstansiyon ve pronasyon pozisyonundayken uygulanan ani aksiyel

traksiyon (örneğin çocuğu elinden tutarak kaldırmak veya salıncak gibi sallamak), radial başın annüler ligamentin altından kaymasına ve ligamentin radiokapitellar eklem arasına sıkışmasına neden olur [4].

Klinik Değerlendirme ve Tanı

Tanı, büyük oranda dikkatli bir anamnez ve tipik fizik muayene bulguları ile konur. Aileler genellikle çocuğun kolundan çekilme öyküsünü tarif eder, ancak vakaların yaklaşık %25'inde spesifik bir travma öyküsü alınamayabilir (örneğin çocuğun yatakta kolunun üzerine dönmesi) [5].

Klinik Görünüm:

Çocuk genellikle ağrılı kolunu gövdesine bitişik, dirsekten hafif fleksiyonda ve ön kolu pronasyonda tutar.Etkilenen ekstremiteyi kullanmayı reddeder (psödoparalizi).Dirsek çevresinde belirgin şişlik, ekimoz, eritem veya deformite görülmez [6].

Deformite, belirgin ödem veya fokal kemik hassasiyeti (özellikle suprakondiler bölgede) olması durumunda altta yatan bir kırık (ör. suprakondiler humerus kırığı) şüphesi uyanmalı ve redüksiyon denenmemelidir.

Görüntüleme Yöntemleri

Klasik anamnez ve klinik bulgulara sahip hastalarda rutin direkt grafi çekilmesi önerilmemektedir [1, 5]. Radyolojik görüntüleme ancak şu durumlarda endikedir:

Tipik mekanizma dışı yaralanmalar (örneğin yüksekten düşme).

Dirsekte belirgin ödem, ekimoz veya deformite varlığı.

Yapılan redüksiyon manevralarının (genellikle 2 veya 3 deneme) başarısız olması.

Redüksiyon sonrası çocuğun kolunu kullanmaya başlamaması [2].

RBS vakalarında çekilen direkt grafiler genellikle tamamen normaldir veya subluksasyon belirtisi göstermez.

Redüksiyon Manevraları ve Güncel Tedavi Yaklaşımları

RBS tedavisinde temel amaç, sıkışmış olan annüler ligamenti radiokapitellar eklem aralığından kurtarmaktır. Literatürde tanımlanmış ve acil servislerde sık uygulanan iki ana redüksiyon manevrası bulunmaktadır:

Hiperpronasyon Manevrası: Hekim bir eliyle çocuğun dirseğini kavrar ve başparmağını radial baş üzerine yerleştirir. Diğer eliyle çocuğun el bileğini kavrayarak ön kola ani ve sıkı bir hiperpronasyon uygular.

Supinasyon-Fleksiyon Manevrası: Çocuğun dirseği radial baş desteklenerek kavranır. Ön kola önce güçlü bir supinasyon, ardından dirseğe tam fleksiyon yaptırılır.

Güncel Literatür Karşılaştırması:

Geleneksel olarak supinasyon-fleksiyon manevrası tıp eğitiminde daha yaygın öğretilmiş olsa da, son yıllarda yapılan randomize kontrollü çalışmalar ve meta-analizler hiperpronasyon manevrasının üstünlüğünü ortaya koymaktadır. Cochrane veri tabanında yer alan güncel derlemeler ve son literatür çalışmaları, hiperpronasyon tekniğinin ilk denemede başarılı olma

oranının (%80-95) supinasyon-fleksiyon tekniğine (%60-80) göre anlamlı düzeyde daha yüksek olduğunu belirtmektedir [7, 8]. Ayrıca hiperpronasyon manevrasının uygulama sırasında daha az ağrıya neden olduğu bildirilmiştir [9]. Bu nedenle güncel kılavuzlar, ilk seçenek olarak hiperpronasyon manevrasının kullanılmasını önermektedir.

Redüksiyon sırasında radial baş üzerinde hissedilen bir "klik" sesi veya hissi, işlemin başarılı olduğunun en güçlü göstergesidir. Başarılı bir redüksiyondan 10-15 dakika sonra çocuğun ağrısı tamamen geçer ve etkilenen kolunu (oyuncak uzatılması gibi provokasyonlarla test edilebilir) normal şekilde kullanmaya başlar [5].

Sonuç

Radial başı subluksasyonu, pediatrik acil servislerde doğru teşhis ve müdahale ile anında iyileşme sağlanan nadir ve yüz güldürücü durumlardan biridir. Klinik şüpheye yer bırakmayan klasik vakalarda radyolojiden kaçınmak, acil servis iş yükünü hafifletirken radyasyon maruziyetini de engeller. Kanıta dayalı tıp uygulamaları ışığında, hiperpronasyon manevrası daha yüksek ilk seferde başarı oranı ve daha az ağrı profili ile acil hekimlerinin ilk tercihi olmalıdır.

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M4413-Özet Metin

0–5 YAŞ ÇOCUĞU OLAN EBEVEYNLERİN ÇOCUKLUK ÇAĞI ATEŞİNE İLİŞKİN BİLGİ, TUTUM VE SAĞLIK HİZMETİ BAŞVURU DAVRANIŞLARININ DEĞERLENDİRİLMESİ: KESİTSEL BİR ÇALIŞMA

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Amaç

Çocukluk çağı ateşi, özellikle beş yaş altındaki çocuklarda sağlık kuruluşlarına başvurunun sık nedenlerinden biridir. Ateş çoğu zaman fizyolojik bir konak yanıtı olmasına rağmen ebeveynlerde ciddi hastalık, nöbet veya kalıcı hasar gelişeceğine ilişkin kaygıya yol açabilmektedir. Bu durum sağlık hizmeti kullanım davranışını etkileyebilmektedir. Birinci basamakta verilen doğru ve yapılandırılmış danışmanlık, ebeveynlerin ateşi değerlendirme ve uygun sağlık kuruluşuna başvurma davranışlarını geliştirebilir. Bu çalışmada 0–5 yaş arasında çocuğu bulunan ebeveynlerin çocukluk çağı ateşine ilişkin bilgi düzeyleri, tutumları ve sağlık hizmeti başvuru davranışlarının değerlendirilmesi; ateş bilgi düzeyiyle ilişkili sosyodemografik ve birinci basamak sağlık hizmeti kullanımına ilişkin faktörlerin belirlenmesi amaçlanmıştır.

Yöntem

Çalışma, kesitsel ve tanımlayıcı tiptedir. Etik kurul onayı, Turgut Özal Üniversitesi Sağlık Bilimleri Bilimsel Araştırmalar Etik Kurulu'ndan 02.07.2026 tarihinde 2026/274 sayılı karar ile alınmıştır. Veriler, etik kurul onayının alınmasının ardından çevrim içi anket yöntemiyle toplanmıştır. Olasılıksız uygun örnekleme yöntemiyle 18 yaş ve üzerinde, 0–5 yaş arasında en az bir çocuğu bulunan, çevrim içi anketi eksiksiz tamamlayan 102 ebeveyn çalışmaya dahil edilmiştir. Anket; sosyodemografik özellikleri, çocuklara ilişkin klinik özellikleri, çocuk acil servisi ve aile hekimliği hizmeti kullanımını, ateş yönetimine ilişkin bilgi ve tutumları değerlendiren sorulardan oluşmuştur. Ateş bilgi düzeyi 12 maddelik, 5'li Likert tipinde bir puanlamayla değerlendirilerek; yüksek toplam puan yüksek bilgi düzeyini göstermiştir. Tüm analizlerde $p<0,05$ değeri anlamlı kabul edilmiştir.

Bulgular

Katılımcıların %72,5'i kadın, %27,5'i erkekti. %49,0'ı 35–44 yaş grubunda ve %56,9'u üniversite ve üzeri eğitim düzeyindeydi. Aile hekimine başvuru nedenleri incelendiğinde en sık başvuru nedeninin aşı yaptırma (%28,4) olduğu görülmektedir. Bunu boy-kilo takibi (%22,5) ve ateşli hastalıklar (%13,7) izlemektedir. Ebeveynler aile hekimliği hizmetlerini daha çok bu gibi amaçlarla kullanmaktadır. Çocuk acil servisine son başvurunun en sık nedenlerine bakıldığında; ateş (%27,5) ve solunum yolu şikâyetleri (%25,5) ön planda olduğu görüldü (Tablo 1).

Tablo 1. Çocuk acil servisine en sık başvuru nedenleri

Başvuru nedeni	Kişi sayısı	%
Ateş	28	27.5
Solunum yolu şikayetleri	26	25.5
Başvuru olmadı	18	17.6
Kusma/İshal	11	10.8
Travma	8	7.8
Döküntü	3	2.9
Diğer	8	7.9

Ebeveynlerin çocuklarını acil servise götürmelerinde en sık belirtilen etken çocuğun hastalığının ciddi olabileceğini düşünmeleriydi (%45,1); bunu mesai saatleri dışında sağlık hizmetine erişim güçlüğü yaşamaları (%31,4), yüksek ateşin çocuğa zarar vereceğinden endişe etmeleri (%31,4), çocuğun ateşli havale geçirme ihtimalinden korkmaları (%24,5) ve acil serviste çocuğun hastalık durumunun daha hızlı değerlendirileceğini düşünme (%23,5) izledi. İkili lojistik regresyonda ateş bilgi puanının, son altı ayda çocuk acil servisine başvurunun bağımsız belirleyicisi olmadığı görülmüştür (OR=1,02; %95 GA: 0,96–1,09; p=0,546).

Katılımcıların yaş grupları, cinsiyet dağılımı, eğitim düzeyi, çocuk sayısı, en küçük çocuğun yaşı, çocukta kronik hastalık varlığı, son altı ay içerisinde çocuk acil servisine başvuru durumu, aile hekimine başvuru davranışları, aile hekiminden danışmanlık alma sıklığı, ateşli havale öyküsü ve hastane yatış öyküsüne ilişkin tanımlayıcı özellikler arasındaki ilişki incelenmiştir. Eğitim düzeyi yükseldikçe ateş bilgi puanı artmaktadır (p=0,020). Acil servise gitmeden önce aile hekimine başvuran ebeveynlerin bilgi puanı daha yüksekti (p=0,001) ve aile hekiminden danışmanlık alma sıklığı ile bilgi puanı arasında anlamlı ilişki vardı (p=0,013). (Tablo 2).

Tablo 2. Ateş bilgi düzeyi ile sosyodemografik ve klinik değişkenlerin karşılaştırılması

Değişken	İstatistiksel test	p değeri
Yaş grubu	Kruskal–Wallis	0,038
Eğitim düzeyi	Kruskal–Wallis	0,020
Acile gitmeden önce aile hekimine başvuru	Mann–Whitney U	0,001
Aile hekiminden danışmanlık alma	Kruskal–Wallis	0,013
Çocuk sayısı	Kruskal–Wallis	0,087
Çocukta kronik hastalık varlığı	Mann–Whitney U	0,785
Son 6 ay çocuk acil servisine başvuru	Mann–Whitney U	0,665
Hastane yatışı öyküsü	Mann–Whitney U	0,106

Katılımcıların ateş bilgi düzeyi puan ortalaması 45,72 ± 7,96 olarak hesaplanmıştır. Ateş bilgi düzeyi puanının medyan değeri 46 olup, minimum ve maksimum puanlar sırasıyla 11 ve 55 olarak bulunmuştur. Ateş bilgi puanı yaş grubuna göre anlamlı farklılık göstermiş olup (p=0,038); en düşük ortalama puan 18–24 yaş grubunda (38,7), en yüksek ortalama puan 45 yaş ve üzerindeki ebeveynlerde (53,0) olarak saptandı. Yaş arttıkça bilgi puanının arttığı görülmüştür.

Sonuç

Ebeveynlerin çocukluk çağı ateşine ilişkin bilgi düzeyi; yaş, eğitim düzeyi ve birinci basamak sağlık hizmetleriyle etkileşimle anlamlı ilişkili bulunmuştur. Bu durum, ebeveynlik

deneyiminin artması, önceki ateşli hastalık deneyimleri ve sağlık hizmetleriyle daha fazla temas edilmesiyle açıklanabilir

Acil servise başvurmadan önce aile hekimine başvuran ve aile hekiminden daha sık danışmanlık alan ebeveynlerin ateş bilgi puanlarının daha yüksek olması, aile hekimliğinin eğitici ve yönlendirici rolünü desteklemektedir. Buna karşın ateş bilgi puanının çocuk acil servisi başvurusunu bağımsız olarak öngörmemesi, başvuru kararının yalnızca bilgi düzeyine değil; kaygı, güvence arayışı, sağlık hizmetine erişim ve önceki deneyimler gibi çok boyutlu etkenlere bağlı olduğunu düşündürmektedir.

Aile sağlığı merkezlerinde kısa, yapılandırılmış ve tekrarlayan ateş danışmanlığı verilmesi; doğru ateş yönetimi davranışlarını destekleyebilir ve uygunsuz sağlık hizmeti kullanımını azaltmaya katkı sağlayabilir. Bu danışmanlıkta; ateşin fizyolojik anlamı, doğru ateş ölçümü, antipiretiklerin kilo bazlı kullanımı, sıvı alımının desteklenmesi, gereksiz antibiyotik kullanımından kaçınılması ve acil başvuru gerektiren alarm bulguları açık şekilde anlatılmalıdır Birinci basamak sağlık hizmetlerinde ebeveyn eğitimine daha fazla yer verilmesi, ebeveyn kaygısını azaltabilir ve gereksiz acil sağlık hizmeti kullanımını sınırlamaya katkı sağlayabilir.

M4414-Tam Metin

AKUT İNMEDE HASTANE İÇİ MORTALİTE İÇİN NÖTROFİL/LENFOSİT, MONOSİT/LENFOSİT VE LAKTAT/ALBUMİN ORANLARININ KARŞILAŞTIRMALI VE ARTIMLI PROGNOSTİK DEĞERİ

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Amaç

Akut inmede prognoz yalnızca serebral hasarın boyutuyla değil, sistemik inflamasyon, doku hipoperfüzyonu, metabolik stres ve fizyolojik rezervle de ilişkilidir. Bu nedenle yoğun bakım kabulünde kolayca elde edilebilen, hızlı ve düşük maliyetli biyobelirteçler erken risk sınıflandırmasında önem taşımaktadır. Nötrofil/lenfosit oranı (NLR), nötrofil aracılı inflamatuvar yanıt ile lenfosit baskılanması arasındaki dengeyi yansıtır ve akut iskemik inmede mortalite, kötü fonksiyonel sonuç ve erken nörolojik kötüleşmeyle ilişkilendirilmiştir [1-5]. Monosit/lenfosit oranı (MLR) monosit aktivasyonu ile lenfosit yanıtını birlikte değerlendirir; benzer hücresel oranların kısa dönem sonuçlarla ilişkili olduğu bildirilmiştir [4,6,7,10]. Laktat/albumin oranı (LAR) ise hipoperfüzyon ve metabolik stres göstergesi olan laktat ile inflamasyon ve azalmış fizyolojik rezervle ilişkili albumini tek ölçütte birleştirir. Kritik akut iskemik inme hastalarında yüksek LAR'ın 28 günlük mortaliteyle ilişkisi gösterilmiştir [8]. NLR'nin uzun dönem mortaliteyle ilişkili olması da inflamatuvar yükün prognostik önemini desteklemektedir [9]. Bununla birlikte bu üç oranın aynı yoğun bakım kohortunda doğrudan karşılaştırıldığı ve temel klinik değişkenlere sağladıkları ek katkının birlikte incelendiği çalışmalar sınırlıdır. Bu çalışmada NLR, MLR ve LAR'ın hastane içi mortaliteyle ilişkilerinin karşılaştırılması ve NLR ile LAR'ın birlikte kullanımının temel klinik modele artımlı prognostik katkısının değerlendirilmesi amaçlandı.

Yöntem

Bu tek merkezli, retrospektif gözlemsel çalışmaya Malatya Eğitim ve Araştırma Hastanesi yoğun bakım ünitelerinde 1 Ocak 2023-31 Aralık 2025 tarihleri arasında akut inme tanısıyla izlenen erişkin hastalar dahil edildi. Yinelenen kayıtlar, temel demografik verileri veya mortalite bilgisi eksik olgular, nötrofil, lenfosit, monosit, laktat ya da albumin sonucu bulunmayan hastalar ve laboratuvar sonuçları yoğun bakım kabulü dışındaki bir zamana ait kayıtlar çalışma dışında bırakıldı. Veri temizliği sonrasında 274 hasta analiz edildi. Yalnızca yoğun bakım kabulünde alınan ilk kan örneği kullanıldı. NLR, mutlak nötrofil sayısının mutlak lenfosit sayısına; MLR, mutlak monosit sayısının mutlak lenfosit sayısına; LAR ise serum laktat düzeyinin serum albumin düzeyine bölünmesiyle hesaplandı. Birincil sonlanım hastane içi mortaliteydi. Gruplar Mann-Whitney U, ki-kare veya gerekli durumlarda Fisher kesin testiyle karşılaştırıldı. NLR, MLR ve LAR'ın mortaliteyi ayırt etme performansı alıcı işletim karakteristiği (ROC) analiziyle değerlendirildi; eğri altında kalan alan (AUC) ve %95 güven

aralıkları hesaplandı, optimal eşikler Youden indeksiyle belirlendi. Biyobelirteçlerin bağımsız ilişkileri yaş, cinsiyet ve ek hastalık varlığına göre düzeltilmiş çok değişkenli lojistik regresyonla incelendi. Sağ çarpık dağılım nedeniyle biyobelirteçler log2 dönüştürüldü. Model performansı AUC, Brier skoru ve Akaike bilgi kriteriyle değerlendirildi; iç doğrulama 1000 tekrarlı bootstrap ile yapıldı.

Bulgular

Toplam 274 hastanın 185'i (%67,5) sağ olarak taburcu edilirken, 89 hastada (%32,5) hastane içi mortalite gelişti. NLR, MLR ve LAR değerlerinin tamamı ölen hastalarda anlamlı olarak daha yüksekti (tümü p<0,001). Medyan NLR sağ kalanlarda 2,30, ölenlerde 6,85; MLR sırasıyla 0,32 ve 0,63; LAR ise 0,39 ve 1,39 olarak bulundu. Düzeltilmemiş ROC analizinde AUC, NLR için 0,714, MLR için 0,702 ve LAR için 0,838 idi. LAR'ın ayırt edici performansı NLR'den (ΔAUC=0,124; p=0,002) ve MLR'den (ΔAUC=0,136; p<0,001) anlamlı olarak daha yüksekti; NLR ile MLR arasında anlamlı fark yoktu. Düzeltilmiş analizlerde biyobelirteçlerin iki katına çıkması mortaliteyle ilişkiliydi: NLR için OR=1,99 (%95 GA 1,56-2,55), MLR için OR=1,96 (%95 GA 1,47-2,61) ve LAR için OR=4,32 (%95 GA 2,93-6,38); tümü p<0,001. Yaş, cinsiyet ve ek hastalık varlığından oluşan klinik modelin AUC değeri 0,734 idi. Klinik modele NLR eklenmesiyle AUC 0,816'ya, MLR eklenmesiyle 0,801'e ve LAR eklenmesiyle 0,887'ye yükseldi. NLR ve LAR'ın birlikte yer aldığı Model 4 en yüksek ayırt edici performansı gösterdi (AUC=0,899; %95 GA 0,855-0,938; optimism-corrected AUC=0,889). Bu model klinik modele göre AUC'yi 0,165 artırdı (p<0,001), ayrıca en düşük Brier skoruna (0,113) ve Akaike bilgi kriterine (217,9) sahipti. Birleşik modelde NLR ve LAR mortaliteyle ilişkilerini korudu; NLR için OR=1,48 ve LAR için OR=3,65 idi.

Sonuç

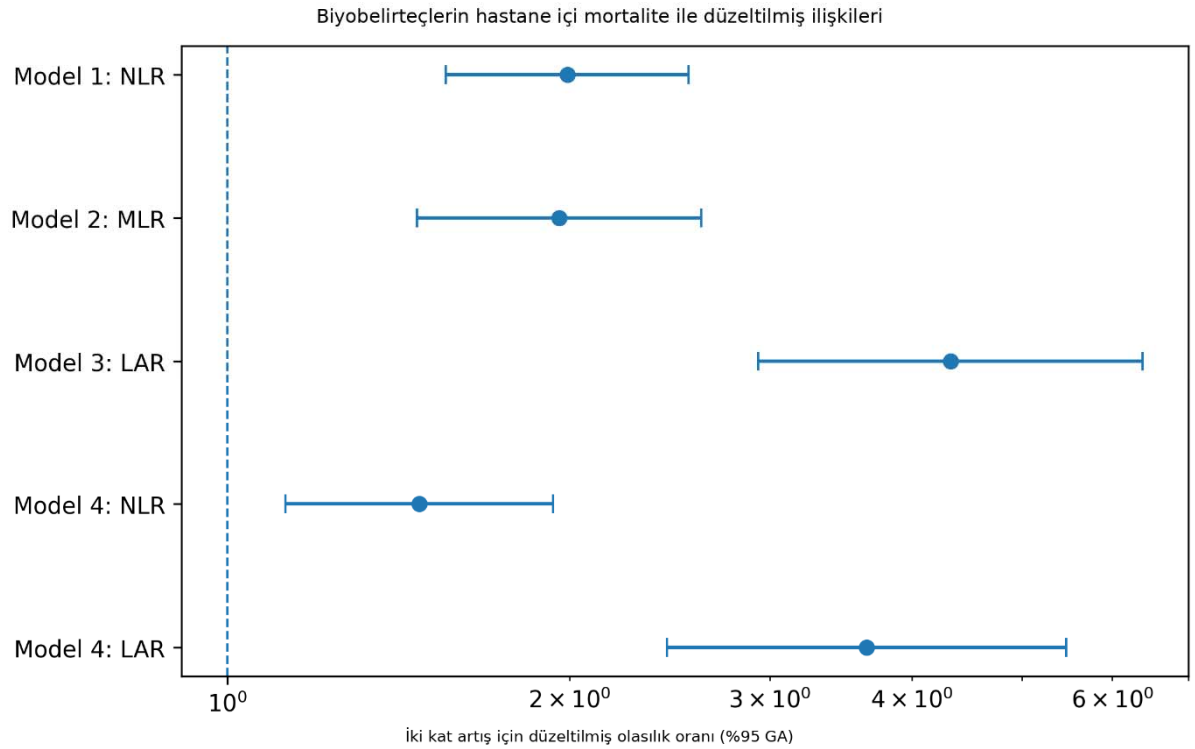
Yoğun bakımda izlenen akut inme hastalarında kabul sırasında hesaplanan NLR, MLR ve özellikle LAR hastane içi mortaliteyle ilişkili bulundu. LAR tek başına NLR ve MLR'den daha yüksek ayırt edici performans gösterirken, NLR ile birlikte kullanıldığında temel klinik modele ek prognostik katkı sağladı. Bu oranların rutin laboratuvar sonuçlarından kolayca hesaplanabilmesi erken risk değerlendirmesinde pratik bir avantaj sağlayabilir. Bununla birlikte tek merkezli retrospektif tasarım, inme alt tipi ve nörolojik şiddet göstergelerinin veri setinde bulunmaması ve dış doğrulama yapılmamış olması sonuçların genellenebilirliğini sınırlar. NLR, MLR ve LAR klinik kararların yerine geçen bağımsız araçlar olarak değil, erken risk sınıflandırmasını destekleyen yardımcı göstergeler olarak değerlendirilmelidir. Bulguların farklı merkezlerde, nörolojik şiddet ölçütlerini ve tedavi özelliklerini içeren prospektif çalışmalarla doğrulanması gereklidir.

Tablo 1. NLR, MLR ve LAR'ın hastane içi mortalite için düzeltilmemiş ayırt edici performansı

Biyobelirteç	AUC (%95 GA)	Optimal kesim	Duyarlılık, %	Özgüllük, %
NLR	0,714 (0,637-0,783)	6,720	51,7	93,5
MLR	0,702 (0,626-0,772)	0,598	53,9	85,9
LAR	0,838 (0,787-0,885)	1,051	85,4	76,8

Optimal kesim değerleri Youden indeksiyle belirlenmiştir. AUC karşılaştırmaları: LAR-NLR ΔAUC=0,124 (p=0,002); LAR-MLR ΔAUC=0,136 (p<0,001); NLR-MLR ΔAUC=0,012 (p=0,713).

Şekil 1. NLR, MLR ve LAR'ın hastane içi mortaliteyle düzeltilmiş ilişkileri

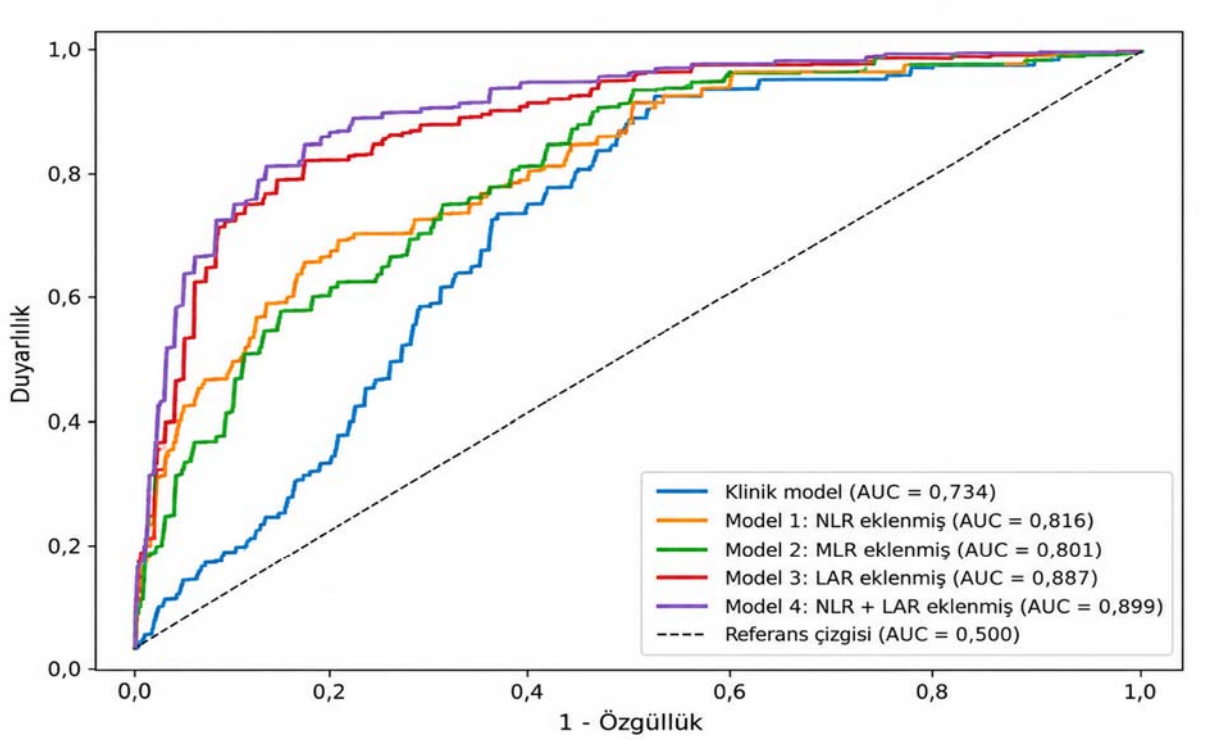


Tablo 2. Düzeltilmiş biyobelirteç ilişkileri ve mortalite modeli performansı

Model	Biyobelirteç	Düzeltilmiş OR (%95 GA)	AUC (%95 GA)	Düzeltilmiş AUC	Brier
Klinik	Yaş, cinsiyet, ek hastalık	—	0,734 (0,675-0,793)	0,720	0,183
Model 1	NLR, iki kat artış	1,99 (1,56-2,55)	0,816 (0,764-0,869)	0,805	0,155
Model 2	MLR, iki kat artış	1,96 (1,47-2,61)	0,801 (0,747-0,853)	0,790	0,165
Model 3	LAR, iki kat artış	4,32 (2,93-6,38)	0,887 (0,841-0,927)	0,878	0,119
Model 4	NLR, iki kat artış	1,48 (1,13-1,93)	0,899 (0,855-0,938)	0,889	0,113
	LAR, iki kat artış	3,65 (2,44-5,47)			

Tüm modeller yaş, cinsiyet ve ek hastalık varlığına göre düzeltilmiştir. Biyobelirteçler log2 dönüştürülmüştür. Düzeltilmiş AUC değerleri 1000 bootstrap örneklemiyle elde edilmiştir.

Şekil 2. Düzeltilmiş mortalite modellerinin ROC eğrileri



Klinik model yaş, cinsiyet ve ek hastalık değişkenlerini içermektedir. Model 1'e NLR, Model 2'ye MLR, Model 3'e LAR, Model 4'e ise NLR ve LAR birlikte eklenmiştir. En yüksek ayırt edici performans Model 4'te gözlenmiştir (AUC = 0,899).

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M4415-Tam Metin

PROXIMAL ULNAR OSTEOTOMY WITHOUT ANNULAR LIGAMENT RECONSTRUCTION FOR NEGLECTED PEDIATRIC BADO TYPE I MONTEGGIA FRACTURES: A CASE SERIES

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Background: Neglected Monteggia fractures are uncommon but challenging pediatric injuries that may result in chronic radial head dislocation, pain, loss of forearm rotation, elbow dysfunction, cubitus valgus, and degenerative changes if left untreated (1,2). Although numerous surgical techniques have been described, the necessity of annular ligament reconstruction remains controversial (3–6). The present study evaluated the clinical and radiographic outcomes of proximal ulnar osteotomy without annular ligament reconstruction in children with neglected Bado type I Monteggia fractures.

Methods: Six consecutive pediatric patients with neglected Bado type I Monteggia fractures underwent surgical treatment. The mean age was 11.2 years (range, 8–15 years), and the mean interval from injury to surgery was 7.8 months (range, 5–12 months). A proximal metaphyseal ulnar osteotomy with dorsal angulation was performed in all patients to restore ulnar alignment and achieve indirect reduction of the radial head, followed by plate-and-screw fixation. Neither open reduction of the radial head nor annular ligament reconstruction was performed, as stable reduction was obtained after correction of the ulna, consistent with recent reports (4,6,7). The mean follow-up period was 6 months (range, 4–9 months).

Results: Radiographic union was achieved in all patients at a mean of 2 months. No redislocation, nonunion, infection, implant failure, or neurovascular complications occurred. At the final follow-up, elbow flexion ranged from 124° to 140°, pronation from 78° to 90°, and supination from 79° to 90°. Four patients achieved a Mayo Elbow Performance Index (MEPI) score of 100, while two patients scored 85, indicating excellent or good functional outcomes.

Conclusion: Restoration of ulnar alignment by proximal metaphyseal osteotomy with dorsal angulation provides stable reduction of the radial head and satisfactory short-term functional outcomes without routine annular ligament reconstruction or direct exposure of the radiocapitellar joint. These findings support growing evidence that accurate correction of ulnar deformity is the principal determinant of successful treatment in neglected pediatric Monteggia fractures (3,4,6–9).

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Figure 1: Preoperative lateral radiograph of Patient 1 demonstrating a neglected Bado type I Monteggia fracture with persistent anterior radial head dislocation and ulnar malunion.



Figure 2: Early postoperative radiograph of the same patient showing restoration of ulnar alignment with proximal metaphyseal dorsal angulation osteotomy, plate fixation, and successful indirect reduction of the radial head without annular ligament reconstruction.



M4416-Tam Metin

PEDIATRIC FOREIGN BODY INGESTION IN THE EMERGENCY DEPARTMENT: A 3-MONTH RETROSPECTIVE ANALYSIS AND REVIEW OF CURRENT MANAGEMENT GUIDELINES

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ABSTRACT

Background: Pediatric foreign body ingestion (FBI) is a frequent acute presentation in emergency departments (EDs). Rapid risk stratification and management are critical to prevent life-threatening complications.

Objective: To retrospectively evaluate the clinical characteristics, radiological findings, management strategies and outcomes of pediatric patients presenting with foreign body ingestion to a tertiary ED over a three-month period.

Methods: Electronic health records of 59 pediatric patients presenting with suspected FBI between May 6, 2026, and August 6, 2026, were screened using ICD-10 code T18. Cases with corrosive substance ingestion (n=2), inaccessible radiological data (n=1) and unconfirmed foreign bodies were excluded, resulting in a final cohort of 18 patients. Demographics, clinical features, physical object properties, anatomical locations, risk profiles and management outcomes were analyzed using SPSS 27.0.

Results: The cohort comprised 10 males (55.6%) and 8 females (44.4%), with a median age of 48 months (IQR: 17.75–70.75). Median time for the presentation was 2.5 hours. Foreign body locations included the upper GI tract (61.1%), lower GI tract (27.8%) and esophagus (11.1%). Asymptomatic presentation occurred in 88.9% of cases; dysphagia and pain were present only in esophageal impactions. Radiopaque items accounted for 94.4% (n=17) of cases, while 1 case involved a radiolucent item identified via computed tomography. High-risk objects (button batteries and magnets) constituted 33.3% (n=6). Low-risk objects were significantly larger in size than high-risk objects (p=0.040). Five patients (27.8%) underwent endoscopic retrieval and all 5 were hospitalized. Hospitalization was significantly associated with endoscopic intervention (p=0.001). No patients required surgery and zero mortality or procedural morbidity was observed.

Conclusion: Pediatric FBI can be safely managed with algorithm-driven risk stratification. Endoscopic intervention is required in less than a third of cases and emergency-driven conservative follow-up is safe for low-risk, asymptomatic gastric objects.

Keywords: Pediatric emergency medicine, Foreign body ingestion, Endoscopy, Button battery, Risk stratification.

1. INTRODUCTION

Pediatric foreign body ingestion (FBI) represents one of the most common acute presentations encountered in pediatric emergency departments (EDs) worldwide. Children, particularly toddlers between six months and three years of age are uniquely prone to FBI due to their

developmental stage characterized by oral exploration, emerging mobility, and incomplete swallowing coordination [1,2]. While most ingested objects pass spontaneously through the gastrointestinal (GI) tract without causing harm, approximately 10% to 20% of cases require endoscopic intervention, and less than 1% necessitate surgical management [3,4].

The clinical presentation of FBI in pediatric patients ranges from completely asymptomatic states to life-threatening acute emergencies. Symptoms, when present, are often non-specific and depend heavily on patient age, the anatomical site of impaction, and the physical characteristics of the ingested object [5]. Common symptoms include dysphagia, odynophagia, drooling, vomiting, neck pain, and respiratory distress secondary to tracheal compression. However, a significant proportion of pediatric ingestions occur unwitnessed by caregivers, posing a major diagnostic challenge to emergency physicians [6].

In recent years, the clinical landscape of pediatric FBI has evolved significantly due to changes in household consumer products. While traditional radiopaque objects such as coins remain the most frequently reported ingested items, there is an increasing incidence of high-risk foreign bodies, notably button batteries, high-powered neodymium magnets and sharp metallic objects [7,8]. Button batteries pose a severe threat of rapid tissue necrosis, mucosal burn, esophageal perforation and tracheoesophageal fistula formation through electrochemical reactions occurring within hours of impaction [8,9]. Consequently, international societies, including the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN), have updated their management algorithms to emphasize rapid risk stratification and timely intervention [9,10].

Despite established international guidelines, management approaches in real-world emergency care settings can vary based on institutional resources, pediatric subspecialty availability, and local patient demographics. Evaluating short-term epidemiological trends and clinical outcomes within tertiary pediatric emergency centers is crucial for optimizing acute management pathways and local health policies.

Therefore, this study aims to retrospectively evaluate the clinical characteristics, radiological findings, management strategies, and outcomes of pediatric patients presenting with foreign body ingestion to a tertiary emergency department over a three-month period, while contextualizing these findings within the framework of current literature and clinical guidelines.

2. METHODS

2.1. Study Design and Population

This single-center, retrospective, descriptive cross-sectional study was conducted in the Pediatric Emergency Department of Malatya Training and Research Hospital. Electronic health records were systematically screened using the hospital information management system (HBYS, Akgün Software) for international classification of diseases (ICD-10) diagnosis codes under T18 (Foreign body in alimentary tract) and its subcategories between May 6, 2026, and August 6, 2026.

Initially, a total of 59 pediatric patients presenting with suspected foreign body ingestion were identified. The study applied specific exclusion criteria to maintain cohort homogeneity and diagnostic validity: Ingestion of corrosive/caustic substances (n = 2) as chemical injuries

require distinct clinical and toxicological management algorithms despite ICD coding and inaccessible or incomplete radiological imaging data (n = 1).

Out of the remaining cases, 18 patients had radiologically or endoscopically verified foreign bodies. Patients in whom no foreign body was identified were excluded from the final analytical cohort. Thus, the final study population comprised 18 patients (n = 18).

2.2. Data Collection and Variable Definitions

Patient demographics (age, sex), time elapsed between ingestion and presentation (exposure time in hours), clinical presentation, complaints, radiological characteristics (radiopaque vs. radiolucent), anatomical location (esophagus, upper GI tract, lower GI tract), maximum dimension of the object in millimeters, surgical risk stratification, management modality (conservative vs. endoscopic vs. surgical), hospitalization, length of stay, and clinical outcomes (complications and mortality) were recorded.

Foreign bodies were categorized based on surgical risk profile. High-risk objects were classified as button batteries and high-powered magnets whereas low-risk objects were classified as coins, prayer beads, rubber fragments, hairpins, rings, and unidentified blunt metallic fragments.

All hospitalized patients scheduled for endoscopic retrieval received pre-procedural Anesthesiology consultation and were cleared as American Society of Anesthesiologists (ASA) Physical Status Class I.

2.3. Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 27.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as absolute numbers (n) and percentages (%). Descriptive continuous variables with non-normal distribution were expressed as medians and interquartile ranges (IQR; 25th–75th percentiles). Independent samples t-test was utilized to compare object sizes across risk categories. Associations between categorical variables were evaluated using Fisher's Exact Test. A two-tailed p-value of < 0.05 was considered statistically significant.

3. RESULTS

3.1. Demographic and Clinical Characteristics

Of the 18 evaluated pediatric cases, 10 (55.6%) were male and 8 (44.4%) were female. Anatomical localization revealed that foreign bodies were in the esophagus in 2 cases (11.1%), the upper gastrointestinal tract in 11 cases (61.1%), and the lower gastrointestinal tract in 5 cases (27.8%).

Except for the two patients with esophageal foreign body impaction, all patients were completely asymptomatic upon arrival. The two patients with esophageal impaction presented with symptoms of dysphagia and localized pain. No patients presented with severe complications such as acute respiratory distress, severe vomiting or abdominal pain.

Radiologically, 17 cases (94.4%) presented with radiopaque foreign bodies, whereas 1 case (5.6%) involved a radiolucent object. All ingested objects were classified as blunt objects.

Table 1. Quantitative Parameters of Pediatric Ingestion Cases (n = 18)

Variable	Median	Interquartile Range (IQR) (25% – 75%)
Age (months)	48.0	17.75 – 70.75
Time to Presentation / Exposure (hours)	2.5	1.00 – 5.25
Maximum Object Size (millimeters)	18.0	12.00 – 26.00

3.2. Risk Stratification, Management, and Clinical Outcomes

According to surgical risk classification, 6 cases (33.3%) were categorized as high-risk (button batteries and magnets), while 12 cases (66.7%) were classified as low risk (coins, prayer beads, rubber fragments, hairpins, rings, and 16 mm metallic fragments).

Interestingly, the mean size of low-risk objects was statistically significantly larger than that of high-risk objects (Independent samples t-test, $p = 0.040$).

Management outcomes showed that 6 patients (33.3%) were hospitalized, and 12 patients (66.7%) were discharged directly from the emergency department. Endoscopic foreign body removal was performed in 5 patients (27.8%), all of whom were cleared as ASA I by anesthesiology. The remaining 13 patients (72.2%) were managed conservatively with outpatient stool monitoring instructions. No patient required surgical intervention (0%).

All 6 hospitalized patients were observed for 1 day and discharged without any incident. No procedural or disease-related complications (e.g., mucosal burn, ulceration, perforation, or obstruction) occurred during management. Zero mortality was observed during clinical follow-up (0%).

3.3. Comparative Analysis

There was no statistically significant association between the presence of a high-risk foreign body and the need for endoscopic intervention (Fisher's Exact Test, $p = 0.615$).

However, a strong statistically significant association was observed between hospitalization status and the necessity for endoscopic intervention (Fisher's Exact Test, $p = 0.001$). Endoscopic removal was required in 83.3% ($n = 5/6$) of hospitalized patients, whereas no patients discharged directly from the emergency department underwent endoscopic intervention (0%).

4. DISCUSSION

Pediatric foreign body ingestion (FBI) remains a major cause of unscheduled visits to pediatric emergency departments (EDs), demanding prompt risk stratification to prevent severe complications. Over the past two decades, the diagnostic and therapeutic approach to pediatric FBI has shifted from aggressive immediate interventions toward algorithm-driven conservative management, balanced with emergency endoscopic retrieval for high-risk objects [1,2]. In this 3-month retrospective cohort, we evaluated the clinical profiles, imaging protocols and intervention outcomes of 18 pediatric patients, providing critical real-world insights from a tertiary care center.

4.1. Evolution of Guidelines and High-Risk Object Management

Over the last 20 years, international management guidelines, most notably from ESPGHAN, NASPGHAN and ESGE, have undergone major paradigm shifts regarding high-risk foreign bodies [1,2,3]. Historically, all ingested foreign bodies in the esophagus or stomach were

considered candidates for early endoscopic clearance. However, contemporary guidelines strongly emphasize risk stratification based on physical object properties (e.g., button batteries, high-powered neodymium magnets, sharp objects) and exposure duration [1,3]. Button batteries now represent a hyper-acute emergency; mucosal damage can initiate within 15–30 minutes, leading to esophageal perforation, mediastinitis, or fatal aortoenteric fistulas within two hours [3,8]. Current guidelines dictate that esophageal button batteries must be retrieved within 2 hours of presentation, whereas gastric button batteries may be monitored conservatively for up to 24–48 hours if the patient is completely asymptomatic and the exposure time is precise [2,3].

In our study, high-risk objects (button batteries and magnets) constituted 33.3% (n=6) of cases. Interestingly, while surgical risk profile did not show a statistically significant association with the need for endoscopic intervention (p=0.615), this finding is likely attributable to our conservative management of gastric button batteries in asymptomatic toddlers. Furthermore, low-risk objects (such as coins) were statistically significantly larger in maximum dimension than high-risk objects (p=0.040). This crucial finding illustrates that children readily swallow small, hazardous items like button batteries unnoticed, whereas larger low-risk items are often caught during oral exploration, raising immediate parental concern.

4.2. Surgical Indications and the Exposure Time Dilemma

Surgical intervention in pediatric FBI is traditionally reserved for cases with severe complications (e.g., bowel perforation, refractory obstruction, peritonitis) or failure of endoscopic retrieval, particularly in multiple magnet ingestions causing severe tissue necrosis across intestinal loops [7]. While large-scale multicenter studies report surgical rates of 0.5% to 1.5% [1,7], no patients in our cohort required surgical management, and zero mortality or procedural morbidity was observed.

A critical area where current literature and clinical guidelines still lack absolute consensus is the 'exposure time threshold' beyond which endoscopic intervention becomes ineffective or poses heightened procedural risk. Prolonged exposure times (>24 hours) for sharp or erodible objects are associated with deeply impacted mucosal edema, granulation tissue formation, and increased risk of inadvertent iatrogenic perforation during endoscopic manipulation [2,3]. Although NASPGHAN sets a 24-hour conservative limit for asymptomatic gastric objects, clear-cut evidence establishing an absolute hour mark that predicts endoscopic failure or mandates surgical conversion remains undefined in current literature. In our cohort, the median time to presentation was 2.5 hours (IQR: 1.0–5.25), indicating that early ED presentation in our region enabled safe, timely endoscopic interventions before tissue edema or fixation occurred.

4.3. Imaging Modalities: Plain Radiography, CT, and the Emergence of Ultrasound

Radiological assessment in our department followed a standardized safety protocol, executing full gastrointestinal tract plain radiographies (neck, chest, and abdominal X-rays) for all suspected cases. Plain radiography successfully visualized 94.4% (n=17) of cases due to the radiopaque nature of ingested items. However, radiolucent foreign bodies (e.g., plastic toys, organic matter, thin glass, wood) pose a distinct diagnostic hurdle [6,10].

In our series, a single patient (5.6%) ingested a radiolucent item. To confirm diagnosis and anatomical localization, non-contrast computed tomography (NCCT) was utilized. Although NCCT offers near-100% sensitivity and specificity for radiolucent objects, its routine use in

pediatrics is restricted due to ionizing radiation exposure [6]. In this context, point-of-care ultrasound (POCUS) and formal ultrasonography (USG) have emerged in pediatric emergency literature as promising, non-radiative diagnostic alternatives [5,10]. Recent studies by Chen et al. and Cohen et al. demonstrate that USG can effectively identify radiolucent gastrointestinal objects (such as plastic or wood) by detecting hyperechoic borders with posterior acoustic shadowing or localized gut wall thickening [5,10]. However, USG remains highly operator-dependent, limited by bowel gas interference, and is not yet incorporated as a primary screening tool in standard pediatric FBI algorithms [2,5]. Thus, while plain radiography remains the gold-standard initial screening tool, low-dose CT or targeted USG should be reserved for radiolucent suspicions or complicated presentations.

4.4. Hospitalization Criteria and Endoscopic Correlation

A major finding in our study was the absolute correlation between hospitalization status and endoscopic intervention (p=0.001). All patients who underwent endoscopic retrieval (27.8%, n=5) were hospitalized and received pre-procedural Anesthesiology clearance (ASA I status), whereas all patients managed conservatively (72.2%, n=13) were discharged directly from the ED with outpatient stool monitoring instructions. All hospitalized patients were safely discharged on post-procedure day 1.

This reflects a common trend in tertiary centers where hospitalization is primarily driven by procedural requirements (e.g., post-anesthesia observation, pediatric gastroenterology monitoring) rather than underlying clinical instability. Reviewing the current literature reveals a notable lack of standardized, objective 'hospitalization admission criteria' specifically tailored for pediatric FBI [4]. Most admissions in emergency care are decision-driven by the necessity for pediatric endoscopists and anesthesiologists. Establishing validated, objective risk scores to guide admission versus safe ED discharge in asymptomatic children with low-risk gastric objects remains an unmet need in pediatric emergency medicine [4].

4.5. Limitations

This study has several limitations. First, the small sample size (n=18) after rigorous exclusion criteria reduces statistical power, potentially masking subtle associations between risk profiles and management outcomes. Second, the single-center, short-term (3-month) retrospective cross-sectional design restricts the generalizability of the findings and prevents long-term outcome tracking. Third, the absolute absence of major surgical complications or long-term mucosal morbidity in our cohort, while clinically favorable, prevented us from analyzing risk factors associated with surgical conversion or severe morbidity.

5. CONCLUSION

In conclusion, pediatric foreign body ingestion can be effectively and safely managed in the emergency department using standardized risk-stratification pathways. Most patients with blunt, low-risk gastric foreign bodies can be safely managed conservatively with outpatient monitoring, reserving hospitalization and endoscopic intervention for esophageal impactions, symptomatic patients, or verified high-risk objects. Full GI tract plain radiography remains the primary diagnostic screening tool, whereas CT and emerging ultrasound modalities should be judiciously selected for radiolucent presentations. Future multicenter prospective studies are

warranted to establish objective hospitalization criteria and precise time-to-intervention thresholds for high-risk ingestions.

6. ACKNOWLEDGEMENTS

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M4417-Tam Metin

CLINICAL PITFALLS IN PEDIATRIC GASTROINTESTINAL PERFORATION: THREE CASES, THREE LESSONS

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ABSTRACT

Introduction

Gastrointestinal perforation is a life-threatening surgical emergency in children in which delayed diagnosis may result in sepsis, multiple organ dysfunction, and death. Early diagnosis may be challenging because clinical presentation often mimics other intra-abdominal diseases, while laboratory and imaging findings can be misleading. We aimed to present three pediatric cases of gastrointestinal perforation illustrating distinct diagnostic, etiological, and medicolegal pitfalls encountered in the pediatric emergency department.

Methods

Three pediatric patients with surgically confirmed gastrointestinal perforation managed at a tertiary pediatric emergency department were retrospectively reviewed. Clinical presentation, laboratory and imaging findings, operative findings, and factors contributing to diagnostic uncertainty were analyzed.

Results

The first patient was initially diagnosed with acute pancreatitis because of elevated serum amylase and lipase levels but was found to have extensive gastric necrosis and perforation, raising suspicion of intentional corrosive ingestion. The second patient presented with septic shock, and surgical findings together with review of previous medical records revealed recurrent injuries consistent with non-accidental trauma. The third patient had initial computed tomography findings suggestive of acute cholecystitis without evidence of perforation; however, serial physical examinations prompted repeat imaging, leading to the diagnosis of gastric perforation. Each case highlighted a different cognitive pitfall, including diagnostic anchoring on laboratory findings, failure to recognize patterns of child abuse, and premature diagnostic closure based on initial imaging.

Conclusion

These cases demonstrate that gastrointestinal perforation in children should be diagnosed through continuous clinical reassessment rather than reliance on isolated laboratory or imaging findings. Serial physical examination, etiological reassessment, review of previous medical records, and repeat imaging when clinically indicated are essential for improving diagnostic accuracy and reducing delayed diagnosis in pediatric emergency practice.

Clinical Pitfalls in Pediatric Gastrointestinal Perforation: Three Cases, Three Lessons

Introduction

Gastrointestinal perforation is a life-threatening surgical emergency in children that may result in sepsis, multiple organ dysfunction, and death when diagnosis is delayed. Clinical presentation varies according to the site and etiology of the perforation, as well as the time elapsed before presentation, while laboratory and imaging findings may be nonspecific during the early stages. In particular, free intraperitoneal air may not be evident on plain radiographs in cases of traumatic gastrointestinal perforation, and initial imaging alone may be insufficient to exclude the diagnosis. Furthermore, gastrointestinal perforation frequently mimics other intra-abdominal conditions, increasing the risk of diagnostic delay. In this case series, we present three pediatric patients with gastrointestinal perforation, each illustrating a distinct diagnostic, etiological, or medicolegal pitfall encountered in the pediatric emergency department.

Case 1

A 17-year-old girl was referred to our pediatric emergency department from another hospital with a preliminary diagnosis of acute pancreatitis based on elevated serum amylase (204 U/L) and lipase (678 U/L) levels. On presentation, she appeared critically ill with abdominal distension, diffuse tenderness, and guarding. Despite the laboratory findings suggestive of pancreatitis, her physical examination was more consistent with an acute surgical abdomen. A nasogastric tube drained brown, turbid gastric contents, and an upright abdominal radiograph demonstrated free subdiaphragmatic air, raising suspicion of gastrointestinal perforation. Following hemodynamic stabilization and initiation of broad-spectrum antibiotic therapy, the patient underwent emergency laparotomy.

Surgical exploration revealed approximately 3 liters of contaminated intraperitoneal fluid containing food debris, together with extensive gastric necrosis and a large gastric perforation. Wedge resection of the necrotic gastric tissue was performed, followed by primary repair of the defect.

The extensive necrotic appearance of the stomach raised suspicion of corrosive ingestion and prompted reassessment of the underlying etiology. Further history revealed that the patient had been receiving psychiatric follow-up for an eating disorder and was being treated with sertraline and olanzapine. She also had a history of self-harming behavior and recent social withdrawal. Although corrosive ingestion could not be confirmed, the intraoperative findings together with the psychiatric history strongly suggested intentional ingestion of a corrosive agent as the underlying cause of the perforation. Despite surgical intervention and intensive postoperative care, the patient died in the pediatric intensive care unit.

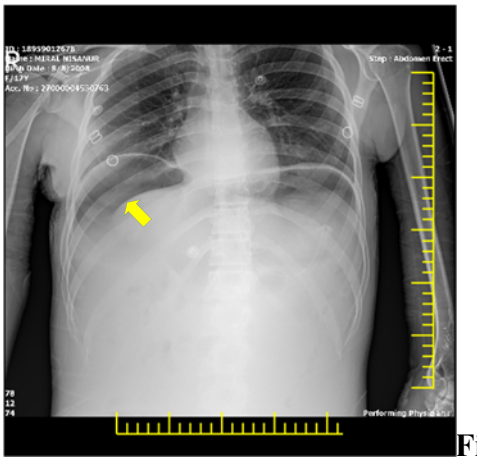


Figure 1. Upright abdominal radiograph showing free subdiaphragmatic air beneath the right hemidiaphragm (yellow arrow)

Case 2

A 6-year-old boy with cerebral palsy and mild cognitive developmental delay presented to our pediatric emergency department with a 3-day history of abdominal pain, bilious vomiting, and failure to pass stool or flatus. On admission, he was lethargic, hypotensive, and in septic shock. Physical examination revealed abdominal distension, diffuse tenderness, guarding, and rebound tenderness. An upright abdominal radiograph demonstrated free subdiaphragmatic air, and feculent material was drained through a nasogastric tube. Following aggressive fluid resuscitation, initiation of broad-spectrum antibiotics, and norepinephrine infusion, the patient underwent emergency laparotomy.

Surgical exploration revealed a gastric perforation at the pyloric region, complete transection of the small bowel approximately 1 cm distal to the ligament of Treitz, and organized intra-abdominal hematomas. The gastric and intestinal injuries were primarily repaired.

Because the intraoperative findings were highly suggestive of traumatic injury, the patient's history was reassessed and previous medical records were reviewed. Two months earlier, he had presented with a scalp hematoma and altered mental status without any reported history of trauma. One month later, he returned with recurrent unexplained hematomas involving the scalp and neck. Hematologic evaluation performed because of the recurrent hematomas revealed no evidence of an underlying bleeding disorder. Review of his medical records further demonstrated multiple emergency department visits over the preceding two years for unexplained bruising and swelling, as well as surgical treatment for a femoral fracture one month before the current admission. Considering the recurrent unexplained injuries, recent femoral fracture, and traumatic intraoperative findings, non-accidental trauma was strongly suspected. A medicolegal report was filed, and the child was referred to social services for further evaluation.

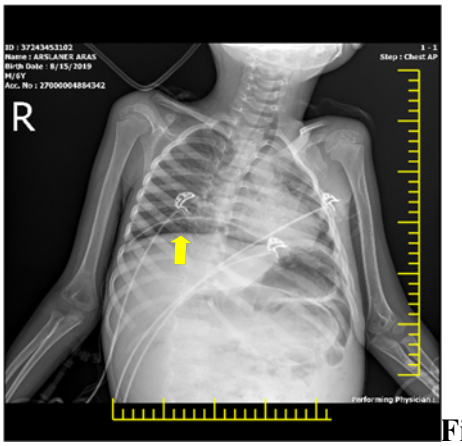


Figure 2. Upright abdominal radiograph demonstrating free intraperitoneal air beneath the right hemidiaphragm.

Case 3

A 16-year-old boy presented with a 1-day history of abdominal pain and four to five episodes of vomiting. On initial examination, he had diffuse abdominal tenderness, most prominent in the epigastric region, without guarding or rebound tenderness. Laboratory evaluation revealed a white blood cell count of 20,050/mm³ and a C-reactive protein (CRP) level of 1 mg/L. Liver function tests, serum amylase, and lipase levels were within normal limits. Contrast-enhanced abdominal computed tomography (CT) demonstrated marked gallbladder distension, gallbladder wall thickening, and pericholecystic inflammatory changes, without free intraperitoneal air or free fluid. These findings were initially considered suggestive of acute cholecystitis, and admission to the pediatric gastroenterology service was planned.

During observation in the pediatric emergency department, serial physical examinations revealed progressive clinical deterioration. The patient first developed guarding and rebound tenderness in the right lower quadrant, followed by generalized peritonitis with a rigid abdomen. His CRP level increased to 120 mg/L. Although a repeat upright abdominal radiograph again showed no free subdiaphragmatic air, worsening clinical findings prompted repeat abdominal CT. The follow-up CT demonstrated persistent gallbladder hydrops together with enlargement of the appendix to 8 mm with wall thickening, multiple foci of mesenteric free air, and free fluid between the bowel loops. Based on the progression to an acute surgical abdomen and the repeat CT findings, the patient underwent emergency surgery. Appendectomy was performed, and surgical exploration additionally revealed a small gastric perforation, which was repaired primarily.



Figure 3. Upright abdominal radiograph of Case 3 demonstrating the absence of free subdiaphragmatic air.

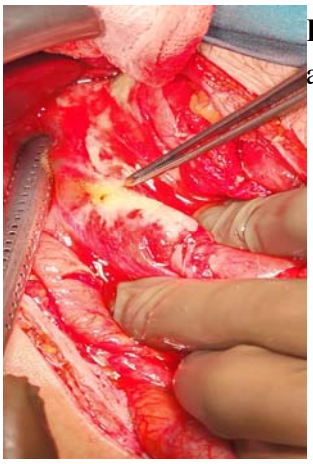


Figure 4. Intraoperative photograph demonstrating a small gastric antral perforation (indicated by the forceps).

Discussion and Conclusion

The three cases presented here demonstrate that gastrointestinal perforation in children is not merely a surgical diagnosis but a complex clinical entity requiring integration of clinical reasoning, serial physical examinations, etiological reassessment, and careful review of previous medical records.

	Case 1	Case 2	Case 3
Initial diagnosis	Acute pancreatitis	Bleeding disorder	Acute cholecystitis
Finding that changed the diagnosis	Peritonitis and free air on upright abdominal radiograph	Traumatic intraoperative findings and review of previous medical records	Serial physical examinations and repeat abdominal CT
Critical pitfall	Corrosive ingestion / intentional self-harm	Child abuse	Overreliance on initial imaging
Key clinical lesson	Laboratory findings should not outweigh clinical assessment	Previous healthcare encounters should be reviewed comprehensively	Serial physical examinations and repeat imaging, when indicated, may change the diagnosis

Table 1. Summary of the clinical characteristics, diagnostic pitfalls, and key learning points of the three cases.

In **Case 1**, elevated serum amylase and lipase levels could easily have led to diagnostic anchoring on acute pancreatitis. However, hyperamylasemia and hyperlipasemia may also occur in several non-pancreatic abdominal conditions, including gastrointestinal perforation. Therefore, biochemical abnormalities should never supersede clinical findings suggestive of peritonitis or an acute surgical abdomen. In adolescents presenting with gastrointestinal perforation, corrosive substance ingestion, underlying psychiatric disorders, and intentional self-harm should also be considered during etiological evaluation.

Case 2 illustrates that child abuse is often recognized not through a single injury but through a pattern of recurrent unexplained injuries over time. Severe intra-abdominal injuries, including bowel perforation and pancreatic injury, are well-recognized indicators of non-accidental trauma. The absence of an underlying bleeding disorder despite recurrent hematomas should not terminate the diagnostic process. Instead, previous emergency department visits, fracture history, inconsistencies between the reported mechanism of injury and clinical findings, and operative findings should be evaluated collectively. Current recommendations emphasize comprehensive assessment, including detailed history, physical examination, imaging studies,

and exclusion of underlying bone disorders when evaluating suspected abusive fractures in children.

In **Case 3**, the absence of radiological evidence of perforation on the initial CT scan and imaging findings suggestive of acute cholecystitis did not eliminate the need for continued clinical observation. Free intraperitoneal air may be absent on both plain radiographs and initial CT imaging, particularly during the early stages of gastrointestinal perforation. Progressive peritoneal signs should therefore prompt repeated clinical assessment, early surgical consultation, and repeat imaging when clinically indicated. In addition, inflammatory changes secondary to gastric perforation may extend to adjacent structures, resulting in gallbladder abnormalities that mimic acute cholecystitis.

Overall, these three cases highlight distinct cognitive pitfalls that may contribute to delayed diagnosis of gastrointestinal perforation in the pediatric emergency setting, including overreliance on laboratory findings, premature diagnostic closure, and failure to integrate previous medical records into clinical decision-making. Recognition of clinical deterioration through serial physical examinations, continuous reassessment of the differential diagnosis, careful etiological investigation, and timely repeat imaging remain fundamental to improving diagnostic accuracy and patient outcomes.

Keywords: gastrointestinal perforation; acute abdomen; child abuse; corrosive substance ingestion; serial physical examination; pediatric emergency medicine.

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M4418-Özet Metin

PEDİATRİK HASTALARDA MOYAMOYA HASTALIĞI: GÖRÜNTÜLEME BULGULARI

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AMAÇ

Moyamoya hastalığı, intrakraniyal internal karotid arterlerin terminal segmentleri ve proksimal dallarında ilerleyici stenoz veya oklüzyon ile karakterize, nadir görülen serebrovasküler bir hastalıktır. Çocukluk çağında geçici iskemik ataklar veya akut nörolojik defisit ile ortaya çıkabilmektedir. Bu bildiride, akut fokal nörolojik bulgularla başvuran iki pediatrik hastada Moyamoya hastalığının manyetik rezonans görüntüleme (MRG) ve dijital substraksiyon anjiyografi (DSA) bulgularının sunulması amaçlanmıştır.

YÖNTEM

Akut nörolojik defisit ile başvuran ve görüntüleme incelemeleri sonucunda Moyamoya hastalığı tanısı alan iki pediatrik hastanın kraniyal bilgisayarlı tomografi (BT), difüzyon ağırlıklı MRG ve DSA görüntüleri retrospektif olarak değerlendirildi. MRG'de akut iskemik değişikliklerin varlığı ve dağılımı, DSA'da ise intrakraniyal internal karotid arterlerin terminal segmentlerindeki stenozlar ve buna eşlik eden kollateral dolaşım paterni değerlendirildi.

BULGULAR

İlk hasta 6 yaşında erkek çocuktu. Birkaç gündür devam eden baş ağrısı, sol kolda güçsüzlük ve duyu kaybı ile başvuran hastada uykuya eğilim ve sol üst ekstremitede motor güç kaybı mevcuttu. Difüzyon ağırlıklı MRG'de sağ parieto-oksipital bölgede akut iskemi ile uyumlu difüzyon kısıtlanması izlendi. DSA incelemesinde bilateral supraklinoid internal karotid arter segmentlerinde stenoz ve bazal ganglionlar düzeyinde belirgin kollateral damar ağı saptandı. Kollateral damar ağı karakteristik "sigara dumanı görünümü" oluşturmaktaydı.

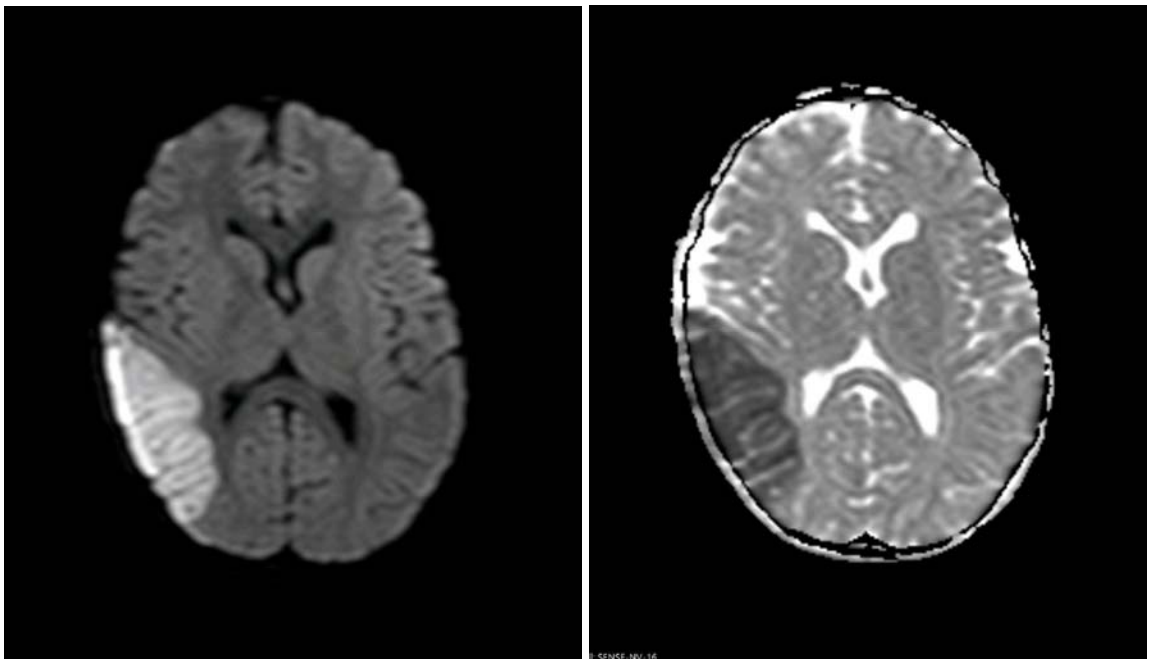
İkinci hasta 5 yaşında erkek çocuktu ve akut gelişen sağ taraflı güçsüzlük ile başvurdu. Kraniyal BT'de sağ anterior frontal lob ile bilateral frontal ve parietal loblarda hipodens parankimal alanlar izlendi ve bunun üzerine difüzyon MRG gerçekleştirildi. Difüzyon ağırlıklı görüntülerde bilateral serebral hemisferlerde hiperintens, ADC görüntülerinde hipointens alanlar izlenerek bulgular akut dönem enfarktları ile uyumlu değerlendirildi. DSA incelemesinde bilateral supraklinoid internal karotid arter segmentlerinde stenoz ve buna eşlik eden belirgin kollateral dolaşım paterni izlendi.

Her iki hastada da MRG, akut iskemik beyin hasarını ortaya koyarken, DSA'da internal karotid arterlerin terminal segmentlerindeki stenozlara eşlik eden karakteristik kollateral dolaşım paterni tanıya yönlendirdi.

SONUÇ

Çocukluk çağında akut fokal nörolojik defisit ve iskemik beyin hasarı saptandığında, altta yatan vasküler nedenler göz önünde bulundurulmalıdır. MRG, akut iskemik değişikliklerin

gösterilmesinde önemli bir yöntem olmakla birlikte, Moyamoya hastalığının karakteristik vasküler paterninin ortaya konulmasında DSA temel görüntüleme yöntemidir. Özellikle bilateral terminal internal karotid arter stenozu ve belirgin kollateral damar ağının birlikte görülmesi, Moyamoya hastalığı açısından tanısal önem taşımaktadır. Erken ve doğru tanı, hastaların uygun tedavi ve revaskülarizasyon planlamasına yönlendirilmesi açısından önemlidir.



Şekil 1: Difüzyon ağırlıklı görüntülerde sağ parieto-oksipital bölgede hiperintens, ADC haritasında hipointens izlenen, akut iskemi ile uyumlu difüzyon kısıtlanması.



Şekil 2: Sağ CCA dijital substraksiyon anjiyografisi (DSA); terminal İCA'da şiddetli darlık ile birlikte bazal ganglion düzeyinde karakteristik "sigara dumanı görünümü" (puff of smoke) oluşturan kollateral damar ağı izlenmektedir.

M4419-Tam Metin

TERRA FİRMA-FORME DERMATOZU: FARKLI KLİNİK YERLEŞİM GÖSTEREN İKİ OLGU

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Özet

Terra firma-forme dermatozu (TFFD), kirli görünüm veren hiperpigmente plaklarla karakterize, nadir görülen benign bir keratinizasyon bozukluğudur. Bu bildiride, farklı anatomik bölgelerde yerleşim gösteren 10 ve 8 yaşlarındaki iki çocuk TFFD olgusu sunulmuştur. Her iki olguda da su ve sabunla temizlenmeyen asemptomatik hiperpigmente lezyonlar, %70 izopropil alkol ile silme testi sonrasında tamamen kaybolmuş ve TFFD tanısı doğrulanmıştır. Bu olgular, çocukluk çağında görülen kirli görünümlü hiperpigmente lezyonların ayırıcı tanısında TFFD'nin akılda tutulması gerektiğini ve alkol silme testinin tanıda hızlı, kolay ve güvenilir bir yöntem olduğunu göstermektedir

Anahtar kelimeler: Terra firma-forme dermatozu, çocuk, hiperpigmentasyon, alkol silme testi, olgu sunumu.anıda hızlı, kolay ve güvenilir bir yöntem olduğunu göstermektedir

Giriş

Terra firma-forme dermatozisi (TFFD), ilk kez Duncan ve arkadaşları tarafından 1987 yılında tanımlanan, benign ve sıklıkla gözden kaçan edinilmiş bir keratinizasyon bozukluğudur. Klinik olarak en sık çocuk ve adölesanlarda görülmekle birlikte her yaş grubunda ortaya çıkabilir. Hastalık; boyun, gövde, ekstremiteler ve fleksural alanlarda yerleşen, kirli görünüm veren kahverengi-siyah, retiküler veya verrüköz hiperpigmente plaklarla karakterizedir. Lezyonlar normal su ve sabunla temizlenmezken, %70 izopropil veya etil alkol ile mekanik silme sonrasında tamamen kaybolması tanısal özelliğidir.

TFFD'nin etiyopatogenezi tam olarak bilinmemekle birlikte, keratinosit maturasyonunda gecikme, melanin, sebum, ter ve korneositlerin kompakt birikimi sonucu geliştiği düşünülmektedir. Hastalık asemptomatik olduğundan sıklıkla kozmetik kaygılar nedeniyle dermatoloji polikliniğine başvurulur. Klinik görünümü nedeniyle akantozis nigrikans, dermatosis neglecta, konfluent ve retiküle papillomatozis, pityriasis versicolor ve postinflamatuvar hiperpigmentasyon ile karışabilmektedir. Bu nedenle gereksiz biyopsi ve laboratuvar tetkiklerine yol açabilmektedir.

Bu olgu sunumunda, farklı anatomik bölgelerde yerleşim gösteren ve alkolle silme testi ile tanısı doğrulanan iki Terra firma-forme dermatozisi olgusunun klinik özellikleri, ayırıcı tanısı ve tanısal yaklaşımı sunulmuştur.

Olgu 1

Hasta: 8 yaşında erkek.

Başvuru şikâyeti: Yaklaşık 1 yıldır karın bölgesinde giderek belirginleşen kahverengi lekeler.

Öykü: Hastanın lezyonları asemptomatikti. Kaşıntı, ağrı veya yanma tariflemiyordu. Düzenli banyo yapmasına rağmen lezyonların kaybolmadığını, sabun ve lifle kuvvetli şekilde temizlemeye çalışmasına rağmen düzelme olmadığını ifade etti. Bilinen sistemik hastalığı, düzenli ilaç kullanımı ve aile öyküsü yoktu.

Dermatolojik muayene: Abdomenin her iki lateralinde ve suprapubik bölgede simetrik dağılım gösteren, kirli görünüm veren kahverengi, retiküler hiperpigmente plaklar izlendi.



(Şekil 1)

Ayırıcı tanı: Dermatosis neglecta, akantozis nigrikans, konfluent-retiküle papillomatozis ve postinflamatuvar hiperpigmentasyon düşünüldü.

Tanısal yaklaşım: %70 izopropil alkol emdirilmiş gazlı bez ile mekanik silme testi uygulandı.



(Şekil 2)

Sonuç: Lezyonların tamamen kaybolduğu ve altında normal deri görünümünün ortaya çıktığı izlendi. İşleme bağlı hafif geçici eritem gelişti. Klinik olarak Terra firma-forme dermatozisi tanısı konuldu.

Tedavi ve izlem: Hastaya hastalığın benign olduğu anlatıldı. Ek tedavi verilmedi; nüks halinde izopropil alkol ile temizleme önerildi.

Olgu 2

Hasta: 10 yaşında erkek.

Başvuru şikâyeti: Yaklaşık 8 aydır sağ ön kol ve dirsek çevresinde giderek belirginleşen kahverengi lekeler.

Öykü: Lezyonlar asemptomatikti. Düzenli kişisel hijyenine rağmen pigmentasyonun kaybolmadığını, çeşitli sabunlar ve nemlendiriciler kullanmasına rağmen düzelme olmadığını belirtti. Özgeçmişinde sistemik hastalık, ilaç kullanımı veya travma öyküsü bulunmuyordu.

Dermatolojik muayene: Sağ ön kol fleksör yüzünde, dirsekten el bileğine kadar uzanan düzensiz sınırlı, retiküler görünüm gösteren kahverengi hiperpigmente plaklar mevcuttu.



(Şekil 3)

Ayırıcı tanı: Dermatosis neglecta, akantozis nigrikans, konfluent-retiküle papillomatozis ve postinflamatuvar hiperpigmentasyon düşünüldü.

Tanısal yaklaşım: %70 izopropil alkol emdirilmiş gazlı bez ile lezyonlara mekanik silme testi uygulandı.



(Şekil 4)

Sonuç: Lezyonların tamamen temizlendiği ve normal deri görünümünün ortaya çıktığı gözlendi. İşlem sonrasında hafif geçici eritem gelişti. Klinik olarak Terra firma-forme dermatozisi tanısı konuldu.

Tedavi ve izlem: Hastaya hastalığın benign karakteri anlatıldı. Ek tedavi başlanmadı; nüks gelişmesi halinde izopropil alkol ile silme uygulanabileceği konusunda bilgilendirildi.

Tartışma

Terra firma-forme dermatozu (TFFD), keratinizasyon sürecindeki gecikmeye bağlı geliştiği düşünülen, benign ve sıklıkla tanısı gözden kaçan edinilmiş bir pigmentasyon bozukluğudur. Hastalık en sık çocukluk ve adölesan dönemde görülmekte olup, kirli görünüm veren kahverengi-gri makül ve plaklarla karakterizedir. Lezyonlar çoğunlukla asemptomatik olduğundan hastalar kozmetik kaygılar nedeniyle dermatoloji polikliniklerine başvurmakta, hastalığın nadir bilinmesi nedeniyle tanıda gecikmeler yaşanabilmektedir. Bizim olgularımızın da 8 ve 10 yaşlarında olması, asemptomatik seyretmesi ve uzun süre devam etmesine rağmen rutin banyo ile düzelmemesi literatürde bildirilen tipik klinik özelliklerle uyumludur.

TFFD'nin patogenezi tam olarak aydınlatılamamış olmakla birlikte, keratinosit maturasyonunda gecikme sonucunda melanin, sebum, ter ve kompakt korneositlerin epidermiste birikmesiyle geliştiği düşünülmektedir. Hastalıkta kişisel hijyen genellikle normaldir ve lezyonların kirli görünümü hijyen yetersizliğini yansıtmaz. Bu nedenle hastaların gereksiz yere hijyen eksikliği ile ilişkilendirilmesi psikososyal açıdan olumsuz sonuçlar doğurabilmektedir. Bazı yayınlarda atopik dermatit, kserozis kutis ve diğer epidermal bariyer bozuklukları ile birliktelik bildirildiğinden, bu hastalarda TFFD'nin akılda tutulması önerilmektedir.

TFFD'nin en önemli özelliği, klinik görünümü nedeniyle çok sayıda hiperpigmentasyon nedeni ile karışabilmesidir. Özellikle dermatosis neglecta, akantozis nigrikans, konfluent-retiküle papillomatozis, pityriasis versicolor ve postinflamatuvar hiperpigmentasyon ayırıcı tanıda değerlendirilmelidir. Dermatosis neglecta ile benzer klinik görünüm göstermesine rağmen, dermatosis neglecta daha çok belirgin hijyen yetersizliği veya ağrı, immobilizasyon ve nörolojik hastalık gibi nedenlerle yetersiz temizlik sonucu gelişirken, TFFD'de hastaların kişisel hijyeni genellikle normaldir. Bu ayrımın yapılması gereksiz laboratuvar incelemeleri, biyopsi ve tedavilerin önüne geçilmesi açısından önem taşımaktadır.

Tanıda en önemli yöntem %70 izopropil veya etil alkol ile yapılan mekanik silme testidir. Lezyonların alkol ile tamamen ortadan kalkması hem tanıyı doğrulamakta hem de eş zamanlı tedavi sağlamaktadır. Bu basit, ucuz ve noninvaziv yöntem sayesinde gereksiz invaziv girişimler önlenebilmekte ve hastalar kısa sürede tedavi edilebilmektedir. Bizim her iki olgumuzda da alkol silme testi sonrasında lezyonların tamamen kaybolması tanıyı doğrulamış ve ek tetkik gereksinimini ortadan kaldırmıştır.

Sonuç olarak, Terra firma-forme dermatozu özellikle çocukluk çağında görülen, kolaylıkla gözden kaçabilen ancak basit bir klinik test ile tanısı konulabilen bir dermatozdur. Kirli görünüm veren, su ve sabunla temizlenmeyen asemptomatik hiperpigmente lezyonlarla başvuran hastalarda TFFD mutlaka akılda tutulmalı ve gereksiz tetkik veya tedavilere başvurmadan önce alkol silme testi uygulanmalıdır. Sunulan iki olgu, hastalığın farklı anatomik bölgelerde görülebileceğini ve dikkatli klinik değerlendirme ile kolaylıkla tanınabileceğini bir kez daha göstermektedir.

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M4420-Özet Metin

GLOBAL RESEARCH ON PEDIATRIC READINESS IN EMERGENCY DEPARTMENTS: A BIBLIOMETRIC ANALYSIS

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Abstract

Background: Pediatric readiness denotes an emergency department's capacity to provide safe, timely, and age-appropriate care for children. Although readiness has become an increasingly prominent quality and policy priority, the structure and evolution of its evidence base have not been comprehensively mapped.

Objective: To characterize publication growth, sources, geographic distribution, citation influence, and thematic evolution in research on pediatric readiness in hospital emergency departments. **Methods:** The Web of Science Core Collection was searched for 2000–2025 using terms related to pediatric readiness, preparedness, readiness scores, and pediatric emergency care coordinators in hospital emergency departments. Article and review records were eligible. After title and abstract screening, 100 of 128 records were included. Bibliometric analyses were performed with the bibliometrix package through Biblioshiny.

Results: The 100 documents were published in 28 sources between 2007 and 2025 and involved 521 authors. Annual publication output increased by 12.25%, with 90% of papers appearing from 2018 onward and a peak of 18 papers in 2023. Pediatric Emergency Care was the leading source (n=19). The United States contributed to 96 documents and accounted for 2,586 of 2,604 citations; international co-authorship was 12%. The most cited paper was the 2015 national assessment of emergency department pediatric readiness (349 citations). The leading author keyword was "pediatric readiness" (n=25), followed by simulation (n=11) and quality improvement (n=10). Thematic emphasis evolved from preparedness toward simulation and quality improvement, and more recently toward formal readiness frameworks, pediatric emergency care coordinators, and trauma-center outcomes.

Conclusions: Pediatric readiness research has expanded rapidly but remains geographically concentrated. Future work should prioritize multinational validation, implementation in diverse health systems, standardized outcome measures, and collaborative research addressing resource-limited settings.

Keywords: pediatric readiness; emergency department; pediatric emergency medicine; bibliometric analysis; quality improvement; simulation; emergency care coordinator

Table 1. Main characteristics of the bibliometric dataset

Indicator	Value
Timespan	2007–2025

Indicator	Value
Documents	100
Sources	28
Authors	521
Single-authored documents	0
Co-authors per document	10.3
International co-authorship	12%
Author keywords	160
References	1,880
Total citations	2,604
Average citations per document	26.04
Average document age	5.05 years
Annual growth rate	12.25%

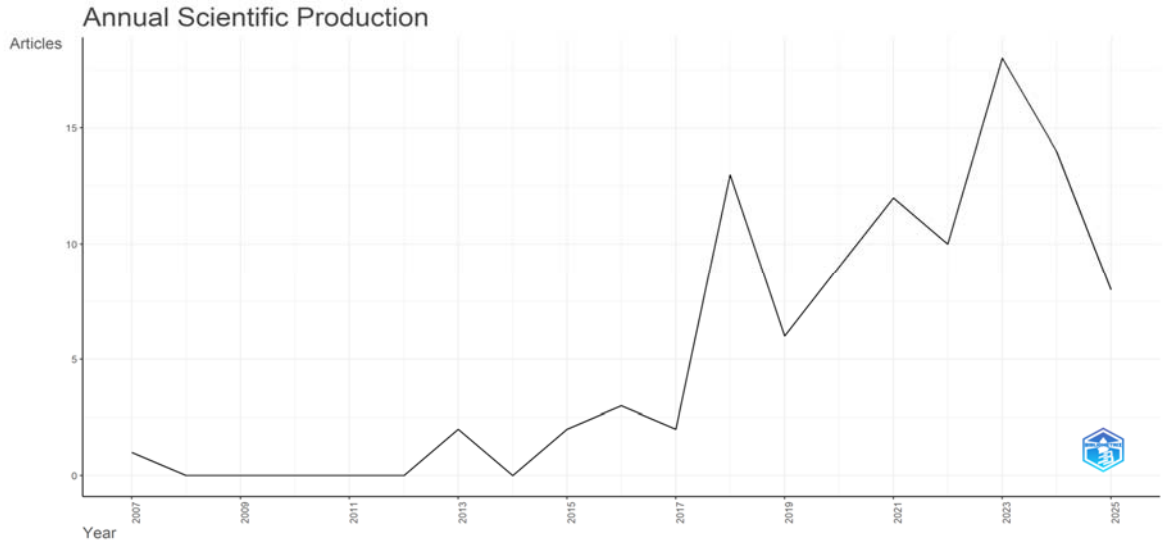


Figure 1. Annual scientific production on pediatric readiness in emergency departments, 2007–2025.

Table 2. Most productive publication sources

Rank	Source	Documents
1	Pediatric Emergency Care	19
2	Journal of Pediatrics	7
3	Academic Emergency Medicine	6
3	JAMA Network Open	6
3	Journal of the American College of Emergency Physicians Open	6
3	Pediatrics	6
7	Clinical Pediatric Emergency Medicine	5
7	Journal of Emergency Nursing	5
9	Annals of Emergency Medicine	4
9	JAMA Pediatrics	4
9	Journal of Trauma and Acute Care Surgery	4
9	Journal of Emergency Medicine	4

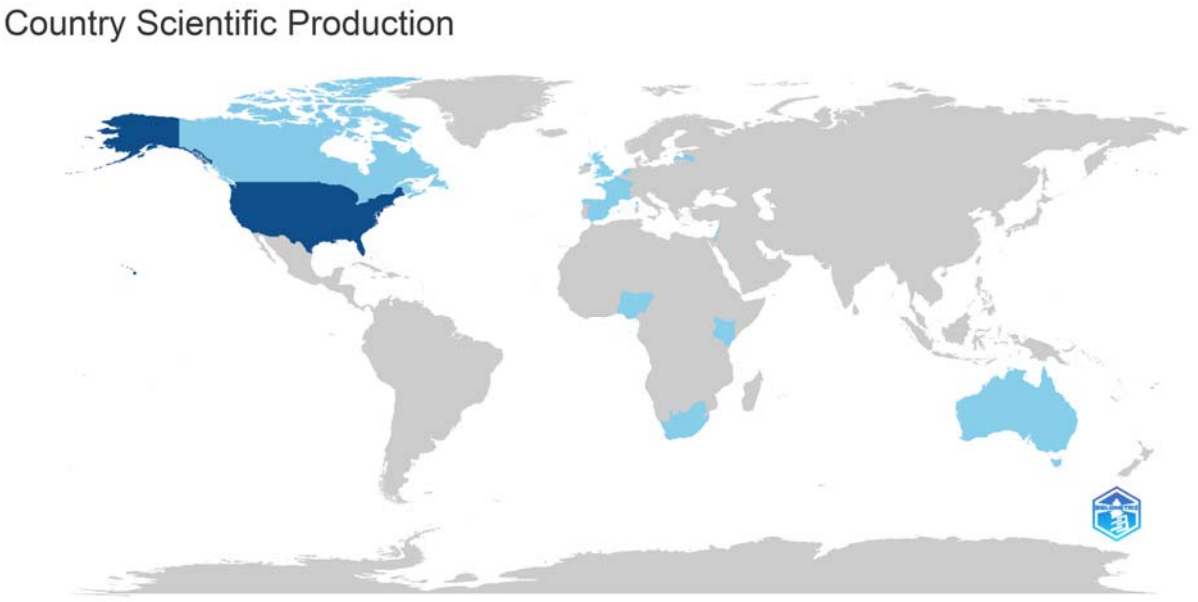


Figure 2. Geographic distribution of scientific production. Shading indicates the presence and relative frequency of country affiliations; documents with multinational authorship may be counted for more than one country.

M4422-Tam Metin

EMERGENCY MANAGEMENT OF THE PAEDIATRIC PATIENTS PRESENTING WITH CONVULSIVE STATUS EPILEPTICUS

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ABSTRACT

Introduction:
Convulsive status epilepticus (CSE) is one of the most urgent neurological emergencies in childhood, with an incidence of 10–40 per 100,000 and substantial morbidity. As defined, "status epilepticus is an abnormally prolonged seizure or recurrent seizures without complete recovery to baseline," and rapid intervention is essential to prevent irreversible neuronal injury.

Discussion:
The pathophysiology of CSE reflects failure of endogenous seizure-terminating mechanisms, internalisation of GABA-A receptors, recruitment of NMDA/AMPA receptors, neuroinflammation, blood–brain barrier disruption, and excitotoxic calcium-mediated neuronal death.

Emergency management prioritises airway, breathing, circulation, glucose correction, and prompt benzodiazepine administration. Evidence supports midazolam as the most effective first-line agent, particularly via buccal or intranasal routes. When seizures persist beyond 20 minutes, second-line agents—fosphenytoin/phenytoin, levetiracetam, valproate, or phenobarbital—demonstrate comparable efficacy, with drug selection guided by respiratory status, hemodynamic stability, underlying etiology, and age-specific considerations. Refractory CSE requires escalation to continuous anesthetic infusions and paediatric intensive care.

Conclusion:
Early recognition, mechanism-based drug selection, and timely escalation of therapy are essential to prevent long-term neurological sequelae. Effective management of pediatric CSE relies on rapid decision-making and a multidisciplinary approach, which together significantly improve clinical and neurological outcomes.

Keywords: status epilepticus, seizure, pediatric, emergency management

INTRODUCTION

Epilepsy affects 0.5%–1% of children, peaking in infancy, and results from abnormal, excessive, or synchronous cortical/subcortical neuronal discharges that may be focal or generalized (1–3). Status epilepticus (SE)—an emergency occurring in 10–40 per 100,000 people—results when seizure-terminating mechanisms fail, leading to abnormally prolonged or recurrent seizures without baseline recovery between episodes (1–3,5). Convulsive SE (CSE)

carries a 2.7%–8% mortality rate and a 10%–20% morbidity rate, including cognitive impairment, focal deficits, and hemodynamic instability (1,3,5). SE presents as: (1) CSE (generalized tonic–clonic seizures with postictal impairment), (2) nonconvulsive SE (continuous/fluctuating impaired awareness), or (3) epilepsia partialis continua (recurrent focal deficits without impaired awareness) (3,4). Under the 2015 International League Against Epilepsy (ILAE) revised operational definition, treatment must begin at time point t_1 (abnormally prolonged seizure duration) and escalate by t_2 to prevent irreversible neuronal injury, death, or network alteration (1).

ETIOLOGY AND PATHOPHYSIOLOGY

Status epilepticus (SE) is a clinical state driven by diverse etiologies that primarily dictate overall prognosis. Known (symptomatic) causes are predominantly structural (e.g., developmental cortical disorders, tuberous sclerosis, traumatic brain injury, perinatal insults, tumors) or genetic, which together account for roughly two-thirds of cases, alongside metabolic, inflammatory, toxic, or infectious causes (1–3).

SE develops when endogenous seizure-terminating mechanisms—such as neurotransmitter depletion, ionic shifts, and GABAergic inhibition—fail to halt hyperexcitability (3,7). Impaired Na^+/K^+-ATPase activity and altered K^+ currents sustain this state. Within 10–30 minutes, $GABA_A$ receptors are internalized while excitatory NMDA and Ca^{2+}-permeable AMPA receptors migrate to the synapse, driving pharmacoresistance (2,3). This hyperexcitability is further amplified by tachykinins, reduced GABA synthesis, interneuron loss, and altered mTOR-mediated autophagy (2,3).

Concurrently, SE triggers acute neuroinflammation via glial and P2X7 receptor-mediated cytokine release, which enhances excitatory signaling, downregulates inhibitory receptors, and induces P-glycoprotein-mediated drug resistance (3,7). Matrix metalloproteinase (MMP) breakdown of the blood–brain barrier allows albumin, thrombin, and leukocytes to enter, compromising astrocytic glutamate and ion buffering (3,7).

At the cellular level, acute glutamate accumulation drives massive Na^+ and Ca^{2+} influx (2,3,7). Na^+ causes acute cellular swelling, whereas Ca^{2+} overload triggers mitochondrial dysfunction, ATP depletion, reactive oxygen/nitrogen species generation, and activation of calpains, calcineurin–cofilin, and nitric oxide synthase (2,3,7). The resulting oxidative stress, cytoskeletal breakdown, and gene expression changes lead to widespread brain atrophy (notably in the hippocampus and entorhinal cortex) and cell death via necrosis, apoptosis, and ferroptosis (3,7).

INITIAL MANAGEMENT AND CHOICE OF DRUGS

Because outcomes depend on seizure duration and etiology, rapid termination of clinical and electrical seizure activity is crucial to reduce morbidity and mortality (4,5). Management priorities are: (1) stabilize airway, breathing, and circulation (ABCs); (2) terminate seizures and prevent recurrence; (3) manage refractory SE; and (4) identify and treat life-threatening causes like hypoglycemia, meningitis, or mass lesions (5).

Following ABC stabilization to prevent secondary brain injury, secure IV access rapidly, using intraosseous (IO) insertion as an immediate alternative (4,5). Evaluate blood glucose immediately; if hypoglycemic, administer 2 mL/kg of 25% dextrose via a central line or 5

mL/kg of 10% dextrose peripherally, reassessing glucose every 3–5 minutes post-bolus while maintaining continuous cardiorespiratory monitoring (4,5).

Benzodiazepines are first-line, given as a complete calculated single dose (4,5,8):

- **No IV access (<3 min):** Rectal diazepam (0.3–0.5 mg/kg), IM midazolam (0.1–0.2 mg/kg), or intranasal/buccal midazolam (0.2–0.3 mg/kg) (4,5,8). Midazolam (especially buccal) is superior to diazepam in therapeutic success, relapse reduction, and lower treatment failure risk (6).
- **Established IV access:** IV midazolam (0.1–0.2 mg/kg; max 5 mg) or IV diazepam (0.2–0.3 mg/kg; max 10 mg) (4,5,8).
- **Adverse effects:** Sedation, apnea, hypotension, tachyphylaxis (midazolam infusions), and gasping syndrome/hyperosmolarity from benzyl alcohol/propylene glycol in diazepam ampoules (8).
- **Repeat dosing:** Initial agents should not be repeated, except IV lorazepam or IV diazepam, which may be repeated once at full dose if seizures persist past 5 minutes (4,5,8).

If seizures persist after two full benzodiazepine doses, escalate to second-line agents (expected initiation at ~20 minutes, completed by ~40 minutes) (4,5,8):

- **Fosphenytoin / Phenytoin IV (15–20 mg/kg; max 1000 mg):** Controls 50%–80% of prolonged seizures (5). Phenytoin can cause severe tissue injury (purple glove syndrome) via extravasation—a risk avoided by its water-soluble prodrug, fosphenytoin (5,8). Both can cause arrhythmias, bradycardia, and hypotension; avoid in toxic ingestions, withdrawal states, or theophylline/TCA toxicities (5,8).
- **Phenobarbital IV (15–20 mg/kg):** Has equivalent efficacy but higher respiratory depression risk (especially with benzodiazepines); preferred in infants <6 months, prolonged febrile seizures, or toxic/withdrawal states (4,5,8).
- **Levetiracetam IV (30–60 mg/kg):** Offers equal efficacy with fewer respiratory/cardiovascular side effects, making it ideal for hemodynamically unstable or respiratory-compromised patients (dose adjustment needed in renal impairment) (5,8).
- **Valproate IV (20–30 mg/kg; max 3000 mg):** Equal efficacy and well-tolerated hemodynamically (4,5,8). Ideal for breakthrough seizures due to non-adherence; exercise caution in liver disease and strictly avoid in mitochondrial disorders or unexplained delay in children <2 years (4,5,8).

If seizures continue despite second-line therapy (or exceed 1 hour), the condition is classified as refractory CSE, yielding diminishing returns from second-line agents (5). Management requires pediatric intensive care transfer, neurology consultation, and continuous infusions of midazolam, pentobarbital, high-dose phenobarbital, or propofol, monitoring closely for hypotension and respiratory depression (5).

CONCLUSION

Pediatric convulsive status epilepticus is a rapidly progressive emergency that markedly increases mortality and morbidity. As highlighted in this review, “prognosis of SE worsens

with increasing duration," making early diagnosis and treatment essential to prevent neurological injury.

The pathophysiology reflects a complex interplay of impaired GABAergic inhibition, NMDA/AMPA receptor activation, neuroinflammation, and blood–brain barrier disruption, all of which accelerate treatment resistance.

Clinically, rapid seizure termination with benzodiazepines remains the cornerstone of initial management, with strong evidence supporting midazolam as an effective and safe first-line agent. Among second-line therapies, fosphenytoin, levetiracetam, and valproate demonstrate similar efficacy, and selection should be tailored to the child's respiratory and hemodynamic status. Seizures persisting beyond one hour or despite two treatment steps should be considered refractory, prompting escalation to anesthetic infusions and intensive care.

In conclusion, effective CSE management requires rapid decision-making, mechanism-informed drug selection, and a multidisciplinary approach; timely intervention significantly improves long-term neurological outcomes in children.

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M4421-Tam Metin

MECKEL SCINTIGRAPHY IN THE DIAGNOSIS OF PEDIATRIC MECKEL'S DIVERTICULUM: OUR CLINICAL EXPERIENCE

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Objective: Meckel's diverticulum is one of the important causes of unexplained lower gastrointestinal bleeding in childhood. Meckel scintigraphy with Tc-99m pertechnetate has high diagnostic accuracy in detecting ectopic gastric mucosa. This study aims to present the results of pediatric Meckel scintigraphies performed in our clinic and our clinical experience.

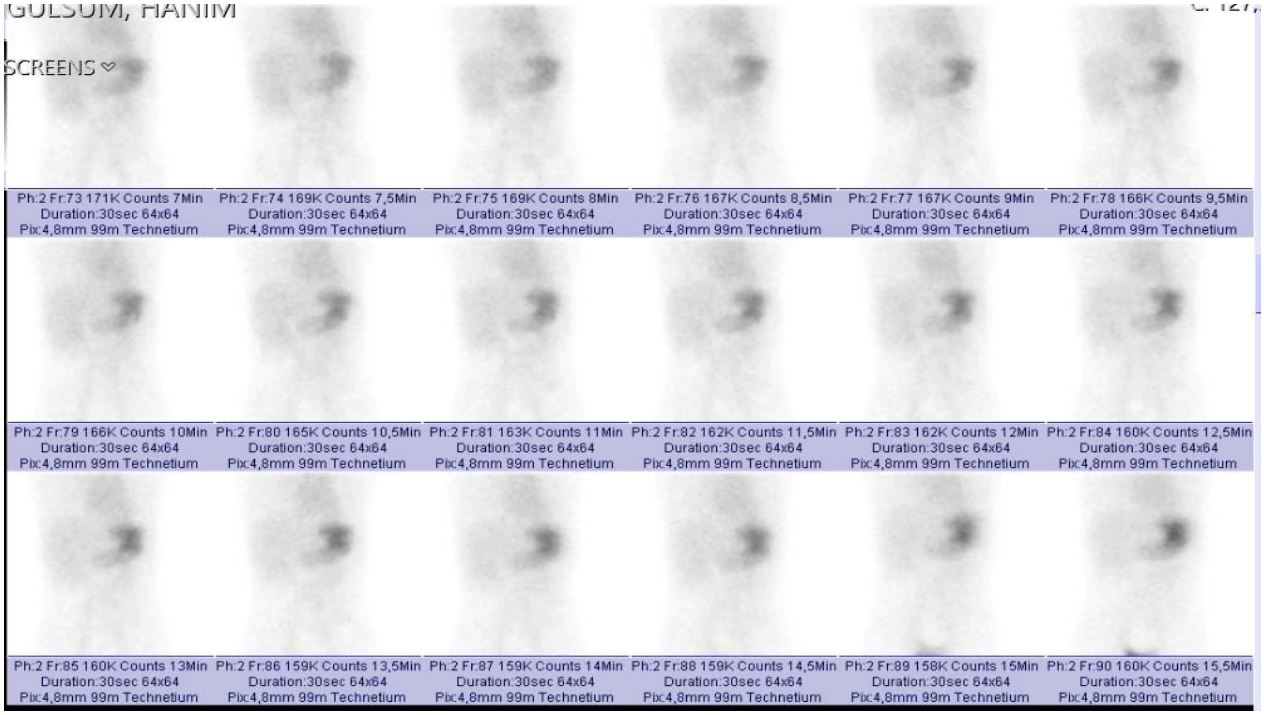
Materials and Methods: Pediatric Meckel scintigraphies performed with Tc-99m pertechnetate with a preliminary diagnosis of Meckel's diverticulum in our clinic since 2020 were retrospectively evaluated. The clinical presentation findings, scintigraphic features, and histopathological results in available cases were examined.

Results: A total of 41 pediatric Meckel scintigraphies were evaluated. In four cases (9.8%), an ectopic focus appearing simultaneously with the stomach and increasing in activity intensity over time was observed, yielding a positive result in favor of Meckel's diverticulum. All cases with positive scintigraphy were histopathologically confirmed as Meckel's diverticulum containing heterotopic gastric mucosa after surgical resection.

Conclusion: Our clinic's experience shows that Tc-99m pertechnetate Meckel scintigraphy has high diagnostic reliability in the diagnosis of Meckel's diverticulum containing ectopic gastric mucosa in pediatric patients. Especially in children presenting with unexplained lower gastrointestinal bleeding, its application in appropriate clinical indications significantly contributes to reaching the correct diagnosis, reducing unnecessary investigations, and planning appropriate surgical treatment.

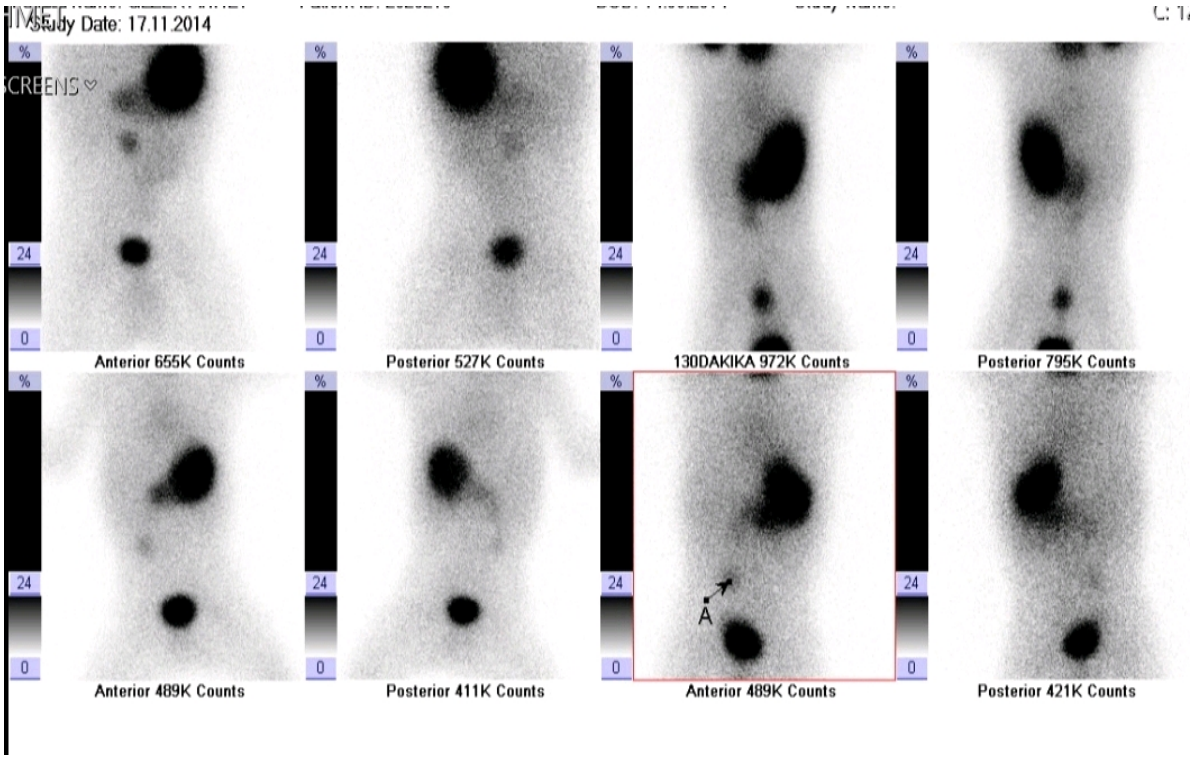
Case 1:

A 6-month-old girl was evaluated with Tc-99m pertechnetate Meckel scintigraphy for a preliminary diagnosis of Meckel's diverticulum due to bloody stools. Dynamic images did not show pathological activity suggestive of ectopic gastric mucosa concurrent with the stomach. The findings were not interpreted as suggestive of Meckel's diverticulum.



Case 2:

A 4.5-month-old male patient was evaluated with Tc-99m pertechnetate Meckel scintigraphy for a preliminary diagnosis of Meckel's diverticulum due to hematochezia. Dynamic images showed increased focal ectopic activity to the right of the umbilical region, simultaneous with the stomach. The findings were considered consistent with Meckel's diverticulum containing ectopic gastric mucosa, and histopathological examination confirmed the diagnosis (Meckel's diverticulum containing heterotopic gastric mucosa).



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M4423-Tam Metin

CLINICAL EXPERIENCE OF TC-99M MIBI HEPATOBILIARY SCINTIGRAPHY IN THE EVALUATION OF BILIARY ATRESIA IN PEDIATRIC PATIENTS

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Objective: Biliary atresia (BA) is one of the most important causes of prolonged cholestatic jaundice in the neonatal period, and early diagnosis is critical for surgical success. This study aimed to evaluate the clinical performance of hepatobiliary scintigraphy performed with Tc-99m MIBI in the diagnosis of BA at our center.

Materials and Methods: 47 pediatric patients who underwent hepatobiliary scintigraphy at our center since 2020 were retrospectively reviewed. Scintigraphic findings were compared with histopathological results. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy rate were calculated for 30 cases with pathological confirmation.

Results: In the scintigraphy, 20 patients were evaluated in favor of BA, 11 patients in favor of neonatal hepatitis, and 14 patients were evaluated as normal. In the analysis of 30 cases with pathological confirmation, the sensitivity of hepatobiliary scintigraphy in diagnosing biliary atresia (BA) was found to be 78.6%, specificity 50.0%, PPO 57.9%, NPO 72.7%, and overall accuracy rate 63.3%. A significant portion of false positive cases were diagnosed with Alagille syndrome and other genetic/metabolic cholestatic diseases, while some BA cases showed false negative results.

Conclusion: Hepatobiliary scintigraphy performed with Tc-99m MIBI at our center demonstrates acceptable sensitivity in diagnosing biliary atresia. However, due to its low specificity, scintigraphic findings should be evaluated in conjunction with clinical, laboratory, and histopathological data. Furthermore, caution should be exercised when directly comparing results obtained using MIBI with studies using standard Tc-99m IDA derivatives.

Case 1 :

2-month-old female patient.Referred from an external center due to acholic stools.Hepatobiliary scintigraphy was performed with a preliminary diagnosis of biliary atresia.Liver perfusion and concentration were normal.Minimal bowel activity was observed at 30 minutes, and significant bowel activity was observed from 60 minutes onwards. It was not evaluated as conclusive for biliary atresia.



Case 2:

A 2-month-old girl presented with jaundice and was evaluated with Tc-99m MIBI hepatobiliary scintigraphy for a preliminary diagnosis of biliary atresia. At 60 minutes on the scintigraphy, no radiopharmaceutical passage was observed into the gallbladder and duodenum. The findings were interpreted as suggestive of biliary atresia. Liver biopsy confirmed biliary atresia.



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M4425-Tam Metin

MİNÖR TRAVMA ÖYKÜSÜ İLE BAŞVURAN PEDİYATRİK SEPTİK ARTRİT OLGUSUNDA ULTRASONOGRAFİNİN TANISAL ROLÜ

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Amaç

Septik artrit, çocukluk çağında geri dönüşümsüz eklem hasarına yol açabilen ortopedik acillerden biridir (1,4). Erken tanı ve tedavi, komplikasyonların önlenmesi açısından önemlidir. Tanıda klinik ve laboratuvar bulguları ile görüntüleme yöntemleri birlikte değerlendirilmelidir. Ultrasonografi (USG), özellikle kalça ekleminde efüzyonun saptanması ve tanısal aspirasyona rehberlik etmesi açısından önemli bir görüntüleme yöntemidir (1,2). Bu olgu eşliğinde, minör travma öyküsü ile başvuran pediyatrik septik artritte USG'nin tanısal ve girişimsel rolünün vurgulanması amaçlandı.

Yöntem

Altı yaşında kız hasta, bacaklarını aşırı abdüksiyona getirmesini takiben başlayan sol kalça ağrısı ve ertesi gün gelişen ateş nedeniyle çocuk acil servisine başvurdu. Hastanın klinik, laboratuvar ve görüntüleme bulguları değerlendirildi. USG'de saptanan efüzyona yönelik USG rehberliğinde tanısal aspirasyon yapıldı. Sinovyal sıvı hücre sayımı ve kültür sonuçları ile hastanın cerrahi tedavi ve takip süreci değerlendirildi.

Bulgular

Fizik muayenede sol kalçada hassasiyet ve hareket kısıtlılığı mevcuttu. Laboratuvar incelemelerinde lökosit sayısı $5,86\times10^3/\mu L$, C-reaktif protein 11,4 mg/L ve eritrosit sedimentasyon hızı 32 mm/saat olarak saptandı. Periferik lökosit sayısı normal sınırlardaydı.

Direkt grafide belirgin osseöz patoloji izlenmedi; sol kalça ekleminde hafif efüzyonu düşündüren eklem aralığı genişliği mevcuttu (Şekil 1). Kalça USG'sinde sol kalça ekleminde efüzyon ve buna bağlı anterior kapsüler distansiyon izlendi (Şekil 2). Klinik ve görüntüleme bulguları doğrultusunda USG rehberliğinde tanısal aspirasyon gerçekleştirildi. Sarı-beyaz renkli, hafif pürülan sinovyal sıvı aspire edildi. Sinovyal sıvı hücre sayımı yaklaşık 100.000 hücre/mm^3 olarak saptandı ve bulgular septik artrit lehine değerlendirildi. Kültür sonucu beklenmeden hasta acil cerrahi tedaviye alındı. Sinovyal sıvı kültüründe üçüncü günde *Staphylococcus aureus* üremesi saptandı.

Pediyatrik akut kalça ağrısında geçici sinovit, osteomiyelit, juvenil idiyopatik artrit, travmatik hemartroz ve diğer inflamatuvar veya enfeksiyöz nedenler ayırıcı tanıda düşünülmelidir (1,3,5). Normal periferik lökosit sayısı septik artriti dışlamaz (1). USG, özellikle kalça ekleminde efüzyonun gösterilmesi ve aspirasyona rehberlik etmesi açısından değerlidir. Minör travmanın septik artriti doğrudan tetiklediğine ilişkin güçlü kanıt bulunmamaktadır; travma öyküsü başlangıçta mekanik nedenleri ön plana çıkarabileceğinden, ateş ve progresif ağrı varlığında septik artrit ayırıcı tanıda tutulmalıdır (1,5).

Sonuç

Çocuklarda kalça ağrısı ve ateş birlikteliğinde septik artrit mutlaka akılda tutulmalıdır. Travma öyküsü ve normal periferik lökosit sayısı enfeksiyöz etiyolojiyi dışlamamalıdır. USG, eklem efüzyonunun erken saptanması ve tanısal aspirasyona rehberlik etmesi sayesinde tanı ve tedavi sürecinde kritik rol oynar. Klinik ve sinovyal sıvı bulguları septik artriti güçlü şekilde destekliyorsa kültür sonucu beklenmeden uygun tedavi planlanmalıdır.

Şekil 1. Başvuru sırasında elde edilen direkt grafide sol kalça ekleminde hafif efüzyonu düşündüren eklem aralığı genişliği izlenmektedir.

Şekil 2. Sol kalça ultrasonografisinde eklem efüzyonuna bağlı anterior kapsüler distansiyon izlenmektedir.

KAYNAKLAR

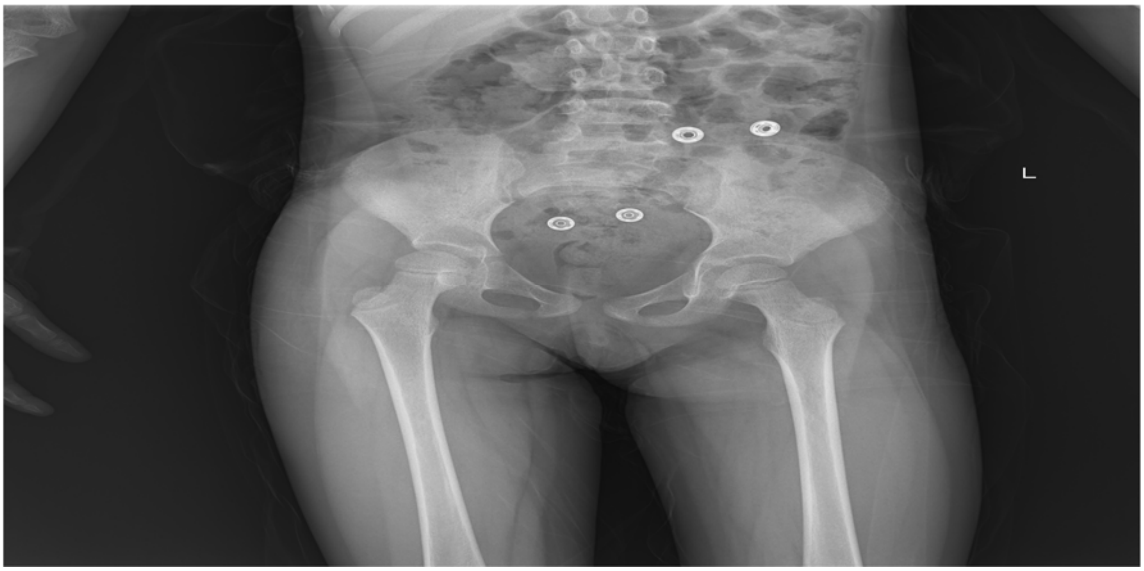
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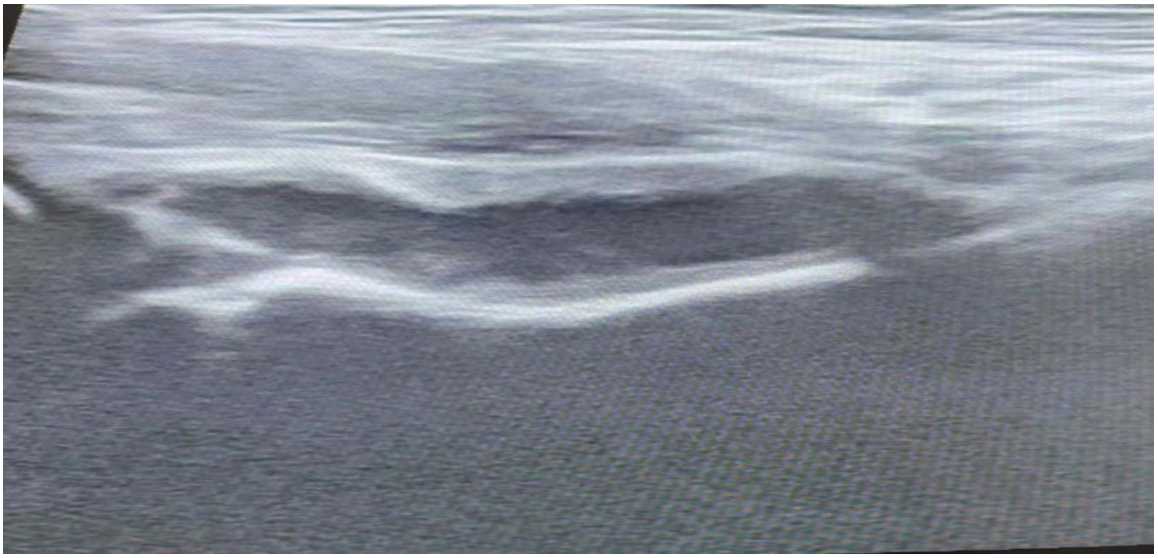
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M4426-Tam Metin

MANAGEMENT OF NEONATAL MYELOMENINGOCELE: A CASE REPORT

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INTRODUCTION

Myelomeningocele (MMC) is the most common open neural tube defect caused by failure of caudal neural tube closure during embryogenesis. It is associated with significant morbidity, including lower extremity motor deficits, neurogenic bladder, hydrocephalus, and Chiari II malformation. Early surgical repair is the standard treatment to reduce infection risk, preserve neural tissue, and improve neurological outcomes.

METHODS

A male neonate with dorsolumbar myelomeningocele (Figures 1A–C), born at 35 weeks of gestation by cesarean section with a birth weight of 2,710 g, was retrospectively evaluated. Clinical course, surgical management, radiological findings, complications, and outcomes were reviewed.

RESULTS

Emergency MMC repair was performed 16 hours after birth. Daily wound care was provided. Early postoperative skin flap discoloration gradually resolved (Figure 1B). Mild cerebrospinal fluid leakage occurred on postoperative days 3–4 and resolved with conservative wound management. During follow-up, the patient developed apnea requiring mechanical ventilation, inotropic support, and broad-spectrum antibiotics. The patient was successfully extubated on postnatal day 14. Cranial magnetic resonance imaging demonstrated hydrocephalus and Chiari II malformation (Figure 2). Serial head circumference and fontanel assessments showed stable hydrocephalus without progression; therefore, ventriculoperitoneal shunt placement was unnecessary. The patient was discharged in stable condition on postoperative day 20 after achieving full oral feeding.

DISCUSSION

Hydrocephalus frequently accompanies MMC and often necessitates ventriculoperitoneal shunt placement. In this case, early surgical repair and close multidisciplinary follow-up resulted in stable hydrocephalus without shunt insertion, highlighting the importance of individualized management and careful clinical and radiological surveillance.

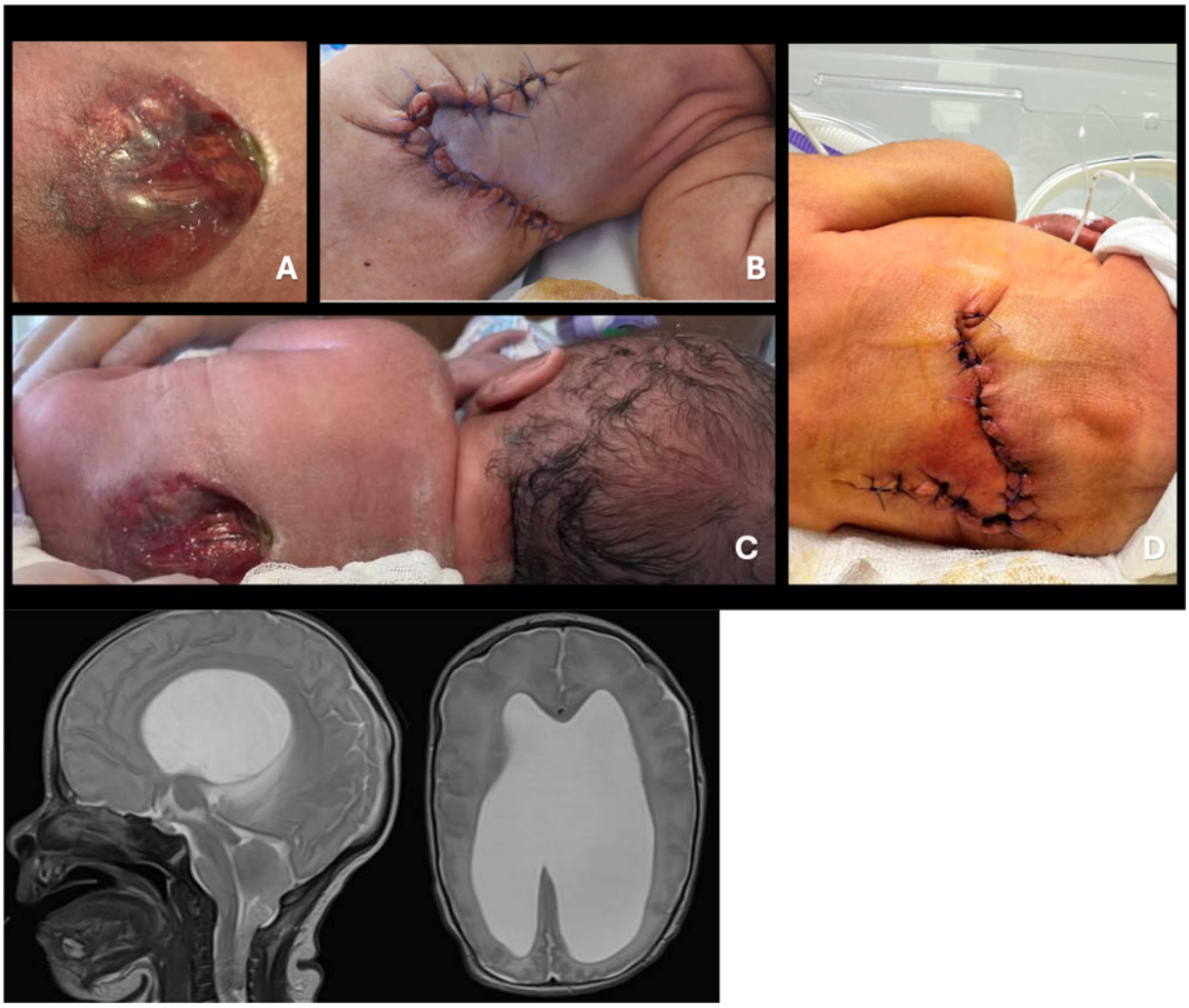
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M4427-Tam Metin

ASSOCIATION OF EMERGENCY DEPARTMENT ADMISSION LACTATE, BASE DEFICIT, AND NRBC LEVELS WITH INTENSIVE CARE UNIT REQUIREMENT IN PEDIATRIC TRAUMA PATIENTS

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AIM

Trauma remains a cause of childhood morbidity and mortality, and early recognition of deterioration is essential for triage and timely intensive care. Admission biomarkers that are rapidly available may support clinical assessment before the full trajectory of injury becomes apparent. Lactate reflects impaired tissue perfusion and disturbed oxygen metabolism, and both admission lactate and lactate clearance have been associated with adverse outcomes in pediatric trauma (1-3). Base deficit is another practical marker of metabolic burden; the Base Deficit, International Normalized Ratio, and Glasgow Coma Scale (BIG) score has reported value for pediatric trauma risk stratification (4,5). Nucleated red blood cells (NRBCs) may enter the peripheral circulation during hypoxia, systemic inflammation, and bone marrow stress, but evidence in pediatric trauma remains limited (6). Recent studies have emphasized broader adverse outcomes, including intensive care unit (ICU) admission and prolonged hospitalization, rather than mortality alone (7-9). We therefore evaluated whether emergency department admission lactate, absolute base deficit, and NRBC levels were associated with ICU requirement and compared their discriminative performance in children presenting with trauma.

METHODS

This retrospective single-center study included children aged 0-18 years who presented to the Emergency Department of Malatya Training and Research Hospital with trauma between 2021 and 2026. Cases were classified as isolated head, blunt abdominal, blunt thoracic, multitrauma, or extremity-pelvic trauma. Eligible patients had clinical assessment and laboratory testing during the initial emergency department evaluation. Non-trauma admissions, patients with missing core laboratory data, cases without outcome information, and patients without initial assessment were excluded. The final analysis included 193 patients with complete core data. Recorded variables were age, trauma diagnosis, GCS, admission lactate, base excess, absolute base deficit derived from base excess, NRBC percentage, hospital length of stay, ICU length of stay, and in-hospital mortality. ICU requirement was the primary outcome. Continuous variables were summarized as median with interquartile range and compared using the Mann-Whitney U test. Categorical variables were compared using the chi-square test or Fisher's exact test. Receiver operating characteristic (ROC) curves were generated for lactate, absolute base deficit, and NRBC to assess discrimination for ICU requirement. Areas under the curve (AUCs), 95% confidence intervals (CIs), optimal cut-offs, sensitivity, and specificity were calculated; cut-offs were selected with the Youden index. Mortality analyses were secondary

because only 11 deaths occurred. The study received Education Planning Board approval, and anonymized data were analyzed. Statistical significance was defined as $p<0.05$.

FINDINGS

The cohort comprised 193 children; 45 required ICU care and 148 were managed without ICU admission. Median age was similar between groups, whereas median GCS was 9 in the ICU group and 11 in the non-ICU group ($p<0.001$). All three admission biomarkers were significantly higher among patients requiring intensive care (Table 1; Figure 1). Median lactate was 5.40 mmol/L in the ICU group versus 3.80 mmol/L in the non-ICU group, median absolute base deficit was 10.00 versus 7.25, and median NRBC was 1.23% versus 0.22%, respectively; all $p<0.001$. Hospital length of stay was longer among ICU patients, with medians of 8 and 7 days ($p<0.001$). ROC analysis demonstrated comparable discrimination across the three biomarkers (Table 2; Figure 2). Absolute base deficit had the highest AUC at 0.808 (95% CI 0.726-0.889), followed by NRBC at 0.807 (95% CI 0.725-0.888) and lactate at 0.788 (95% CI 0.704-0.872). The optimal cut-off for absolute base deficit was 9.30, providing 66.7% sensitivity and 83.8% specificity. For NRBC, a cut-off of 0.62% provided 82.2% sensitivity and 69.6% specificity, whereas a lactate cut-off of 4.70 mmol/L provided 75.6% sensitivity and 77.0% specificity. In-hospital mortality occurred in 11 patients, representing 24.4% of the ICU group; no deaths occurred outside the ICU.

CONCLUSION

Admission lactate, absolute base deficit, and NRBC levels were associated with ICU requirement in this pediatric trauma cohort. Base deficit findings are consistent with previous work supporting base-deficit-based pediatric trauma assessment and BIG-score approaches (4,5,10), while lactate findings align with studies linking admission lactate or lactate kinetics to injury severity and outcome (1-3). NRBC showed an AUC almost identical to absolute base deficit and slightly higher than lactate, suggesting complementary information reflecting hypoxic, inflammatory, or marrow-stress responses (6). Higher biomarker values occurred with lower GCS, supporting interpretation with clinical severity rather than as isolated decision thresholds. Pediatric studies have similarly emphasized combined physiological and neurological assessment for early risk stratification (9,10). This retrospective single-center study was limited by selection of patients undergoing early laboratory testing, possible effects of prehospital care and resuscitation on biomarker levels, and institutional triage influences on ICU admission. The small number of deaths limited mortality analysis. Nevertheless, simultaneous measurement of lactate, absolute base deficit, and NRBC may provide a practical admission profile for identifying children requiring closer observation or ICU evaluation. Prospective multicenter studies should determine whether adding NRBC to established clinical scores improves prediction in larger pediatric cohorts. These findings warrant prospective external validation studies. Independent pediatric trauma validation remains necessary.

Table 1. Clinical and admission laboratory findings according to ICU requirement

Variable	No ICU required (n=148)	ICU required (n=45)	p
Age, years	13.50 (10.00-15.00)	13.00 (10.00-16.00)	0.988
GCS	11.00 (10.00-12.00)	9.00 (9.00-10.00)	<0.001
Lactate, mmol/L	3.80 (2.90-4.50)	5.40 (4.70-5.60)	<0.001
Absolute base deficit	7.25 (5.18-8.73)	10.00 (8.60-10.70)	<0.001

NRBC, %	0.22 (0.00-0.75)	1.23 (0.75-1.52)	<0.001
Hospital stay, days	7.00 (5.00-9.00)	8.00 (7.00-10.00)	<0.001
Mortality, n (%)	0 (0.0)	11 (24.4)	<0.001

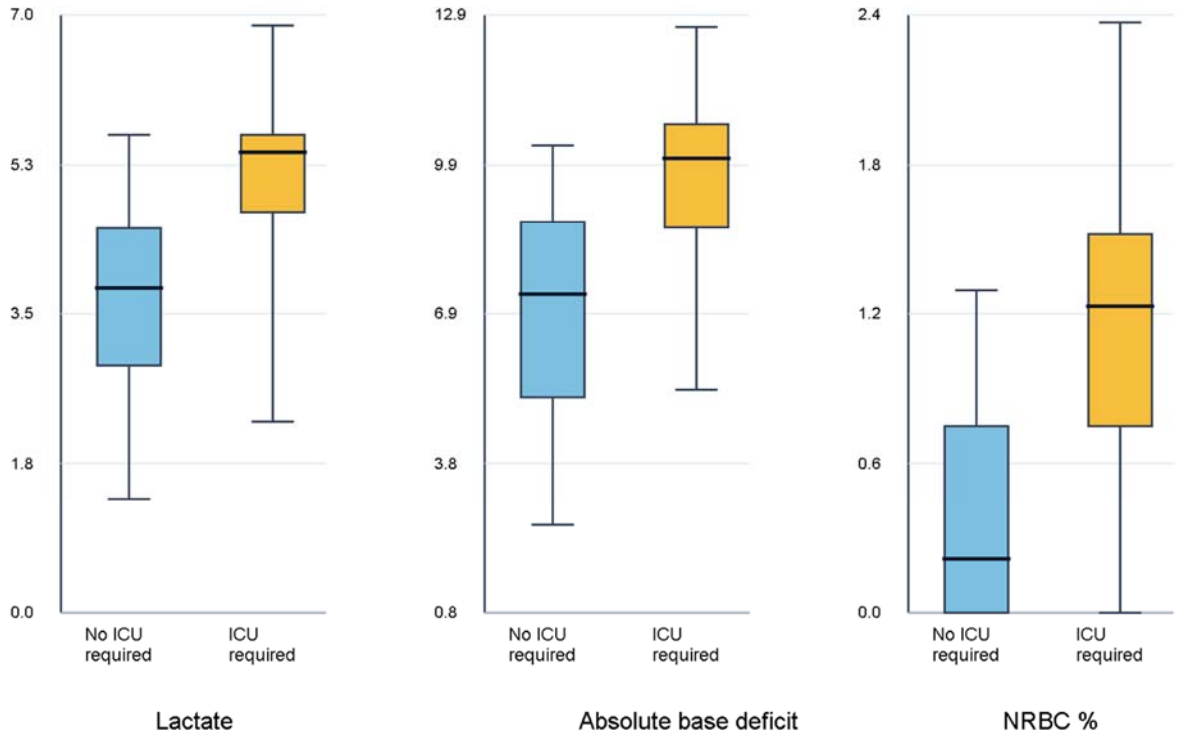
Data are median (interquartile range) unless otherwise stated. GCS: Glasgow Coma Scale; ICU: intensive care unit; NRBC: nucleated red blood cells.

Table 2. ROC analysis of admission biomarkers for ICU requirement

Marker	AUC	95% CI	Cut-off	Sensitivity	Specificity
Lactate	0.788	0.704-0.872	4.70	75.6%	77.0%
Absolute base deficit	0.808	0.726-0.889	9.30	66.7%	83.8%
NRBC	0.807	0.725-0.888	0.62	82.2%	69.6%

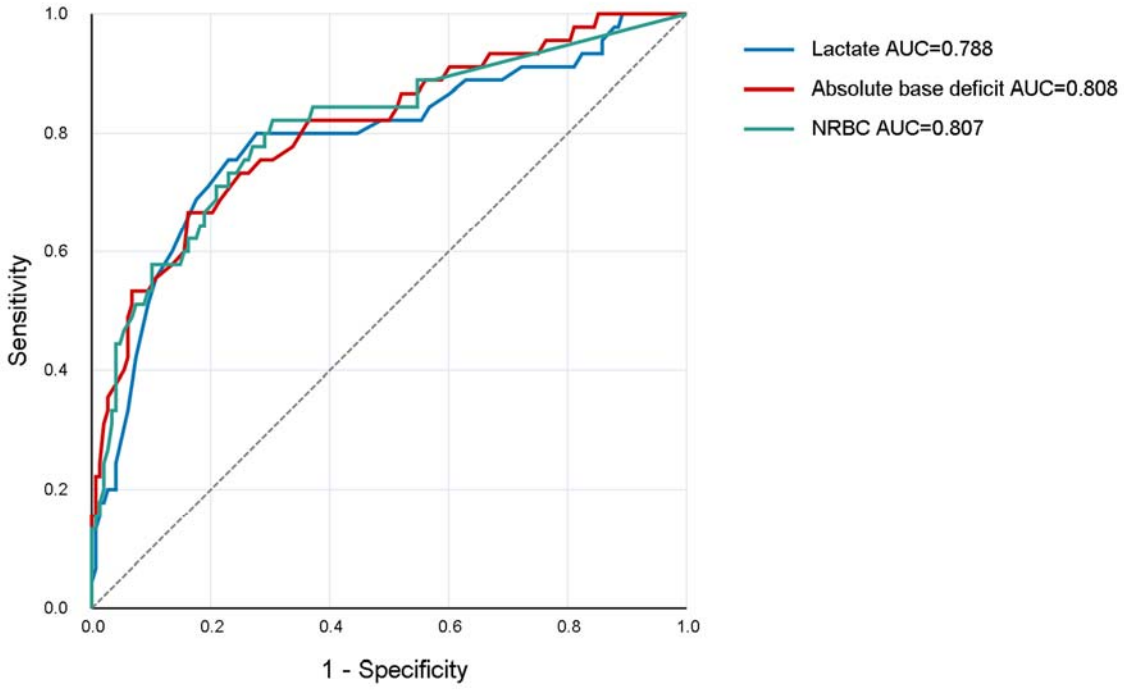
AUC: area under the curve; CI: confidence interval; ICU: intensive care unit; NRBC: nucleated red blood cells; ROC: receiver operating characteristic.

Figure 1. Distribution of lactate, absolute base deficit and NRBC according to ICU requirement



Box plots show biomarker distributions in patients with and without ICU requirement. The central line represents the median, and boxes represent the interquartile range.

Figure 2. ROC curves of lactate, absolute base deficit and NRBC for predicting ICU requirement



ROC curves demonstrate the discriminative performance of biomarkers measured at emergency department admission

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M4428-Tam Metin

APPROACH TO PARACETAMOL INTOXICATION IN THE PEDIATRIC EMERGENCY DEPARTMENT

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ABSTRACT

Introduction

Paracetamol is one of the most commonly used analgesic and antipyretic medications in children. Although it is considered safe at therapeutic doses, overdose can lead to hepatotoxicity and fulminant hepatic failure (1). Paracetamol intoxication is a clinical condition frequently encountered in the pediatric emergency department following incorrect dosing, accidental ingestion, or suicide attempts (2).

Development

The toxic effects of paracetamol are associated with depletion of hepatic glutathione stores and accumulation of the toxic metabolite NAPQI. Clinical manifestations progress through four stages: initially nonspecific symptoms, followed by signs of hepatic injury, fulminant hepatic failure, and either recovery or death (3).

Conclusion

The aim of this presentation is to address the pathophysiology and clinical manifestations of paracetamol intoxication in children, its diagnostic evaluation in the emergency department, common errors, and fundamental treatment approaches.

Keywords: Paracetamol, child, hepatotoxicity, N-acetylcysteine, acute liver failure

INTRODUCTION

Paracetamol intoxication is one of the most common drug poisonings in childhood. Although paracetamol is safe at therapeutic doses, overdose may cause irreversible liver cell injury (4). In children, toxicity generally occurs following a single ingestion exceeding 150 mg/kg (5).

Diagnostic evaluation should not be based solely on dose calculation. Clinical findings, time of ingestion, laboratory values, and risk factors should be considered together. In particular, children with a history of hepatic disease may develop toxicity even at lower doses (6). In addition, incorrect dosing is common, particularly when families administer repeated high doses to febrile children (7).

Common Mistakes

- Considering every paracetamol ingestion as intoxication.
- Failing to calculate the dose based on the child's body weight.
- Using the nomogram at the wrong time.
- Delaying initiation of NAC.

- Discharging the patient early solely because AST/ALT levels are normal.

ETIOLOGY AND PATHOPHYSIOLOGY

Paracetamol is normally metabolized in the liver through glucuronidation and sulfation. However, when an overdose occurs, these pathways become saturated, resulting in the formation of the toxic metabolite NAPQI (N-acetyl-p-benzoquinone imine).

What is NAPQI?

- It is the toxic metabolite of paracetamol.
- It is normally conjugated with glutathione and rendered harmless.
- In overdose, glutathione stores become depleted → NAPQI remains unbound → hepatocellular necrosis and fulminant hepatic failure develop (3).

The pathophysiological process can be divided into four stages:

- **Stage I (0–24 hours):** Nausea, vomiting, malaise, sweating (2).
- **Stage II (24–72 hours):** Elevation of hepatic enzymes, right upper quadrant pain, hepatomegaly (4).
- **Stage III (72–96 hours):** Fulminant hepatic failure, coagulopathy, encephalopathy, hypoglycemia (5).
- **Stage IV (4 days–2 weeks):** Recovery or death (7).

Risk Factors

- Chronic liver disease.
- Malnutrition or fasting (low glutathione stores).
- Different metabolic capacity in neonates and infants.
- Concomitant medication use (e.g., anticonvulsants, rifampicin).

CLINICAL FINDINGS AND EVALUATION IN THE PEDIATRIC EMERGENCY DEPARTMENT

Paracetamol intoxication in children initially presents with nonspecific findings. Vomiting, anorexia, malaise, and sweating may occur during the early period (1). When hepatic injury develops, elevated transaminase levels, jaundice, coagulopathy, and hypoglycemia may occur (4).

Initial evaluation in the emergency department should be performed using the ABCDE approach. The amount of paracetamol ingested, time of ingestion, and concomitant medications should be assessed in the history. Physical examination should include evaluation for hepatomegaly, jaundice, and changes in consciousness (2).

Laboratory investigations include serum paracetamol concentration, AST/ALT, INR, bilirubin, blood glucose, and renal function tests.

Rumack–Matthew Nomogram

The nomogram was developed to determine the risk of hepatotoxicity following a single ingestion of paracetamol (1).

Time (hours)	Serum Paracetamol Level (µg/mL)	Interpretation / Criterion
4–24 hours	≥150 µg/mL	At or above the treatment line → NAC should be initiated
4–24 hours	<150 µg/mL	Below the treatment line → NAC is not required
<4 hours	Not applicable	The nomogram should not be used because the concentration has not yet reached its peak
>24 hours	Not applicable	The nomogram is no longer valid; clinical and laboratory findings should guide management

Important Notes

- The nomogram is valid only for a single ingestion.
- The nomogram may be inadequate in the presence of risk factors such as chronic ingestion, concomitant hepatic disease, or alcohol use.
- Any patient whose serum concentration is at or above the "treatment line" on the nomogram has an indication for NAC.

EMERGENCY TREATMENT AND MANAGEMENT

The fundamental approach to treatment is aimed at preventing hepatic injury.

- **Decontamination:** Activated charcoal may be administered within the first hour following ingestion (3).
- **Specific antidote:** N-acetylcysteine (NAC) replenishes glutathione stores and facilitates the detoxification of NAPQI. Oral or intravenous protocols may be used (4).
  - Although NAC is most effective when administered within the first 8 hours, it may also reduce hepatic injury when administered later. Therefore, NAC should be initiated even after 8 hours.
- **Supportive treatment:** Hypoglycemia, coagulopathy, and electrolyte abnormalities should be corrected (5).
- **Advanced treatment:** Liver transplantation may be considered in patients who develop fulminant hepatic failure (7).

Discharge Decision

- Normal AST/ALT levels alone do not constitute a sufficient criterion for safe discharge.
- Enzyme levels may remain normal during the first 24 hours, while hepatotoxicity may develop at a later stage.
- For discharge:
  - The paracetamol concentration should be below the toxic threshold.
  - Clinical findings should be stable.
  - Sufficient time should have elapsed since ingestion.
  - No risk factors should be present (6).

CONCLUSION

Paracetamol intoxication is a common clinical condition in children that can be fatal if not diagnosed and treated promptly. The toxic effects of NAPQI, appropriate use of the nomogram, and timely initiation of NAC constitute the mainstays of treatment.

Long-term follow-up should be continued by pediatric gastroenterology and hepatology specialists. Family education and prevention of incorrect dosing may contribute to reducing the incidence of intoxication (7).

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M4430-Tam Metin

SPONTANEOUS PNEUMOTHORAX FOLLOWING SEVERE COUGHING IN AN ADOLESCENT: A CASE REPORT

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Abstract

Background: Spontaneous pneumothorax (SP) is a rare but clinically significant condition in the paediatric and adolescent population. Primary spontaneous pneumothorax (PSP) occurs in the absence of underlying lung pathology and is most frequently seen in tall, lean adolescent males. Severe coughing, by transiently elevating intrathoracic pressure, is a recognised precipitating mechanism.

Case Presentation: A 14-year-old male with no history of trauma, chronic lung disease, or smoking presented to the emergency department with sudden-onset severe left-sided chest pain following one week of intense coughing. Physical examination revealed markedly reduced breath sounds over the left hemithorax with haemodynamically stable vital signs. Posteroanterior chest radiography demonstrated left massive spontaneous pneumothorax. Emergency left-sided tube thoracostomy was performed, achieving substantial lung re-expansion on the post-procedure control radiograph. Air leak resolved progressively, and the chest tube was removed upon confirmation of full expansion on serial chest radiographs. The patient was discharged with full clinical and radiological recovery.

Conclusion: This case illustrates that PSP should remain in the differential diagnosis of adolescents presenting with acute chest pain, even without underlying lung disease. Severe coughing is a recognised trigger. Tube thoracostomy is a safe and effective treatment for massive spontaneous pneumothorax in this age group.

Keywords: Spontaneous Pneumothorax; Adolescent; Severe Cough; Tube Thoracostomy; Emergency Department

Introduction

Spontaneous pneumothorax is defined as the presence of air in the pleural space in the absence of trauma, resulting in partial or complete lung collapse. It is broadly classified into primary spontaneous pneumothorax (PSP), which occurs without underlying lung disease, and secondary spontaneous pneumothorax (SSP), which develops as a complication of pre-existing pulmonary pathology.

PSP predominantly affects tall, lean young males, with an estimated annual incidence of 7.4 per 100,000 in males and 1.2 per 100,000 in females. Although relatively uncommon in children and adolescents, PSP is the most frequent form of pneumothorax in this age group and accounts for a meaningful proportion of emergency presentations with acute chest pain.

The underlying mechanism typically involves the rupture of small subpleural air blebs or bullae, most commonly located at the lung apex. Factors that transiently increase intrathoracic pressure — including severe coughing, intense physical exertion, and Valsalva manoeuvres — are well-recognised precipitants. The cardinal presenting symptoms are sudden-onset pleuritic chest pain and dyspnoea. We report a case of left massive PSP in a 14-year-old male precipitated by one week of severe coughing, treated successfully with emergency tube thoracostomy.

Case Presentation

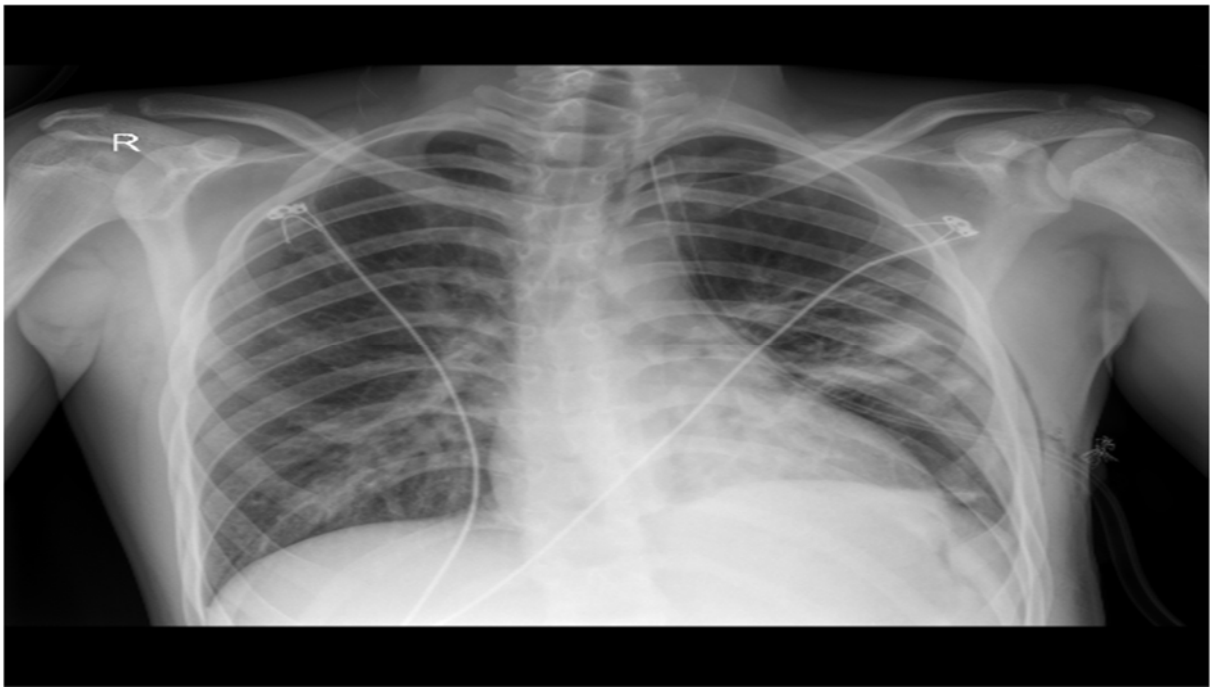
A 14-year-old male presented to the emergency department with sudden-onset severe left-sided chest pain. He reported a one-week history of severe, persistent coughing that had preceded the onset of chest pain. There was no history of trauma, no known chronic lung disease, and no history of cigarette or electronic cigarette use.

On physical examination, the patient's general condition was good; he was fully conscious, alert, oriented, and cooperative. Vital signs were haemodynamically stable throughout. Oxygen saturation measured by pulse oximetry on room air was within normal limits. Auscultation of the chest revealed markedly reduced breath sounds over the entire left hemithorax, in contrast to the right side. Abdominal examination was unremarkable. Laboratory investigations revealed no pathological findings.

Posteroanterior (PA) chest radiography demonstrated an appearance consistent with left massive spontaneous pneumothorax, with complete collapse of the left lung and displacement of the mediastinum to the right. Given the clinical and radiological findings, the decision for emergency tube thoracostomy was made without delay.

Left-sided tube thoracostomy was performed under emergency conditions. The post-procedure control chest radiograph confirmed substantial lung re-expansion. The patient was admitted for inpatient observation. Air leak through the chest drain gradually resolved over the subsequent days, and serial control chest radiographs confirmed progressive and ultimately complete lung expansion. The chest tube was removed at the appropriate clinical juncture. The patient was discharged in good general condition with full clinical and radiological recovery.





Discussion

Primary spontaneous pneumothorax, although relatively uncommon in the paediatric age group, must always be considered in the differential diagnosis of acute chest pain in adolescents, even in the absence of underlying lung disease or a history of trauma. The index case is representative of the classic PSP demographic: a young adolescent male with no antecedent pulmonary pathology.

The precipitating mechanism in this case — severe and prolonged coughing — is a well-described trigger for PSP. Repeated and forceful coughing generates transient but significant elevations in intrathoracic pressure, which can be sufficient to rupture pre-existing subpleural blebs or bullae in susceptible individuals, leading to air leakage into the pleural space. This mechanism is analogous to other intrathoracic pressure-raising activities, such as the Valsalva manoeuvre or heavy physical exertion.

Posteroanterior chest radiography remains the first-line and most readily available imaging modality for the diagnosis of pneumothorax, allowing rapid confirmation of the diagnosis, size estimation, and exclusion of alternative diagnoses. In cases of diagnostic uncertainty or when the PA radiograph is inconclusive, computed tomography (CT) of the chest provides definitive characterisation. Thoracic ultrasound is an increasingly used adjunct in the emergency department setting.

The management of spontaneous pneumothorax in children and adolescents depends on pneumothorax size, degree of clinical compromise, and institutional protocol. Small, clinically stable pneumothoraces may be managed conservatively with observation and supplemental oxygen. Moderate pneumothoraces may be amenable to needle aspiration or small-bore drain insertion. Massive pneumothorax, as in the present case, necessitates urgent tube thoracostomy, which is a safe and effective intervention associated with high rates of lung re-expansion and low complication rates. For recurrent PSP or persistent air leak, video-assisted thoracoscopic surgery (VATS) with bleb resection and pleurodesis is the recommended surgical approach.

Conclusion

This case highlights that primary spontaneous pneumothorax should be included in the differential diagnosis of adolescents presenting with acute chest pain, particularly following activities that raise intrathoracic pressure such as severe coughing. The absence of trauma or underlying lung disease does not exclude this diagnosis. Posteroanterior chest radiography is the cornerstone of diagnosis, and tube thoracostomy is a safe, effective, and definitive treatment for massive spontaneous pneumothorax in this age group, enabling complete lung re-expansion and full clinical recovery.

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M4431-Tam Metin

PATTERNS OF OTOLARYNGOLOGY CONSULTATIONS IN THE PEDIATRIC EMERGENCY DEPARTMENT

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Abstract

Introduction/Aim:
Pediatric otolaryngology consultations in the emergency department involve a broad spectrum of conditions. This study aimed to evaluate the demographic characteristics, consultation reasons, diagnoses, management, and clinical outcomes of pediatric patients referred for otolaryngology consultation.

Methods:
This retrospective study included pediatric patients (0–18 years) who underwent otolaryngology consultation in the pediatric emergency department of a tertiary referral hospital. Demographic characteristics, consultation indications, final diagnoses, management strategies, and hospitalization status were reviewed. Descriptive statistical analyses were performed.

Results:
A total of 529 pediatric patients were included (mean age, 8.73 ± 5.20 years; 59.2% male). Trauma was the leading indication for consultation (50.9%), followed by foreign bodies (21.2%), otologic and neuro-otologic disorders (13.4%), epistaxis (7.6%), infectious diseases (5.5%), and other conditions (1.5%). Nasal trauma represented the majority of traumatic consultations, although most children had no evidence of nasal fracture. Foreign bodies were most frequently located in the nose, followed by the ear. Otitis media was the most common diagnosis among otologic consultations, whereas upper respiratory tract infection predominated among infectious diseases. Most patients were managed conservatively or with minor procedures, including foreign body removal and nasal fracture reduction. Hospitalization was required in 35 patients (6.6%).

Conclusion:
Trauma and foreign bodies accounted for the majority of pediatric otolaryngology consultations in the emergency department, whereas most patients were successfully managed without hospitalization. These findings may assist in optimizing emergency department triage, resource utilization, and the timely involvement of otolaryngology specialists.

Keywords: Pediatric emergency; otolaryngology consultation; trauma; foreign body; epistaxis.

Table 1. Demographic Characteristics, Clinical Outcomes, and Consultation Categories		
Variable	**n**	**%**
Total number of patients	529	100
Age, years (mean±SD)	8.73 ± 5.20	
Male sex	313	59.2
Female sex	216	40.8
ENT hospitalization	35	6.62
ENT procedures		
Foreign body removal	70	13.2
Epistaxis management (cauterization and nasal packing)	10	1.9
Closed reduction of nasal fractures	44	8.3
Primary suturing	14	2.6
Abscess drainage	3	0.6
Consultation categories		
Trauma	269	50.9
Nasal	222	42.0
Otologic	24	4.5
Oral cavity and soft tissue trauma	23	4.3
Foreign body	112	21.2
Nasal	67	12.7
Aural	34	6.4
Oral cavity	9	1.7
Airway foreign body/aspiration	2	0.4
Infections	29	5.5
Upper respiratory tract infection	15	2.8
Peritonsillar abscess/ Acute tonsillitis	8	1.5
Neck abscess	3	0.6
Acute lymphadenitis	2	0.4
Sialadenitis	1	0.2
Otologic and neuro-otologic disorders	71	13.4
Epistaxis	40	7.6
Other conditions	8	1.5

Table 2. Final Otolaryngologic Diagnoses According to Consultation Categories (n = 529)			
Consultation Category	**Final ENT Diagnosis**	**n**	**%**
Trauma	Nasal trauma without fracture	147	27.8
	Displaced nasal fracture	48	9.1
	Non-displaced nasal fracture	27	5.1
	No traumatic otologic findings	6	1.1
	Auricular laceration	5	0.9
	Auricular soft tissue injury	4	0.8
	Tympanic membrane perforation	3	0.6
	Hemotympanum	4	0.8
	Hearing loss	1	0.2
	Temporal bone fracture	1	0.2
	Tongue laceration	7	1.3
	Lip laceration	8	1.5
	Other intraoral lacerations	7	1.3
	No intraoral traumatic findings	1	0.2
Foreign Body	Nasal foreign body	52	9.8
	No nasal foreign body detected	15	2.8

Table 2. Final Otolaryngologic Diagnoses According to Consultation Categories (n = 529)			
Consultation Category	**Final ENT Diagnosis**	**n**	**%**
	Aural foreign body	21	4.0
	No aural foreign body detected	7	1.3
	Cerumen impaction	4	0.8
	Otitis media	2	0.4
	No oral cavity foreign body body detected	8	1.5
	Oral cavity foreign body	1	0.2
	Laryngeal foreign body	1	0.2
	Aspiration	1	0.2
Infectious Diseases	Upper respiratory tract infection	15	2.8
	Acute tonsillitis/peritonsillar abscess	8	1.5
	Neck abscess	3	0.6
	Acute lymphadenitis	2	0.4
	Sialadenitis	1	0.2
Otologic and Neuro-otologic Disorders	Otitis media	29	5.5
	Cerumen impaction	13	2.5
	No otologic pathology detected	13	2.5
	Facial paralysis	7	1.3
	Hearing loss	4	0.8
	Perichondritis	2	0.4
	Otitis externa	2	0.4
	Mastoiditis	1	0.2
Epistaxis	Active epistaxis	11	2.1
	No active bleeding on examination	29	5.5
Other Conditions	Post-tonsillectomy complications	3	0.6
	Tracheostomy tube replacement	2	0.4
	Lower lip mucocele	1	0.2
	Temporomandibular joint dislocation	1	0.2
	Caustic substance exposure	1	0.2

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M4432-Tam Metin

HYPERAMMONEMIC ENCEPHALOPATHY AND ACUTE BICYTOPENIA ASSOCIATED WITH CHRONIC VALPROIC ACID USE: A CASE REPORT

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Objective: Valproic acid (VPA) is a broad-spectrum antiepileptic drug widely used in the treatment of childhood epilepsy. While thrombocytopenia and other hematologic side effects may occur during treatment, hyperammonemic encephalopathy is a less common complication that can lead to serious consequences if diagnosis is delayed. Hyperammonemia can develop even in patients with normal liver function tests, and the severity of the clinical presentation may not always correlate with serum valproic acid levels [1,2]. Hematologic complications associated with valproic acid use in children, such as thrombocytopenia, neutropenia, and bone marrow suppression, have also been reported [3]. The aim of this case report is to highlight the concurrent occurrence of hyperammonemic encephalopathy and acute bicytopenia in a child receiving chronic valproic acid therapy.

Case Presentation: A 5-year-old male patient was brought to the emergency department due to restlessness, lethargy, and a progressively increasing tendency to sleep. At the time of presentation, his Glasgow Coma Scale score was 12. Initial laboratory tests revealed a hemoglobin level of 8.19 g/dL and a platelet count of 14.8×10^9/L. A complete blood count performed one month prior was found to be within normal limits. During follow-up, the patient's hemoglobin level dropped to 6.1 g/dL.

A cranial computed tomography (CT) scan and diffusion-weighted magnetic resonance imaging (MRI), performed to evaluate the etiology of the acute change in consciousness, revealed no acute intracranial pathology or focal hemorrhage. The serum valproic acid level was measured at 150.1 µg/mL, within the toxic range, while the serum ammonia level was 209 µmol/L. Aspartate aminotransferase and alanine aminotransferase levels were within normal limits.

Based on the current neurological findings, marked hyperammonemia, and high valproic acid level, valproic acid-associated hyperammonemic encephalopathy was suspected. The concurrent severe thrombocytopenia and rapidly progressive anemia were evaluated as part of valproic acid-associated acute hematologic toxicity, and the patient was admitted to the pediatric intensive care unit.

Previous case series and case reports have demonstrated that valproate-associated hyperammonemic encephalopathy can occur in the presence of normal liver enzymes [1,2]. Similarly, it has been reported that valproic acid can cause various hematologic toxicities in pediatric patients, including thrombocytopenia and bone marrow suppression [3].

Conclusion: In a child taking valproic acid, if new-onset lethargy, a tendency to sleep, or unexplained changes in consciousness occur, hyperammonemic encephalopathy should be considered in the differential diagnosis—even if liver function tests are normal—and serum ammonia levels should be measured without delay [1,2]. Furthermore, as seen in this case, rapidly developing severe thrombocytopenia and anemia may be indicative of valproic acid-related hematologic toxicity. Regular monitoring of hematologic parameters during valproic acid therapy in pediatric patients is therefore important [3]. Recognizing that neurological and hematologic toxicity can occur concurrently may contribute to the early recognition of drug-related complications.

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M4433-Tam Metin

FOLEY KATATER UYGULAMASI SONRASI ÜRETER PERFORASYONU

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ÖZET

Üreter perforasyonu, endoürolojik girişimler sırasında nadir görülen ancak ciddi komplikasyonlara yol açabilen bir durumdur. En sık üreteroskopi sırasında meydana gelmektedir.(1,2,5) Bu olgu sunumunda, foley katater uygulaması sonrasında gelişen üreter perforasyonu ve konservatif tedavi yaklaşımı sunulmaktadır. Erken tanı ve uygun stentleme ile başarılı klinik sonuç elde edilmiştir.

Anahtar Kelimeler: Üreter perforasyonu, komplikasyon, foley katater

GİRİŞ

Üreter perforasyonu, retroperitoneal ürinoma, ürosepsis, apse oluşumu, enfeksiyon ve sonrasında böbrek yetmezliği gibi bir dizi probleme yol açan nadir bir durumdur. (6,9)Üreter rüptürüne neden olan etkenler arasında malignite, idrar taşları, idiyopatikretroperitoneal fibrozis, yakın zamanda yapılan iyatrojenik müdahale, dış travma, dejeneratif böbrek rahatsızlıkları, dış kompresyonlu ürografi ve spontan nedenler yer almaktadır.(6,7)Üreter travması çok nadirdir ve künt ve delici genitoüriner travmaların %1'inden azını oluşturduğu düşünülmektedir. En sık ateşli silah yaralanmalarında görülür.(7)

OLGU SUNUMU

65 yaş kadın hasta 1 saat önce foley katater değişimi sonrası artan sol yan ağrısı kasık ağrısı bulantı kusma şikayetleri ile acile başvurdu.Hastanın sol alt kadranda kasık bölgesinde hassasiyet defans mevcut.Hasta bilateral ürostomisi mevcut sonda ile takipli.Lomber fraktürden opere nörojen mesanesi olan hasta bugün üroloji poliklinik muayenesinde sondası değiştirilmiş sonrasında ağrısı artınca acile başvurmuş.

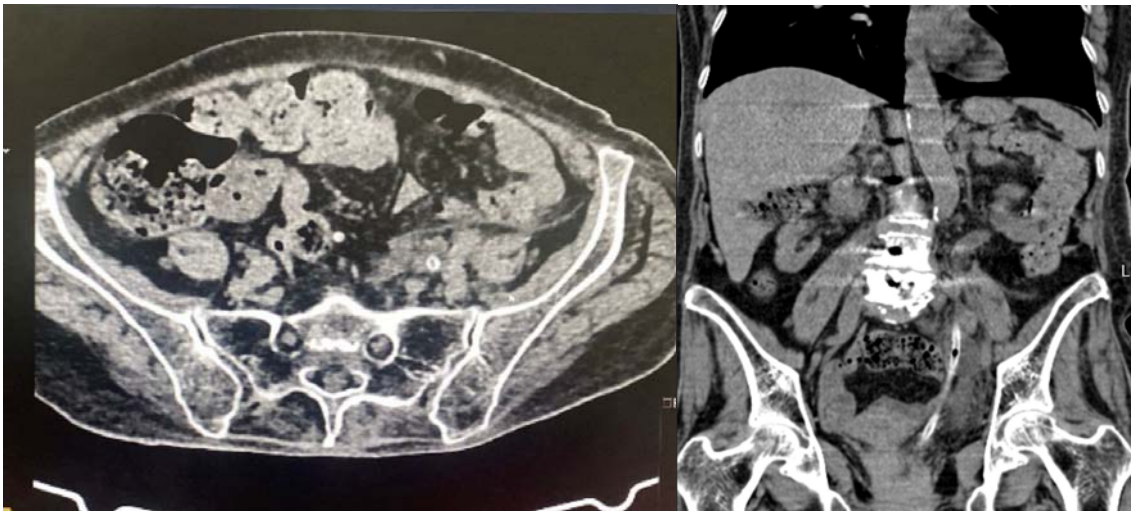
Hastanın özgeçmişinde osteoporoz,hipertansiyon, lomber çökme fraktür,nörojen mesane,böbreklerde bilateral ürostomi mevcut.

Laboratuvar sonuçlarında crp<0.3, bun 32.7,cre 1.8(bazali 1.8) wbc 9.5,hgb 11.2,plt 362,

TİT +1 lökosit 260 wbc +1 kan 65 rbc +2 protein mevcut

Görüntüleme Kontrassız Abdomen BT raporu

Bilateral böbrekler normal konumda olup konturları lobüle izlendi.Bilateral böbrekler ve renal pelvisten cilt altına uzanan nefrostomi kataterine ait görünüm izlendi.Sağ böbrek simetriğine kıyasla boyutları azalmış.parankimi yer yer incelmiştir,pelvikaliksiyel sistemi normaldir.Sol böbrek normal boyutta ve parankim yapısında olup pelvikaliksiyel sisteminde grade 2 ektazi mevcuttur.Sol böbrek renal pelvis düzeyinde milimetrik çaplarda hava dansiteleri mevcuttur(işleme sekonder).Sol üreter orta düzeyinden mesane dışına uzanım gösteren foley katatere ait görünüm saptanmıştır(üreter perforasyonu).Mesane boş görünümdedir



Hasta foley katater uygulamasına bağlı üreter perforasyonu sebebiyle ürolojiye danışıldı. Hastanın sondası çıkarıldı hastaya üretrogram çekilmesi açısından üroloji servisine yatırıldı.Hasta ampirik tedavi amaçlı enfeksiyon hastalıklarına danışıldı 2x1 g iesef ıv tedavi önerildi.

TARTIŞMA

Üreter perforasyonu nadir ancak önemli komplikasyonlarından biridir ve sıklıkla distal üreterde görülür. Literatürde perforasyon oranı %0,5–4 arasında bildirilmektedir (1,2).

Üreteral yaralanmalarda erken tanı, tek ve en önemli prognostik faktör olarak kabul edilir. Üreteral yaralanma tanısı geciken hastalarda komplikasyon oranı çok daha yüksektir. Gecikmiş tanının vakaların %40'ı kadarında komplikasyona yol açtığı, buna karşın hemen tanı konulan vakaların %10'unun komplikasyona yol açtığı bildirilmiştir(3,4). Risk faktörleri arasında dar üreter, büyük taşlar ve zorlayıcı manipülasyonlar yer almaktadır.(1,6,7)

Erken tanınan perforasyonlarda JJ stent yerleştirilmesi ve antibiyotik tedavisi genellikle yeterlidir. Gecikmiş tanı durumunda ise ürinom, sepsis ve geç dönem striktür gelişme riski artmaktadır. (1,6,8,9) Bu olguda, perforasyonun intraoperatif dönemde saptanması ve hızlı müdahale edilmesi olumlu klinik sonuç sağlamıştır.

SONUÇ

Foley katater uygulaması sırasında gelişen üreter perforasyonu nadir görülse de ciddi sonuçlara yol açabilir. En yaygın semptomlar, şiddetli periton tahrişi ile birlikte ani, şiddetli, kalıcı alt karın ağrısıdır.(8) Üreter yaralanmasından kaynaklanan idrar kaçağı, ürinoma oluşumuna yol açabilir ve bu da sonunda enfeksiyon veya apseye neden olabilir. Sızan idrar ayrıca bağırsakları ve peritonu tahriş ederek ağrıya ve ileusa yol açabilir. (6,8,9) Üreter darlığı devam ederse ve idrar drenajı olmazsa, bu tıkanıklık böbrek fonksiyon kaybına ve nihayetinde böbrek kaybına yol açabilir.(10) Erken tanı ve uygun konservatif tedavi ile cerrahi girişime gerek kalmadan başarılı sonuçlar elde edilebilir.

Bu olgu, erişkin hastalarda görülen üreteral travmaların tanı ve tedavi sürecindeki deneyimlerin çocuk hastalardaki üreteral travmaların yönetimine de katkı sağlayabileceğini göstermektedir. Özellikle travma mekanizmasının doğru değerlendirilmesi, üreteral yaralanmadan şüphelenilmesi, uygun görüntüleme yöntemlerinin seçilmesi ve erken dönemde multidisipliner

yaklaşımın sağlanması, çocuk hastalarda oluşabilecek komplikasyonların azaltılması açısından önemlidir. Erişkin olgulardan elde edilen klinik deneyimler, çocuklarda üreteral travmanın daha nadir görülmesi nedeniyle karşılaşılan tanısal ve tedaviye ilişkin güçlüklerin aşılmasına ve uygun yönetim algoritmalarının oluşturulmasına katkı sağlayabilir.

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M4434-Tam Metin

PREDICTIVE VALUE OF THE C-REACTIVE PROTEIN/ALBUMIN RATIO AND CALLY INDEX FOR THE DURATION OF HOSPITAL STAY IN PEDIATRIC PNEUMONIA PATIENTS

İlyas daşkıran

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ABSTRACT

OBJECTIVE

Community-acquired pneumonia is one of the leading causes of hospitalization in childhood. Practical biomarkers are needed to accurately assess the severity of the disease and predict the length of hospital stay (LOS). In this study, we aimed to investigate the relationship between the CRP/Albumin Ratio (CAR) and the C-reactive protein-Albumin-Lymphocyte (CALLY) index with the duration of hospitalization in pneumonia patients presenting to the pediatric emergency department, and to demonstrate the utility of these composite parameters in predicting the clinical course.

MATERIALS AND METHODS

We retrospectively included 29 pediatric pneumonia patients who presented to the Pediatric Emergency Department of Malatya Training and Research Hospital between February 1, 2026, and August 1, 2026, and met the inclusion criteria. Demographic data of the patients, along with serum CRP, albumin, and absolute lymphocyte values at presentation, were retrieved from the hospital information system. The CAR and CALLY indices were calculated using these parameters. For statistical analysis, Spearman's correlation test was used according to the distribution of the data; a value of $p < 0.05$ was considered statistically significant.

RESULTS

The median age of the included patients (51.7% male, 48.3% female) was 8.0 years (IQR: 1.5–11.0), and the median length of hospital stay was 3.0 days (IQR: 0.0–5.0). Regarding laboratory parameters, the median CAR value was found to be 0.23 (IQR: 0.12–0.94), and the median CALLY index was 9.79 (IQR: 3.08–26.36). In the correlation analysis, significant moderate positive correlation was identified between the length of hospital stay and CAR ($r = 0.421, p = 0.023$), while a moderate negative correlation was found with the CALLY index ($r = -0.415, p = 0.025$). While serum CRP levels alone showed only a weak positive correlation with LOS ($r = 0.368, p = 0.049$), albumin levels and lymphocyte counts alone showed no significant correlation with LOS ($p > 0.05$).

CONCLUSION

In our study, we demonstrated that composite indices (CAR and CALLY)—which evaluate inflammation, immune response, and nutritional status together—possess higher diagnostic power in predicting the length of hospital stay compared to single laboratory parameters. We conclude that CAR and, particularly, the CALLY index calculated at the time of admission in

pediatric emergency department settings can serve as practical, cost-effective, and reliable biomarkers for clinical risk stratification and predicting hospitalization duration in pediatric pneumonia patients.

Keywords: Pediatric pneumonia, CALLY index, CRP/Albumin ratio, Length of stay, Biomarker.

Giriş bölümünüzün tıp literatürüne ve uluslararası akademik yazım standartlarına uygun İngilizce çevirisi aşağıdadır:

INTRODUCTION

Community-acquired pneumonia (CAP) remains one of the leading causes of childhood hospitalization and mortality in children under five years of age worldwide [1]. The variability of the clinical course among pediatric patients leads to an prolonged length of hospital stay (LOS), increased healthcare costs, and a higher risk of hospital-acquired complications [2]. Therefore, early and reliable biomarkers are required to accurately evaluate disease severity and predict the length of stay during emergency department or outpatient clinic presentations [3].

The inflammatory response and the state of the immune system play a critical role in the pathophysiology of pneumonia [4]. Complete blood count parameters and biochemical indicators are widely used to reflect the degree of systemic inflammation [5]. While C-reactive protein (CRP) is a sensitive parameter of inflammation indicating the host's acute-phase response, serum albumin levels—acting both as an indicator of nutritional status and a negative acute-phase reactant—decrease during acute inflammation [6]. In recent years, the CRP/Albumin Ratio (CAR), derived from the ratio of these two parameters, has emerged as a marker with higher prognostic value in patients with infection and sepsis compared to CRP or albumin alone [7].

Furthermore, the predictive power of combined indices that simultaneously evaluate inflammation, immune dysfunction, and nutritional status is being actively investigated in clinical practice [8]. The CALLY (CRP-Albumin-Lymphocyte) index, which integrates C-reactive protein, albumin, and lymphocyte count, is an innovative scoring system that holistically reflects the immuno-inflammatory and nutritional status [9]. A low CALLY index or a high CAR value is associated with a weak immune response, severe inflammation, and a prolonged recovery process [10].

Predicting the clinical course and length of hospital stay in pediatric pneumonia patients is of paramount importance for proper patient management and risk stratification [11]. The aim of this study is to evaluate the relationship between admission CAR and CALLY index levels with the length of hospital stay in pediatric pneumonia patients, and to demonstrate the utility of these composite biomarkers in clinical risk stratification and predicting hospitalization duration.

MATERIALS AND METHODS

Study Design and Patient Selection

This study was designed as a retrospective, descriptive, and cross-sectional study. A total of 38 pediatric patients who presented to the Pediatric Emergency Department of Malatya Training and Research Hospital between February 1, 2026, and August 1, 2026, and were diagnosed with pneumonia based on clinical, laboratory, and radiological evaluations, were evaluated for

inclusion. Patient data were retrospectively screened using the hospital information management system (HIMS).

Inclusion criteria were defined as being under 18 years of age, receiving a diagnosis of pneumonia in the pediatric emergency department, and having complete baseline complete blood count (CBC) and biochemical test results available at presentation. Nine patients with missing or erroneous laboratory data, unavailable length of stay (LOS) records, known immunodeficiency, chronic lung disease, active malignancy, or hematological disease were excluded from the study. Consequently, our statistical analysis was conducted on 29 pediatric patients who fully satisfied the specified inclusion and exclusion criteria.

Collection of Demographic and Clinical Data

Patient demographics (age, sex), length of hospital stay (days), as well as serum C-reactive protein (CRP, mg/L), albumin (g/L), and absolute lymphocyte count (10^9/L) at presentation were retrieved from the HIMS records. Based on these parameters, two composite biomarkers were calculated:

- **CRP/Albumin Ratio (CAR):** Calculated using the formula:
$$\text{CAR} = \frac{\text{CRP (mg/L)}}{\text{Albumin (g/L)}}$$
- **CALLY Index (CRP-Albumin-Lymphocyte):** Derived using the formula:
$$\text{CALLY Index} = \frac{\text{Albumin (g/dL)} \times \text{Absolute Lymphocyte Count (/mL)}}{\text{CRP (mg/dL)} \times 10^4}$$

Statistical Analysis

Statistical analyses of the collected data were performed using SPSS (Statistical Package for the Social Sciences) software, version 25.0. The normality of continuous variables was evaluated using the Shapiro-Wilk test. Because the parameters were not normally distributed, continuous variables were presented as median and interquartile range (IQR: 25th–75th percentiles), while categorical variables were expressed as frequencies (n) and percentages (%). The direction and strength of relationships between variables were evaluated using Spearman's rank correlation analysis. The interpretation of correlation coefficients (r) was based on the widely accepted classification criteria established by Schober et al. (2018) [11]. A statistical significance threshold of $p < 0.05$ was applied to all analyses.

RESULTS

A total of 29 pediatric pneumonia patients (51.7% male, 48.3% female) were included in our study. The median age of the patients was 8.0 years (IQR: 1.5–11.0), and the median length of hospital stay (LOS) was 3.0 days (IQR: 0.0–5.0). Regarding the initial laboratory parameters, the median CRP level was 11.0 mg/L (IQR: 5.35–40.85), the median albumin level was 42.5 g/L (IQR: 39.75–45.20), the median absolute lymphocyte count was 2.48×10^9/L (IQR: 1.85–3.53), the median CALLY index was 9.79 (IQR: 3.08–26.36), and the median CAR (CRP/Albumin Ratio) was 0.23 (IQR: 0.12–0.94).

The relationships between the length of hospital stay and clinical/laboratory parameters were evaluated using Spearman's rank correlation analysis. In the correlation analysis, a statistically significant moderate positive correlation was identified between the length of hospital stay and CAR ($r = 0.421, p = 0.023$), whereas a moderate negative correlation was found between the CALLY index and the length of stay ($r = -0.415, p = 0.025$). On the other hand, serum CRP levels demonstrated only a weak positive, yet statistically significant, correlation with the length

of hospital stay ($r = 0.368, p = 0.049$). No statistically significant correlation was observed between the length of stay and age, albumin levels, or lymphocyte counts ($p > 0.05$).

DISCUSSION

Predicting the clinical course and length of hospital stay (LOS) in pediatric pneumonia patients is of critical importance for risk stratification in emergency departments and for the efficient utilization of healthcare resources [1, 2]. The primary finding of our study is that the C-reactive protein/albumin ratio (CAR) and the CALLY index measured at admission demonstrate significant correlations with the length of hospital stay.

In the literature, C-reactive protein (CRP) is the most frequently utilized acute-phase reactant in pediatric lower respiratory tract infections [4, 6]. However, the capacity of single parameters that merely reflect the inflammatory response to predict the duration of clinical course can sometimes be limited. Based on the classification criteria of Schober et al. (2018) [11], while CRP alone showed only a weak correlation with LOS in our study, the correlation of CAR—derived by taking the ratio of CRP to albumin—with LOS rose to a moderate level. This aligns with existing studies in adult and critically ill patient populations reporting that CAR exhibits higher prognostic value in reflecting infection severity and length of stay compared to individual parameters alone [7]. Evaluating CRP, a marker of systemic inflammation, together with albumin, a negative acute-phase reactant and nutritional marker, better captures the severity of the clinical picture.

On the other hand, the predictive power of composite parameters that simultaneously assess the host's immunological response and nutritional status alongside inflammation has gained significant attention in clinical practice [8]. The CALLY index, which incorporates C-reactive protein, albumin, and lymphocyte count, represents a novel immuno-nutritional scoring system [9]. Decreased CALLY index values in the literature have been reported to be associated with an impaired immune response, severe inflammation, and prolonged hospitalization [10]. The moderate negative correlation between the CALLY index and LOS identified in our study demonstrates that this index is also a useful parameter for predicting the clinical course in pediatric pneumonia.

The most notable finding of our study is the difference in correlation strength displayed by composite indices compared to their individual component parameters. When evaluated independently, serum albumin levels and lymphocyte counts showed no statistically significant correlation with LOS, whereas CRP exhibited only a weak correlation. In contrast, CAR and the CALLY index, constructed through the combination of these biomarkers, demonstrated stronger and statistically significant correlations with LOS. This indicates that composite indices—which holistically address inflammation, immunity, and nutritional status—possess superior diagnostic power in predicting hospitalization duration and performing clinical risk stratification compared to single laboratory parameters.

The main limitations of our study include its single-center design and the relatively small sample size [12]. Nevertheless, our findings support the practical utility of composite indices in pediatric emergency department settings.

CONCLUSION

In conclusion, CAR and particularly the CALLY index, calculated at presentation in pediatric pneumonia patients, can be considered practical, cost-effective, and reliable clinical biomarkers for predicting the length of hospital stay.

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M4435-Özet Metin

CLINICAL CHARACTERISTICS AND HOSPITAL OUTCOMES ASSOCIATED WITH REPEATED INTRAMUSCULAR EPINEPHRINE ADMINISTRATION IN PEDIATRIC ANAPHYLAXIS

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Aim: Repeated intramuscular epinephrine administration may be required in pediatric anaphylaxis; however, the clinical characteristics associated with this requirement remain unclear. This study aimed to compare patients receiving a single dose of intramuscular epinephrine with those receiving two or more doses and to explore baseline factors associated with repeated administration.

Methods: This retrospective cohort study included patients aged 0–18 years who were diagnosed with anaphylaxis and treated in a tertiary pediatric emergency department between April 2023 and April 2026. Demographic and clinical characteristics, administered treatments, observation duration, and hospital outcomes were compared between patients receiving a single dose and those receiving two or more doses of intramuscular epinephrine. Firth bias-reduced penalized logistic regression analysis was used to identify factors associated with repeated epinephrine administration.

Results: A total of 62 patients were included. Of these, 43 (69.4%) received a single dose of intramuscular epinephrine, whereas 19 (30.6%) received two or more doses. Cardiovascular involvement, gastrointestinal involvement, shock, and severe anaphylaxis were significantly more frequent in the repeated-dose group. Patients requiring repeated doses also had longer observation periods, a greater need for intravenous fluid therapy and intravenous epinephrine infusion, and higher pediatric intensive care unit admission rates. In multivariable analysis, cardiovascular involvement (adjusted odds ratio [aOR] 5.40, 95% confidence interval [CI] 1.54–23.66; p=0.008) and gastrointestinal involvement (aOR 3.83, 95% CI 1.18–13.16; p=0.025) were independently associated with repeated intramuscular epinephrine administration.

Conclusion: Repeated intramuscular epinephrine administration in pediatric anaphylaxis was associated with a more severe clinical presentation, greater treatment intensity, and increased healthcare utilization. Cardiovascular and gastrointestinal involvement may help identify patients who require closer monitoring and early escalation of care. These findings should be confirmed in larger prospective studies.

Keywords: anaphylaxis; child; intramuscular epinephrine; repeated epinephrine administration; cardiovascular involvement; pediatric emergency department

Funding: No external funding was received for this study.

M4436-Tam Metin

AGE-RELATED DIFFERENCES IN PROCEDURAL CHALLENGES DURING AMPLATZER SEPTAL OCCLUDER CLOSURE OF ATRIAL SEPTAL DEFECTS: ADULT CLINICAL EXPERIENCE VERSUS PEDIATRIC LITERATURE

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1. Introduction

Atrial septal defect (ASD) is one of the most common congenital heart diseases, accounting for approximately 5–10% of all congenital cardiac anomalies identified at birth and up to 30–40% of congenital heart disease diagnosed in adulthood (Khan et al.). The secundum-type ASD, located within the region of the fossa ovalis, represents roughly 75% of all ASD cases and is the most common form amenable to percutaneous device closure.

Physiologically, a hemodynamically significant ASD produces a left-to-right shunt that leads to progressive right atrial and right ventricular volume overload. Because small-to-moderate defects are frequently well tolerated in childhood, a substantial proportion of patients remain asymptomatic for decades and are diagnosed only in adulthood, often incidentally or after the onset of exertional dyspnea, palpitations, atrial arrhythmias, or signs of right heart failure. Untreated defects diagnosed late in life are further associated with pulmonary hypertension and an increased risk of paradoxical embolism, and may occasionally present acutely with decompensated heart failure or arrhythmia requiring emergency admission.

Since its introduction, the Amplatzer Septal Occluder (ASO) has become the device of choice for transcatheter closure of secundum ASD, largely replacing surgical closure in anatomically suitable cases and offering shorter hospital stay, avoidance of cardiopulmonary bypass, and a favorable long-term safety profile (Snijder et al.). Much of the initial procedural experience and technical refinement of transcatheter ASD closure, including balloon sizing, rim assessment, and maneuvers to stabilize the device across large or complex defects, was developed and reported primarily in pediatric cohorts. However, adult patients differ from children in several anatomical and clinical respects: defects diagnosed in adulthood tend to be larger at the time of intervention, interatrial septal tissue is often less compliant, deficient or aneurysmal rims are more frequently encountered, and age-related comorbidities may influence both procedural risk and left ventricular hemodynamic adaptation after shunt closure (Dehghani and Boyle; Khan et al.).

Despite the growing volume of adult ASD closure procedures, direct comparisons between adult and pediatric procedural experience remain limited, and most reference data for pediatric outcomes are derived from large single-center series such as that reported by Doğan and Levent. In this study, we aimed to describe the procedural characteristics, technical success, and complications encountered during percutaneous ASO closure of secundum ASD in a cohort of adult patients at our institution, and to compare these findings with the pediatric literature and

with previously published adult series, in order to characterize age-related differences in procedural difficulty and to underscore the clinical value of timely diagnosis and closure in childhood.

2. Methods

2.1. Patient Population and Study Design

This retrospective, single-center study included 63 consecutive adult patients (aged >17 years) with a secundum-type ASD who underwent catheter-angiography for percutaneous closure with the Amplatzer Septal Occluder between 2020 and 2026 at our institution. Indications for closure included a hemodynamically significant left-to-right shunt (Qp:Qs typically >1.5), right ventricular volume overload on echocardiography, exertional dyspnea or reduced exercise tolerance, atrial arrhythmia, or a history suggestive of paradoxical embolism. Patients with unsuitable anatomy on pre-procedural imaging, such as insufficient septal rims precluding device stability, were excluded from device implantation and were not included in the closure cohort.

2.2. Procedural Technique

All procedures were performed under fluoroscopic and transesophageal (or intracardiac, where applicable) echocardiographic guidance via femoral venous access. Defect diameter and rim adequacy were assessed by transesophageal echocardiography, and balloon sizing using the stop-flow technique was performed in patients with borderline or large defects to determine the stretched diameter and guide device selection. In patients with large or elliptical defects where the device could not be seated stably in a position parallel to the septum, the Minnesota maneuver was attempted to improve device orientation and stability prior to release. Device position and stability were confirmed by both the balloon (Minnesota) push-pull assessment and echocardiographic imaging before final release. Procedural success was defined as stable device deployment without significant residual shunt or need for surgical referral. Complications were categorized as major (e.g., device embolization, need for surgical intervention, hemodynamically significant pericardial effusion) or minor (e.g., access-site hematoma not requiring intervention, trivial residual shunt).

2.3. Statistical Analysis

Continuous variables are expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Given the retrospective, single-arm nature of the adult cohort, procedural characteristics and complication rates were compared descriptively with previously published pediatric data reported by Doğan and Levent, as well as with other adult series identified in the literature, rather than through direct statistical hypothesis testing against a concurrent pediatric control group.

3. Results

The mean age of our adult patients was 36.7 ± 15.1 years, considerably higher than the pediatric cohort reported by Doğan and Levent (mean age 8.08 ± 3.9 years). Thirty-six of our 63 patients (57.1%) were female, a proportion nearly identical to the female predominance observed in the pediatric series (57.2%), suggesting that sex distribution among secundum ASD patients is largely independent of age at diagnosis.

The mean defect diameter in our adult cohort was 16.44 ± 5.03 mm, notably larger than the mean defect size reported in the pediatric series (12.56 ± 4.02 mm), consistent with the expectation that longstanding, previously undiagnosed defects tend to enlarge over time as the atrial septum remodels under chronic volume overload. A second, hemodynamically distinct ASD was identified in 4 patients (6.3%) in our cohort, slightly more frequent than the 4.5% multiple-defect rate reported in children.

Procedural failure, defined as inability to achieve stable device deployment, occurred in 3 of our 63 patients (4.8%). This included 1 patient (1.6%) with device embolization and 2 patients (3.2%) in whom stable device positioning parallel to the septum could not be achieved despite the Minnesota maneuver, owing to large defect diameter and unfavorable septal geometry; both were referred for surgical closure. These figures compare with an overall procedural failure rate of 1.3% and an embolization rate of 0.6% in the pediatric series by Doğan and Levent, and are broadly consistent with embolization rates of approximately 1–3% reported in other adult series using the Amplatzer device (Snijder et al.; Alnasser et al.).

Additional complications in our cohort included mild residual shunt in 3 patients (4.8%), detected on follow-up echocardiography, and a femoral access-site hematoma not requiring surgical or endovascular intervention in 1 patient (1.6%). A detailed side-by-side comparison of procedural characteristics and complications between our adult cohort and the pediatric literature is presented in Table 1.

4. Discussion

The principal finding of this study is that, although percutaneous ASO closure of secundum ASD is feasible and generally safe in adults, with a female predominance and overall complication spectrum broadly similar to that reported in children, adult patients present with substantially larger defects and experience more frequent difficulty achieving stable device positioning, occasionally necessitating surgical referral. This pattern is consistent with the broader adult ASD literature, in which larger defect diameter and unfavorable rim anatomy have repeatedly been identified as predictors of procedural failure and device-related complications (Snijder et al.).

Compared with the pediatric series of Doğan and Levent, our adult cohort showed a similar sex distribution but a mean defect diameter that was approximately 4 mm larger and a procedural failure rate that was roughly three-fold higher. This difference likely reflects the natural history of undiagnosed ASD: defects that escape detection in childhood continue to enlarge under chronic left-to-right shunting and right heart volume overload, so that by the time of diagnosis in adulthood they are frequently larger, and the surrounding septal tissue may be less compliant or aneurysmal, both of which increase the technical difficulty of achieving a stable device position. The need for the Minnesota maneuver and, in some cases, surgical referral in our cohort illustrates this added procedural complexity relative to typical pediatric cases.

Our findings are also consistent with previously published adult series. Snijder et al. reported a major complication rate of 2.9% and an embolization rate of approximately 1% among adults treated with the Amplatzer device, similar in magnitude to the 1.6% embolization rate observed in our cohort. Larger meta-analyses of transcatheter ASD closure in adults, such as those by Villablanca et al. and Alnasser et al., report overall procedural success rates in the range of 95–97% and low rates of major complications, again broadly in line with our results. Khan et al.

and Dehghani and Boyle further highlight that older adults undergoing ASD closure may be at additional risk of hemodynamic complications related to unmasking of left ventricular diastolic dysfunction after shunt closure, an aspect not typically relevant in pediatric practice and one that adds another layer of complexity to adult procedural planning, even though it was not directly assessed in the present study.

From a clinical standpoint, these findings reinforce the importance of early recognition and timely percutaneous closure of secundum ASD during childhood, when defects are generally smaller, septal tissue more compliant, and procedural success rates higher. Delayed diagnosis into adulthood not only increases the technical complexity of transcatheter closure but may also allow the development of pulmonary hypertension, atrial arrhythmias, or heart failure, conditions that can ultimately present as cardiac emergencies. This underscores the relevance of pediatric screening and follow-up programs in preventing the late, more complex presentations described in our adult cohort.

This study has several limitations. It is a retrospective, single-center analysis with a relatively small adult sample size, and comparisons with pediatric data were made descriptively against previously published literature rather than a concurrent, matched pediatric control group treated at the same institution with identical protocols. Long-term follow-up data beyond the immediate post-procedural period were also limited. Larger, prospective, multicenter studies directly comparing adult and pediatric outcomes within the same protocol would help to confirm and extend these findings.

5. Conclusion

Percutaneous closure of secundum ASD with the Amplatzer Septal Occluder is safe and effective in adult patients, with a complication profile broadly comparable to that reported in pediatric series. However, adults present with significantly larger defects and a higher rate of procedural difficulty related to device positioning, occasionally requiring surgical referral. These age-related differences highlight the importance of timely diagnosis and closure of ASD during childhood, both to simplify future procedural management and to prevent the late cardiac complications associated with long-standing, undiagnosed defects.

Table 1. Comparison of procedural characteristics and complications: adult cohort versus pediatric literature.

Parameter	Our adult cohort (n=63)	Doğan & Levent, pediatric (n=334)
Mean age	36.7 ± 15.1 years	8.08 ± 3.9 years
Female sex	36/63 (57.1%)	191/334 (57.2%)
Mean defect diameter	16.44 ± 5.03 mm	12.56 ± 4.02 mm
Multiple / second ASD	4/63 (6.3%)	15/334 (4.5%)
Procedural failure	3/63 (4.8%)	4/334 (1.3%)
Device embolization	1/63 (1.6%)	2/334 (0.6%)
Failed device positioning (surgical referral)	2/63 (3.2%)	2/334 (0.6%)
Mild residual shunt	3/63 (4.8%)	*not reported*
Femoral hematoma	1/63 (1.6%)	*not reported*

Other major complications (anesthesia/respiratory, atelectasis)	none observed	2/334 (0.6%)

Source: Doğan E, Levent E. "Transcatheter Closure of Secundum Atrial Septal Defects in Pediatric Patients: A 15-Year Single-Center Experience." Cureus, vol. 16, no. 3, 2024, e57150.

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M4437-Özet Metin

HOW WELL IS OUR PEDIATRIC EMERGENCY DEPARTMENT PERFORMING? A THREE-YEAR EVALUATION USING QUALITY INDICATORS

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Introduction / Aim
Quality indicators are objective measures of pediatric emergency care, but data from two-track systems, where medical visits go to a pediatric ED and trauma to an adult ED, are scarce. We evaluated triage distribution, time to physician and 72-hour unscheduled return visits across all under-18 visits of a state hospital.
Methods
All under-18 visits to both EDs between July 2023 and June 2026 were retrospectively analyzed from hospital records. Returns were linked across units by national ID, then irreversibly anonymized. Waiting time was assessed in kiosk-registered walk-in patients. Chi-square, Kruskal-Wallis and multivariable logistic regression were used.
Results
Overall, 298,609 visits by 98,244 children were included (median age 8; 53.9% male; 79.2% pediatric ED). Triage: red 0.5%, yellow 59.0%, green 40.0%; 4.9% were injury-related. Median time to physician was 13 (IQR 6-30) minutes and 7.2% waited over 60 minutes. The 72-hour return rate was 5.97%; 12.6% of returns crossed units and single-unit analysis would yield 5.21%. Hospitalization was 2.2%, rising from 1.9% to 2.4%. Yellow triage (OR 1.48), trauma (OR 1.19), male sex, night shift, younger age and adult-ED care (OR 1.23) independently predicted returns.
Conclusion
In two-track pediatric emergency systems, quality indicators, particularly 72-hour returns, must be measured across units: single-unit metrics underestimate them and miss the highest-risk group, children managed in adult EDs. We therefore developed a cross-unit monitoring procedure: monthly linked return-visit dashboards stratified by unit, and targeted discharge instructions for high-risk children (yellow triage, younger age, adult-ED care). Cross-unit linkage should become a standard quality metric in similar two-track systems.

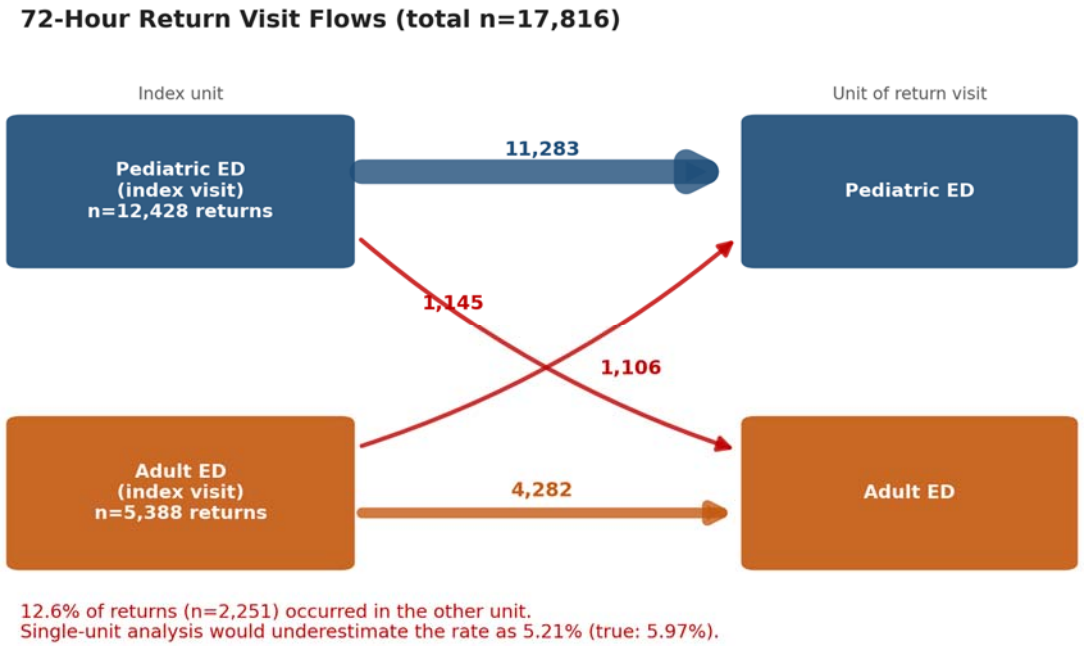
Table 1. Quality indicators of under-18 emergency visits by unit (July 2023 - June 2026)

Indicator	Pediatric ED	Adult ED (<18)	Total
Visits, n	236,610	61,999	298,609
Age, median (IQR), years	7 (4-12)	11 (6-14)	8 (4-13)
Male, %	51.6	62.6	53.9
Triage red / yellow / green, %	0.5 / 50.0 / 49.1	0.3 / 93.3 / 5.0	0.5 / 59.0 / 40.0
Injury-related visits, %	0.8	20.4	4.9
Time to physician*, median (IQR), min	13 (6-30)	4 (0-8)	13 (6-30)
Waiting >60 min*, %	7.3	0.4	7.2

72-hour return visits, %	5.25	8.69	5.97
Hospitalization, %	1.3	5.7	2.2
Arrival by ambulance, %	0.7	2.2	1.0

*Assessed in kiosk-registered walk-in patients; patients taken directly to treatment areas are registered concurrently with care.

Figure 1. Cross-unit flows of 72-hour return visits



Ethics note: Ethics committee application submitted (SBU Konya Beyhekim Training and Research Hospital, Non-Interventional Clinical Research Ethics Committee); approval documentation will be provided before presentation.

M4438-Tam Metin

ISOLATED TRAUMATIC STERNOCLAVICULAR JOINT DISLOCATION IN AN ADOLESCENT MALE FOLLOWING A MOTOR VEHICLE ACCIDENT: A CASE REPORT

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Abstract

Sternoclavicular (SC) joint dislocation is a rare injury, accounting for approximately one percent of all joint dislocations, yet it carries disproportionate clinical significance because of the joint's proximity to the trachea, esophagus, and great mediastinal vessels. In skeletally immature and young adult patients, the diagnostic picture is further complicated by the medial clavicular physis, which remains open until the early twenties and can fracture in a pattern that closely mimics true joint dislocation — a phenomenon termed pseudodislocation. We report the case of a 17-year-old male who presented with an isolated right sternoclavicular joint dislocation after a motor vehicle accident, without associated fracture or other injury and with stable vital signs. Orthopedic and thoracic surgery consultations were obtained, and the patient was discharged with a clavicular figure-of-eight bandage and outpatient follow-up. This report reviews the clinical evaluation of traumatic SC joint injury, the importance of distinguishing anterior from posterior displacement, the differential diagnosis of medial clavicular physeal fracture in this age group, and the evidence supporting conservative management of stable injuries.

Keywords: sternoclavicular joint dislocation, medial clavicle physeal fracture, pseudodislocation, adolescent trauma, motor vehicle accident, figure-of-eight bandage

Introduction

Dislocation of the sternoclavicular joint is one of the least common major joint dislocations encountered in trauma practice, reflecting the inherent stability conferred by the strong anterior and posterior sternoclavicular ligaments, the costoclavicular ligament, and the interclavicular ligament. Because disruption of this joint requires a substantial and specifically directed force, isolated SC dislocation without associated thoracic or clavicular fracture is uncommon, and its occurrence should prompt a systematic search for other injuries, even when the patient is otherwise stable.

Traumatic SC joint injuries are classified by the direction of displacement of the medial clavicle relative to the sternum, as either anterior or posterior, with anterior displacement being considerably more common. This distinction has direct clinical consequences: posterior displacement places the medial clavicle in direct proximity to the trachea, esophagus, innominate vessels, and other mediastinal structures, and can produce airway compromise, vascular injury, or dysphagia, whereas anterior displacement, though painful and deforming, is

rarely associated with mediastinal compromise and is more amenable to conservative management.

A further layer of complexity applies specifically to adolescents and young adults. The medial clavicular epiphysis is the last ossification center in the body to fuse to its parent bone, with fusion typically completed between the ages of twenty and twenty-five. Consequently, an injury that appears radiographically or clinically identical to a true SC joint dislocation in a patient under this age may in fact represent a Salter-Harris type I or II fracture through the medial clavicular physis, with the epiphysis remaining attached to the sternum via the intact capsuloligamentous structures while the clavicular shaft displaces — a pattern referred to as pseudodislocation. This distinction, while not always altering the acute management of a stable anterior injury, has important implications for surgical planning should operative intervention become necessary, and for prognostic counseling regarding physeal growth and possible remodeling.

We describe an adolescent male with an isolated right-sided sternoclavicular dislocation following a motor vehicle accident, discuss the diagnostic approach that guided multidisciplinary management, and review the relevant literature regarding this uncommon injury.

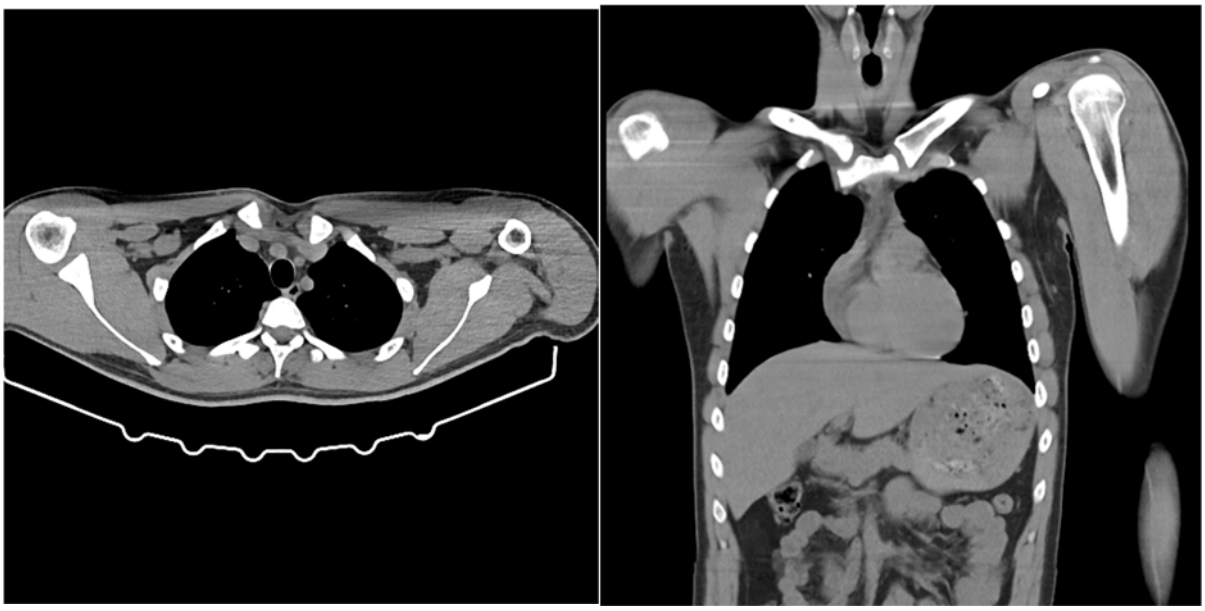
Case Presentation

A 17-year-old male was brought to the emergency department following a motor vehicle accident in which he was a vehicle occupant. He complained of pain and a visible deformity over the right sternoclavicular region, without other localized complaints. There was no reported loss of consciousness and no history suggestive of direct high-force impact to the chest beyond the seatbelt/restraint mechanism typical of frontal or lateral collisions.

On initial assessment, the patient was hemodynamically stable, with normal vital signs throughout the emergency department course. Local examination revealed tenderness, swelling, and a palpable step-off at the right SC joint, with asymmetry compared to the contralateral side. There was no respiratory distress, stridor, dysphagia, dysphonia, or subcutaneous emphysema, and no signs suggestive of mediastinal or great-vessel compromise. Distal neurovascular examination of the right upper extremity, including radial pulse, capillary refill, and sensorimotor function, was normal and symmetric to the left side.

Imaging confirmed an isolated dislocation of the right sternoclavicular joint. No associated clavicular, rib, or sternal fracture was identified, and no other skeletal or visceral injury was found on the trauma survey. Given the mechanism of injury and the anatomical concern inherent to this joint, both orthopedic surgery and thoracic surgery were consulted to jointly assess the direction of displacement and to exclude mediastinal involvement.

Following joint evaluation, both consulting services concurred that the injury was stable, without radiographic or clinical evidence of posterior displacement or mediastinal compromise. The patient was managed conservatively with a clavicular figure-of-eight bandage for immobilization and was discharged home with outpatient orthopedic follow-up arranged to monitor healing, joint stability, and, given the patient's age, the possible contribution of the medial clavicular physis to the injury pattern.



Discussion

Sternoclavicular joint dislocation is an uncommon injury that nonetheless demands a disciplined diagnostic approach because of the potential, particularly with posterior displacement, for injury to structures within or adjacent to the superior mediastinum. Anterior dislocation is the more frequent pattern and is generally considered a lower-risk injury, typically presenting with a visibly prominent medial clavicle and manageable with closed reduction attempts, sling or figure-of-eight immobilization, and observation, since recurrent instability, while common, is usually well tolerated functionally. Posterior dislocation, by contrast, is a recognized surgical emergency: displacement of the medial clavicle behind the manubrium can compress or lacerate the trachea, esophagus, innominate artery or vein, and other great vessels, and mandates urgent cross-sectional imaging and, frequently, operative reduction under controlled conditions with cardiothoracic surgical availability given the risk of vascular injury during reduction maneuvers.

A central diagnostic consideration in this age group is the distinction between a true ligamentous SC joint dislocation and a medial clavicular physeal fracture-separation, or pseudodislocation. Because the medial clavicular physis does not fuse until the early-to-mid twenties, it represents the weakest structural point in the region during adolescence and young adulthood, such that a force sufficient to disrupt the joint in an older adult may instead produce a physeal fracture in a younger patient, with the epiphysis remaining tethered to the sternum by the intact sternoclavicular ligaments while the metaphyseal clavicular shaft displaces anteriorly or posteriorly. Plain radiographs are notoriously unreliable for characterizing this region because of overlapping mediastinal structures and the small, often incompletely ossified epiphysis, and computed tomography has become the imaging modality of choice to define the direction and degree of displacement and its relationship to mediastinal structures, while magnetic resonance imaging can further help differentiate a physeal injury from a true joint dislocation by directly visualizing the unossified epiphyseal cartilage and adjacent ligaments. This distinction is not merely academic: in surgical series of posterior sternoclavicular injuries in young patients, physeal fractures have been found to account for as much as half of cases previously assumed to be true dislocations, and awareness of this entity affects both operative

planning — since standard SC joint stabilization techniques may need to be adapted to fixate a physeal fragment rather than a ligamentous disruption — and long-term counseling, since physeal injuries in a skeletally immature patient carry potential for remodeling that a ligamentous dislocation does not.

Management decisions ultimately hinge on the direction of displacement and the presence or absence of mediastinal symptoms and signs, rather than on the anterior/posterior or true-dislocation/physeal-fracture distinction alone. A stable injury with preserved or only mildly disrupted joint contact, no compressive symptoms, and a reassuring clinical examination — as in the present case — is well suited to nonoperative management with sling or figure-of-eight bandage immobilization and close clinical and radiographic follow-up, reserving surgical stabilization for cases with instability, recurrent symptomatic subluxation, or mediastinal compromise. The multidisciplinary evaluation performed in this case, involving both orthopedic and thoracic surgical input, reflects the recommended approach to this injury given the anatomical stakes involved, even when the eventual disposition is conservative.

This case reinforces several practical points for clinicians managing adolescent trauma patients: first, that an apparently isolated SC joint injury in a patient under twenty-five years of age warrants explicit consideration of a medial clavicular physeal fracture; second, that the direction of displacement must be actively excluded as posterior, given the differing risk profiles and management pathways of anterior versus posterior injury; and third, that a multidisciplinary evaluation, even for an injury ultimately managed nonoperatively, is prudent given the proximity of this joint to vital mediastinal structures.

Conclusion

Isolated traumatic sternoclavicular joint dislocation is rare and, in adolescents and young adults, should always be evaluated with the medial clavicular physis in mind, since physeal fracture-separation can closely mimic true joint dislocation. Distinguishing anterior from posterior displacement is essential to guiding management, as posterior injuries carry meaningful risk to mediastinal structures and typically require urgent, image-guided, multidisciplinary care, whereas stable anterior injuries without compressive symptoms can be safely managed conservatively with immobilization and structured follow-up. The present case, in a 17-year-old male following a motor vehicle accident, illustrates a favorable presentation in which prompt multidisciplinary consultation supported safe outpatient management.

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M4440-Tam Metin

ALVEOLAR-CAPILLARY BARRIER INJURY AND HISTOPATHOLOGICAL CHANGES IN PEDIATRIC ACUTE RESPIRATORY DISTRESS SYNDROME

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Abstract

Introduction

Pediatric acute respiratory distress syndrome is a severe clinical manifestation of acute respiratory failure that can develop secondary to various pulmonary or systemic diseases. The disruption of the integrity of the alveolar-capillary barrier, which is formed by the alveolar epithelium and the pulmonary capillary endothelium, plays a pivotal role in the pathogenesis of the disease. Barrier injury can be associated with increased capillary permeability and the accumulation of protein-rich fluid in the interstitial and alveolar spaces. Consequently, pulmonary edema, alveolar collapse, impaired gas exchange, and hypoxemia may develop.

Body

The classic histopathological correlate of pediatric acute respiratory distress syndrome is diffuse alveolar damage. Diffuse alveolar damage is evaluated across overlapping exudative, proliferative, and fibrotic phases. During the exudative phase, capillary congestion, interstitial and intra-alveolar edema, inflammatory cell infiltration, type I alveolar epithelial cell injury, and hyaline membrane formation can be observed.

During the proliferative phase, type II alveolar epithelial cell hyperplasia, alveolar macrophage activation, and fibroblast proliferation may be observed. In prolonged and severe cases, collagen deposition, thickening of the alveolar septa, and interstitial fibrosis can develop. These alterations may lead to the disruption of normal alveolar architecture and the structural remodeling of the lung tissue.

Although mechanical ventilation is a life-saving intervention, inappropriate ventilation pressures and volumes can exacerbate pre-existing lung injury.

Conclusion

In this review, alveolar-capillary barrier injury, the histopathological phases of diffuse alveolar damage, and the microscopic alterations that develop in the lung tissue in pediatric acute respiratory distress syndrome have been discussed.

Keywords: Pediatric acute respiratory distress syndrome, alveolar-capillary barrier, diffuse alveolar damage, hyaline membrane, pulmonary edema.

INTRODUCTION

Acute respiratory distress syndrome is a clinical manifestation of acute hypoxemic respiratory failure that develops as a result of the disruption of alveolar-capillary barrier integrity. Its presentation in

children is termed pediatric acute respiratory distress syndrome. The disease is identified by the acronym PARDS, which stands for Pediatric Acute Respiratory Distress Syndrome. PARDS is a severe clinical syndrome characterized by inflammation in the lung tissue, increased permeability, pulmonary edema, and impaired gas exchange (1,2).

PARDS can develop secondary to various conditions that directly or indirectly affect the lungs. Pneumonia, aspiration of gastric contents, drowning, and pulmonary contusion may be associated with direct lung injury. Conversely, sepsis, severe trauma, pancreatitis, and systemic inflammatory response can lead to indirect lung injury by affecting the pulmonary capillary endothelium (1,2).

The lung architecture, chest wall compliance, airway diameter, and immune response of children differ from those of adults. Consequently, the direct application of adult acute respiratory distress syndrome criteria in children carries certain limitations. Pediatric-specific criteria have been developed for the definition, determination of severity, and management of PARDS. The Second Pediatric Acute Lung Injury Consensus Conference, known as PALICC-2, encompasses current pediatric recommendations regarding the diagnosis and management of PARDS (1).

PARDS is a syndrome based on clinical and physiological criteria. The fundamental histopathological pattern of the disease is diffuse alveolar damage. However, diffuse alveolar damage may not be present at the same severity or exhibit the same appearance in all patients clinically diagnosed with PARDS. Histopathological alterations can vary depending on the etiology, duration, and severity of the disease, as well as the administered therapies (2,3).

The disruption of the integrity of the alveolar-capillary barrier, formed by the alveolar

epithelium and the pulmonary capillary endothelium, underlies diffuse alveolar damage. Increased barrier permeability can lead to the accumulation of protein-rich fluid in the interstitial and alveolar spaces. During this process, inflammatory cell infiltration, alveolar epithelial cell injury, hyaline membrane formation, and, in advanced stages, fibrotic remodeling may be observed (2,3).

HISTOLOGY OF THE NORMAL ALVEOLAR-CAPILLARY BARRIER

Alveoli are the primary structures where gas exchange occurs in the lungs. The alveolar wall is composed of alveolar epithelial cells, a basement membrane, thin interstitial connective tissue, and pulmonary capillary endothelial cells. This structure is referred to as the alveolar-capillary barrier or the blood-air barrier (3,4).

The alveolar epithelium is composed of type I and type II alveolar epithelial cells. Type I cells, characterized by their thin and squamous structure, are responsible for gas exchange. Type II cells, on the other hand, synthesize surfactant and contribute to the regeneration of the alveolar epithelium. Surfactant reduces alveolar surface tension, thereby assisting in the prevention of alveolar collapse (3,4).

The pulmonary capillary endothelium and alveolar epithelium play a significant role in restricting the passage of fluid and proteins. Injury to these structures can be associated with increased capillary permeability. Decreased alveolar fluid clearance, in turn, may contribute to the formation of protein-rich pulmonary edema. The disruption of alveolar-capillary barrier integrity may play a crucial role in the development of the histopathological alterations observed in PARDS (4).

ALVEOLAR-CAPILLARY BARRIER INJURY IN PARDS

PARDS can develop secondary to direct or indirect lung injury. Pneumonia, aspiration, and pulmonary contusion can directly affect the alveolar epithelium. Conversely, sepsis and systemic inflammation can be associated with pulmonary capillary endothelial injury. In both scenarios, the disruption of alveolar-capillary barrier integrity may occur (1,2).

During the early phase of injury, alveolar macrophages, epithelial cells, and endothelial cells become activated. Proinflammatory mediators, such as tumor necrosis factor-alpha, interleukin-1 beta, interleukin-6, and interleukin-8, are secreted by these cells. These mediators can promote the migration of neutrophils into the pulmonary circulation and alveolar space (4,5).

Activated neutrophils secrete proteases and reactive oxygen species. These substances can contribute to alveolar epithelial and capillary endothelial injury. The disruption of intercellular junctions can increase capillary and epithelial permeability. Consequently, protein-rich fluid can accumulate in the interstitial and alveolar spaces (4,5).

Injury to type I alveolar epithelial cells can disrupt the integrity of the alveolar epithelial barrier. The loss of these cells via necrosis or apoptosis can increase epithelial permeability. Consequently, protein-rich edema fluid can accumulate in the alveolar space. Epithelial injury can also impair the function of ion transport systems. This condition may lead to delayed alveolar fluid clearance (4,5).

Injury to type II alveolar epithelial cells can decrease surfactant synthesis and function. The loss of surfactant can increase alveolar surface tension, thereby facilitating alveolar collapse. The decreased participation of collapsed alveoli in ventilation can contribute to impaired gas exchange and the development of hypoxemia (2,4).

HISTOPATHOLOGICAL PHASES OF DIFFUSE ALVEOLAR DAMAGE

Diffuse alveolar damage is one of the primary histopathological patterns associated with PARDS. The process is evaluated across exudative, proliferative, and fibrotic phases. These phases are not distinguished by distinct boundaries and can be observed concurrently within the same lung tissue (3,6).

Exudative Phase

During the exudative phase, alveolar-capillary barrier permeability may increase. On histological examination, capillary congestion, interstitial and intra-alveolar edema, inflammatory cell infiltration, and the loss of type I alveolar epithelial cells can be observed. Hyaline membranes, composed of fibrin, plasma proteins, and cellular debris, can be observed along the alveolar wall (3,6).

Proliferative Phase

During the proliferative phase, tissue repair mechanisms may become prominent. Hyperplasia can develop in type II alveolar epithelial cells, and a response aimed at the resurfacing of the injured epithelial surface may emerge. Alveolar macrophages can contribute to the clearance of cellular debris. Furthermore, an increase in fibroblast and myofibroblast activity may lead to the deposition of collagen and other extracellular matrix components (5,6).

Fibrotic Phase

The fibrotic phase is not observed in all PARDS cases. It may predominantly manifest in prolonged and severe lung injury. During this period, thickening of the alveolar septa, collagen deposition, and the disruption of normal alveolar architecture can be observed. In advanced cases, interstitial fibrosis and a reduction in the pulmonary capillary bed may develop (3,6).

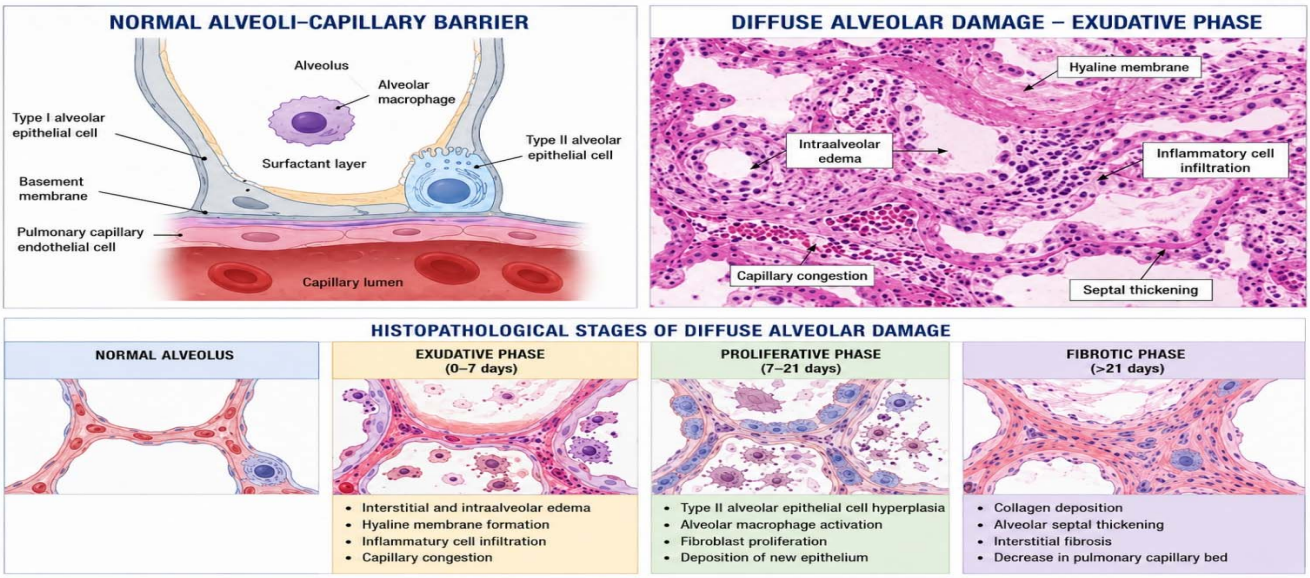


Figure 1. Principal histopathological alterations observed in the normal alveolar-capillary barrier and the exudative, proliferative, and fibrotic phases of diffuse alveolar damage.

CELLULAR AND MICROSCOPIC HISTOPATHOLOGICAL ALTERATIONS

Various structural alterations can be observed in the alveolar epithelial cells and pulmonary capillary endothelial cells in PARDS. Swelling, cytoplasmic degeneration, necrosis, and detachment from the alveolar surface may develop in type I alveolar epithelial cells. Swelling and the disruption of intercellular junctions can be observed in endothelial cells (3,5).

Infiltration of neutrophils, macrophages, and other mononuclear cells can be observed in the alveolar septa. Alveolar walls may become thickened due to interstitial edema. Protein-rich exudate, fibrin, cellular debris, and erythrocytes may be present within the alveolar spaces. The accumulation of these materials can be associated with hyaline membrane formation (3,6).

During the recovery phase, hyperplasia may develop in type II alveolar epithelial cells. These cells can contribute to the resurfacing of the injured alveolar surface. Concurrently, alveolar macrophages may play a role in the clearance of cellular debris. In prolonged cases, an increase in fibroblasts and myofibroblasts, collagen deposition, and interstitial thickening can be observed (5,6).

HISTOPATHOLOGICAL INJURY ASSOCIATED WITH MECHANICAL VENTILATION

Mechanical ventilation may be necessary to sustain life in severe cases of PARDS. However, high tidal volumes and airway pressures can exacerbate existing lung injury. The overdistension of alveoli can lead to structural disruption in the alveolar epithelium and pulmonary capillary endothelial cells (7,8).

On histological examination, rupture of the alveolar septa, epithelial cell loss, interstitial edema, and intra-alveolar hemorrhage can be observed. These findings may be accompanied by neutrophil infiltration and a protein-rich exudate. The cyclic closing and reopening of unstable alveoli during each respiratory cycle can generate repetitive mechanical stress on the alveolar wall (7,8).

In prolonged mechanical injury, type II alveolar epithelial cell hyperplasia, fibroblast proliferation, and collagen deposition may develop. These alterations can lead to the thickening of the alveolar septa and the disruption of normal lung architecture. These findings may support the importance of lung-protective mechanical ventilation strategies in PARDS (1,8).

EFFECTS OF HISTOPATHOLOGICAL ALTERATIONS ON LUNG TISSUE

Interstitial and intra-alveolar edema can lead to the thickening of the alveolar septa and the narrowing of the alveolar spaces. Protein-rich exudate and cellular debris can accumulate within the alveolar spaces. Hyaline membranes can be observed as eosinophilic bands along the alveolar wall (3,6).

The loss of type I alveolar epithelial cells can disrupt alveolar surface integrity. Type II alveolar epithelial cell hyperplasia, on the other hand, can emerge as a reparative response aimed at the regeneration of the injured epithelium. During this process, alveolar macrophages and other inflammatory cells may increase within the alveolar spaces and septa (3,5).

In prolonged injury, the number of fibroblasts and myofibroblasts may increase. The accumulation of collagen and other extracellular matrix components can lead to fibrotic thickening in the alveolar septa. In advanced cases, alveolar spaces may become irregular, normal alveolar architecture can be disrupted, and the pulmonary capillary bed may be reduced (5,6).

LIMITATIONS OF HISTOPATHOLOGICAL EVALUATION IN PEDIATRIC CASES

The diagnosis of PARDS is predominantly established based on clinical findings, imaging results, and oxygenation criteria. Lung biopsy, however, is not included within the routine diagnostic approach. The invasive nature of the procedure can limit direct histological sampling, particularly in children with severe respiratory failure (1,8).

Therefore, histopathological information regarding pediatric cases is predominantly evaluated through autopsy materials, severe cases, and experimental studies. These samples may not reflect all phases and severity levels of the disease. Furthermore, the heterogeneous distribution of lung injury can lead to the concurrent observation of different histopathological findings in various regions of the same tissue (3,6).

Diffuse alveolar damage is considered one of the principal histopathological patterns associated with PARDS. However, diffuse alveolar damage may not be demonstrated in every patient clinically diagnosed with acute respiratory distress syndrome. Different histopathological patterns, such as infection, interstitial lung disease, and organizing pneumonia, can also be associated with similar clinical findings. Therefore, it is appropriate to evaluate histological findings in conjunction with clinical data and the underlying disease (3,9).

CONCLUSION

Histopathological alterations in PARDS initiate with the disruption of the cellular and structural integrity of the alveolar-capillary barrier. In the early phase, alveolar epithelial cell loss, capillary endothelial injury, interstitial and intra-alveolar edema, inflammatory cell infiltration, and hyaline membrane formation can be observed. These findings reflect the exudative phase of diffuse alveolar damage.

If the injury persists, reparative findings such as type II alveolar epithelial cell hyperplasia, macrophage activation, and an increase in fibroblasts and myofibroblasts can emerge. In prolonged cases, the accumulation of collagen and other extracellular matrix components can lead to the thickening of the alveolar septa and the disruption of normal alveolar architecture.

The histopathological appearance is not identical in every case. Exudative, proliferative, and fibrotic changes can coexist in different regions of the same lung tissue. This heterogeneity makes it difficult for tissue samples to reflect the disease in its entirety. Furthermore, since lung biopsy is not routinely performed in children, direct histopathological data specific to PARDS remains limited.

In conclusion, PARDS is a widespread lung injury process in which the alveolar epithelium, pulmonary capillary endothelium, interstitial tissue, and pulmonary microcirculation are collectively affected. Evaluating histopathological findings together with the duration, severity, and clinical characteristics of the disease can contribute to a more accurate understanding of the stage of tissue injury and the repair response.

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M4441-Tam Metin

MEAH ACİLDE YAPILAN KUDUZ TEMAS SONRASI PROFİLAKSİLERİ: BİR YILLIK VERİLERİMİZ

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Giriş:

Kuduz 4000 yılı aşkın süredir bilinen bir zoonotik hastalıktır , dünya çapında 150'den fazla ülke ve bölgede ciddi bir halk sağlığı tehdidi olmaya devam etmektedir. 15 yaşın altındaki çocuklar kuduz vakalarının %40'ını oluşturmaktadır (1). Klinik belirtiler ortaya çıktıktan sonra, kuduz neredeyse %100 ölüm oranına sahiptir ve 21. yüzyılda bile onaylanmış etkili bir tedavisi bulunmamaktadır (2)

Kuduz aşı ile önlenebilir. Kuduz aşısının tetiklediği aktif bağışıklık tepkisi tipik olarak uygulamadan yaklaşık 7 ila 10 gün sonra ortaya çıkar ve 28. gün civarında en yüksek nötralize edici antikor seviyesine ulaşır (3). 1955 gibi erken bir tarihte, kuduz karşıtı serum ve aşının kombinasyonuyla oluşturulan nötralize edici antikorların tedavi döneminin başlarında ve boyunca üretildiği ve şiddetli maruziyetten sonra kuduzun önlenmesinde tek başına aşıdan daha etkili olduğu gözlemlenmiştir (4).

Bağışıklama Uygulamaları Danışma Komitesi (ACIP), 2008 yılında, yara temizliği, yaraların immünoglobulin ile infiltrasyonu ve kuduz aşılarının uygulanmasını içeren bir temas sonrası profilaksi programı önerdi; burada immünoglobulinler yalnızca daha önce aşılanmamış vakalara uygulandı (5). 2018 ve 2024 yıllarında DSÖ, immünoglobulinlere alternatif olarak monoklonal antikorları (mAb'ler) daha da tavsiye etti (6). Aşı kaynaklı aktif bağışıklık yanıtı tamamen gelişmeden önce, ilk 7 gün içinde yara bölgesindeki virüsün pasif antikorlar tarafından hızlı bir şekilde nötralize edilmesi çok önemlidir. Özellikle, 7 günlük süre zarfında immünoglobulin ve aşılama yoluyla nötralize edici antikor seviyeleri genellikle 0,5 IU/mL'den daha düşüktür; oysa DSÖ, kuduz hastalığına karşı seroprotektif minimum seviye olarak 0,5 IU/mL'yi önermektedir (1,2,7,8). Zamanında ve kapsamlı TSP'nin kuduzun önlenmesindeki etkinliğine rağmen, ölümcül aşıya rağmen enfeksiyon vakaları dünya çapında hala bildirilmektedir (9,10,11)

Amaç: Hastanelerin Acillerine ve polikliniklerine her gün başvuran ve çoğunun çocuk yaş grubunun oluşturduğu, önemli bir kısmının kuduz profilaksisi gerektirmeyen hastaların maruziyet durumlarının incelenmesi ve gereksiz yapılan aşılamalara dikkat çekilmesi amaçlanmıştır.

Materyal metod: Çalışmaya Malatya Eğitim Araştırma Hastanesi (MEAH) Aciline evcil ya da olmayan hayvan teması sonrası kuduz profilaksisi için başvuran hastaların, Temmuz 2025 -Haziran 2026 arasındaki bir yıllık verileri alınmıştır. Veriler hastanemiz otomasyon sisteminden ve Aşı biriminden retrospektif olarak taranarak temin edilmiştir.

Bulgular: Hastanemizin aciline 1 yıllık sürede başvuran 1275 hastanın verisi incelendi. Verilerimize göre sadece 48 kişiye Aşı+RIG (Kuduz İmmunglobulini) yapılmıştı. 129 kişiye, temas edilen hayvanın gözlenmesi sonucu sağlıklı olduğu sonucuna ulaşılıp aşılaması 3 dozda sonlandırılmış, 229 kişiye Enfeksiyon hastalıkları polikliniğinde değerlendirildikten sonra deri bütünlüğü bozulmadığı için aşılamaya gerek görülmemiştir. 28 kişi daha öncede temas sonrası kuduz profilaksisi aldıkları için 2 doz aşı önerilmişti. Sahipli olmasına rağmen 107 köpek ve 21 kedinin kuduz aşısı yapılmamış olduğu saptanmıştır. Riskli temas edilen durumların çoğunluğunun % 67.9 (866) sokak kedileri ile gerçekleştiği

tespit edilmiştir. 39 sahipli ve aşılı evcil hayvanın temas sonrası şahısların kaygıları nedeni ile acil servise başvurdukları ve ilk doz aşılarını yaptıkları tespit olunmuştur.

Tartışma:

Kuduz enfeksiyonu, klinik tablonun ortaya çıkmasıyla birlikte mortalitesi %100'e yakın seyreden, bu nedenle temas sonrası profilaksinin zamanında ve eksiksiz uygulanmasının hayati önem taşıdığı zoonotik bir hastalıktır. DSÖ verilerine göre küresel ölçekte her yıl yaklaşık 59.000 kişi kuduz nedeniyle hayatını kaybetmektedir. Bu vakaların büyük çoğunluğu Asya ve Afrika ülkelerinde kümelenmekte; %99'u enfekte köpek ısırmalarından kaynaklanmakta ve vakaların %40'ını 15 yaş altı çocuklar oluşturmaktadır (1). Türkiye, kuduz açısından halen endemik bir bölge niteliğini korumaktadır. Ülkemizde her yıl yaklaşık 250.000 kuduz riskli temas bildirimi yapılmakta ve ortalama 1-2 insan kuduz vakası kaydedilmektedir. Gelişmekte olan ülkelerde olduğu gibi ülkemizde de ana rezervuar ve bulaş kaynağı kedi ve köpeklerdir (12).

Virüsün yara yerinden santral sinir sistemine (SSS) ulaşma süresi (inkübasyon dönemi); inoküle edilen viral yük, suşun virülanlığı, ısırık bölgesinin SSS'ye yakınlığı ve innervasyon yoğunluğu, doku hasarının boyutu ile kıyafet gibi koruyucu bariyerlerin varlığına bağlı olarak değişkenlik gösterir. İnkübasyon süresi genellikle 1-3 ay arasında seyretmekle birlikte, vakaların %10-20'sinde 10-20 gün gibi kısa süreler gözlenmekte; nadiren bir yılı aşabilmektedir (literatürde en uzun inkübasyon süresi 19 yıl olarak bildirilmiştir). Bu değişkenlik, etkin temas sonrası profilaksi uygulamalarına olanak tanıyan kritik bir zaman penceresi sunmaktadır. Virüsün kas dokusundaki lokal replikasyonu takiben asetilkolin reseptörleri aracılığıyla periferik sinir sistemine girişini engellemek adına yara bakımı, aşı ve Kuduz Immunoglobülin (RIG) uygulamalarının ivedilikle yapılması şarttır (12).

Dünya Sağlık Örgütü riskli temasları 3 kategoride sınıflandırırken, ulusal rehberimizde bu süreç 4 kategori altında detaylandırılmıştır. Kategori 1'de risk bulunmayıp profilaksi gerekmezken; Kategori 3 ve 4, doku bütünlüğünün bozulduğu, yüksek riskli ve aşı ile birlikte Ig uygulamasını gerektiren durumları kapsamaktadır.

Hastanemiz Verilerinin Değerlendirilmesi ve Klinik Yaklaşım

Hastalığın yüksek mortalitesine karşın, her hayvan teması TSP endikasyonu taşımamaktadır. Ülkemizde yılda 250.000'den fazla hastaya profilaksi uygulanmakta; ancak bu uygulamaların önemli bir kısmının hatalı veya gereksiz endikasyonlara dayandığı görülmektedir.

Hastanemizde yürütülen 1 yıllık retrospektif incelemede şu bulgulara ulaşılmıştır:

- **Sınıflandırma ve Yanlış Endikasyon:** Temas nedeniyle başvuran 1275 hastanın acil servisteki ilk değerlendirmelerinde ayrıntılı yara skoru yapılmaksızın tümüne ilk doz aşı uygulanmış ve poliklinik kontrolüne yönlendirilmiştir. Ancak poliklinikte uzman tarafından gerçekleştirilen ikincil değerlendirmede, vakaların sadece 48'inin gerçek Kategori 3 risk taşıdığı, 229 hastanın ise aşılanma endikasyonu bulunmadığı tespit edilmiştir.
- **Temas Türü ve Demografik Dağılım:** Başvuruların ve çocukluk çağı yaralanmalarının çoğunluğunu kedi temasları (%67,9) oluşturmuştur.
- **Aşılama ve Toplumsal Bilinç Düzeyi:** Temas gerçekleştiren 107 köpek ve 21 kedinin sahipleri tarafından aşılatılmadığı saptanmıştır. Bununla birlikte, toplumsal farkındalık yetersizliğine bağlı olarak, evcil ve aşılı 39 kedinin neden olduğu basit temaslarda dahi hasta veya hasta yakınlarının anksiyete sebebiyle profilaksi talebinde bulunduğu gözlemlenmiştir.

Sonuç ve Öneriler

Kuduz riskli temaslarında vakit kaybetmeksizin mekanik yara temizliği yapılmalı ve en yakın sağlık kuruluşuna başvurulmalıdır. Gereksiz aşı ve RIG kullanımının, dolayısıyla sağlık ekonomisindeki

yükün ve kaynak israfının önüne geçilmesi için acil servislerdeki ilk değerlendirmelerin titizlikle yapılması ve birincil basamak hekimlerinin bu konuda güncel bilgi düzeyine sahip olması gerekmektedir. Toplumun evcil hayvan aşılaması ve gerçek risk durumları konusunda bilinçlendirilmesi de acil bir ihtiyaçtır. En etkili mücadele stratejisinin ise enfeksiyonun henüz hayvan popülasyonundayken kontrol altına alınması ve bulaş zincirinin kaynağında kırılması olduğu unutulmamalıdır

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M4442-Tam Metin

AVASCULAR NECROSIS IN PEDIATRIC SCAPHOID NONUNION: A CASE REPORT TREATED WITH OLECRANON BONE GRAFT AND HEADLESS COMPRESSION SCREW

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Introduction/Aim: Avascular necrosis (AVN) is an extremely rare complication of pediatric scaphoid fractures, with no consensus on optimal treatment. We present our experience with a nonvascularized olecranon bone graft and headless compression screw fixation in a pediatric patient with delayed-diagnosed scaphoid nonunion and proximal pole AVN.

Case: A 14-year-old male presented with left wrist pain following a fall. The initial fracture was missed, and the patient underwent 45 days of splint immobilization at an outside facility without union. He was subsequently referred to our clinic. MRI demonstrated complete T1 signal loss in the scaphoid, consistent with proximal pole AVN. CT confirmed nonunion with associated humpback deformity.

Method: Open surgery was performed under general anesthesia. The fracture site was curetted to remove sclerotic and necrotic tissue. Intraoperative assessment of the proximal pole revealed punctate bleeding, indicating residual vascularity. The defect was filled with nonvascularized cancellous bone graft harvested from the ipsilateral olecranon. Stable fixation was achieved using a headless compression screw supplemented with a K-wire. Postoperative immobilization protocol was applied.

Result: At the three-month postoperative follow-up, radiographic union was achieved with progressive improvement in wrist range of motion. The patient reported substantial pain relief, and physical therapy is ongoing.

Conclusion: Approximately 10 cases of pediatric scaphoid AVN have been reported in the literature, and optimal treatment remains debated. The high spontaneous revascularization capacity in children and the presence of intraoperative punctate bleeding suggest that successful union may be achievable with nonvascularized grafting. The olecranon represents a viable alternative donor site that avoids the risk to the distal radius physis while providing adequate cancellous bone volume.

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Figure 1. Posteroanterior (a) and lateral (b) wrist radiographs demonstrate scaphoid nonunion in a patient with an eight-month history of wrist injury previously managed with splint immobilization at an outside facility. T1-weighted coronal MRI reveals decreased signal intensity of the proximal pole, consistent with avascular necrosis (c).

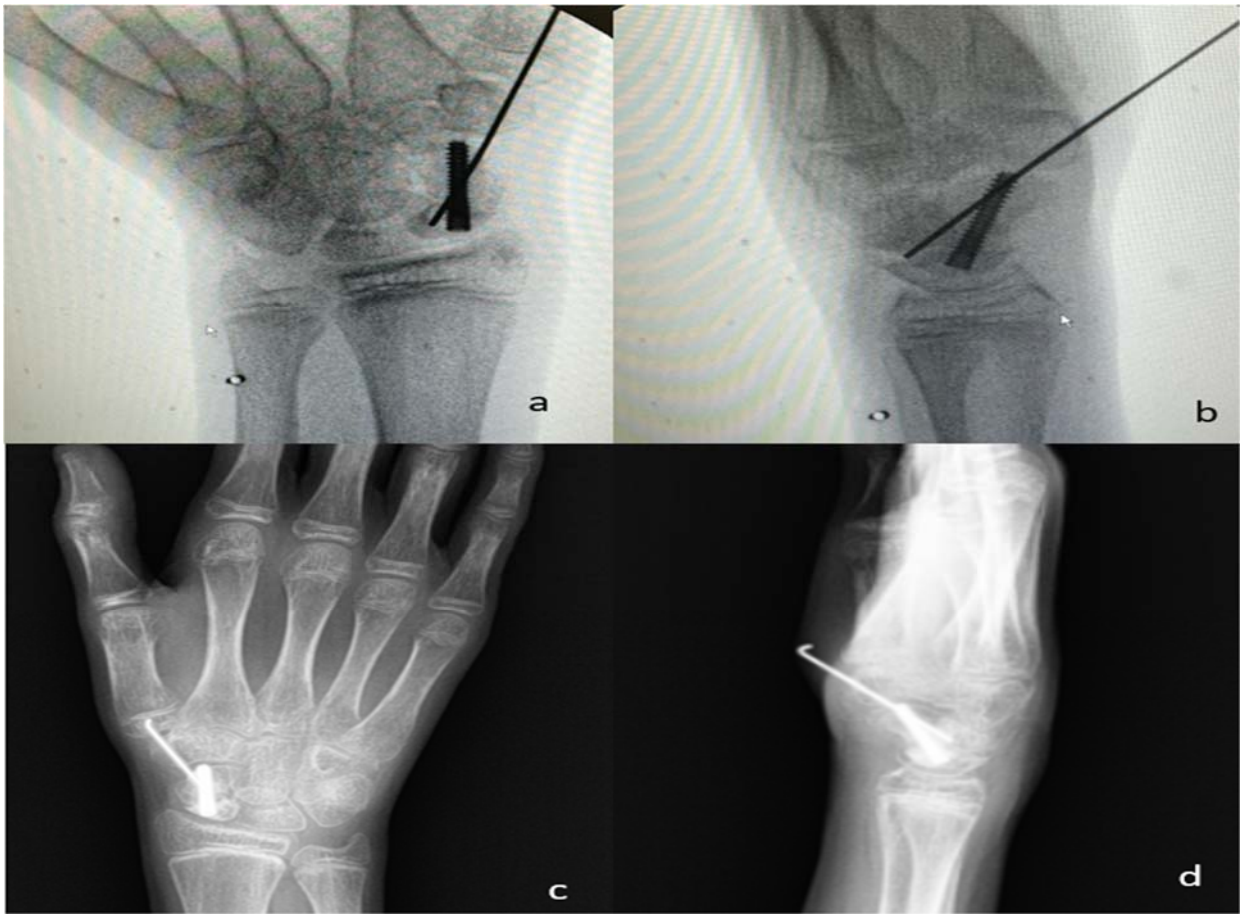


Figure 2. Intraoperative fluoroscopic images (a, b) demonstrate fixation with a headless cannulated compression screw following cancellous bone grafting harvested from the olecranon. An additional Kirschner wire was applied to augment fixation and support the dorsal cortex at the fracture site. Posteroanterior and lateral radiographs obtained at the three-month postoperative visit (c, d) reveal trabecular bridging and radiographic evidence of union.

M4443-Tam Metin

CHANGING THORACIC IMAGING HABITS IN PEDIATRIC EMERGENCY DEPARTMENTS AFTER THE PANDEMIC: RETROSPECTIVE COMPARATIVE ANALYSIS WITH ADULT DATA

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INTRODUCTION AND OBJECTIVE:

Radiological imaging in emergency departments (EDs) was already increasing before the COVID-19 pandemic [1]. Although ED visits declined during the early pandemic [2], chest computed tomography (CCT) use increased substantially because of its rapid diagnostic value [3]. This increase has been shown to persist, albeit at a lower level, in the post-pandemic period [4]. Because children are more susceptible to the harmful effects of ionizing radiation, increased use of chest imaging raises important public health concerns [5,6]. However, the long-term effects of the pandemic on imaging practices in pediatric emergency departments remain unclear. This study aimed to compare chest X-ray (CXR) and CCT utilization before, during, and after the pandemic in a tertiary pediatric emergency department and to evaluate associated demographic changes.

MATERIALS AND METHODS:

This retrospective cross-sectional study included patients presenting to the Turgut Özal Medical Center Pediatric Emergency Department between January 2019 and March 2023. As in the reference adult study [4], the study period was divided into pre-pandemic (January 2019–February 2020), pandemic (March 2020–March 2022), and post-pandemic (April 2022–March 2023) phases. Monthly ED visits, CXR and CCT examinations, patient sex, and mean age were retrieved from the electronic database. Imaging rates were calculated as percentages of total ED visits. Repeated-measures analysis of variance (ANOVA) was used for statistical analysis.

RESULTS:

During the study period, 94,373 pediatric emergency department visits were recorded. The demographic characteristics and imaging findings are summarized in **Table 1**.

In the pre-pandemic period, CXR was performed in 15.36% of 24,934 visits (mean age, 3.73 years), while CCT was not used (0.00%). During the pandemic, CXR utilization increased significantly to 22.87% of 37,058 visits, and CCT entered routine practice, reaching 0.66%, with a mean patient age of 8.10 years. In the post-pandemic period, despite a slight decline, CXR use remained above pre-pandemic levels (19.93% of 32,381 visits). CCT utilization remained unchanged at 0.66%, while the mean age of children undergoing CCT decreased to 7.77 years (**Table 2**).

Table 1: Pediatric Emergency Visits and Thoracic Imaging Distribution by Period

Variables	**Pre-Pandemic**	**Pandemic Periodi**	Post-Pandemic
Total Applications (n)	24.934	37.058	32.381

Applicant Gender (Female/Male %)	46.1 / 53.9	45.6 / 54.4	46.1 / 53.9
Total Number of Patients Undergoing CXR (n)	3.831	8.475	6.454
Total Number of Patients Undergoing CCT (n)	0	244	215

Table 2: Rates of Thoracic Imaging Methods and Mean Ages by Period

Variables	**Pre-Pandemic**	**Pandemic Period**	**Post-Pandemic**
CXR Utilization Rate (%)	15.36	22.87	19.93
CCT Utilization Rate (%)	0.00	0.66	0.66
CXR Mean Age (Years)	3.73	4.79	4.80
CCT Mean Age (Year)	-	8.10	7.77

DISCUSSION AND CONCLUSION:

Our findings suggest that the COVID-19 pandemic has permanently lowered the threshold for thoracic imaging in pediatric emergency departments. Unlike the adult population, where post-pandemic CXR use declined and CCT became the predominant modality [4], both CXR and CCT utilization remained above pre-pandemic levels in our pediatric cohort.

The most notable finding was the persistent use of CCT after its introduction during the pandemic, remaining stable at 0.66% despite not being used before the pandemic. Similar to adult studies [4], the mean age of children undergoing CCT also decreased, reaching 7.77 years in the post-pandemic period. Given the increased lifetime risk of radiation-induced malignancy in children, this trend is concerning [5,6].

In conclusion, unnecessary thoracic imaging in pediatric emergency departments should be minimized through careful clinical assessment and reduced reliance on defensive medicine. Radiation-free alternatives such as point-of-care lung ultrasonography should be encouraged whenever appropriate [7].

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M4444-Tam Metin

ASSOCIATION OF ADMISSION PH AND PLATELET-TO-LYMPHOCYTE RATIO WITH INTENSIVE CARE ADMISSION IN PEDIATRIC DIABETIC KETOACIDOSIS: A RETROSPECTIVE COHORT STUDY

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Abstract

Background
Early identification of children with diabetic ketoacidosis (DKA) who require pediatric intensive care unit (PICU) admission is important for selecting an appropriate level of monitoring and treatment. Although admission pH is an established indicator of DKA severity, the clinical utility of the platelet-to-lymphocyte ratio (PLR), an inexpensive marker derived from routine complete blood counts, remains unclear.

Objective
This study aimed to evaluate the associations of admission pH, PLR, and other routinely available laboratory parameters with PICU admission in children with DKA and to determine the discriminative performance of pH and PLR.

Methods
We conducted a single-center retrospective cohort study of patients aged <18 years who presented directly to Malatya Training and Research Hospital with DKA between July 1, 2024, and July 1, 2026. Of 55 patients screened, 36 met the eligibility criteria. Demographic characteristics and pretreatment laboratory findings were compared between patients admitted and not admitted to the PICU. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the ability of admission pH and PLR to discriminate PICU admission. Optimal cutoff values were determined using the Youden index**.**

Results
The median age of the patients was 13.0 years (interquartile range: 8.25–15.0), and 21 (58.3%) were female. Twenty-three patients (63.9%) were admitted to the PICU. Patients requiring PICU admission had significantly lower admission pH values (p=0.008), higher PLR values (p=0.010), and longer hospital stays (p=0.001). No significant between-group differences were observed in age, lactate, platelet count, glucose, creatinine, albumin, sodium, potassium, or calculated serum osmolarity.

Admission pH demonstrated an area under the ROC curve (AUC) of 0.771 (95% confidence interval [CI]: 0.610–0.932; p=0.008). A pH cutoff of ≤7.13 yielded 65.2% sensitivity and 84.6% specificity for PICU admission. PLR demonstrated an AUC of 0.763 (95% CI: 0.604–0.921; p=0.010). A PLR cutoff of ≥154.54 yielded 65.2% sensitivity and 92.3% specificity.

Conclusion
Lower admission pH and higher PLR were associated with PICU admission in children with DKA, and both parameters demonstrated moderate discriminative performance. The relatively high specificity but limited sensitivity of the identified cutoff values suggests that pH and PLR should be used as adjuncts to, rather than substitutes for, comprehensive clinical assessment. Larger prospective multicenter studies are required to validate these findings.

Keywords: diabetic ketoacidosis; child; pediatric intensive care unit; platelet-to-lymphocyte ratio; pH; risk stratification

Özet
Arka Plan

Çocuk yoğun bakım ünitesine (ÇYBÜ) yatış gerektiren diyabetik ketoasidozlu (DKA) çocukların erken dönemde belirlenmesi, uygun izlem ve tedavi düzeyinin seçilmesi açısından önemlidir. Başvuru pH'sı, DKA şiddetinin yerleşik bir göstergesi olmasına rağmen, rutin tam kan sayımlarından elde edilen, düşük maliyetli bir belirteç olan trombosit/lenfosit oranının (PLR) klinik yararlılığı belirsizliğini korumaktadır.

Amaç
Bu çalışmada, DKA'lı çocuklarda başvuru pH'sı, PLR ve rutin olarak elde edilebilen diğer laboratuvar parametreleri ile ÇYBÜ'ye yatış arasındaki ilişkilerin değerlendirilmesi ve pH ile PLR'nin ayırt edici performansının belirlenmesi amaçlandı.

Yöntemler

1 Temmuz 2024 ile 1 Temmuz 2026 tarihleri arasında DKA nedeniyle Malatya Eğitim ve Araştırma Hastanesi'ne doğrudan başvuran 18 yaşından küçük hastalar üzerinde tek merkezli retrospektif bir kohort çalışması yürüttük. Taramadan geçirilen 55 hastanın 36'sı uygunluk kriterlerini karşıladı. ÇYBÜ'ye yatırılan ve yatırılmayan hastaların demografik özellikleri ile tedavi öncesi laboratuvar bulgularını karşılaştırdık. Başvuru pH'sı ve PLR'nin ÇYBÜ'ye yatışı ayırt etme yeteneğini değerlendirmek amacıyla alıcı işletim karakteristiği (ROC) eğrisi analizi yaptık. Optimal eşik değerleri Youden indeksi kullanılarak belirledik.

Bulgular
Hastaların medyan yaşı 13,0 yıl (çeyrekler arası aralık: 8,25–15,0) olup, 21'i (%58,3) kızdı. Yirmi üç hasta (%63,9) ÇYBÜ'ye yatırıldı. ÇYBÜ'ye yatış gerektiren hastaların başvuru pH değerleri anlamlı olarak daha düşük (p=0,008), PLR değerleri daha yüksek (p=0,010) ve hastanede kalış süreleri daha uzundu (p=0,001). Yaş, laktat, trombosit sayısı, glukoz, kreatinin, albümin, sodyum, potasyum veya hesaplanan serum ozmolaritesi açısından gruplar arasında anlamlı fark gözlenmedi.

Başvuru pH'sı, 0,771'lik bir ROC eğrisi altındaki alana (AUC) sahipti (%95 güven aralığı [GA]: 0,610–0,932; p=0,008). ≤7,13 pH eşik değeri, ÇYBÜ'ye yatış için %65,2 duyarlılık ve %84,6 özgüllük sağladı. PLR için AUC 0,763'tü (%95 GA: 0,604–0,921; p=0,010). ≥154,54 PLR eşik değeri ise %65,2 duyarlılık ve %92,3 özgüllük sağladı.

Sonuç
Daha düşük başvuru pH'sı ve daha yüksek PLR, DKA'lı çocuklarda ÇYBÜ'ye yatış ile ilişkiliydi ve her iki parametre de orta düzeyde ayırt edici performans gösterdi. Belirlenen eşik değerlerin nispeten yüksek özgüllüğe, ancak sınırlı duyarlılığa sahip olması, pH ve PLR'nin kapsamlı klinik değerlendirmenin yerine değil, tamamlayıcısı olarak kullanılması gerektiğini düşündürmektedir. Bu bulguları doğrulamak için daha büyük, prospektif ve çok merkezli çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: diyabetik ketoasidoz; çocuk; çocuk yoğun bakım ünitesi; trombosit/lenfosit oranı; pH; risk sınıflandırması

GİRİŞ

Diyabetik ketoasidoz (DKA), çocukluk çağında tip 1 diabetes mellitusun en ciddi ve yaşamı tehdit eden akut komplikasyonlarından biridir. Mutlak veya göreceli insülin eksikliği sonucunda gelişen DKA; hiperglisemi, ketozis ve metabolik asidoz ile karakterizedir. Güncel International Society for Pediatric and Adolescent Diabetes (ISPAD) kılavuzu DKA'yı hiperglisemi, venöz pH <7,30 veya serum bikarbonat <18 mmol/L ve ketonemi ya da ketonüri birlikteliğiyle tanımlamakta; hastalık şiddetini ise temel olarak pH ve bikarbonat düzeyine göre sınıflandırmaktadır [1]. İnsülin eksikliğine glukagon, katekolaminler, kortizol ve büyüme hormonu gibi karşı düzenleyici hormonların artışı eşlik etmekte; bunun sonucunda glukoneogenez, glikojenoliz, lipoliz ve ketogenez hızlanmaktadır. Ortaya çıkan hiperglisemi ve ketonemi; ozmotik diürez, sıvı-elektrolit kaybı, hipovolemi ve ilerleyici metabolik asidoza neden olmaktadır [2].

Tanı ve tedavideki ilerlemelere rağmen DKA, çocuklarda tip 1 diyabetin ilk başvuru şekli olmaya devam etmektedir. On üç ülkeden verilerin değerlendirildiği çok merkezli bir çalışmada, yeni tanı tip 1 diyabetli çocuklarda DKA sıklığının ülkeler arasında belirgin farklılık gösterdiği ve 2006–2016 döneminde birçok ülkede artış eğilimi sergilediği bildirilmiştir [3]. COVID-19 pandemisi döneminde bu sorun daha da belirginleşmiş; 13 ulusal diyabet kayıt sistemini içeren geniş ölçekli bir çalışmada tanı anındaki DKA prevalansının pandemi öncesindeki %27,3 düzeyinden 2020'de %39,4'e ve 2021'de %38,9'a yükseldiği gösterilmiştir [4]. Bu veriler, DKA'nın pediatrik acil servisler ve yoğun bakım üniteleri açısından güncelliğini koruyan önemli bir sağlık sorunu olduğunu göstermektedir.

Pediatrik DKA tedavisi sıvı replasmanı, sürekli insülin infüzyonu, elektrolit bozukluklarının düzeltilmesi ve hastanın klinik ve nörolojik durumunun yakın izlenmesine dayanır. Klinik olarak belirgin beyin hasarı DKA ataklarının yaklaşık %0,5–0,9'unda görülmesine rağmen ciddi nörolojik sekellere veya ölüme yol açabilmektedir. PECARN DKA FLUID çalışmasında intravenöz sıvının verilme hızı veya sodyum klorür içeriği ile nörolojik sonuçlar arasında anlamlı ilişki bulunmaması, DKA ile ilişkili beyin hasarının yalnızca sıvı tedavisiyle açıklanamayacak kadar karmaşık olduğunu göstermiştir [5]. Bunun yanında hipokalemi, hipoglisemi, akut böbrek hasarı, hiperkloremik asidoz, tromboz ve dolaşım bozukluğu gibi komplikasyonlar da tedavi sürecini güçleştirebilmektedir. Şiddetli asidozu, dolaşım bozukluğu, bilinç değişikliği veya tedavi sırasında komplikasyon gelişme riski bulunan çocukların yoğun izlem altında değerlendirilmesi önerilmektedir [6].

Yoğun bakım gereksiniminin erken belirlenmesi, uygun izlem düzeyinin seçilmesi ve sınırlı yoğun bakım kaynaklarının etkili kullanılması açısından önemlidir. Başvuru pH'sı, DKA şiddetinin belirlenmesinde kullanılan en temel laboratuvar parametrelerinden biridir. Pediatrik yoğun bakım ünitesinde gerçekleştirilen bir çalışmada şiddetli asidoz, dolaşım bozukluğu ve bilinç düzeyindeki değişikliklerin olumsuz klinik sonuçlarla ilişkili olduğu gösterilmiştir [7]. Benzer şekilde, düşük pH düzeyinin DKA ile başvuran çocuklarda bilinç değişikliğini ayırt etmede anlamlı performans gösterdiği bildirilmiştir [8]. Daha düşük başvuru pH'sının tedavi süresi ve hastanede kalış süresiyle ilişkili olduğunu gösteren çalışmalar da bulunmaktadır [9]. Bununla birlikte DKA'nın klinik seyri yalnızca asidozun derecesine bağlı değildir; dehidratasyon, hiperosmolarite, böbrek fonksiyonları, elektrolit bozuklukları ve sistemik inflamatuvar yanıt da hastanın klinik durumunu etkileyebilir.

DKA'nın enfeksiyon bulunmasa bile belirgin bir inflamatuvar yanıt oluşturabildiği gösterilmiştir. Pediatrik DKA hastalarında proinflamatuvar sitokin düzeylerinin yükseldiği ve metabolik bozukluğun düzelmesiyle bu yanıtın gerilediği bildirilmiştir [10]. Deneysel ve klinik çalışmalar, DKA sırasında ortaya çıkan sistemik inflamasyonun serebrovasküler endotel aktivasyonu ve endotel bariyer işlev bozukluğuyla ilişkili olabileceğini göstermiştir [11]. Bu nedenle tam kan sayımından elde edilen hücresel inflamasyon göstergeleri, DKA'nın şiddetini ve klinik seyrini değerlendirmede potansiyel olarak yararlı olabilir.

Son yıllarda nötrofil/lenfosit oranı, trombosit/lenfosit oranı (PLR), sistemik immün-inflamasyon indeksi ve sistemik inflamatuvar yanıt indeksi gibi kolay hesaplanabilen göstergelerin DKA'daki olası rolleri araştırılmaktadır. Yeni tanı tip 1 diyabetli çocuklarda nötrofil/lenfosit oranının DKA varlığı ve asidoz şiddeti hakkında ek bilgi sağlayabileceği gösterilmiştir [12]. Pediatrik DKA'da lökosit yanıtını ayrıntılı olarak değerlendiren yakın tarihli bir çalışmada lökosit alt gruplarıyla birlikte PLR gibi trombosit ve lenfosit temelli indekslerde de belirgin değişiklikler saptanmıştır [13]. Bununla birlikte bu göstergelerin klinik sonuçlarla ilişkisine yönelik bulgular tutarlı değildir. Bilici ve Gökyar, sistemik immün-inflamasyon indeksinin asidoz şiddeti ve asidozun düzelme süresiyle ilişkili olduğunu, ancak PLR'nin klinik sonuçlarla ilişkisinin daha sınırlı kaldığını bildirmiştir [14]. Yakın tarihli başka bir pediatrik çalışmada ise akut DKA sırasında interlökinler, kemokinler, büyüme faktörleri ve matriks metalloproteinazları içeren özgün bir inflamatuvar profil geliştiği gösterilmiştir [15]. Bu bulgular, sistemik inflamasyonun pediatrik DKA patofizyolojisinin önemli bir bileşeni olduğunu desteklemekle birlikte, tam kan sayımından kolaylıkla hesaplanan inflamatuvar indekslerin yoğun bakım gereksinimini öngörmedeki klinik değerinin henüz yeterince açıklığa kavuşmadığını göstermektedir.

GEREÇ VE YÖNTEM

Araştırmanın Tasarımı ve Merkezi

Bu çalışmayı tek merkezli, retrospektif ve gözlemsel bir kohort araştırması olarak gerçekleştirdik. Malatya Eğitim ve Araştırma Hastanesi çocuk acil servisine 1 Temmuz 2024–1 Temmuz 2026 tarihleri arasında başvuran ve hastane bilgi yönetim sisteminde diyabetik ketoasidoz (DKA) tanısı bulunan 18 yaşından küçük hastaların kayıtlarını geriye dönük olarak taradık. Belirlenen çalışma döneminde DKA tanısıyla izlenen 55 hastayı uygunluk açısından değerlendirdik. Dahil edilme ve dışlanma kriterlerini uyguladıktan sonra 36 hastayı nihai analize dahil ettik.

Çalışmayı rutin klinik uygulamaya herhangi bir müdahalede bulunmadan gerçekleştirdik. Hastaların tanı, tedavi, servis veya yoğun bakım yatış kararları araştırmadan bağımsız olarak sorumlu hekimler tarafından verildi.

Hasta Seçimi

Çalışmaya 18 yaşından küçük, Malatya Eğitim ve Araştırma Hastanesi çocuk acil servisine doğrudan başvuran ve başvuru anında DKA tanı kriterlerinin tamamını karşılayan hastaları dahil ettik. DKA tanısını; kan glikozunun >200 mg/dL olması, venöz pH'nin <7,30 veya serum bikarbonat düzeyinin <18 mmol/L olması ve ketonemi ya da orta/büyük düzeyde ketonüri bulunması şeklindeki ISPAD kriterlerine göre doğruladık [1]. Ayrıca başvuru kan gazı, tam kan sayımı ve biyokimyasal incelemeleri tedavi başlanmadan önce veya tedavinin klinik olarak anlamlı bir değişikliğe yol açmayacağı ilk değerlendirme döneminde yapılmış olan hastaları çalışmaya aldık.

DKA tanısı hastane kayıtlarında yer almasına rağmen biyokimyasal tanı ölçütlerinin tamamını karşılamayan hastaları çalışma dışında bıraktık. Başka bir sağlık kuruluşunda sıvı veya insülin tedavisi başlandıktan sonra hastanemize sevk edilen hastaları, başlangıç laboratuvar değerlerinin tedaviden etkilenmiş olabileceği gerekçesiyle dahil etmedik. Benzer şekilde, hastanemizden başka bir merkeze sevk edilmesi nedeniyle klinik sonlanımı ve hastanede kalış süresi belirlenemeyen hastaları dışladık.

Başvuru pH'sı, tam kan sayımı, mutlak lenfosit sayısı, trombosit sayısı, albümin düzeyi veya diğer temel çalışma değişkenlerinden herhangi biri eksik olan hastaları değerlendirmeye almadık. Aktif bakteriyel enfeksiyon, hematolojik veya onkolojik hastalık, sistemik inflamatuvar hastalık ya da kan hücresi sayılarını belirgin biçimde etkileyebilecek ilaç kullanımı bulunan hastaları, hematolojik inflamasyon indekslerinde karıştırıcı etki oluşturabilecekleri için çalışma dışında bıraktık. Aynı hastanın çalışma döneminde birden fazla DKA atağı bulunması durumunda, gözlemlerin bağımsızlığını korumak amacıyla yalnızca ilk başvuruyu analize dahil ettik.

Verilerin Toplanması

Hastaların verilerini elektronik hasta kayıtları, acil servis değerlendirme formları, yatış dosyaları ve laboratuvar sonuçlarından elde ettik. Verileri önceden hazırladığımız standart bir veri toplama formuna kaydettik. Veri girişini tamamladıktan sonra hasta kayıtları ile oluşturulan veri setini yeniden karşılaştırarak doğruladık. Analiz öncesinde hasta kimlik bilgilerini kaldırarak verileri anonim hâle getirdik.

Demografik değişkenler olarak yaş ve cinsiyeti kaydettik. Başvuru laboratuvar değişkenleri olarak beyaz küre sayısı, mutlak lenfosit sayısı, trombosit sayısı, venöz pH, laktat, glikoz, üre, kreatinin, albümin, sodyum ve potasyum düzeylerini değerlendirdik. Tüm laboratuvar analizlerinde acil serviste tedavi öncesinde alınan ilk kan örneğine ait değerleri kullandık. Ayrıca hastanede kalış süresini ve pediatrik yoğun bakım ünitesine yatış durumunu kaydettik.

Hesaplanan Parametreler

Trombosit/lenfosit oranını (PLR), trombosit sayısını mutlak lenfosit sayısına bölerek hesapladık:

PLR = Trombosit sayısı / Mutlak lenfosit sayısı

Lenfosit/albümin oranını (LAR), mutlak lenfosit sayısını serum albümin düzeyine bölerek hesapladık:

LAR = Mutlak lenfosit sayısı / Serum albümin düzeyi

Hesaplanan serum osmolaritesini aşağıdaki formülü kullanarak belirledik:

Serum osmolaritesi = (2 × Na) + (Glikoz / 18) + (BUN / 2,8)

Hesaplamada sodyum düzeyini mmol/L, glikoz ve kan üre nitrojeni (BUN) düzeylerini mg/dL olarak kullandık ve serum osmolaritesini mOsm/kg olarak ifade ettik.

Sonlanım Noktaları

Çalışmanın birincil sonlanım noktasını pediatrik yoğun bakım ünitesine yatış olarak belirledik. Yoğun bakım yatışını, hastanın acil servis değerlendirmesinden sonra veya hastane izlemi sırasında herhangi bir zamanda pediatrik yoğun bakım ünitesine kabul edilmesi şeklinde tanımladık. Bu sonlanımı geriye dönük olarak yeniden sınıflandırmak yerine, klinik izlem sırasında gerçekleşen yoğun bakım yatış kararına göre kaydettik.

İkincil değerlendirmelerde yoğun bakım yatışı bulunan ve bulunmayan hastaların demografik, biyokimyasal ve hematolojik özelliklerini karşılaştırdık. Ayrıca yoğun bakım yatışıyla anlamlı ilişki gösteren başvuru parametrelerinin ayırt edici performanslarını değerlendirdik.

İstatistiksel Analiz

İstatistiksel analizleri IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA) programını kullanarak gerçekleştirdik. Kategorik değişkenleri sayı ve yüzde olarak ifade ettik. Sürekli değişkenlerin dağılımını Shapiro–Wilk testiyle değerlendirdik. Shapiro–Wilk testinde $p<0,05$ bulunan değişkenleri nonparametrik olarak kabul ettik. Ayrıca doğal alt sınırı sıfır olan değişkenlerde ortalama−3 standart sapma değerinin sıfıra eşit veya sıfırdan küçük olması durumunda, teorik normal dağılımın klinik olarak mümkün olmayan negatif değerler oluşturabileceğini dikkate alarak bu değişkenleri de nonparametrik olarak değerlendirdik.

Parametrik dağılım gösteren sürekli değişkenleri ortalama±standart sapma, nonparametrik dağılım gösteren değişkenleri ise medyan ve çeyrekler arası aralık (IQR: 25.–75. persentil) ile sunduk. Yoğun bakım yatışı olan ve olmayan iki bağımsız grubun parametrik sürekli değişkenlerini bağımsız örneklem t-testiyle karşılaştırdık. Varyansların homojenliğini Levene testiyle değerlendirdik; varyansların eşit olmadığı durumlarda Welch düzeltmeli t-testi sonuçlarını kullandık. Nonparametrik sürekli değişkenlerin karşılaştırılmasında Mann–Whitney U testini kullandık. Kategorik değişkenleri Pearson ki-kare testiyle; beklenen hücre sayısının yetersiz olduğu durumlarda Fisher kesin testiyle karşılaştırdık.

Yoğun bakım yatışıyla anlamlı ilişki gösteren ve başvuru sırasında ölçülebilen pH ve PLR'nin ayırt edici performanslarını receiver operating characteristic (ROC) analiziyle değerlendirdik. Eğri altında kalan alanı (AUC), standart hata ve %95 güven aralığıyla birlikte hesapladık. Düşük pH değerleri yoğun bakım yatışıyla ilişkili olduğundan ROC analizinin yönünü, düşük pH değerlerinin pozitif test sonucunu göstereceği şekilde belirledik. Optimal kesim değerlerini Youden indeksi kullanarak hesapladık ve bu eşiklere ait duyarlılık ve özgüllük değerlerini sunduk.

Tüm analizleri iki yönlü gerçekleştirdik ve p<0,05 değerini istatistiksel anlamlılık sınırı olarak kabul ettik. Eksik veriler için veri ataması yapmadık ve analizleri gerekli değişkenleri eksiksiz olan hastalar üzerinden gerçekleştirdik. Retrospektif çalışma dönemindeki tüm uygun hastaları dahil ettiğimiz için ayrıca örneklem büyüklüğü hesabı yapmadık. Sınırlı örneklem büyüklüğü ve aşırı uyum riski nedeniyle çok değişkenli regresyon modeli oluşturmadık.

BULGULAR

Çalışmaya pediatrik diyabetik ketoasidoz tanısı alan toplam 36 hastayı dahil ettik. Hastaların ortanca yaşını 13,0 yıl (IQR: 8,25–15,0) olarak belirledik. Hastaların 15'i (%41,7) erkek, 21'i (%58,3) kızdı. Hastaların 23'ünü (%63,9) yoğun bakım yatışı olan, 13'ünü (%36,1) ise yoğun bakım yatışı olmayan grupta değerlendirdik. Çalışmada hiçbir değişkende eksik veri bulunmadı.

Tüm çalışma grubunda WBC değerini medyan 16,84 (IQR: 9,47–22,35), lenfosit sayısını medyan 3,14 (IQR: 2,35–3,80), pH değerini medyan 7,131 (IQR: 7,071–7,200), laktat düzeyini medyan 2,55 (IQR: 1,75–3,68) ve üre düzeyini medyan 29,35 (IQR: 22,83–36,25) olarak bulduk. Hastanede kalış süresini medyan 4,0 gün (IQR: 2,25–7,0), LAR değerini medyan 0,69 (IQR: 0,55–0,93) ve PLR değerini medyan 143,99 (IQR: 101,43–217,82) olarak belirledik.

Ortalama trombosit sayısını 414,36±116,36, glikoz düzeyini 532,17±161,58, kreatinin düzeyini 0,88±0,27, albümin düzeyini 4,31±0,49, sodyum düzeyini 130,69±4,83, potasyum düzeyini 4,75±0,82 ve hesaplanan serum osmolaritesini 301,66±11,19 olarak hesapladık.

Yoğun Bakım Yatışına Göre Karşılaştırmalar

Yoğun bakım yatışı olan ve olmayan grupları karşılaştırdığımızda ortalama trombosit sayıları arasında anlamlı farklılık saptamadık (432,17±132,55'e karşı 382,85±74,79; p=0,163). Benzer şekilde glikoz (513,96±173,37'ye karşı 564,38±138,87; p=0,376), kreatinin (0,88±0,29'a karşı 0,87±0,24; p=0,855), albümin (4,33±0,51'e karşı 4,28±0,47; p=0,758), sodyum (130,04±5,21'e karşı 131,85±4,00; p=0,288), potasyum (4,69±0,88'e karşı 4,85±0,71; p=0,587) ve hesaplanan serum osmolaritesi (299,32±11,13'e karşı 305,81±10,45; p=0,095) açısından gruplar arasında anlamlı farklılık belirlemedik.

Nonparametrik değişkenleri karşılaştırdığımızda yoğun bakım yatışı olan hastalarda pH değerlerini yoğun bakım yatışı olmayan hastalara göre anlamlı olarak daha düşük bulduk (p=0,008). Yoğun bakım yatışı olan hastaların hastanede kalış sürelerinin anlamlı olarak daha uzun olduğunu belirledik (p=0,001). Ayrıca bu hastalarda PLR değerlerini yoğun bakım yatışı olmayan hastalara göre anlamlı olarak daha yüksek bulduk (p=0,010). Yaş (p=0,728) ve laktat düzeyi (p=0,277) açısından ise gruplar arasında anlamlı farklılık saptamadık.

ROC Analizi

Başvuru sırasında ölçülen pH ve PLR değerlerinin yoğun bakım yatışını ayırt etme performanslarını değerlendirmek amacıyla ROC analizi yaptık. Düşük pH değerlerini yoğun bakım yatışı açısından pozitif test sonucu kabul ettiğimiz ters yönlü değerlendirmede pH için eğri altında kalan alanı 0,771 olarak hesapladık (%95 GA: 0,610–0,932; p=0,008). Optimal pH kesim değerini ≤7,13 olarak belirledik. Bu kesim değerinde duyarlılığı %65,2 ve özgüllüğü %84,6 olarak bulduk.

PLR için eğri altında kalan alanı 0,763 olarak hesapladık (%95 GA: 0,604–0,921; p=0,010). Optimal PLR kesim değerini ≥154,5353 olarak belirledik. Bu kesim değerinde duyarlılığı %65,2 ve özgüllüğü %92,3 olarak saptadık. Roc eğrisini şekil 1'de gösterdik.

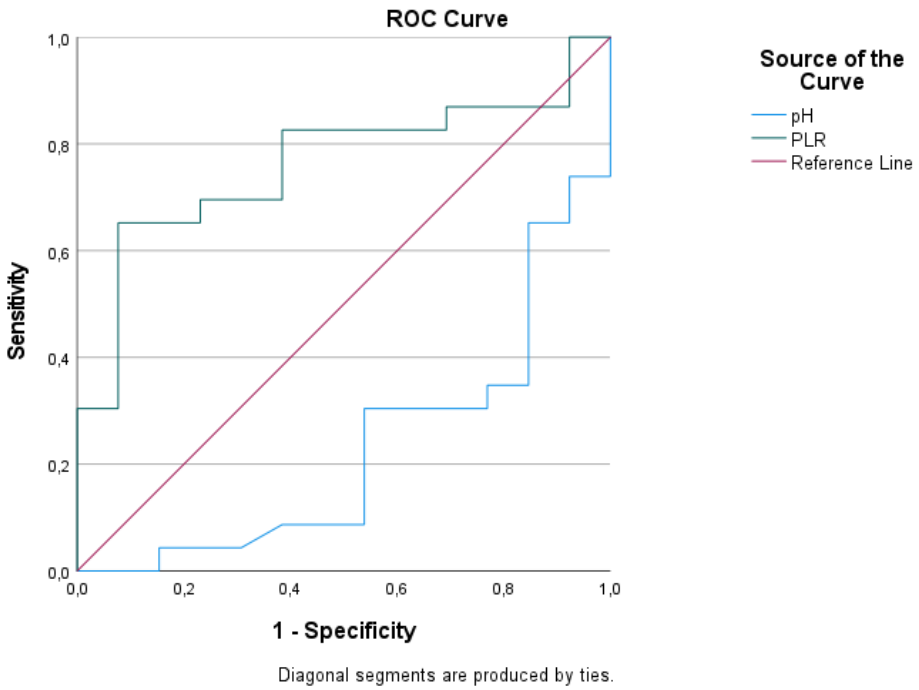


Figure 1. Receiver operating characteristic (ROC) curves of pH and platelet-to-lymphocyte ratio (PLR) for predicting pediatric intensive care unit admission in patients with diabetic ketoacidosis.

TARTIŞMA

Bu çalışmada pediatrik DKA hastalarında yoğun bakım yatışıyla ilişkili başvuru özelliklerini değerlendirdik. Yoğun bakım yatışı gereken hastalarda pH değerlerini daha düşük, PLR değerlerini daha yüksek ve hastanede kalış sürelerini daha uzun bulduk. ROC analizinde hem pH hem de PLR yoğun bakım yatışını orta düzeyde ayırt etti. Buna karşılık yaş, laktat, glikoz, trombosit, kreatinin, albümin, sodyum, potasyum ve hesaplanan serum osmolaritesi bakımından gruplar arasında anlamlı farklılık saptamadık. Bu bulgular, asidozun derecesinin pediatrik DKA'daki klinik ciddiyetini koruduğunu ve PLR'nin yoğun bakım gereksiniminin değerlendirilmesine katkı sağlayabilecek kolay ulaşılabilir bir inflamatuvar gösterge olabileceğini düşündürmektedir.

Başvuru pH'sı, pediatrik DKA'nın tanımlanması ve şiddetinin sınıflandırılmasında kullanılan temel parametrelerden biridir. ISPAD kılavuzu DKA şiddetini büyük ölçüde pH ve bikarbonat düzeyine göre sınıflandırmakta; pH <7,20'yi orta, pH <7,10'u ise ağır DKA ile ilişkilendirmektedir [1]. Önceki çalışmalarda düşük pH düzeylerinin dolaşım bozukluğu, bilinç değişikliği, tedavi süresinin uzaması ve olumsuz klinik sonuçlarla ilişkili olduğu gösterilmiştir. Jayashree ve Singhi, pediatrik yoğun bakım ünitesinde izlenen DKA hastalarında şiddetli asidozun olumsuz klinik sonuçlarla ilişkili olduğunu bildirmiştir [7]. Chhapola ve ark. başvuru pH'sının DKA'lı çocuklarda bilinç değişikliğini ayırt etmede anlamlı performans gösterdiğini belirlemiştir [8]. Horvat ve ark. ise düşük başvuru pH'sının daha uzun tedavi ve hastanede kalış

süresiyle ilişkili olduğunu göstermiştir [9]. Yoğun bakım yatışı gereken hastalarda daha düşük pH değerleri saptamamız bu çalışmalarla uyumludur.

ROC analizinde pH için AUC değerini 0,771 olarak bulduk. Bu sonuç pH'nin yoğun bakım yatışını tek başına kusursuz biçimde belirlemese de klinik olarak anlamlı ve orta düzeyde bir ayırt ediciliğe sahip olduğunu göstermektedir. Youden indeksine göre optimal pH kesim değerini ≤7,13 olarak belirledik. Bu eşik, ISPAD tarafından ağır DKA için kabul edilen pH <7,10 sınırına oldukça yakındır ve orta DKA'dan ağır DKA'ya geçiş aralığında yer almaktadır. Dolayısıyla elde ettiğimiz kesim değeri, asidoz derinleştikçe yoğun bakım gereksiniminin arttığı yönündeki klinik beklentiyle uyumludur.

Bununla birlikte pH ≤7,13 değeri yeni bir DKA şiddet sınıflaması veya tek başına yoğun bakım yatış kriteri olarak değerlendirilmemelidir. Bu değer, çalışmamızdaki hasta dağılımından elde edilen ve duyarlılık ile özgüllük arasındaki en uygun dengeyi sağlayan istatistiksel bir eşiktir. Kesim değerinin duyarlılığının %65,2 olması, yoğun bakım yatışı gereken hastaların yaklaşık üçte birinin yalnızca bu eşik kullanıldığında belirlenemeyebileceğini göstermektedir. Buna karşılık %84,6'lık özgüllük, pH ≤7,13 saptanmasının artmış yoğun bakım gereksinimini destekleyen bir bulgu olabileceğini düşündürmektedir. Bu nedenle pH; bilinç durumu, dolaşım bulguları, hidrasyon düzeyi, elektrolit bozuklukları ve tedaviye yanıt gibi diğer klinik değişkenlerle birlikte değerlendirilmelidir [6].

Çalışmamızın diğer önemli bulgusu, yoğun bakım yatışı gereken hastalarda PLR değerlerinin daha yüksek olmasıdır. DKA yalnızca bir metabolik asidoz tablosu değildir; enfeksiyon bulunmasa bile belirgin bir sistemik inflamatuvar yanıt oluşturabilir. Pediatrik DKA hastalarında proinflamatuvar sitokinlerin arttığı ve metabolik bozukluğun düzelmesiyle bu yanıtın gerilediği gösterilmiştir [10]. Ayrıca DKA sırasında gelişen inflamasyonun serebrovasküler endotel aktivasyonu ve endotel bariyer işlev bozukluğuyla ilişkili olabileceği bildirilmiştir [11]. PLR, trombosit aracılı inflamatuvar ve trombotik aktivite ile lenfosit yanıtını tek bir parametrede birleştiren, rutin tam kan sayımından ek maliyet gerektirmeden hesaplanabilen bir göstergedir.

Tam kan sayımından elde edilen inflamatuvar indekslere yönelik pediatrik DKA verileri giderek artmakla birlikte sonuçlar henüz tutarlı değildir. Scutca ve ark. nötrofil/lenfosit oranının DKA varlığı ve asidoz şiddeti hakkında ek bilgi sağlayabileceğini göstermiştir [12]. Kumar ve ark. pediatrik DKA'da lökosit alt gruplarıyla birlikte PLR gibi trombosit ve lenfosit temelli indekslerde de değişiklikler bulunduğunu bildirmiştir [13]. Buna karşılık Bilici ve Gökyar, sistemik immün-inflamasyon indeksinin asidoz şiddeti ve asidozun düzelme süresiyle ilişkili olduğunu, ancak PLR'nin klinik sonuçlarla ilişkisinin daha sınırlı kaldığını göstermiştir [14]. Yakın tarihli başka bir çalışmada akut pediatrik DKA sırasında interlökinler, kemokinler, büyüme faktörleri ve matriks metalloproteinazlarını içeren özgün bir inflamatuvar profil geliştiği belirlenmiştir [15]. Çalışmalar arasındaki farklılıklar; hasta seçimi, DKA şiddeti, eşlik eden enfeksiyonların dışlanma biçimi, laboratuvar örneklerinin alınma zamanı ve kullanılan klinik sonlanımların farklı olmasından kaynaklanabilir.

PLR için AUC değerini 0,763 ve optimal kesim değerini ≥154,54 olarak belirledik. Bu eşikte elde ettiğimiz %92,3'lük özgüllük, yüksek PLR değerinin yoğun bakım gereksinimini destekleyen bir bulgu olabileceğini göstermektedir. Ancak duyarlılığın %65,2 ile sınırlı kalması, düşük PLR değerinin yoğun bakım gereksinimini güvenli şekilde dışlayamayacağını

ortaya koymaktadır. Bu nedenle PLR'nin bir tarama testi veya bağımsız yatış kriterinden çok, klinik değerlendirme ve geleneksel biyokimyasal göstergeleri tamamlayan yardımcı bir risk belirteci olarak kullanılması daha uygun görünmektedir. Ayrıca çalışmamızda çok değişkenli analiz yapmadığımız için PLR'nin pH ve diğer klinik değişkenlerden bağımsız bir belirleyici olduğunu söylemek mümkün değildir.

Yoğun bakım yatışı olan hastalarda hastanede kalış süresini daha uzun bulmamız, bu hastalarda hastalık şiddetinin, izlem gereksiniminin ve tedavi yoğunluğunun daha fazla olmasıyla açıklanabilir. Bununla birlikte hastanede kalış süresi başvuru anında mevcut bir özellik değil, klinik sürecin sonunda ortaya çıkan bir sonuçtur. Bu nedenle hastanede kalış süresini yoğun bakım yatışını öngören bir belirteç olarak değerlendirmedik ve ROC analizine dahil etmedik.

Glikoz, elektrolitler, kreatinin, laktat ve hesaplanan serum osmolaritesi açısından gruplar arasında anlamlı farklılık saptamamamız, bu değişkenlerin DKA yönetimindeki klinik önemini azaltmamaktadır. Kan glikozunun büyüklüğü ketozis veya asidozun derecesini her zaman doğrudan yansıtmayabilir. Benzer şekilde elektrolitler, böbrek fonksiyonları ve osmolarite hastanın sıvı kaybı, kusma süresi, oral alımı ve başvuru zamanından etkilenebilir [2]. Ayrıca örneklem büyüklüğümüzün sınırlı olması, özellikle serum osmolaritesi gibi gruplar arasında sayısal farklılık bulunan bazı değişkenlerde gerçek bir ilişkinin gösterilememesine neden olmuş olabilir. Bu nedenle anlamlı farklılık bulunmamasını bu parametrelerin klinik olarak önemsiz olduğu şeklinde yorumlamamak gerekir.

Çalışmamızın güçlü yönleri, yalnızca hastanemize doğrudan başvuran ve başlangıç laboratuvar değerleri tedaviden etkilenmemiş hastaları değerlendirmemiz, eksik verisi bulunan hastaları dışlamamız ve tüm göstergeleri başvuru sırasında rutin olarak elde edilebilen parametrelerden hesaplamamızdır. Ayrıca pH gibi yerleşik bir DKA şiddet göstergesi ile PLR gibi kolay hesaplanan bir inflamatuvar indeksi aynı klinik sonlanım üzerinden değerlendirmemiz, bulguların pediatrik acil servis uygulamalarına aktarılabilirliğini artırmaktadır.

KISITLILIKLAR

Çalışmamızın bazı önemli kısıtlılıkları bulunmaktadır. İlk olarak araştırmayı tek merkezde, retrospektif olarak ve yalnızca 36 hasta üzerinde gerçekleştirdik. Küçük örneklem büyüklüğü istatistiksel gücü azaltmış, güven aralıklarının genişlemesine ve bazı gerçek ilişkilerin gösterilememesine neden olmuş olabilir. Ayrıca belirlediğimiz pH ve PLR kesim değerlerini aynı hasta grubunda hesapladığımız için bu eşiklerin performansı olduğundan yüksek tahmin edilmiş olabilir. Kesim değerleri bağımsız bir doğrulama grubunda veya yeniden örnekleme yöntemleriyle doğrulanmamıştır.

İkinci olarak yoğun bakım yatışı tamamen biyolojik hastalık şiddetini gösteren nesnel bir sonlanım değildir. Yoğun bakım yatış kararı; hastanın klinik durumu yanında kurumsal yatış protokolleri, yatak kapasitesi ve sorumlu hekimin değerlendirmesinden etkilenebilir. Ayrıca pH klinik uygulamada yoğun bakım kararında kullanılan parametrelerden biri olduğundan, pH ile yoğun bakım yatışı arasındaki ilişkinin bir bölümü mevcut klinik karar sürecini yansıtıyor olabilir.

Üçüncü olarak örneklem büyüklüğünün sınırlı olması nedeniyle çok değişkenli regresyon modeli oluşturmadık. Bu nedenle pH ve PLR'nin diğer klinik ve laboratuvar değişkenlerinden bağımsız etkilerini değerlendiremedik. Özellikle PLR; dehidratasyon, hemokonsantrasyon,

fizyolojik stres, tanı konulmamış enfeksiyonlar ve kan hücresi sayılarını etkileyen diğer durumlarla değişebilir. Kayıtlarda belirgin enfeksiyonu bulunan hastaları dışlamış olsak da retrospektif tasarım nedeniyle subklinik enfeksiyon ve diğer ölçülmeyen karıştırıcı faktörleri tamamen ortadan kaldıramadık.

Dördüncü olarak yalnızca başvuru anındaki laboratuvar değerlerini değerlendirdik. Tedavi sürecinde pH ve PLR'de meydana gelen değişimleri, asidozun düzelme süresini ve seri ölçümlerin prognostik değerini incelemedik. Bilinç düzeyi, dehidratasyon derecesi, bikarbonat, beta-hidroksibütirat, HbA1c, yeni tanı veya bilinen diyabet durumu ve tedaviye başlama süresi gibi potansiyel olarak önemli değişkenleri kapsamlı bir risk modeline dahil edemedik. Hesaplanan serum osmolaritesini kullandığımız için doğrudan ölçülen serum osmolaritesinin olası ek değerini de değerlendiremedik.

Son olarak çok sayıda laboratuvar değişkenini karşılaştırmamız ve çoklu karşılaştırmalar için düzeltme yapmamamız tesadüfi anlamlılık olasılığını artırmış olabilir. Başka merkezlerden sevk edilen hastaları dışlamamız başlangıç değerlerinin standardizasyonunu artırsa da sonuçlarımızın sevkle hasta kabul eden üçüncü basamak merkezlere ve farklı yoğun bakım yatış uygulamalarına genellenebilirliğini sınırlandırmaktadır.

SONUÇ

Pediatrik DKA hastalarında daha düşük başvuru pH'sının ve daha yüksek PLR değerinin yoğun bakım yatışıyla ilişkili olduğunu gösterdik. Hem pH hem de PLR yoğun bakım gereksinimini orta düzeyde ayırt etti. pH ≤7,13 ve PLR ≥154,54 eşikleri yüksek özgüllük göstermelerine rağmen duyarlılıklarının sınırlı olması nedeniyle tek başlarına yoğun bakım yatış veya dışlama kriteri olarak kullanılmamalıdır.

Başvuru pH'sı pediatrik DKA şiddetinin değerlendirilmesindeki temel konumunu korurken, PLR rutin tam kan sayımından kolaylıkla hesaplanabilen yardımcı bir risk göstergesi olabilir. Bu bulguların doğrulanması ve PLR'nin bağımsız prognostik değerinin belirlenmesi için standartlaştırılmış yoğun bakım yatış kriterlerinin kullanıldığı, daha geniş örneklemli, çok merkezli ve prospektif çalışmalara ihtiyaç vardır.

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M4446-Tam Metin

ACUTE FOOT DROP DUE TO PROLONGED SITTING IN A 17-YEAR-OLD ADOLESCENT GIRL: PERONEAL NERVE COMPRESSION NEUROPATHY: A CASE REPORT

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Introduction: Acute foot drop is an important neurological condition that may result from various etiologies, including lumbar radiculopathy, lumbosacral plexopathy, sciatic nerve lesions, and peroneal neuropathy. The superficial course of the common peroneal nerve (CPN) around the fibular head and neck makes it particularly susceptible to external compression. Although compression neuropathy associated with prolonged knee flexion or squatting is uncommon, it should be considered in the differential diagnosis, particularly in children and adolescents. We present a case of acute peroneal nerve compression neuropathy associated with prolonged positioning.

Case Presentation: A 17-year-old girl presented to the emergency department with sudden-onset right foot weakness, numbness, and difficulty walking after sitting with her right knee in a flexed position for approximately 9–10 hours while working in the garden. There was no history of trauma. Physical examination revealed right foot drop and a steppage gait. Muscle strength of the right ankle dorsiflexors, great toe dorsiflexors, and evertor muscles was 0/5, with hypoesthesia in the right L5 dermatome. Deep tendon reflexes were normal, while plantar flexion and inversion were preserved. Direct radiographs of the knee and ankle revealed no fracture or mass lesion. Lumbar magnetic resonance imaging (MRI) showed no pathology that could explain L5 radiculopathy. Clinically, diffuse peroneal nerve neuropathy due to compression was considered. Electromyography (EMG) performed in the third week demonstrated axonal degeneration of the right common peroneal nerve. The patient was treated with a posterior ankle-foot orthosis, neuromuscular electrical stimulation**,** sensory re-education, and an individualized exercise program. At the two-month follow-up, muscle strength had completely recovered, with full functional recovery.

Discussion: CPN neuropathy is an important entrapment neuropathy of the lower extremity. After branching from the sciatic nerve, the CPN courses superficially around the fibular neck, making it vulnerable to external compression and direct trauma(1). Causes of CPN neuropathy include trauma, knee surgery, knee dislocation, fibular or tibial fractures, orthosis or prosthesis use, tumors, and positional compression(2,3). Prolonged sitting with the legs crossed, squatting, kneeling, or maintaining the knee in flexion may cause peroneal nerve compression(4,5). Clinically, CPN neuropathy typically presents with acute or subacute partial or complete foot drop, accompanied by loss of ankle dorsiflexion and eversion, sensory changes over the dorsum of the foot, and a steppage gait.(1). Numbness or paresthesia may also occur. Detailed neurological examination, including assessment of muscle strength, sensation, deep tendon reflexes, and gait pattern, is essential for lesion localization. Electrodiagnostic studies can help

determine the level of the lesion, distinguish peripheral nerve lesions from radiculopathy, and evaluate prognosis.

A careful differential diagnosis is essential in patients with acute foot drop. L4–L5 radiculopathy, sciatic nerve lesions, lumbosacral plexopathy, and anterior compartment syndrome may produce similar findings. Therefore, low back or radicular pain, sensory distribution, reflexes, and the function of muscles innervated by nerves other than the peroneal nerve, such as the tibialis posterior, should be assessed. In our patient, acute foot drop developed after prolonged sitting with the knee flexed. The absence of low back or thigh pain, preservation of plantar flexion and inversion, and normal deep tendon reflexes did not support a radicular lesion**.** Knee and ankle radiographs showed no fracture or mass lesion, and lumbar MRI revealed no pathology explaining L5 radiculopathy. EMG findings in the third week demonstrated axonal degeneration of the right CPN, supporting the clinical diagnosis.

Conclusion: In children and adolescents with sudden-onset foot drop, peroneal nerve compression neuropathy associated with prolonged positioning should be considered in the differential diagnosis, in addition to neurological conditions requiring urgent evaluation. A detailed history, careful neurological examination, and appropriately timed electrodiagnostic evaluation facilitate early diagnosis. Early diagnosis and appropriate rehabilitation are important for supporting functional recovery

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M4447-Tam Metin

DIAGNOSTIC ACCURACY OF PHYSICAL EXAMINATION FOR DETECTING PEDIATRIC KNEE EFFUSION: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Aim

Physical examination (PE) is routinely used to assess knee effusion in children, but small or clinically silent effusions may be missed. This systematic review and meta-analysis evaluated the diagnostic accuracy of PE for pediatric knee effusion, using ultrasonography (US) as the reference standard.

Method

PubMed, Web of Science Core Collection, and Scopus were searched on 21 July 2026 without date or language restrictions; backward and forward citation searching supplemented the database search. Reporting followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses framework. Twelve studies were included in the systematic review (1-12). Five studies with paired PE and US data provided the quantitative data (1,2,5,6,8). Sensitivity and specificity were jointly pooled using a bivariate random-effects model with restricted maximum-likelihood estimation. A continuity correction of 0.5 was applied to one zero cell. Likelihood ratios, diagnostic odds ratio, and the summary receiver operating characteristic area under the curve were calculated. Sensitivity analyses excluded studies with a zero cell, repeated observations, or a secondarily reconstructed contingency table.

Results

The searches and citation screening identified 831 records; 311 duplicates were removed, 520 titles and abstracts were screened, and 28 reports underwent eligibility assessment. Twelve studies were included in the systematic review, of which five contributed 569 paired knee-level assessments from approximately 193 children to the meta-analysis. Study-level sensitivity ranged from 50.0% to 89.3%, and specificity from 0% to 90.9%. Pooled sensitivity was 71.5% (95% confidence interval [CI], 57.7%-82.1%), and pooled specificity was 74.8% (95% CI, 45.8%-91.2%). The positive likelihood ratio was 2.84 (95% CI, 0.96-8.41), the negative likelihood ratio was 0.38 (95% CI, 0.19-0.78), and the diagnostic odds ratio was 7.43 (95% CI, 1.24-44.63). The summary receiver operating characteristic area under the curve was 0.773. Heterogeneity was substantial for sensitivity (I^2=68.1%) and specificity (I^2=86.6%). Across targeted exclusion analyses, pooled sensitivity remained between 67.0% and 73.4%, whereas specificity ranged from 67.1% to 81.8%.

Conclusion

Physical examination showed moderate diagnostic accuracy for US-confirmed pediatric knee effusion but was insufficient to confirm or exclude effusion reliably when used alone. US should complement PE when findings are equivocal or subclinical inflammation is suspected.

The small evidence base, heterogeneous PE definitions, zero-cell and spectrum effects, and non-independent knee- or visit-level observations require cautious interpretation.

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Keywords
Pediatric knee effusion; physical examination; ultrasonography; diagnostic accuracy; meta-analysis

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M4450-Tam Metin

EMERGENCY THORACOTOMY AND PULMONARY RESECTION FOR BLUNT THORACIC TRAUMA IN A PEDIATRIC PATIENT

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Aim

Blunt mechanisms account for most thoracic injuries in children, and the compliant pediatric chest wall allows severe parenchymal injury to occur even without rib fractures [1]. Most pulmonary contusions and lacerations resolve with nonoperative management and without long-term respiratory sequelae [1,2]; therefore, operative experience in children is limited, and the indications for pulmonary resection and rib fixation in this age group are not clearly defined. Lacerations caused by penetration of displaced rib fragments are classified as a distinct type of parenchymal injury [3]. We aimed to present a child with severe multitrauma who underwent emergency thoracotomy, pulmonary resection, and rib fixation for lung lacerations caused by displaced rib fractures.

Method

The patient's clinical data, operative notes, and imaging studies, including chest CT (computed tomography) and chest radiography, were reviewed retrospectively from hospital records. The extent of parenchymal injury was assessed on CT and confirmed intraoperatively. Postoperative recovery was evaluated by the clinical course, chest radiography, time to extubation, time to chest tube removal, and length of hospital stay. The noteworthy feature of this case is the need for combined anatomical and nonanatomical lung resection with rib plate fixation in a child, an uncommon approach in pediatric blunt thoracic trauma.

Results

A 15-year-old boy with multitrauma after a pedestrian traffic accident was intubated at another center, underwent tube thoracostomy for hemopneumothorax, and was referred to our department. Chest CT showed multiple displaced right rib fractures, right lower lobe laceration, hemopneumothorax, subcutaneous emphysema, pneumomediastinum, and pulmonary contusion, together with a scapular fracture and liver laceration (Figure 1a, 1b). Emergency surgery was planned.

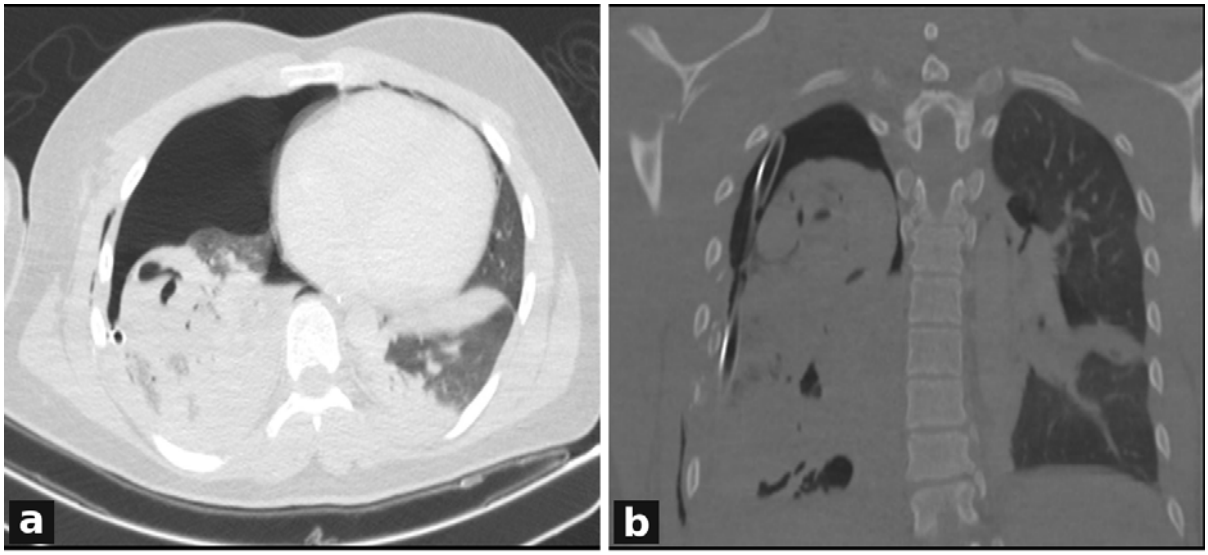


Figure 1. (a) Axial chest CT showing extensive hematoma, contusion, and hemopneumothorax in the right lower lobe; (b) coronal CT showing consolidation of the right upper and lower lobes with the chest tube and scapular fracture.

A right thoracotomy was performed through the fifth intercostal space. A laceration tract caused by the displaced rib fragments, with near-total hematoma of the lower lobe, required right lower lobectomy, and a wedge resection was performed for a similar tract in the upper lobe. The fractured ribs were stabilized with plates, whereas the liver laceration and scapular fracture were managed nonoperatively.

Postoperatively, the lung was fully expanded, and bronchoscopy was performed to clear secretions (Figure 2c). The patient was extubated on postoperative day 3, the chest tube was removed on day 7, and he was discharged in good condition on day 9. Follow-up chest radiography showed full lung expansion with the rib plates in place (Figure 2d).

Conclusion

Although pulmonary lacerations due to displaced rib fractures in pediatric blunt thoracic trauma are usually managed nonoperatively, timely thoracotomy with pulmonary resection can be lifesaving when parenchymal injury, bleeding, or air leak cannot be controlled. Because mortality increases with the extent of lung resection in trauma, resection should be limited to the injured parenchyma whenever possible [4]. Surgical stabilization of rib fractures is a safe and feasible option in selected children [5] and, in our patient, was associated with early extubation and full recovery.

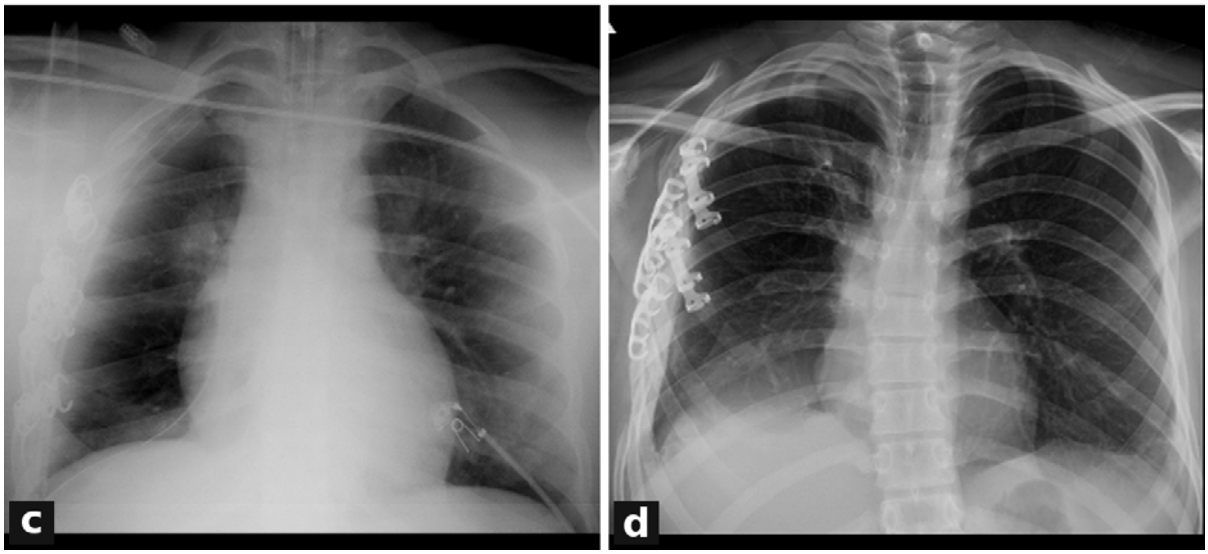


Figure 2. (c) Chest radiograph on postoperative day 1 showing lung expansion, the chest tube, and rib plates; (d) follow-up chest radiograph showing full lung expansion and rib plates.

Project/research support: This study received no project or research support.

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M4451-Tam Metin

MULTISTAGE SURGICAL MANAGEMENT OF SEVERE THORACIC TRAUMA DUE TO GUNSHOT INJURY IN A PEDIATRIC PATIENT

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Aim

Firearm injuries have become a leading cause of death among children and adolescents [1]. Most penetrating chest injuries in children can be managed with tube thoracostomy alone, and thoracotomy is rarely required [2]; consequently, experience with extensive shotgun injuries combining pulmonary laceration, massive hemothorax, and large chest wall defects is limited in this age group. Moreover, chest wall reconstruction with prosthetic mesh carries a considerable risk of infection, which may necessitate removal of the prosthesis [3]. We aimed to present the staged surgical management of a pediatric patient with a severe gunshot injury of the chest.

Method

The patient's clinical data, operative notes, and serial imaging studies, including chest CT (computed tomography) and chest radiography, were reviewed retrospectively from hospital records. The operative findings, the procedures performed at each stage, postoperative complications, and the length of hospital stay were evaluated. The noteworthy feature of this case is the full recovery of a pediatric patient with a 10 × 10 cm chest wall defect and extensive pulmonary laceration after three consecutive operations, including parenchyma-sparing resection and repeated chest wall reconstruction.

Results

A 17-year-old girl presented with confusion after a gunshot injury, with an entry wound at the level of the left third rib and exit wounds over the left hemithorax; breath sounds were absent on the left. Chest CT showed extensive contusion and laceration of the left lung, massive hemothorax, multiple metallic pellets, and fractures of five left ribs (Figure 1a). Emergency tube thoracostomy drained 1800 mL of blood, exceeding the accepted threshold for surgical exploration [4], and urgent surgery was performed.

Thoracotomy revealed a 10 × 10 cm chest wall defect, active bleeding from the lingular artery, and lacerations of the upper lobe and lingular segment. Lingulectomy, parenchymal repair, and chest wall reconstruction with composite mesh were performed. Chest radiography on postoperative day 1 showed left lower lobe consolidation (Figure 1b), and the patient was extubated on postoperative day 4.

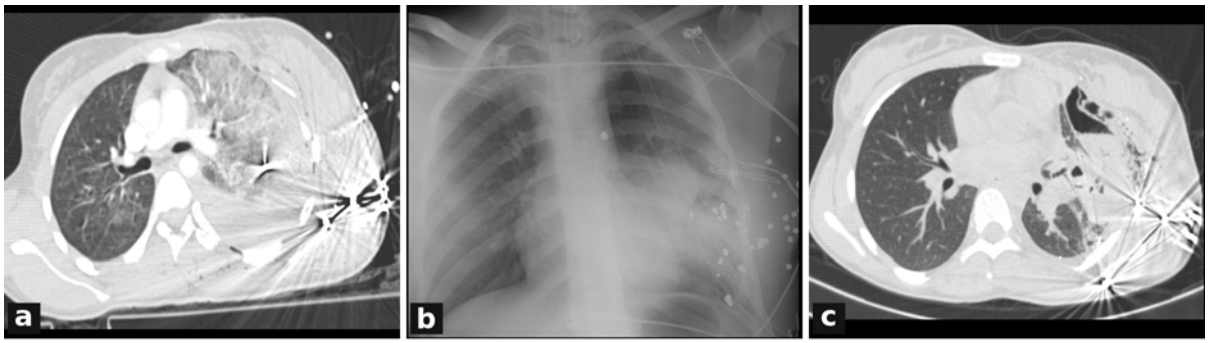


Figure 1. (a) Axial chest CT showing left lung contusion and hemothorax with multiple metallic pellets and rib fractures; (b) chest radiograph on postoperative day 1 showing left lower lobe consolidation, the chest tube, and pellets; (c) follow-up CT showing air-fluid levels (empyema) adjacent to the chest wall mesh, with the chest tube and pellets.

Empyema subsequently developed adjacent to the mesh (Figure 1c); the mesh was removed, decortication was performed, and the chest wall was reconstructed with polypropylene mesh (Figure 2d). A third operation was required for suture dehiscence caused by prolonged air leak (Figure 2e), and the chest wall was reconstructed with a fixator-based system. The patient was discharged in good condition on postoperative day 50 with full lung expansion (Figure 2f).



Figure 2. (d) Chest radiograph after the second operation showing air-fluid levels and pellets; (e) chest CT during prolonged air leak showing pneumothorax; (f) follow-up chest radiograph after recovery showing pellets, rib plates, and full lung expansion.

Conclusion

Pediatric gunshot injuries can cause extensive, multifocal pulmonary and chest wall damage with life-threatening hemorrhage. Early thoracotomy, parenchyma-sparing resection, and chest wall reconstruction are lifesaving in such cases. Large defects may require staged surgery for complications such as empyema, mesh infection, and prolonged air leak, and full recovery can be achieved with timely, multistage surgical management.

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Financial relationships: The authors have no financial relationships or conflicts of interest to declare regarding this study.

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M4452-Tam Metin

PARENCHYMA-SPARING SURGERY FOR STAB WOUND-RELATED HEMOPNEUMOTHORAX IN A PEDIATRIC PATIENT

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Aim

Most penetrating chest injuries in children, including stab wounds, can be managed with tube thoracostomy alone, and thoracotomy is rarely required [1]. When surgery is needed, the decision is based on the volume of chest tube output and the patient's physiological status [2]. However, data on the extent of lung resection required for actively bleeding parenchymal lacerations in children are limited, and resection may be chosen for extensive injuries. We aimed to present a pediatric patient with multiple stab wounds and bilateral hemopneumothorax whose bleeding laceration extending into two lobes was treated with primary repair without lung resection.

Method

The patient's clinical data, operative notes, and imaging studies, including chest CT (computed tomography) and chest radiography, were reviewed retrospectively from hospital records. The indication for surgery, operative findings, surgical technique, duration of chest tube drainage, postoperative complications, and length of hospital stay were evaluated. The noteworthy feature of this case is that an actively bleeding laceration extending across the major fissure into two lobes was managed with vascular control and parenchymal repair alone, without lobectomy or wedge resection.

Results

A 17-year-old boy presented with multiple stab wounds; his general condition was poor, but he was conscious and cooperative. Examination revealed a 4 × 3 cm wound superomedial to the right nipple penetrating the pleura and four smaller wounds on the left chest wall, back, gluteal region, and forearm; breath sounds were reduced bilaterally. Chest CT showed bilateral hemopneumothorax, and emergency bilateral tube thoracostomy was performed. CT obtained after tube placement showed right hemothorax, right lung hematoma, left pneumothorax, and extensive subcutaneous emphysema (Figure 1a, 1b). Because 1400 mL of hemorrhagic fluid drained from the right chest tube, emergency surgery was performed.

Right thoracotomy revealed 2000 mL of intrathoracic fluid and an actively bleeding parenchymal laceration extending across the major fissure into both adjacent lobes, with extensive hematoma. The bleeding vessel and the lacerated parenchyma were repaired, and the remaining wounds were closed primarily. No lung resection was performed.

Postoperative chest radiography showed bilateral lung expansion (Figure 2c). The right chest tube was removed on postoperative day 5 and the left on day 7, and the patient was discharged in good condition on day 8 without complications. Follow-up chest radiography showed full lung expansion (Figure 2d).

Conclusion

Penetrating thoracic trauma can cause hemopneumothorax and massive hemorrhage requiring emergency surgery, with high-volume drainage as the main indication for thoracotomy. Because mortality increases with the extent of lung resection in trauma [3,4], lung-sparing techniques such as

suture repair and tractotomy, which can control deep parenchymal hemorrhage without formal resection, should be preferred whenever possible [4,5]. In our patient, primary repair and vascular control without resection preserved lung tissue, and timely diagnosis with early thoracotomy resulted in full recovery with low morbidity.

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Financial relationships: The authors have no financial relationships or conflicts of interest to declare regarding this study.

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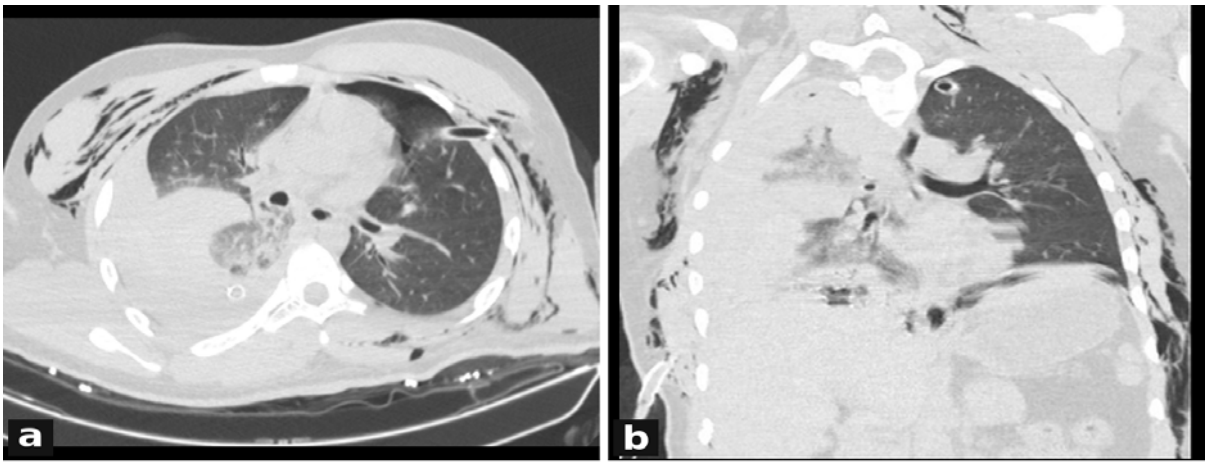


Figure 1. (a) Axial chest CT showing right hemothorax, bilateral chest tubes, lower lobe hematoma, left pneumothorax, and extensive subcutaneous emphysema; (b) coronal CT showing extensive right lung hematoma, hemothorax, and subcutaneous emphysema.

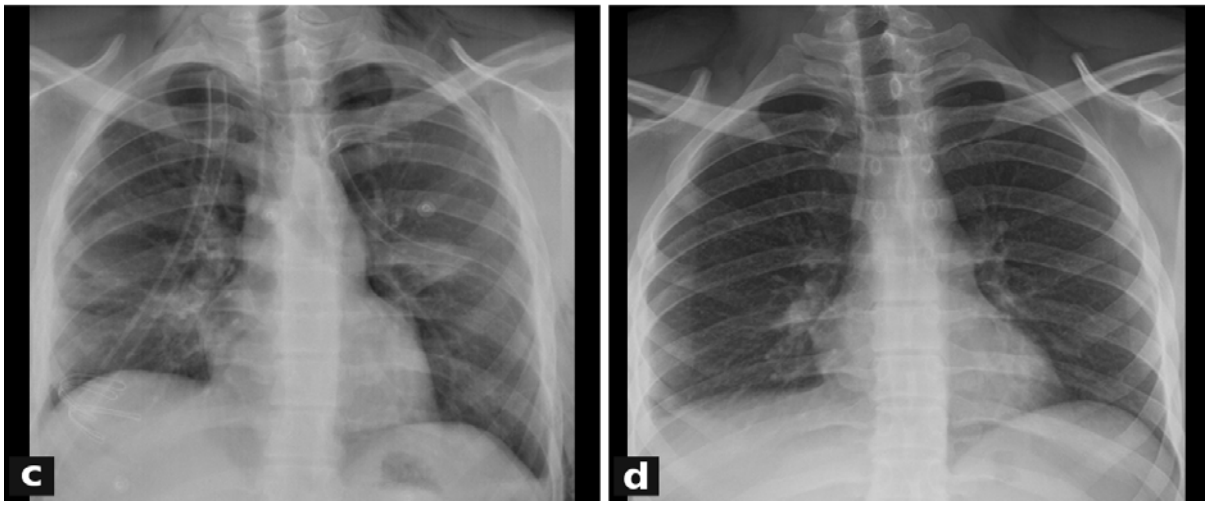


Figure 2. (c) Postoperative chest radiograph showing bilateral lung expansion with bilateral chest tubes; (d) follow-up chest radiograph after chest tube removal showing full lung expansion.

M4453-Tam Metin

THE FIRST 24 HOURS IN PEDIATRIC BURNS: FLUID RESUSCITATION CALCULATIONS AND CONTROVERSIAL AREAS

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ABSTRACT

Introduction:

Pediatric burns are among the trauma models in which rapid hemodynamic fluctuations and unpredictable complications are most frequently encountered in emergency department practice. [2] Compared with adults, children have a greater body surface area-to-mass ratio and thinner skin, which dramatically accelerates both heat and fluid loss. [2] Fluid resuscitation during the first 24 hours is the most critical intervention for preventing burn shock and multiple organ failure. [2]

Development:

The traditional Parkland formula (4 mL/kg/% total body surface area burned [TBSA]), which has been regarded as the gold standard of burn resuscitation for decades, has been subject to serious criticism in recent years because of its potential to cause fluid overload in pediatric patients. [2,3] The American Burn Association (ABA) guidelines have modified the formulas to avoid this iatrogenic condition, referred to as “fluid creep,” which may result in abdominal compartment syndrome, pulmonary edema, and prolonged mechanical ventilation. [3,4] Currently, the goal in pediatric patients is to reduce the formula-based volume to 3 mL/kg/%TBSA and, particularly in children weighing less than 30 kg, to add dextrose to maintenance fluids in order to preserve limited glycogen stores. [2,4] While the use of synthetic colloids has decreased, early albumin (rescue colloid) support in persistent shock remains a focus of debate. [2,4]

Conclusion:

Burn formulas are not static prescriptions but merely the starting point of resuscitation. [2,4] Successful management during the first 24 hours is based on titrating fluid administration according to the patient’s immediate needs through hourly monitoring of clinical parameters such as urine output and capillary refill. [2,4]

Keywords: Pediatric burn, fluid resuscitation, fluid creep, Parkland formula, maintenance fluid.

INTRODUCTION

The initial management of a child presenting to the emergency department with severe burn trauma requires not only management of the skin injury but also simultaneous treatment of the rapidly developing systemic inflammatory response syndrome (SIRS) and intravascular volume loss. [2,4] Children have a larger body surface area (BSA) relative to body mass than adults. [2] This anatomical difference significantly increases fluid loss through evaporation. [2] In addition, their thinner skin structures cause burns to progress into deeper tissues within a much shorter period. [2] Delayed or inadequate fluid resuscitation may lead to increased burn depth,

acute kidney injury, and irreversible hypovolemic shock; conversely, excessive fluid administration, the other side of the coin, is at least as fatal as inadequate fluid resuscitation. [2,3,4]

FROM PARKLAND TO THE PRESENT: CHANGES IN CALCULATIONS

The Parkland formula (4 mL Ringer's lactate × body weight [kg] × % total body surface area burned), which was accepted without controversy in emergency medicine practice for many years, has provided a standard starting point, particularly for burns involving more than 20% of the body surface area. [2,4] Half of the calculated volume is administered during the first 8 hours (from the time of the burn), while the remaining half is administered over the subsequent 16 hours. [2,4]

However, retrospective and prospective analyses conducted over the past 15 years have demonstrated that when clinicians adhere blindly to the formula, patients receive substantially more fluid than predicted. [3]

This phenomenon is referred to in the medical literature as "Fluid Creep." [3] Excessive crystalloid loading has resulted in devastating iatrogenic consequences such as compartment syndrome, pulmonary edema, myocardial depression, and orbital compartment syndrome (vision loss). [3] Based on these findings, the American Burn Association (ABA) modified the resuscitation coefficient in 2018 and updated the initial fluid volume for the pediatric age group (under 14 years) to 3 mL/kg/%TBSA. [4] The "Rule of Nines," one of the most common sources of error in formula-based calculations, should also be avoided in children, and the Lund-Browder chart, which takes into account the relatively larger head-and-neck proportion, should be used meticulously. [4]

A PEDIATRIC-SPECIFIC HAZARD: HYPOGLYCEMIA

The most critical distinction between pediatric and adult burn fluid management is the requirement for maintenance fluids. [2,4] Particularly in children weighing less than 30 kg (less than 20 kg according to some guidelines), hepatic glycogen stores are very limited, and the increased metabolic rate under severe stress rapidly leads to hypoglycemia. [2,4] Therefore, in addition to the Ringer's lactate (RL) boluses calculated for burn shock, maintenance fluids containing 5% dextrose (D5½NS or D5LR) should be added hourly according to the 4-2-1 rule (Holliday-Segar). [2,5] Resuscitation with RL alone may result in a hypoglycemic burn patient developing refractory seizures during emergency department observation. [2]

CONTROVERSIAL AREAS: COLLOID USE AND TIMING

Whether colloids (albumin, fresh frozen plasma) should be routinely used during the first 24 hours remains one of the most heated debates in emergency and burn literature. [2,4] Traditional teaching held that, because of increased capillary permeability during the first 12–24 hours, colloids would leak into the interstitial space and further exacerbate edema (protein-leaking). [2,4]

However, with the increasing problem of "fluid creep," the concept of "Rescue Colloid" has emerged. [2,3] In the current approach, if the patient continues to have urine output below the target despite receiving 130–150% of the calculated fluid rate, adding 5% albumin to the infusion from the 8th or 12th hour of resuscitation onward (approximately 0.3–0.5 mL/kg/%TBSA) is strongly recommended rather than administering additional crystalloid.

[2,4] Synthetic colloids (starch-based products, etc.) have been completely eliminated from pediatric burn resuscitation because of their nephrotoxic profiles. [2,5]

CLINICAL MONITORING: FORMULAS ARE ONLY A STARTING POINT

Regardless of how refined the formulas become, they cannot predict the patient's individual physiological response. [2,4] For the emergency physician, the formula is merely the first step used to set the infusion pump. [2,4] The true guide to successful hemodynamic management is "urine output." [2,4] The target urine output in children is 1–1.5 mL/kg/hour for those weighing less than 30 kg and 0.5–1 mL/kg/hour for those weighing more than 30 kg. [2,4] Placement of a Foley catheter is essential for hourly urine output monitoring. [2,4] If urine output exceeds the target, the fluid rate should be reduced by 20–30%; if urine output is inadequate, the fluid rate should be increased. [2,4] Pulse pressure, central capillary refill time, and lactate clearance are other secondary dynamic parameters that support urine output. [2,4]

CONCLUSION

Fluid resuscitation during the first 24 hours in pediatric burns requires a delicate mathematical balance. [2,4] The transition from an aggressive Parkland approach to more restrictive and target-directed guidelines (modified 3 mL/kg/%TBSA) has significantly reduced complication rates. [3,4] In emergency department management, it should be remembered that children's glycogen stores may be rapidly depleted; maintenance fluids should therefore be supplemented with dextrose to reduce the risk of hypoglycemia, and early integration of albumin should not be avoided in cases of persistent hypoperfusion. [2,5] Formulas do not treat the patient; the clinician treats the patient. [2,4]

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M4454-Tam metin

SMALL BOWEL KNOTTING OF A DISTAL VENTRICULOPERITONEAL SHUNT CATHETER ASSOCIATED WITH INTRA-ABDOMINAL ADHESIONS: A PEDIATRIC CASE REPORT

Yunus Emre Mutlu[1], Recai Engin[1], Süreyya Toklu[1], Fatih Tomakin[1]

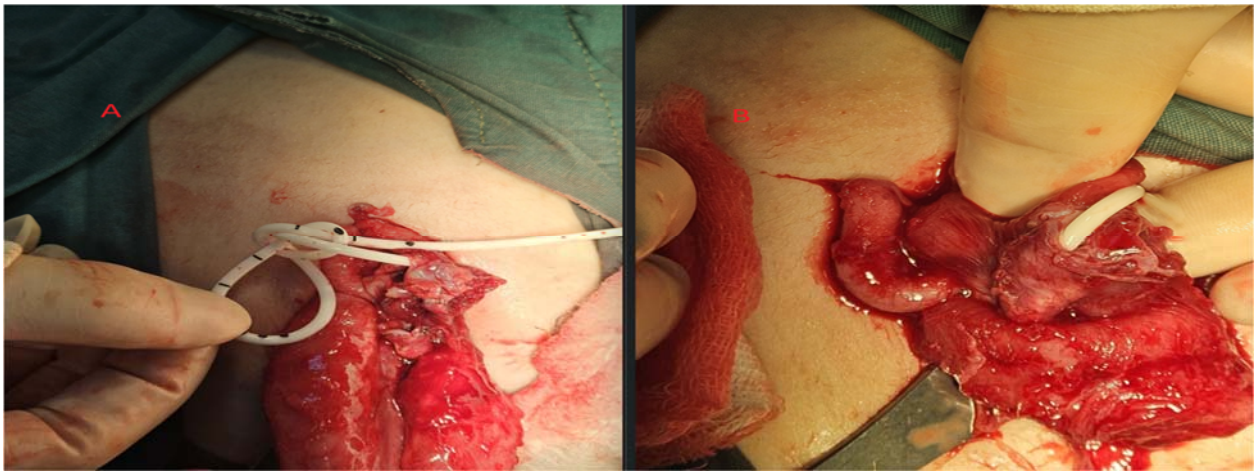
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Introduction: Ventriculoperitoneal (VP) shunting is the standard treatment for pediatric hydrocephalus. True knotting of the distal catheter around the bowel is an exceptionally rare cause of shunt malfunction. We report a pediatric case to emphasize early recognition and management.

Methods: A 2-year-old child with congenital hydrocephalus and previous VP shunt placement presented with suspected shunt dysfunction. Clinical findings, abdominal ultrasonography, operative findings, and surgical management were reviewed.

Results: Exploration revealed extensive intra-abdominal adhesions and true knotting of the distal VP catheter around the small bowel, causing a limited ischemic area without perforation. Adhesiolysis and catheter revision were performed with pediatric surgery support. Shunt function was restored and the patient recovered without bowel resection.

Conclusion: Distal VP catheter knotting should be considered in children with shunt dysfunction, particularly in the presence of abdominal adhesions. Prompt multidisciplinary surgical intervention can preserve bowel viability and restore shunt function.



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M4455-Tam metin

NON-OPERATIVE MANAGEMENT OF EXTENSIVE TRAUMATIC SPINAL EPIDURAL HAEMATOMA IN AN 8-YEAR-OLD BOY

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Aim: Traumatic spinal epidural haematoma (SEH) can complicate childhood spinal injury, and the development of a neurological deficit calls for urgent assessment for decompression [1]. Conservative treatment has been described in a small adult case series involving minimally symptomatic patients, but these observations do not establish its safety for an extensive paediatric haematoma [2]. A recent review of paediatric thoracolumbar trauma emphasises injury pattern and neurological status when considering surgery, while acknowledging the limited high-level evidence for paediatric classification systems [3]. Evidence for the independent benefit of bracing in traumatic thoracolumbar fractures is also limited by the quality of available studies [4]. We present an 8-year-old boy with isolated back pain after a bicycle fall, extensive posterior thoracic SEH and multilevel compression fractures, who remained neurologically intact during non-operative management. The aim is to describe the clinical and imaging findings accompanying this favourable short-term course and the limits of the inference that can be drawn from it.

Methods: This retrospective single-patient case report reviewed emergency department findings, thoracic computed tomography (CT), non-contrast magnetic resonance imaging (MRI), serial neurological examinations, treatment and follow-up imaging. MRI included T1-weighted, T2-weighted and short tau inversion recovery (STIR) sequences. The sequence of imaging, immobilisation, clinical observation, mobilisation and discharge was reviewed alongside the admission and control MRI findings. The principal outcomes were neurological deterioration, pain evolution and radiological change in the epidural collection and vertebral bodies. Written parental informed consent was obtained.

Results: An 8-year-old boy presented to the emergency department with interscapular back pain after falling from a bicycle. There was no loss of consciousness, seizure or vomiting, and the Glasgow Coma Scale score was 15. Motor strength was normal in all extremities, deep tendon reflexes were normal and the Babinski response was negative. The only abnormal examination finding was midline thoracic tenderness on palpation and percussion. Detection of multilevel thoracic vertebral body compression fractures on CT prompted thoracic spine MRI with STIR, T1-weighted and T2-weighted sequences. MRI characterised acute–subacute superior endplate compression with marrow oedema at T5–T9 and minimal additional involvement at L2. It also demonstrated an extensive posterior epidural haematoma extending from T1 to T9, without an abnormal spinal cord signal. Thus, substantial radiological injury was present despite the absence of a neurological deficit. After the epidural haematoma was identified on MRI, a brace was applied and the patient was immobilised under vital-sign and neurological monitoring. The observation period therefore included repeated clinical assessment alongside the radiological evaluation. Control MRI was subsequently obtained, after which mobilisation was initiated.

Following a further period of observation and improvement in pain, the patient was discharged without neurological deterioration. The available follow-up MRI images documented resorption of the epidural haematoma, with normal spinal cord calibre and signal and no residual cord compression. Vertebral body heights were maintained without progressive collapse or kyphotic deformity at that examination. No surgical evacuation or spinal fixation was performed during the reported course.

Conclusion: The feature that makes this case worth presenting is the coexistence of an extensive thoracic epidural haematoma and multilevel vertebral compression fractures with preserved neurological function and subsequent radiological resolution. For the emergency assessment, the case illustrates that isolated post-traumatic back pain and a normal motor examination can coexist with clinically significant spinal imaging findings. In this patient, observation with bracing, immobilisation and neurological reassessment was accompanied by a favourable early outcome. The outcome does not establish that a similarly extensive haematoma can routinely be treated without surgery, or that the brace caused haematoma resorption. Clinical and imaging findings must be considered together, with renewed assessment if the neurological examination changes. The available follow-up is short term; this report cannot establish long-term spinal alignment, remodelling or functional recovery. The educational value lies in the discordance between haematoma extent and the preserved examination, together with the observed course under close surveillance.

Keywords: Spinal epidural haematoma, paediatric trauma, vertebral compression fracture, conservative management

FIGURES

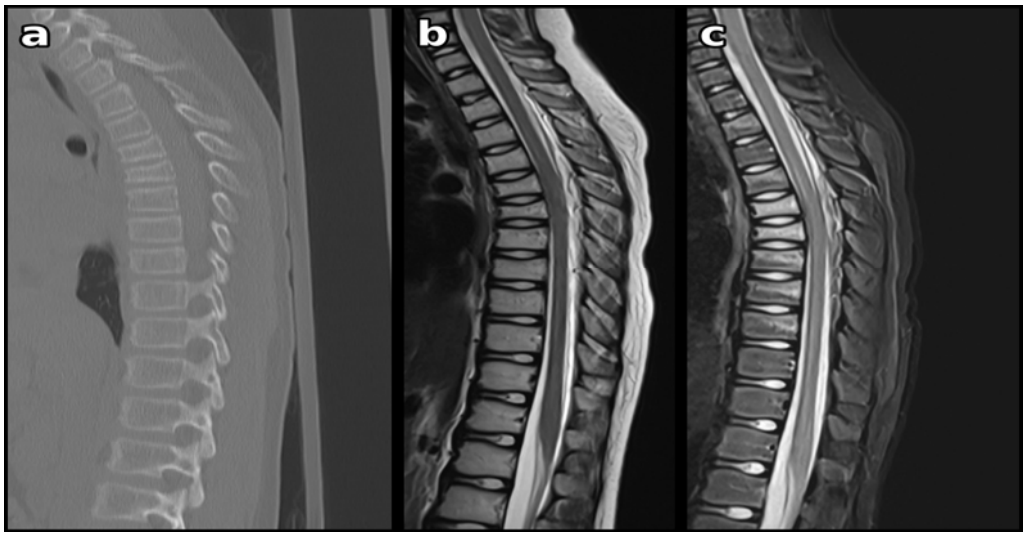


Figure 1. Imaging at admission. (a) Sagittal thoracic computed tomography in the bone window shows multilevel vertebral body compression fractures with anterior height loss. (b) Sagittal T2-weighted magnetic resonance image demonstrates the posterior epidural collection; the reported extent is T1–T9, without cord signal abnormality. (c) Sagittal STIR image demonstrates vertebral endplate compression and marrow oedema.

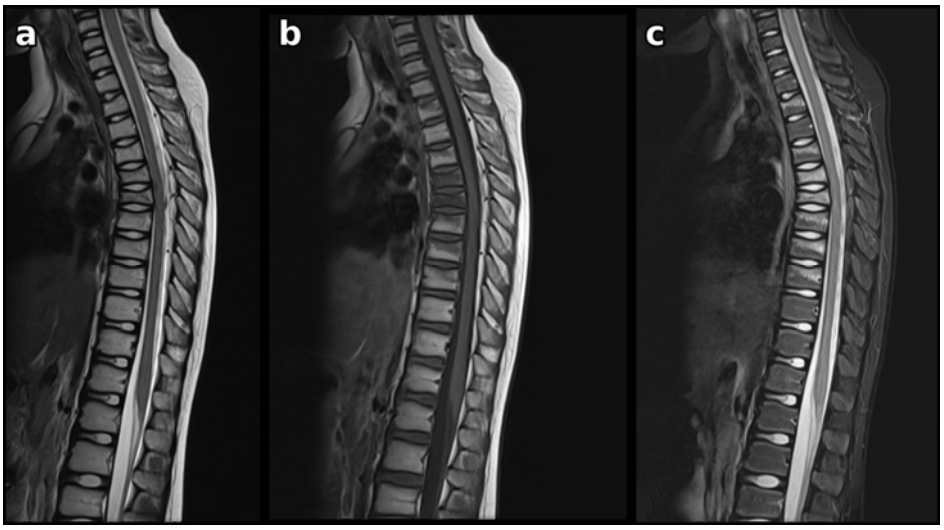


Figure 2. Follow-up magnetic resonance imaging. Sagittal (a) T2-weighted, (b) T1-weighted and (c) STIR images after non-operative management. The epidural haematoma has resorbed, with normal cord calibre and signal and no residual compression. Vertebral body heights are maintained without progressive collapse or kyphotic deformity at this short-term follow-up.

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M4456- Tam METİN

EXCISION OF A CEREBELLAR EPENDYMOMA IN A 1-YEAR-OLD PEDIATRIC PATIENT PRESENTING WITH TORTICOLLIS: A CASE REPORT

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Aim: Acquired torticollis in a child is a sign, not a diagnosis. Among 288 children referred for torticollis, 53 (18.4%) had a non-muscular cause, and an underlying neurological disorder accounted for 27 of those 53 [1]. A posterior fossa tumour is nevertheless expected to announce itself differently: in a meta-analysis of 4171 children the leading features of a posterior fossa tumour were nausea and vomiting (75%), headache (67%) and abnormal gait and coordination (60%), while signs of raised intracranial pressure were absent in more than half of all children with a brain tumour [2]. When torticollis is the first sign, it is read as a neck problem: in five children presenting this way the diagnosis was considerably delayed in every one, and two underwent sternocleidomastoid surgery before the tumour was found [3]. In a second series of five children the delay allowed neurological deterioration and tumour growth that made surgery difficult and the prognosis unfavourable [4]. That delay has a measurable price, because extent of resection is the most important modifiable factor for survival in paediatric ependymoma [5]. We report an infant in whom an isolated head tilt and a gait deviation were the only route to a large fourth ventricular ependymoma, and set out what the emergency assessment has to do differently.

Methods: Retrospective single-patient case report. Emergency department and ward records, preoperative and postoperative magnetic resonance imaging (MRI), the operative note and the histopathology report were reviewed. Imaging was assessed before surgery and again after resection. Written informed consent was obtained from the patient's parent.

Results: A 1-year-old boy was brought to the emergency department with persistent left torticollis and a progressive tendency to veer to the left while walking. There was no nausea, no projectile vomiting and no seizure, and the neurological examination showed no focal cranial nerve deficit. The initial assessment attributed the head tilt to a musculoskeletal cause. Because the complaints persisted, cranial imaging was obtained and showed a lesion adjacent to the fourth ventricle. Contrast-enhanced brain MRI then demonstrated a well-defined mass measuring approximately 42 × 34 mm centered in the fourth ventricle, extending into the right cerebellomedullary angle cistern and compressing the brainstem. Baseline laboratory values were within normal limits. A right frontal external ventricular drain (EVD) was placed to control hydrocephalus and to stabilise intracranial compliance before resection. With the child prone and under real-time neuronavigation tracking, a midline vertical incision running from the external occipital protuberance to the C2 spinous process was made, a suboccipital craniotomy was performed, and the tumour was removed by microsurgical dissection under high

magnification. A near-total resection was achieved and the brainstem was decompressed. The early postoperative course was uneventful, with no new neurological deficit and no surgical complication. The torticollis and the gait deviation improved, and the EVD was weaned and removed. Histopathology confirmed an ependymoma. The child was discharged and referred to the paediatric oncology council for adjuvant treatment.

Conclusion: Persistent torticollis in an infant can be the only presenting sign of a posterior fossa tumour, and the absence of vomiting, headache or a focal deficit does not argue against one, because signs of raised intracranial pressure are absent in more than half of children with a brain tumour [2]. The features that make this case worth presenting are that a head tilt and a gait deviation were the only complaints, that the first assessment was musculoskeletal, and that the lesion behind them already filled the fourth ventricle and compressed the brainstem. For the emergency physician the rule is short: a torticollis that persists, that is painless, or that comes with any change in gait or coordination is an indication for cranial imaging rather than for a soft collar and physiotherapy. Earlier imaging is therefore not only a neurological safeguard but an oncological one, because gross total resection is the mainstay of treatment in paediatric ependymoma and is pursued with intraoperative monitoring and neuronavigation [6], and extent of resection remains the most important modifiable factor for survival [5]. The smaller the tumour is when it is found, the more of that factor is still in the surgeon's hands.

Keywords: emergency; ependymoma; paediatric; posterior fossa tumour; torticollis

FIGURES

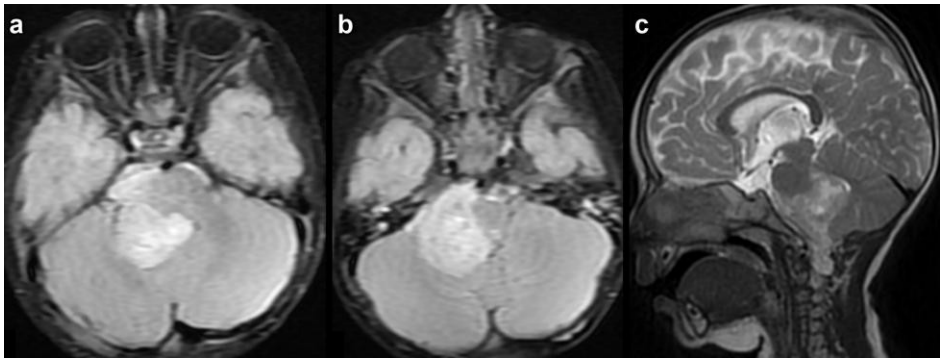


Figure 1. Preoperative magnetic resonance imaging. (a) Axial T2-FLAIR image: a well-defined mass in the right cerebellomedullary angle cistern fills the fourth ventricle. (b) Axial T2-FLAIR image at a higher level: the mass continues to occupy the fourth ventricle between the cerebellar hemispheres. (c) Midline sagittal T2 image: the mass lies within the fourth ventricle and displaces and compresses the brainstem anteriorly.

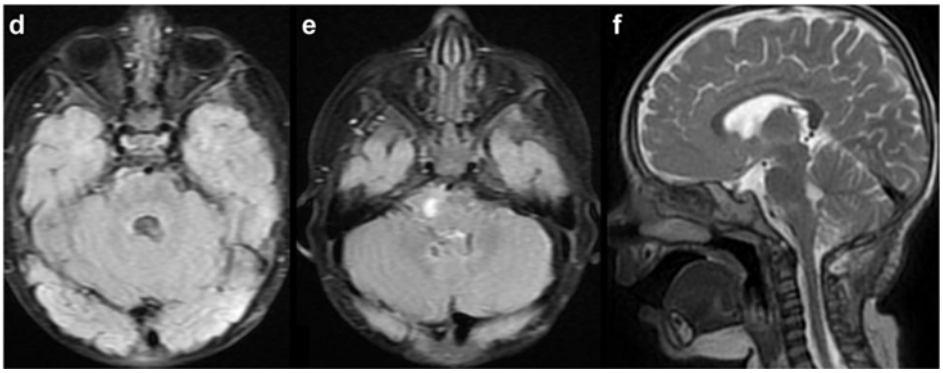


Figure 2. Imaging after suboccipital craniotomy and near-total resection. (d) Axial T2-FLAIR image: the fourth ventricle is decompressed and the brainstem is no longer displaced. (e) Axial T2-FLAIR image at the level of the resection bed: a small focus of signal change remains and the mass effect has resolved. (f) Midline sagittal T2 image: the fourth ventricle is open and the brainstem has returned to its normal position.

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M4457-Tam Metin

DOES THE ETIOLOGY OF PEDIATRIC PNEUMOTHORAX INFLUENCE TREATMENT STRATEGY AND HOSPITALIZATION REQUIREMENTS? A SINGLE-CENTER RETROSPECTIVE STUDY

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Objective

Pneumothorax is an important emergency condition characterized by the accumulation of air in the pleural space, resulting in partial or complete lung collapse and requiring early diagnosis and appropriate treatment. In the pediatric age group, it may develop due to traumatic, primary spontaneous, secondary spontaneous, or iatrogenic causes (1,4). Treatment options include conservative management, tube thoracostomy, and surgical intervention; however, there is no universally accepted treatment algorithm specifically for children (2,3). Studies in the literature have generally evaluated spontaneous and traumatic pneumothorax separately. In pediatric spontaneous pneumothorax, different outcomes have been reported regarding conservative and interventional treatment approaches (5,6), whereas in traumatic pneumothorax, the patient's clinical condition and associated injuries are recommended to be considered when making treatment decisions (4,7). Studies comparing traumatic and non-traumatic pneumothorax within the same pediatric emergency department population are limited (2–4). This study aimed to compare the demographic characteristics, treatment methods, and hospitalization requirements of pediatric patients presenting to the emergency department with traumatic and non-traumatic pneumothorax and to evaluate the effect of etiology on treatment strategy.

Methods

In this single-center retrospective study, the medical records of patients aged 1–17 years who presented to the emergency department between January 1, 2024, and June 30, 2026, and had radiologically confirmed pneumothorax were reviewed. Patients with pneumothorax whose primary clinical management and hospitalization decisions were undertaken by another department because of severe head trauma, intracranial hemorrhage, or major intra-abdominal organ injury were excluded. Neonates, patients aged ≥18 years, patients who died during hospitalization, and repeat admissions were excluded from the analysis. Only patients admitted by the Department of Thoracic Surgery or Pediatric Surgery were included. Patients were divided into two groups according to etiology: traumatic and non-traumatic pneumothorax. Age, sex, pneumothorax laterality, treatment method, hospitalization unit, and length of hospital stay were recorded. Statistical analyses were performed using IBM SPSS Statistics Version 27.0. Continuous variables were compared using the Mann–Whitney U test, and categorical variables were compared using Fisher's exact test. A p-value <0.05 was considered statistically significant.

Results

A total of 30 pediatric patients with pneumothorax were included in the study. Of these, 17 (56.7%) were in the traumatic pneumothorax group and 13 (43.3%) were in the non-traumatic pneumothorax group. No statistically significant differences were found between the traumatic and non-traumatic groups in terms of age, sex, intensive care unit admission, length of hospital stay, or treatment method (all comparisons, $p>0.05$). Intensive care unit admission was required in 11/13 (84.6%) patients in the non-traumatic group and 10/17 (58.8%) patients in the traumatic group ($p=0.229$). Tube thoracostomy was performed in 8/13 (61.5%) patients in the non-traumatic group and 10/17 (58.8%) patients in the

traumatic group (p=1.000). Length of hospital stay was 17.2±15.0 and 12.9±10.6 days, respectively (p=0.433). Pneumothorax was located in the left hemithorax in 17 patients (56.7%) and in the right hemithorax in 13 patients (43.3%). Overall, 9 patients (30.0%) were admitted to the ward and 21 (70.0%) to the intensive care unit. The most common etiologies among traumatic cases were falls and traffic accidents, whereas pneumonia and intubation-related pneumothorax predominated in the non-traumatic group.

Table 1. Comparison of traumatic and non-traumatic pediatric pneumothorax cases

Variable	Non-traumatic (n=13)	Traumatic (n=17)	p
Age, years (mean±SD)	14.2±4.0	13.5±4.4	0.698
Male sex, n (%)	9 (69.2)	13 (76.5)	0.698
Intensive care unit admission, n (%)	11 (84.6)	10 (58.8)	0.229
Length of hospital stay, days (mean±SD)	17.2±15.0	12.9±10.6	0.433
Tube thoracostomy, n (%)	8 (61.5)	10 (58.8)	1.000
Conservative treatment, n (%)	5 (38.5)	7 (41.2)	—

Conclusion

No statistically significant differences were found between traumatic and non-traumatic pediatric pneumothorax cases in terms of treatment method, intensive care requirements, or length of hospital stay. Our findings suggest that although etiology is important in the clinical evaluation of pediatric pneumothorax, it may not independently determine treatment and hospitalization decisions. When traumatic and non-traumatic cases are compared, the treatment approach should be individualized by considering the patient's clinical condition and the severity of pneumothorax together, rather than being based solely on etiology.

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M4458-Tam Metin

CLINICAL SCORING AND IMAGING ALGORITHMS IN PEDIATRIC CERVICAL SPINE INJURIES: STRATEGIES TO AVOID UNNECESSARY RADIATION

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ABSTRACT

Introduction: Although cervical spine injuries are rare in pediatric blunt trauma, they are devastating conditions that can lead to severe morbidity and mortality when missed. [1,2] Anatomical differences in children make them particularly susceptible to injuries of the upper cervical region compared with adults. [1,2] The greatest challenge in emergency medicine is to exclude these potentially fatal injuries while protecting the developing child from the long-term carcinogenic effects of unnecessary ionizing radiation. [4]

Development: Although the NEXUS and Canadian C-Spine Rules, developed for adults, are used in routine clinical practice for cervical spine clearance, the sensitivity of these scoring systems in young children remains controversial. [2,3] In recent years, large-scale studies conducted by networks such as the Pediatric Emergency Care Applied Research Network (PECARN) have identified pediatric-specific risk factors. [3] A low Glasgow Coma Scale (GCS) score, focal neurological deficit, neck pain, torticollis, and a high-energy trauma mechanism are among the most critical indicators. [3] While computed tomography (CT) remains the gold standard in high-risk patients, clinical clearance without radiological imaging can be achieved in low-risk cases. [3,5] Within radiation avoidance strategies, the ALARA (As Low As Reasonably Achievable) principle should be the foundation; plain radiographs should be considered the first option in intermediate-risk groups where anatomical assessment is adequate, and magnetic resonance imaging (MRI) should be preferred when SCIWORA (Spinal Cord Injury Without Radiographic Abnormality) is suspected. [4,5]

Conclusion: The use of standardized clinical scoring tools and age-specific imaging algorithms in pediatric emergency departments significantly reduces unnecessary CT utilization and associated radiation exposure while safely ruling out cervical spine injuries. [3,4]

Keywords: Pediatric trauma, cervical spine injury, clinical decision rules, radiation protection, PECARN.

INTRODUCTION

The stabilization and evaluation of the cervical spine are integral components of the primary survey in the management of polytrauma patients presenting to the emergency department. [3] In the pediatric population, cervical spine injuries (CSI) account for approximately 1% to 2% of all blunt traumas. [1,2] Despite their relative rarity, missed injuries can result in permanent neurological sequelae or death. [1,2] Emergency physicians must strike a difficult balance between avoiding missed critical diagnoses under demanding emergency department conditions and preventing unnecessary radiation exposure. [4]

The cervical anatomy of children differs considerably from that of adults. [1,5] A proportionally larger and heavier head, underdeveloped neck musculature, greater flexibility of the intervertebral ligaments, and a more horizontal orientation of the facet joints render the pediatric spine susceptible to hypermobility and trauma. [1,5] Because of these biomechanical differences, injuries in children younger than eight years of age are frequently observed in the upper cervical region (occiput–C3), whereas the injury pattern shifts toward the lower cervical region (C5–C7), similar to adults, with

progression toward adolescence. [1,5] In addition, the high degree of elasticity explains why spinal cord injury without radiographic abnormality (SCIWORA) occurs more frequently in children in the absence of a bony fracture. [1,5]

Although cervical computed tomography (CT) is frequently preferred because it provides rapid and definitive results, the high radiosensitivity of tissues with rapid cellular division, such as the thyroid and breast tissue in children, creates a substantial carcinogenic risk. [4,5] Therefore, international guidelines recommend the use of structured, evidence-based clinical decision algorithms for pediatric cervical spine clearance. [3,4]

CLINICAL EVALUATION AND SCORING SYSTEMS

The NEXUS (National Emergency X-Radiography Utilization Study) criteria and the Canadian C-Spine Rule (CCR), routinely used for cervical spine clearance in adults, have also been evaluated for adaptation to pediatric patients. [2,3] Pediatric subgroup analyses of the NEXUS study demonstrated sensitivity approaching 100% in children older than eight years; however, its reliability is limited in younger children who are pre-verbal or unable to cooperate adequately. [2] Difficulties in assessing mental status and the inability of a young child to describe neck pain or tenderness make direct adaptation of adult rules challenging. [2,3]

To address this uncertainty, multicenter studies conducted by PECARN have identified risk factors specific to pediatric cervical spine injury. [3] According to this approach, high-risk clinical findings include a Glasgow Coma Scale (GCS) score below 14, the presence of a focal neurological deficit, respiratory distress, significant neck pain or tenderness on palpation, torticollis, or restricted neck movement. [3] In addition, high-risk injury mechanisms, such as diving accidents, ejection from a motor vehicle, or falls from height, are considered independent warning factors. [3] In patients without any of these clinical risk factors, clinical cervical spine clearance (without radiological imaging) is considered highly safe. [3]

IMAGING ALGORITHMS AND RADIATION RISK

Radiological imaging is indicated in children in whom cervical spine injury cannot be clinically excluded or who cannot be adequately examined (e.g., intubated patients, patients with impaired consciousness, or those with severe concomitant head trauma). [3,5] The fundamental principle in this setting is to act in accordance with the ALARA (As Low As Reasonably Achievable) principle. [4] The traditional approach of “plain radiography first, CT if suspicious,” which was previously routine in adults, has been replaced by more refined algorithms in children. [5]

In patients who are conscious and cooperative and have a low-to-moderate level of clinical suspicion, three-view cervical spine radiographs (AP, lateral, and odontoid views) remain the initial imaging modality of choice. [5] However, in young children, interpretation of plain radiographs can be considerably difficult because ossification centers may be mistaken for fracture lines and appearances of pseudosubluxation may occur. [5] At this point, familiarity of the emergency physician with pediatric radiographic patterns is of vital importance. [5]

CT is indicated in patients with high-risk mechanisms, multiple trauma, a low GCS score, or abnormalities/suspicious findings on plain radiographs. [3,5] Age- and weight-appropriate dose-reduction protocols (child-sizing) must be strictly applied in pediatric CT examinations. [4,5] Performing standard adult-dose pan-CT solely because it is “fast” in low-risk children during triage significantly increases the statistical risk of thyroid cancer and leukemia. [4]

In patients with neurological deficits whose plain radiographs or CT scans are normal, magnetic resonance imaging (MRI) should be considered, particularly when 48–72 hours have elapsed since the

trauma and unexplained pain persists. [3,5] MRI is the gold standard for the diagnosis of ligamentous injuries, disc herniations, epidural hematomas, and SCIWORA. [5] The development of rapid-acquisition (fast-sequence) MRI protocols has expanded its use in emergency departments by reducing the need for intubation or deep sedation. [5]

EMERGENCY DEPARTMENT MANAGEMENT AND STRATEGIES

During transfer from the scene to the emergency department, pediatric immobilization should be performed carefully. [5] Because of the prominence of the occiput, placing a small child on a standard trauma board forces the neck into hyperflexion. [5] To prevent this, a pad should be placed beneath the back or shoulders (torso elevation) to maintain a neutral position. [5]

A cervical collar should be appropriately sized for the patient's age; improperly sized collars are not only ineffective but may also cause agitation, airway obstruction, and increased intracranial pressure. [3,5] During the patient's initial emergency department assessment, if the patient is awake, pain-free, and cooperative, the cervical collar should be removed as soon as possible by applying clinical clearance protocols. [3] Prolonged cervical collar use may lead to pressure injuries and respiratory restriction. [5]

CONCLUSION

The management of pediatric cervical spine injuries requires a high level of vigilance and clinical experience in emergency medicine. [3] Rather than relying solely on the physician's personal experience or discretion, evidence-based clinical decision rules, such as PECARN, should be adopted as institutional algorithms. [3,5] This approach enables the successful detection of true and potentially fatal injuries while preventing unnecessary CT use resulting from “defensive medicine” practices. [3] The most effective way to protect future generations from the carcinogenic risks of medical radiation is to rely on clinical examination and restrict radiological imaging to patients at high risk. [4]

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M4459-Tam Metin

ÇOCUKLUK ÇAĞINDA KARDİYAK ÜFÜRÜMLERİN KLİNİK VE EKOKARDİYOGRAFİK SPEKTRUMU: TEK MERKEZ DENEYİMİ

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Giriş ve Amaç

Çocukluk çağında kalp üfürümleri, pediatri pratiğinde en sık karşılaşılan fizik muayene bulgularından biridir. Yaşamın herhangi bir döneminde çocukların %33 ile %80'inde üfürüm saptanabilmektedir (1,2). Bu üfürümlerin çok büyük bir kısmı yapısal olarak normal bir kalpten kaynaklanan "masum üfürümler" olsa da üfürüm bazen ciddi konjenital kalp hastalıklarının (KKH) tek klinik belirtisi olabilir (3). Klinikte masum ve patolojik üfürüm ayrımının doğru yapılması; ciddi patolojilerin erken yakalanması (4), gereksiz tetkiklerin ve ailelerdeki yoğun anksiyetenin önlenmesi açısından kritiktir. Bu çalışma, çocuk kardiyoloji polikliniğine üfürüm ön tanısıyla sevk edilen hastaların klinik özelliklerini, sevk eden hekimlerin değerlendirmeleriyle uzman muayenesi arasındaki korelasyonu ve ekokardiyografinin (EKO) tanısal etkinliğini incelemeyi amaçlamaktadır.

Gereç ve Yöntem

Ocak 2024- Aralık 2024 tarihleri arasında İnönü Üniversitesi Tıp Fakültesi Çocuk Kardiyoloji Polikliniğine üfürüm şikayetiyle sevk edilen veya başvuran 1292 hasta (652 kız, 640 erkek; yaş ortalaması 12,3 ± 3,9 yıl) retrospektif olarak incelenmiştir. Hastalar yaş gruplarına göre 0-1 yaş, 1-5 yaş, 5-10 yaş ve >10 yaş olmak üzere dört gruba ayrılmıştır. Çalışma için İnönü Üniversitesi Tıp Fakültesi Etik Kurulu'ndan onay alınmıştır. Tüm hastalara ayrıntılı fizik muayene, elektrokardiyografi (EKG) ve EKO uygulanmıştır. Aritmi şüphesi olan hastalara 24 saatlik Holter monitörizasyonu yapılmıştır. İstatistiksel analizlerde verilerin normal dağılımı Shapiro-Wilk testi ile incelenmiş; gruplar arası karşılaştırmalarda Student t-testi, ANOVA, Mann-Whitney U testi ve Fischer's exact testi kullanılmıştır. P <0,05 değeri istatistiksel olarak anlamlı kabul edilmiştir.

Bulgular

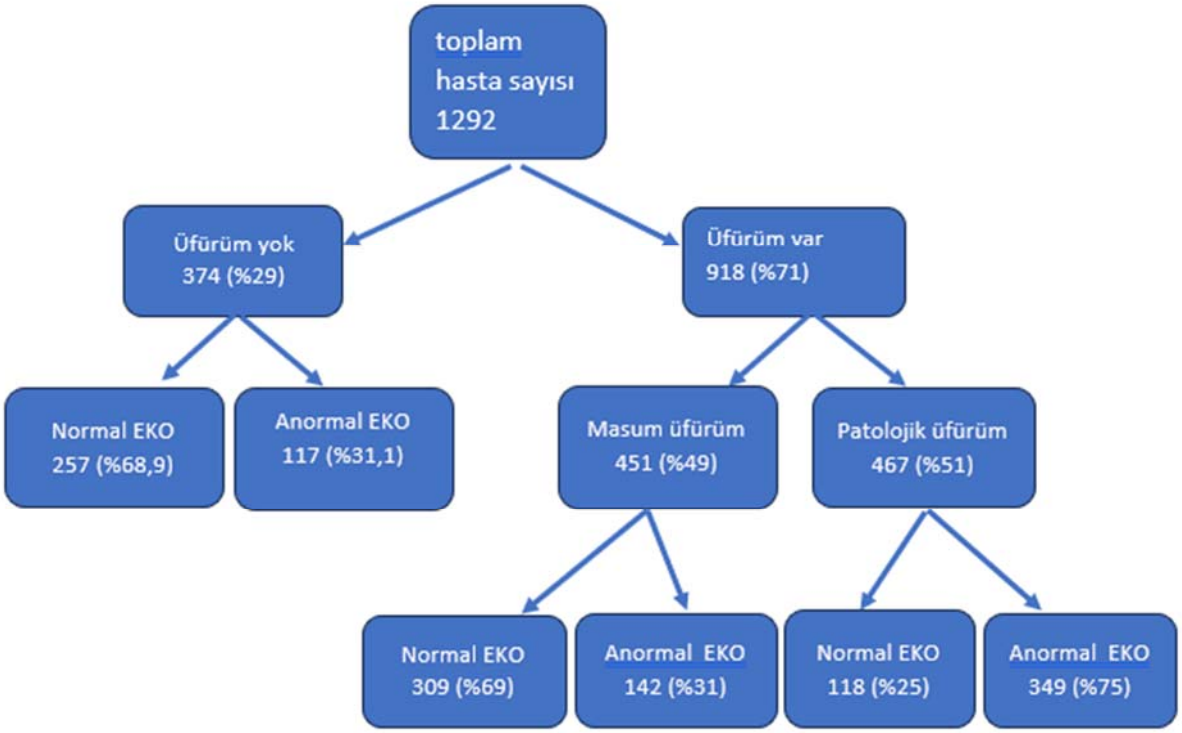
Çalışmaya dahil edilen 1292 hastanın yaş dağılımı incelendiğinde; hastaların %10,2'sinin 0-1 yaş, %10,3'ünün 1-5 yaş, %25,7'sinin 5-10 yaş ve %53,8'inin 10 yaş üzerinde olduğu saptanmıştır. Sevk edilen hastaların %71'inde (918 hasta) çocuk kardiyoloji uzmanı tarafından yapılan muayenede üfürüm varlığı doğrulanırken, %29'unda (374 hasta) üfürüm saptanmamıştır. Muayenede üfürüm duyulan 918 hastanın 451'i (%49,1) klinik olarak masum üfürüm, 467'si (%50,9) ise patolojik üfürüm olarak sınıflandırılmıştır.

Tablo1 Yaş gruplarına göre üfürüm tespit edilen olgu sayıları

Yaş grupları	Üfürüm yok	Masum üfürüm	Patolojik üfürüm	Toplam hasta sayısı / %
0-1 yaş	23	32	77	132/10,2
1-5 yaş	32	46	65	134/10,3
5-10 yaş	87	123	121	332/25,7

>10 yaş	232	257	204	694/53,8
	374	451	467	1292/100

Şekil 1: Hastaların bulgularına göre EKO sonuçları



Ekokardiyografik değerlendirme sonucunda, toplam 1292 hastanın %47,1'inde (608 hasta) en az bir kardiyak anomali tespit edilmiştir. Klinik muayenede üfürüm duyulmayan 374 hastanın %31,1'inde (117 hasta) ve masum üfürüm olarak değerlendirilen 451 hastanın %31'inde (142 hasta) EKO ile yapısal bir anomali saptanmıştır. Patolojik üfürüm tespit edilen 467 hastanın ise %75'inde (349 hasta) EKO bulguları anormal bulunmuştur. EKO'da en sık rastlanan anomaliler sırasıyla; Mitral Kapak Yetersizliği (MY) (%11,2), Patent Foramen Ovale (PFO) (%10,6), Sekundum atriyal septal defekt (ASD) (%9) ve Ventriküler septal Defekttir (VSD) (%4,9). Ritim izlemi sonucunda, hastaların %8,1'inde (105 hasta) ritim bozukluğu (en sık Supraventriküler ekstrasistol (SVE), Ventriküler ekstrasistol (VES) ve Wolf Parkinson White sendromu (WPW) saptanmıştır.

Tablo 2. Cinsiyete göre EKO bulguları

	Kız n (%)	Erkek n (%)	Toplam n (%)
ASD	65 (5)	52 (4)	117 (9)
VSD	35 (2,7)	29 (2,2)	64 (4,9)
MY	86 (6,7)	58 (4,5)	145 (11,2)
PDA	9 (0,6)	12 (0,9)	21 (1,6)
AY	6 (0,4)	15 (1,2)	21 (1,6)
PS	7 (0,5)	8 (0,6)	15 (1,1)
BAV	5 (0,4)	10 (0,8)	15 (1,1)
LVH	8 (0,6)	8 (0,6)	16 (1,2)

MVP	8 (0,6)	2 (0,2)	10 (0,8)
AS	2 (0,2)	5 (0,4)	7 (0,6)
FT	3 (0,2)	5 (0,4)	8 (0,6)
TY	4 (0,3)	8 (0,6)	12 (0,9)
Aort dilatasyonu	2 (0,2)	3 (0,2)	5 (0,4)
PFO	72 (5,6)	65 (5)	137 (10,6)
Diğer	6 (0,5)	13 (1)	19 (1,5)
Normal	337 (26)	347 (26,9)	684 (52,9)
Toplam	652 (50,5)	640 (49,5)	1292 (100)

ASD; Atriyal Septal Defekt, VSD; Ventriküler Septal Defekt, MY; Mitral Kapak Yetersizliği, PDA; Patent Duktus Arteriyozus, AY; Aort Kapak Yetersizliği, PS; Pulmoner Kapak Darlığı, BAV; Biküspit Aortic Kapak, LVH; Sol Ventrikül Hipertrofisi, MVP; Mitral Kapak Prolapsusu, AS; Aort Kapak Darlığı, FT; Fallot Tetralojisi, TY; Triküspit Kapak Yetersizliği, PFO; Patent Foramen Ovale

Tartışma ve Sonuç

Çocukluk çağında üfürümlerin ayırıcı tanısında fizik muayene temel basamak olsa da klinik deneyim, poliklinik yoğunluğu ve hasta uyumu gibi faktörler tanı doğruluğunu etkilemektedir. Literatürde masum üfürüm sıklığı farklı yaş gruplarında %6 ile %90 arasında yüksek oranlarda bildirilmişken (5), çalışmamızda masum üfürüm oranı %35 saptanmıştır. Masum kabul edilen veya üfürüm duyulmayan olgularda %31 oranında yapısal anomali çıkması, fizik muayenenin tek başına minör veya asemptomatik patolojileri (PFO, ASD, hafif MY vb.) gözden kaçırabileceğini göstermektedir (6). Özellikle yenidoğan ve erken süt çocukluğu döneminde fizik muayenenin sınırları bilinmeli ve şüpheli durumlarda uzman görüşü alınmalıdır. Saptanan hafif kapak yetersizlikleri ve septal defektler ilerleyen yaşlarda enfektif endokardit veya kalp yetmezliği açısından risk oluşturabilir.

Ekokardiyografi (EKO), invaziv olmayan doğası ve yüksek tanısal gücüyle üfürümlü hastaların değerlendirilmesinde altın standart yöntemdir. Sonuç olarak, üfürüm ön tanısıyla sevk edilen çocuk hastaların, fizik muayenedeki klinik sınıflamadan bağımsız olarak, kesin tanı ve olası sessiz kardiyak patolojilerin gözden kaçmaması adına uzman kontrolünde ekokardiyografik değerlendirmeye tabi tutulması önerilmektedir.

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M4486-Tam Metin

ÇOCUKLARDA TRAVMATİK KAFA YARALANMALARINDA ACİL SERVİS YÖNETİMİ: PECARN TEMELLİ GÜNCEL YAKLAŞIM

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Özet

Amaç: Çocuklarda travmatik kafa yaralanmalarında acil servis değerlendirmesini optimize etmek ve gereksiz bilgisayarlı tomografi (BT) çekimini engelleyerek hastaları radyasyonun olumsuz etkilerinden korumaktır.

Yöntem: Turgut Özal Üniversitesi Tıp Fakültesi ve Malatya Eğitim ve Araştırma Hastanesi acil servisine başvuran pediatrik kafa travması hastalarında, BT ihtiyacının kanıta dayalı bir şekilde belirlenmesi için PECARN (Pediatric Emergency Care Applied Research Network) temelli güncel klinik karar kuralı yaklaşımı kullanılmıştır.

Bulgular: Acil serviste özellikle kafa travmaları ile gelen pediatrik hastalarda beyin BT ihtiyacının belirlenmesi için PECARN temelli güncel yaklaşım kullanımı ile gereksiz beyin BT'nin ve radyasyonun olumsuz etkilerinin önüne geçilmesi hedeflenmektedir. Acil serviste bu hastalarda ilk yapılması gereken ABCDE'nin belirlenmesi ve GKS skorunun oluşturulmasıdır. Bu basamaklar yapılırken hemen hızlı bir şekilde servikal immobilizasyon yapılmalıdır.

Sonuç: Çocuklarda travmatik kafa yaralanmalarının acil servis de etkin yönetimi, erken klinik değerlendirme ve uygun görüntüleme kararlarının birlikte uygulanmasını gerektirir. PECARN algoritması, klinik olarak önemli travmatik beyin yaralanmalarını güvenle saptamaya yardımcı olurken gereksiz bilgisayarlı tomografi kullanımını ve buna bağlı radyasyon maruziyetini azaltan güvenilir bir karar aracıdır.

Giriş

Pediatrik kafa travmaları, acil servislere başvuruların en sık nedenlerinden biridir. Kafa travması geçiren çocukların çoğunluğunda hafif yaralanmalar görülmekle birlikte, küçük bir grupta müdahale gerektiren veya kalıcı nörolojik hasara yol açabilecek klinik olarak önemli travmatik beyin yaralanmaları (clinically important traumatic brain injury, ciTBI) gelişebilmektedir.

Bilgisayarlı tomografi (BT), intrakraniyal yaralanmaları saptamada altın standart görüntüleme yöntemi olmakla birlikte, çocuklarda iyonize radyasyon maruziyetine bağlı malignite riskini artırmaktadır. Bu nedenle acil servislerde temel hedef, ciTBI riski taşıyan hastaları güvenle saptarken risk taşımayan çocuklarda gereksiz BT çekiminin önüne geçmektir.

Gereç ve Yöntem / İlk Yaklaşım ve İlkeler

Acil servise kafa travması ile getirilen pediatrik hastada ilk değerlendirme ve yönetim adımları şu şekilde sıralanmaktadır:

1. **İlk Değerlendirme (ABCDE):** Havayolu, solunum, dolaşım, nörolojik durum ve ekspojur systematik olarak değerlendirilmelidir.
2. **Servikal İmmobilizasyon:** İlk klinik değerlendirme yapılırken olası servikal omurga yaralanmalarına karşı hasta hızlı bir şekilde servikal immobilizasyona alınmalıdır.
3. **Glaskow Koma Skalası (GKS) Tespiti:** Hastanın nörolojik tablosunu derecelendirmek için GKS skoru hızla belirlenmelidir.

PECARN Klinik Karar Rule ve Uygulama İlkeleri

PECARN (Pediatric Emergency Care Applied Research Network), ABD'nin en büyük pediatrik acil araştırma ağıdır. 2009 yılında Kuppermann ve arkadaşları tarafından yayımlanan PECARN Head Trauma Rule, 25 acil serviste 42.000'den fazla çocuk hasta verisi üzerinde geliştirilmiş ve uluslararası düzeyde doğrulanmıştır. PECARN, özellikle GKS 14–15 olan ve künt kafa travması bulunan çocuklar için tasarlanmıştır.

PECARN Yaş Grupları ve Risk Kriterleri

PECARN algoritması, klinik bulguların yaşa bağlı değişkenliği nedeniyle çocukları iki ana gruba ayırır:

Risk Kategorisi	**< 2 Yaş Grubu Kriterleri**	**≥ 2 Yaş Grubu Kriterleri**
Yüksek Risk	GKS ≤14, mental durum değişikliği veya palpe edilebilen kafatası kırığı	GKS ≤14, mental durum değişikliği veya baziler kafatası kırığı bulguları
Orta Risk	Oksipital/parietal/temporal skalp hematomu, ≥5 sn bilinç kaybı, şiddetli yaralanma mekanizması, normal dışı davranış	Bilinç kaybı öyküsü, kusma, şiddetli baş ağrısı, şiddetli yaralanma mekanizması
Düşük Risk	Yukarıdaki kriterlerin hiçbirinin bulunmaması	Yukarıdaki kriterlerin hiçbirinin bulunmaması

Klinik Uygulama ve Yönetim Stratejisi

PECARN sonucunda hastalar klinik risklerine göre yönetilir:

- **Çok Düşük Risk:** BT çekilmesi önerilmez. Hastanın klinik durumu stabilse uygun taburculuk planlanabilir.
- **Orta Risk:** Klinik gözlem veya BT seçeneği değerlendirilir. Karar; hastanın klinik seyri, semptomların şiddeti, klinisyen deneyimi ve aile ile ortak karar verme sürecine göre şekillenir.
- **Yüksek Risk:** Beyin BT çekilmesi kuvvetle önerilir.

Tartışma ve Sonuç

Çocuklarda travmatik kafa yaralanmalarının acil serviste etkin yönetimi, sistematik bir klinik değerlendirme ve kanıta dayalı görüntüleme kararlarının entegrasyonunu gerektirir. PECARN algoritması, klinisyenlere ciTBI vakalarını yüksek duyarlılıkla saptama imkanı tanırken, düşük riskli grupta gereksiz BT kullanımını azaltarak radyasyon güvenliğini sağlar.

Bireysel klinik özelliklerin titizlikle değerlendirilmesi ve güncel protokollerin klinik pratiğe dahil edilmesi, pediatrik travma hastalarında hem güvenliği hem de tedavi kalitesini artırmaktadır. Sonuç olarak, PECARN temelli yaklaşım, modern acil tıp pratiğinde pediatrik kafa travmalarının yönetiminde temel taşlarından biri olmaya devam etmektedir.

Makalenize / bildiriniz için PECARN ve pediatrik kafa travması yönetiminin temelini oluşturan, uluslararası alanda kabul görmüş **10 adet kaynak** aşağıdadır:

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M4596-Tam Metin

APPROACH TO MEDİCOLEGAL CASES AND LEGAL OBLİGATİONS

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Abstract

Physicians undertake medicolegal duties in addition to providing therapeutic and preventive healthcare services and may face criminal, civil, and administrative liability arising from professional practice. Any indication that a crime may have been committed requires the case to be considered medicolegal and promptly reported to the competent authorities. In potentially medicolegal cases, including injuries, poisonings, burns, mechanical asphyxia, suicide attempts, sexual assaults, child abuse, and occupational accidents, a thorough examination should be performed, necessary consultations and investigations completed, and a clear, objective, and scientifically sound medicolegal report prepared. Inadequate documentation, failure to preserve medical records, delayed reporting, preparation of false documents, and failure to fulfill reporting obligations may result in legal liability. Valid consent based on adequate information is a fundamental requirement for lawful medical intervention; however, life-threatening emergencies and other circumstances prescribed by law may constitute exceptions. When a child's legal representative refuses medically necessary treatment, the child's best interests should be prioritized, and in non-emergency cases, a court order should be obtained in accordance with relevant legislation. Appropriate notification, detailed documentation, accurate reporting, protection of patient confidentiality, and compliance with informed consent procedures are essential for protecting patients' rights and reducing physicians' legal risks.

Keywords: Medicolegal case, medicolegal report, physician liability, informed consent, mandatory reporting

M4500-Özet Metin

EXERCISE-INDUCED BRONCHOCONSTRICTION IN SCHOOL-AGED CHILDREN BORN VERY PRETERM: PREVALENCE AND ASSOCIATED CLINICAL FACTORS

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Objective
Children born very preterm may develop persistent airway dysfunction, but exercise-induced bronchoconstriction (EIB) is not routinely assessed. We aimed to determine objectively confirmed EIB at school age in children born at ≤32 weeks of gestation and to examine its relationships with neonatal history, atopy, laboratory findings, and baseline spirometry.

Methods
This single-center cross-sectional study included children born at ≤32 weeks of gestation and evaluated at 7–8 years at the İnönü University Pediatric Allergy and Immunology Clinic. Of 192 children identified from neonatal intensive care unit records, 66 attended and 42 completed acceptable baseline spirometry and a standardized treadmill challenge. Children with recent infection, exercise-limiting disease, significant congenital heart disease, or another contraindication were excluded. Perinatal, neonatal, respiratory, atopic, laboratory, and anthropometric data were recorded. Spirometry followed American Thoracic Society/European Respiratory Society standards. Participants exercised for at least six minutes at 85–90% of age-predicted maximum heart rate. Forced expiratory volume in one second (FEV_1) was measured at baseline and 5, 10, 15, and 30 minutes. EIB was defined as a ≥10% fall in FEV_1 at any post-exercise time point. Standard parametric or nonparametric and categorical tests were used; $p<0.05$ was significant. The İnönü University Non-Invasive Clinical Research Ethics Committee approved the study on 30 June 2026 (no. 10614), and written parental consent was obtained.

Results
The 42 participants had a median gestational age of 29 weeks (25–32), median birth weight of 1.23 kg (0.75–2.35), and 27 (64.2%) were girls; 8 (19.0%) were small for gestational age. Neonatal sepsis occurred in 28 (66.7%), BPD in 13 (31.0%), mechanical ventilation in 17 (40.5%), and CPAP use in 34 (81.0%). At assessment, asthma and allergic rhinitis were reported in 5 (11.9%) and 6 (14.3%) children. Baseline mean FEV_1 was 89.19±8.48% predicted and mean forced expiratory flow at 25–75% of forced vital capacity ($FEF_{25–75}$) was 101.92±23.02% predicted. EIB was detected in 13 children (31.0%), at 5, 10, 15, and 30 minutes in 4 (9.5%), 7 (16.7%), 5 (11.9%), and 4 (9.5%), respectively. Dyspnea was the most frequent symptom (16/42, 38.0%); four children (9.5%) received a bronchodilator. EIB-positive and EIB-negative groups did not differ significantly in neonatal factors, asthma history, total IgE, or eosinophils. Baseline FEV_1 (93.23% vs 87.37%; $p=0.054$) and $FEF_{25–75}$ (112.30% vs 97.27%; $p=0.060$) were numerically higher in the EIB-positive group but not statistically significant (Tables 1 and 2).

Table 1. Selected demographic, perinatal, and neonatal characteristics of the participants.

Characteristic	Summary	Value, n (%) or median (range)
Female sex	n (%)	27 (64.2)
Gestational age, weeks	Median (range)	29 (25–32)
Birth weight, kg	Median (range)	1.23 (0.75–2.35)
Small for gestational age	n (%)	8 (19.0)
Neonatal sepsis	n (%)	28 (66.7)
Bronchopulmonary dysplasia	n (%)	13 (31.0)
Mechanical ventilation	n (%)	17 (40.5)
Continuous positive airway pressure	n (%)	34 (81.0)
NICU stay, days	Median (range)	44 (3–93)
Asthma or allergic rhinitis	n (%)	5 (11.9) / 6 (14.3)

Table 2. Baseline spirometry and treadmill exercise challenge findings.

Outcome	Overall cohort (n=42)	Value
FEV_1, % predicted, mean ± SD	Baseline	89.19 ± 8.48
$FEF_{25–75}$, % predicted, mean ± SD	Baseline	101.92 ± 23.02
EIB positivity at 5 minutes	n (%)	4 (9.5)
EIB positivity at 10 minutes	n (%)	7 (16.7)
EIB positivity at 15 minutes	n (%)	5 (11.9)
EIB positivity at 30 minutes	n (%)	4 (9.5)
Overall EIB positivity	n (%)	13 (31.0)
Dyspnea during exercise / bronchodilator after test	n (%)	16 (38.0) / 4 (9.5)

Abbreviations: BPD, bronchopulmonary dysplasia; CPAP, continuous positive airway pressure; EIB, exercise-induced bronchoconstriction; $FEF_{25–75}$, forced expiratory flow at 25–75% of forced vital capacity; FEV_1, forced expiratory volume in one second; IgE, immunoglobulin E; NICU, neonatal intensive care unit.

Conclusion

EIB was identified in approximately one-third of school-aged children born very preterm, despite relatively preserved baseline spirometry. Conventional neonatal and clinical characteristics did not reliably distinguish children with and without EIB in this modest sample. Objective exercise challenge testing may therefore provide additional information during respiratory follow-up, particularly for children reporting exertional dyspnea, cough, wheezing, or reduced exercise performance. Larger controlled studies are needed to confirm prevalence estimates and identify clinically useful predictors.

Funding and conflicts of interest

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M4501-Tam Metin

ÇOCUK ACİL SERVİSE BAŞVURAN ADLİ VAKALARIN DEĞERLENDİRİLMESİ

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Giriş ve amaç: Çocukluk çağında meydana gelen adli olaylar tüm Dünya'da önlenebilir sağlık sorunlarının önemli bir kısmını oluşturmaktadır. Yaşadığımız bölgedeki adli olguların tespit edilmesi ve uygun önlemlerin alınması açısından önemlidir. Bu çalışmanın amacı, acil servise başvuran majör travma dışındaki adli nitelikli çocuk hastaların demografik, epidemiyolojik özelliklerini geriye dönük olarak inceleyerek bu hastaların yönetiminde doğru yaklaşımı hedeflemektir.

Yöntem: Hastanemiz çocuk acil servisine 01/01/2025-31/05/2026 tarihleri arasında başvuran ve adli vaka olarak değerlendirilen 0-18 yaş arasındaki 609 hastanın dosyaları retrospektif olarak incelendi. Travma hastaları çalışma dışı bırakıldı. Adli olgular yaş, cinsiyet, tanı, başvuru zamanı (mevsimsel dağılım), yatış, acil servisten taburcu, sevk ve ölüm oranları açısından değerlendirildi.

Bulgular: 609 hastanın yaş ortalaması 9,1 ± 6 yıl, bu hastaların %5,6'sı (n=34) 0-1 yaş, %33'ü (n=201), 1-4 yaş, %11,7'si (n=71) 5-9 yaş, %14,6'si (n=89) 10-14 yaş, %35.1'i (n=236) 15-18 yaş aralığındaydı (Şekil 1). Hastaların %53.2'si kız, %46.8'i erkekti. Başvurular en sık ilkbahar ve kış mevsimlerinde ve saat 16-24 arasında görüldü. Olguların dağılımı incelendiğinde zehirlenme şüphesi ile başvurular %57,9 (n=353) ile ilk sırada görüldü. Sırasıyla yanık %15,9 (n=97), alkol ve madde kullanımı %10,5 (n=64), adölesan gebelikler %7.6 (n=46) izlemekteydi (Tablo 1). Zehirlenme vakalarında en sık ilaç, karbonmonoksit ve korozif maddeler erken olarak görüldü. Zehirlenme şüphesi, yanık ve yabancı cisim aspirasyonu vakaları en sık 1-4 yaş grubunda görüldü. Alkol ve madde kullanımı en sık 15-18 yaş arası erkek hastalarda (%50,7) görüldü. Tüm suisid girişimlerinin %73,6'sı kız hastalar olup, bunların %71,6'sı 15-18 yaş aralığındaydı. Hastaların %40,4'ü (n=246) acil servisten taburcu edildi, %21'i (n=128) çocuk servisinde, %18,4'ü (n=112) ÇYBÜ'de %10,5'i (n=64) Çocuk cerrahisi servisinde yatarak takip edildi. Hastaların %3'ü (n=18) tedavi ve tetkik red formu vererek, %3 'ü (n=18) acili izinsiz terk ederek acil servisten ayrıldı (Şekil 2).

Sonuç: Çocuk acil servise başvuran adli vakalar önemli bir sağlık yükü oluşturmaktadır. Çalışmamızda zehirlenme şüphesi ve yanık nedeniyle başvurular en sık çocuk yaş grubunda görüldü. Bu sebeple ev içindeki ilaçların ve korozif maddelerin çocukların ulaşamayacağı yerde muhafaza edilmesi, koruyucu önlemler alınması ile adli vaka başvurularının azalacağı düşünüldü. Alkol ve kullanımı 15-18 yaş grubunda sık saptandı. Geç adölesan döneminin riskli davranışlar açısından kritik bir dönem olması nedeniyle ailelerin madde kullanımı konusunda eğitilmesi, okullarda koruyucu eğitimler verilmesi, alkol ve maddeye erişimin engellenmesi madde kullanımının önlenmesine katkı sağlayabilir.

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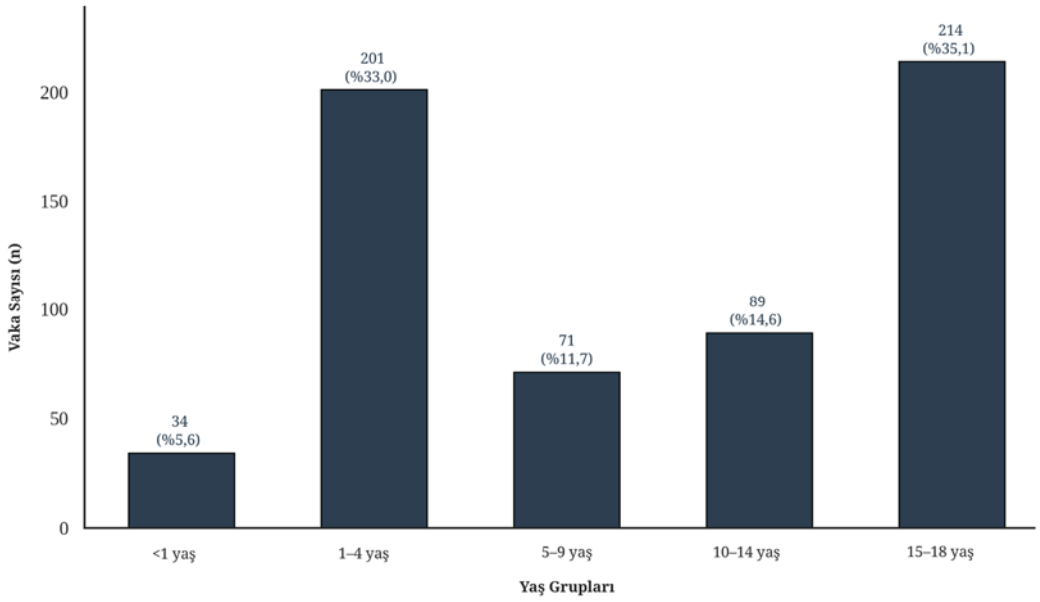
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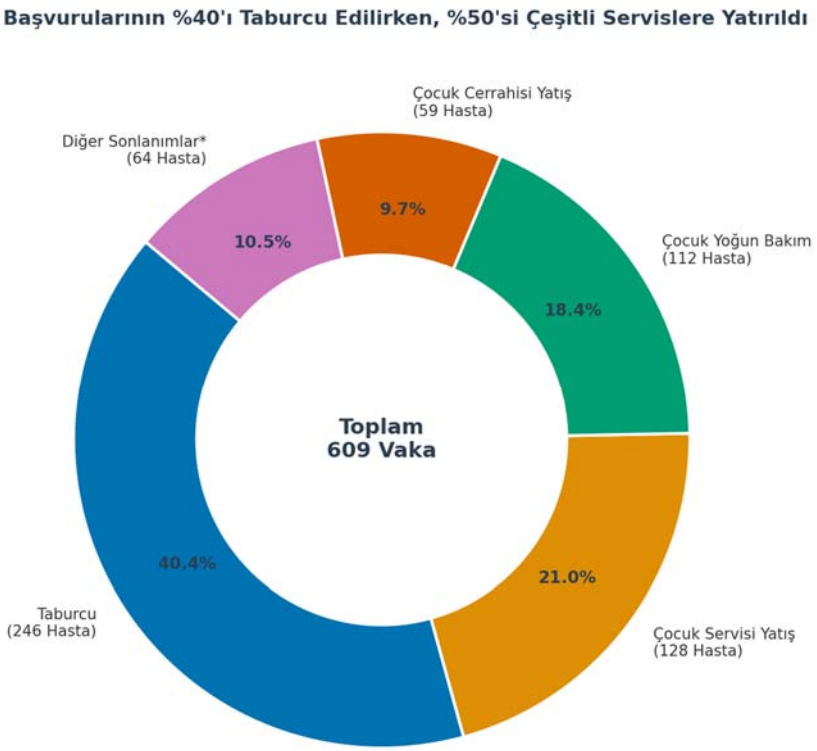
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Şekil 1.



Şekil 2.



Tablo 1: Pediyatrik Acil Başvuru Tanılarının Yaş Gruplarına Göre Dağılımı ve Sıklığı

Tanılar	<1 yaş	1–4 yaş	5–9 yaş	10–14 yaş	15–18 yaş	Toplam
Zehirlenme şüphesi	20	140	45	56	92	353
Yanık	12	50	16	10	9	97
Gebelik durumu	0	0	0	2	44	46
Alkol kullanımı	0	0	0	5	31	36
Madde kullanımı	0	0	1	4	22	27
Elektrik akımına maruz kalma	0	3	3	8	7	21
Diğer	2	2	2	2	8	16
Kardiyak arrest	0	3	1	1	0	5
Cinsel istismar şüphesi	0	0	3	1	1	5
Yabancı cisim aspirasyonu	0	3	0	0	0	3
Toplam	34	201	71	89	214	609

M4502-Tam Metin

PLAY- AND SPORT-BASED PSYCHOSOCİAL SUPPORT İN POST-DİSASTER PEDİATRİC EMERGENCY CARE: A CRİTİCAL EVİDENCE SYNTHESİS AND THE PROPOSED GÜVEN-HAREKET CONCEPTUAL CLİNİCAL PATHWAY

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ABSTRACT

Introduction/Aim: Play and physical activity may support safety, routine, social connectedness, and self-efficacy in disaster-affected children. Direct evidence defining which children may benefit, when these approaches should begin, and which safeguards are required in pediatric emergency care is limited. This critical review evaluated the directness and boundaries of the evidence and developed the GÜVEN-HAREKET conceptual clinical pathway. **Methods:** PubMed/MEDLINE and authoritative resources from the World Health Organization, Inter-Agency Standing Committee, and American Academy of Pediatrics were purposively searched from inception to 1 August 2026. Evidence on post-disaster child psychosocial interventions, play/child-life practices in pediatric emergency departments, and trauma-informed physical activity was critically synthesized according to design, directness, outcome measurement, harms reporting, and transferability. **Results:** The targeted search identified no study directly testing a sport intervention in disaster-related pediatric emergency presentations. A randomized therapeutic-play trial in 53 disaster-exposed children aged 4-6 years reported benefits, but treatment occurred outside the emergency department and the trial was retrospectively registered. In 389 earthquake-exposed adolescents, physical activity was unrelated to post-traumatic stress and weakly inversely associated with depression ($r=-0.228$; $p=0.012$). Pediatric emergency evidence for play primarily addresses procedural pain and short-term anxiety. **Conclusion:** Play and sport should not be framed as stand-alone trauma treatments. They may be considered supportive components after medical stabilization, psychosocial risk stratification, child assent, and provision of safe monitoring. The GÜVEN-HAREKET model is unvalidated and requires multidisciplinary consensus and prospective evaluation.

Keywords: disaster; child; pediatric emergency care; play; sport; physical activity; psychosocial support; trauma-informed care

1. INTRODUCTION

Disasters can simultaneously disrupt children's physical safety, relationships with caregivers, daily routines, educational continuity, and developmental environments. Bereavement, being trapped under rubble, separation from family, displacement, interruption of school and peer networks, uncertainty about shelter, and continuing aftershocks may be associated with fear, sleep disturbance, regression, somatic complaints, irritability, avoidance, difficulty concentrating, and functional impairment. Nevertheless, not every child exposed to a disaster develops a psychiatric disorder. Longitudinal evidence indicates that post-traumatic stress symptoms may decline over time, whereas depression and anxiety may remain elevated for years, particularly among children and adolescents (Newnham et al.,

2022). High-quality care therefore requires early recognition of persistent functional impairment and safety risks without pathologizing expected stress responses.

The pediatric emergency department may be the first and sometimes the only point of contact between the child, family, and health system during the acute phase of a disaster. Excluding life-threatening conditions, applying the ABCDE approach, treating pain and injury, reuniting families, and planning safe discharge are the primary priorities. At the same time, crowding, noise, uncertainty, repeated examinations, and separation from caregivers may intensify the child's stress response. Trauma-informed pediatric care aims to reduce the likelihood of retraumatization, provide developmentally understandable information, create opportunities for choice and control whenever possible, and integrate emotional support into medical care (Marsac et al., 2016).

Play, child-life practices, and distraction methods are used in pediatric emergency care to reduce procedural pain and anxiety. Sport and physical activity have also been proposed as tools that may help restore routines, peer relationships, self-efficacy, and a sense of community after disasters. However, conflating three distinct evidence domains creates a major inferential error: short-term procedural anxiety in pediatric emergency care, post-disaster traumatic stress, and the effects of exercise on general child mental health do not represent the same clinical question.

Rather than combining play and sport under a single category of interventions that "improve well-being," this critical review examines the evidence at three levels: direct evidence (interventions in disaster-exposed children), indirect evidence (play and child-life practices in pediatric emergency care), and transferred evidence (physical activity in non-disaster trauma populations and in general child mental health). The review's original contribution is to make the clinical boundaries of these evidence levels explicit and to propose a testable transition model linking acute pediatric emergency care with post-discharge community recovery.

2. CONCEPTUAL DEFINITIONS AND SCOPE

In this review, play refers to free, guided, or procedure-focused coping activities shaped by the child's choice and developmental level. Therapeutic play is a structured intervention directed toward specific psychosocial goals and delivered by a trained practitioner. Physical activity refers to any bodily movement that increases energy expenditure; exercise refers to planned and repetitive physical activity; and sport refers to more organized participation involving rules, skills, training, and sometimes competition. Using these terms interchangeably obscures intervention dose, practitioner competence, and risk profile.

Low-intensity play that may be used in a pediatric emergency department is clinically different from a structured sport program delivered in a community setting after discharge. This review does not recommend performance training in the emergency department, does not support physical activity before medical stabilization, and does not present play as equivalent to psychotherapy. The scope is children and adolescents aged 0-18 years with disaster exposure who have acute pediatric emergency contact and enter the subsequent early recovery period.

1.AIM AND CRITICAL QUESTIONS

The aim of this critical narrative review was to evaluate the possible role of play- and sport-based psychosocial support in post-disaster pediatric emergency presentations in terms of benefits, harms, feasibility, directness, equity, and certainty of evidence, and to develop the GÜVEN-HAREKET conceptual clinical pathway for future clinical testing.

The review addressed the following questions: (1) Which outcomes are supported by evidence on play and child-life practices in pediatric emergency care? (2) What is the level of direct intervention evidence

for therapeutic play, physical activity, or sport among disaster-exposed children? (3) What indirectness problems arise when findings on procedural anxiety and general mental health are transferred to post-disaster pediatric emergency care? (4) What medical, psychological, ethical, and safeguarding risks may arise from early or inappropriate activity? (5) How can the transition from acute emergency care to community participation be structured safely, inclusively, and measurably?

METHODS

1.1. Review Design and Reporting Approach

This study was designed as a targeted critical narrative review and does not claim to be a systematic review or clinical guideline. Reporting was structured in accordance with SANRA principles, including justification of the topic's importance, clear statement of aims, description of the search approach, appropriate use of sources, differentiation of evidence levels, and presentation of relevant outcome data (Baethge et al., 2019). Use of SANRA does not replace protocol registration, dual-reviewer study selection, comprehensive database searching, or formal risk-of-bias assessment.

1.2. Information Sources and Search Approach

PubMed/MEDLINE was purposively searched from inception to 1 August 2026. Authoritative resources from the World Health Organization, Inter-Agency Standing Committee, and American Academy of Pediatrics on disaster mental health, psychological first aid, pediatric emergency care, and trauma-informed care were also examined. Backward citation searching was performed from the reference lists of key publications.

The core PubMed search string contained Boolean combinations of the following concept clusters: (child* OR adolescen* OR pediatric*) AND (disaster* OR earthquake* OR mass trauma) AND (play OR therapeutic play OR child life OR sport* OR exercise OR physical activity OR psychological first aid OR trauma-informed OR psychosocial support) AND (emergency department OR emergency care OR recovery OR intervention). No language restriction was applied; publications with full texts available in English or Turkish were prioritized for complete assessment. Because the search was targeted, record counts and reasons for exclusion were not reported in a PRISMA flow diagram.

1.3. Eligibility, Prioritization, and Critical Appraisal

Studies examining psychosocial outcomes or interventions in disaster-exposed children and adolescents; research evaluating play, distraction, or child-life practices in pediatric emergency care; physical activity or sport programs for trauma-exposed young people; and guidance on child disaster mental health, psychological first aid, and stepped care were included. Adult-only samples, performance studies unrelated to disaster or injury contexts, and opinion pieces without outcome data were not used as core evidence.

Sources were appraised according to design strength, directness to disaster and pediatric emergency contexts, sample size, comparator, measurement validity, follow-up duration, clinical meaning, harms reporting, timing of registration, generalizability, and equity. A formal GRADE rating was not assigned; instead, evidence was classified as direct, indirect, or transferred. Quantitative synthesis was considered inappropriate because of intervention and outcome heterogeneity and the scarcity of direct studies.

1.4. Development of the GÜVEN-HAREKET Model

Model components were derived from the five essential elements emphasizing safety, calming, efficacy, connectedness, and hope after mass trauma (Hobfoll et al., 2007); the Look, Listen, Link approach of psychological first aid (World Health Organization et al., 2011); stepped psychosocial care (Inter-

Agency Standing Committee, 2007; Hoffmann et al., 2025); trauma-informed pediatric care (Marsac et al., 2016); and pediatric emergency safety priorities.

Components were first divided into two temporal clusters: acute emergency care and post-discharge recovery. A "transition gate" was then added for child preference, contraindications, inclusion, safeguarding, and monitoring. Because no independent Delphi consensus or clinical validation has been conducted, the model is positioned as conceptual and hypothesis-generating.

CRITICAL EVIDENCE SYNTHESIS

1.5. Post-Disaster Psychosocial Need: Evaluating Resilience and Risk Together

Although most children experience distress after a disaster, a substantial proportion show natural recovery as safe environments, caregiver support, and routines are restored. This finding should prevent two opposite errors: labeling every response as a disorder and overlooking serious symptoms by dismissing them as "normal." Post-disaster psychosocial programs for children and adolescents generally appear promising, but they show marked heterogeneity in intervention content, practitioner, outcome measurement, and follow-up duration (Brown et al., 2017; Gibbs et al., 2021). Observational studies following the 2023 Kahramanmaraş earthquakes reported associations among sleep changes, high exposure, loss, family support, and post-traumatic stress (Yakşi and Eroğlu, 2024; Kahraman and Çubukcu, 2025). Observational associations, however, do not demonstrate the effect of a specific intervention.

The role of pediatric emergency care is not to provide long-term psychotherapy. Emergency teams are responsible for medical stabilization, regulation of acute distress, recognition of suicide and safeguarding risk, preservation of caregiver connection, brief information, safety-netting, and appropriate referral. Joint policy statements on pediatric mental and behavioral health emergencies emphasize the limitations of high-intensity emergency environments and the need for coordination after discharge (Saidinejad et al., 2023).

1.6. Psychological First Aid: A Mismatch Between Strength of Recommendation and Outcome Evidence

Psychological first aid (PFA) is widely recommended in the early post-disaster period as a modular approach that promotes safety, practical assistance, calming, and social connection. Its adaptability for children and cultural flexibility are strengths (Gilbert et al., 2021). Nevertheless, the popularity of PFA exceeds the strength of evidence for its effectiveness. In the systematic review by Hermosilla and colleagues, only 12 studies and 1,437 participants were included from 9,048 records; only one study was randomized, and the overall risk of bias was high (Hermosilla et al., 2023). PFA should therefore be viewed not as a proven trauma treatment but as a low-intensity initial approach for doing no harm, providing basic support, and linking people to appropriate services.

The same distinction applies to play and movement. Forcing a child to recount the traumatic event, expecting "emotional release" through play, or presenting physical activity as an automatic solution to symptoms is inconsistent with PFA principles. Play may be beneficial insofar as it increases the child's sense of control; when compulsory or interpretive, it may be retraumatizing.

1.7. Play and Child-Life Practices in Pediatric Emergency Care: Short-Term Benefit, Limited Transferability

The strongest evidence for play and distraction in pediatric emergency care concerns pain, fear, and state anxiety during procedures such as venous access. Randomized trials have shown that active or passive

distraction and nonpharmacological pain management improve some short-term outcomes during procedures (Arıkan and Esenay, 2020; Miller et al., 2016). In a comparative trial, child-life support reduced state anxiety before physician examination, whereas the same effect was not observed with all entertainment-based approaches (Heilbrunn et al., 2014). Multidisciplinary team perspectives suggest that child-life therapists may contribute to family experience and workflow; however, qualitative single-center data do not constitute evidence of effectiveness (Al-Shamaa et al., 2026).

These findings justify the inference that brief, developmentally appropriate play may support communication and procedural tolerance. However, procedural anxiety is measured over minutes or hours, whereas disaster-related bereavement, traumatic stress, family loss, and functional impairment unfold over weeks to years. Directly inferring treatment effects on post-disaster PTSD from pediatric emergency play research involves substantial indirectness in both outcome and time horizon.

1.8. Therapeutic Play and Family-Based Interventions in Disaster-Exposed Children: Promising but Context-Dependent

The randomized, single-blind, two-arm study by Topal and colleagues evaluated a therapeutic-play program in 53 children aged 4-6 years who had been affected by the 2023 earthquakes and were living in a container settlement (Topal et al., 2025). At one month, anxiety, psychosocial status, and sleep-scale outcomes favored the intervention group. The study is valuable because it provides direct experimental evidence in a disaster context. However, the small sample, narrow age range, setting outside the emergency department, reliance on parent-reported measures, and registration after data collection limit the strength of inference. The results do not establish that the same program is feasible or effective in acute pediatric emergency care.

In a one-year controlled study published in 2026, Child-Parent Relationship Therapy delivered to mothers of earthquake-affected preschool children improved maternal empathy in particular; however, the total sample was 36, group sizes were small, and the persistence of gains in child outcomes was constrained by continuing environmental stressors and parental mental health (Bozkurt Karali et al., 2026). This study suggests that the effects of play may arise not only from child-directed activities but also from caregiver regulatory capacity and relationship quality.

In a cluster-randomized school study conducted in a conflict setting, a multicomponent program involving trauma processing, cooperative play, and creative expression improved post-traumatic stress symptoms and hope but showed no significant superiority for depression, anxiety, or functioning (Tol et al., 2008). This supports the possibility of selective benefit, but it does not isolate the independent effect of play.

1.9. Physical Activity and Sport: Biological Plausibility, Contextual Uncertainty

The broader child and adolescent mental health literature provides biological and clinical plausibility that exercise may reduce symptoms of depression and anxiety. A 2026 umbrella review combining 21 systematic reviews, 375 randomized trials, and 38,117 participants reported moderate effects for depression (SMD=-0.45; 95% CI -0.59 to -0.31) and small-to-moderate effects for anxiety (SMD=-0.39; 95% CI -0.61 to -0.17); however, heterogeneity was high, and the evidence was not specific to disaster- or injury-related pediatric emergency populations (Singh et al., 2026).

The most direct physical activity evidence in a disaster context is observational. In a cross-sectional study of 389 earthquake-exposed adolescents aged 11-17 years, Özdemir and colleagues found that physical activity was unrelated to post-traumatic stress and weakly inversely associated with depression (Özdemir et al., 2026; r=-0.228; p=0.012). Reverse causality, self-reporting, access to safe spaces,

socioeconomic conditions, and injury status may confound these findings. The study does not show that an activity prescription reduces trauma.

A systematic review of trauma-informed physical activity programs reported predominantly positive social, emotional, and behavioral outcomes across 19 studies, but the need for randomized and long-term studies remains (Berger et al., 2024). A broader review of at-risk young people identified 36 studies using 85 different outcome measures, illustrating conceptual and measurement fragmentation despite generally favorable findings (Simpson et al., 2024). The Move & Thrive pilot on practitioner training reported gains in knowledge, attitudes, and self-efficacy; its uncontrolled pre-test/post-test design did not demonstrate child clinical outcomes (Kroshus et al., 2025).

1.10. Possible Mechanisms of Effect: Exercise Effect or Social-Context Effect?

The possible psychosocial effects of play and sport cannot be reduced solely to physiological energy

Evidence domain	Best available evidence / key data	Directness	Justifiable inference	Claim not supported by the evidence
Play/distraction in pediatric emergency care	Randomized and comparative studies; procedural pain and short-term anxiety	Indirect	Brief, developmentally appropriate play may support communication and procedural tolerance.	Treatment of post-disaster PTSD or long-term functioning has not been demonstrated.
Post-disaster therapeutic play	Topal et al., 2025; n=53, age 4-6 years, community/container setting	Direct but limited	Structured play after medical stabilization is promising.	It cannot be generalized to acute pediatric emergency care; the sample was small and registration was retrospective.
Family-based play therapy	Bozkurt Karali et al., 2026; n=36, one-year controlled follow-up	Direct but limited	Caregiver empathy and co-regulation should be targeted.	Sustained child outcomes or applicability to emergency care have not been shown.
Physical activity after an earthquake	Özdemir et al., 2026; n=389, cross-sectional; r=-0.228 with depression	Direct observational	Activity, depressive symptoms, and access conditions may be monitored together.	Causality, optimal dose, or trauma-treatment effects cannot be inferred.
Trauma-informed physical activity	Berger et al., 2024; 19 studies; heterogeneous programs	Transferred	Choice, predictability, safe relationships, and trained practitioners are required.	Effectiveness in post-disaster pediatric emergency care has not been established.
Exercise in general child mental health	Singh et al., 2026; 21 reviews, 375 RCTs, 38,117 participants	Transferred	Exercise has biological and clinical plausibility for depression and anxiety.	The evidence cannot be directly generalized to injury, disaster, bereavement, or acute emergency

expenditure. Predictable routine, child choice, co-regulation with a trusted adult, peer connection, mastery experiences, bodily competence, and community membership are plausible mediating mechanisms. These mechanisms are consistent with Hobfoll and colleagues' principles of safety,

calming, efficacy, connectedness, and hope. However, existing studies rarely conduct mediation analyses, so it remains unclear which components are effective.

The same social mechanisms may become harmful in poorly designed programs. Authoritarian coaching language, loud noise, unexpected physical contact, elimination, performance comparisons, body evaluation, and gender restrictions may reproduce loss of control. Trauma-informed sport therefore means not merely "making children exercise" but establishing a predictable, voluntary, inclusive social environment governed by safeguarding standards.

1.11. Harms, Contraindications, and Equity

Unconditional recommendation of play or physical activity is unsafe in the acute post-disaster period. Activity should be postponed in the presence of hemodynamic or respiratory instability, altered consciousness, suspected head or spinal injury, fracture, active bleeding, severe soft-tissue trauma, uncontrolled pain, dehydration, heat illness, or incomplete medical assessment. Severe dissociation, psychotic symptoms, risk of self-harm, uncontrollable agitation, marked re-experiencing, or the child's refusal to participate should also prioritize safety and specialist assessment.

Play should not force reenactment of the traumatic event, and sport should not become a reward-punishment mechanism, compulsory participation, or an alternative to mental health treatment. The activity should be stopped if pain, dizziness, nausea, panic, freezing, aggression, re-experiencing, or functional deterioration occurs. Sparse reporting of adverse events and psychological deterioration in physical activity studies should be interpreted as a lack of safety data rather than evidence of no harm.

2. CRITICAL EVIDENCE MATRIX

Table 1. Directness of evidence on play- and sport-based psychosocial support, the inferences it permits, and its limitations.

Sport programs may increase inequity when they reach only children who are easiest to access. Children with disabilities, those living in rural or temporary housing settings, children facing language barriers, those with chronic illnesses, and girls may encounter greater barriers to participation. Success should be assessed not by participant numbers alone but by safe and equitable access, continuity, child experience, referral completion, and transparent monitoring of adverse events.

Evidence domain	Best available evidence / key data	Directness	Justifiable inference	Claim not supported by the evidence
				contexts.
Psychological first aid / stepped care	WHO, 2011; IASC, 2007; Hoffmann et al., 2025; high risk of bias in outcome studies	Indirect principle-based evidence	Safety, practical assistance, caregiver support, and referral are priorities.	PFA should not be presented as a proven trauma treatment.
GÜVEN-HAREKET model	Evidence-aligned conceptual synthesis developed in this review	Conceptual	Separates acute safety from post-discharge movement through a measurable transition gate.	It is not a validated scale, guideline, or treatment protocol.

GÜVEN-HAREKET CONCEPTUAL CLINICAL PATHWAY

GÜVEN-HAREKET integrates two distinct clinical periods: GÜVEN represents acute assessment and stabilization in pediatric emergency care, whereas HAREKET represents discharge, follow-up, and community-based recovery after medical clearance. The model separates well-supported medical and psychosocial safety principles from less certain recommendations on play and movement through a transition gate. This structure preserves the clinical intuition of the mnemonic while limiting overstatement. The Turkish mnemonic GÜVEN-HAREKET is retained as the formal name of the proposed model.

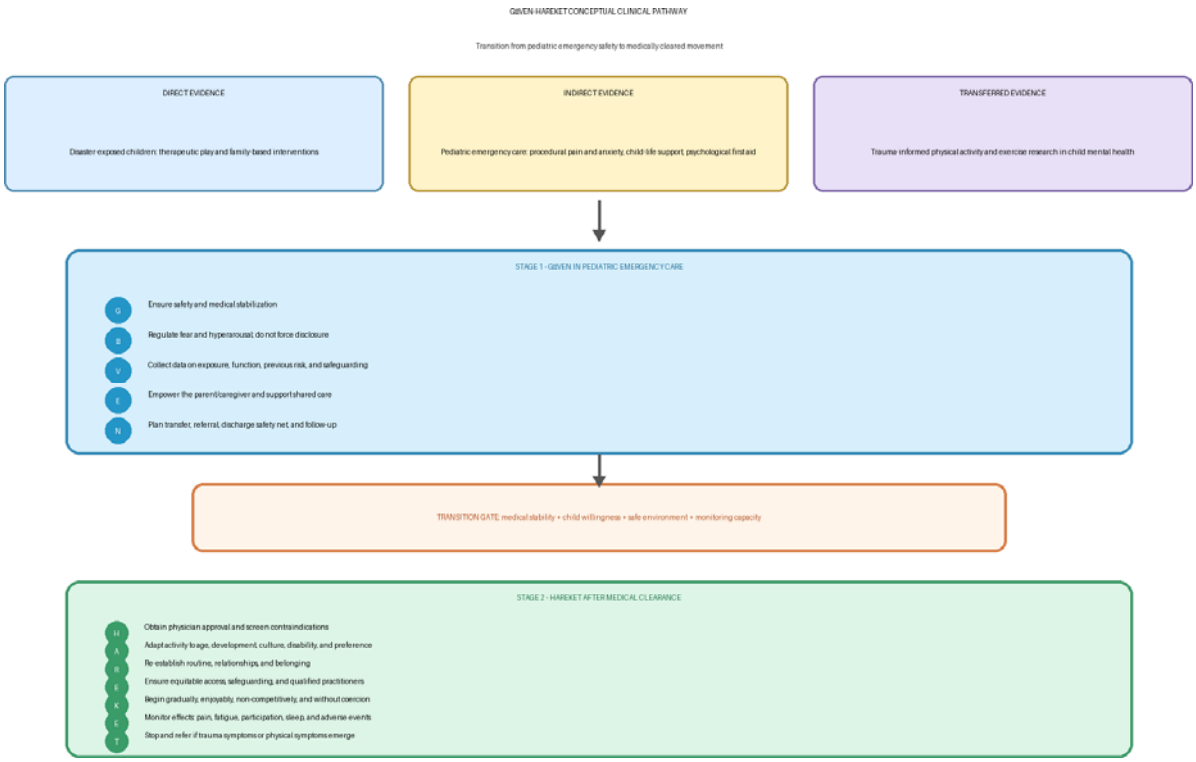


Figure 1. GÜVEN-HAREKET conceptual clinical pathway. The model integrates evidence levels with acute-safety and post-medical-clearance movement stages; it has not been prospectively validated.

2.1. GÜVEN: Acute Pediatric Emergency Stage

G - Ensure safety and medical stabilization: The ABCDE approach, pain control, thermal and fluid needs, privacy, family reunification, and assessment of injuries are prerequisites for psychosocial support.

Ü - Regulate fear and hyperarousal: Introduce yourself, provide brief and accurate information, reduce excessive stimulation, do not force disclosure, and offer the child choices whenever possible. Age-appropriate calming play or objects should be used only if the child accepts them.

V - Collect data and stratify risk: Assess exposure severity, loss, separation, previous trauma or mental health history, sleep, functioning, social support, suicidal ideation, dissociation, safeguarding risk, and caregiver capacity.

E - Empower the parent or caregiver: Identify the caregiver's basic needs and distress; provide brief, concrete advice on listening without blame, preserving routines whenever possible, limiting media exposure, and monitoring red flags.

N-Plan transfer, referral, and follow-up: Arrange same-day child mental health or social-service assessment for children with immediate safety risks; for others, provide written safety-net advice, criteria for re-presentation, and a follow-up link.

2.2. Transition Gate: Eligibility for Activity

Transition to the HAREKET stage should not be based merely on the child "appearing calm" but on four criteria: (1) medical stability and exclusion of injuries that preclude activity; (2) the child's developmental ability to understand the activity and willingness to participate; (3) the caregiver or team's ability to provide a safe environment and supervision; and (4) capacity to stop the activity and refer the child if symptoms or an adverse event occur. If any criterion is unmet, the movement objective should be postponed.

2.3. HAREKET: Play, Movement, and Sport After Medical Clearance

H - Physician approval and contraindication screening: Activity should be restricted by a physician according to injury and illness status; a sport professional does not replace medical decision-making.

A - Adapt activity to age, development, culture, and preference: Free or symbolic play and rhythmic movement may be considered for preschool children; cooperative play for school-age children; and walking, preferred low-to-moderate-intensity movement, or noncompetitive team activities for adolescents.

R - Re-establish routine, relationships, and belonging: The aim is not performance or symptom "extinction" but support for daily structure, peer connection, a sense of accomplishment, and relationships with trusted adults.

E - Ensure equitable access and safeguarding: Adapt environments, equipment, communication, and transport for children with disabilities, girls, children with chronic illness, migrants, and those facing resource deprivation.

K - Begin gradually, enjoyably, noncompetitively, and without coercion: The optimal post-disaster exercise dose is unknown. A brief, symptom-limited, child-selected starting point is more defensible than rigid duration or intensity targets.

E - Monitor effects and tolerance: Monitor pain, fatigue, sleep, fear, avoidance, participation, peer relationships, return to school, functioning, and adverse events; do not measure activity minutes alone.

T - Stop and refer when trauma or physical symptoms arise: If panic, freezing, re-experiencing, aggression, marked avoidance, increased pain, dizziness, or suicide risk develops, stop the activity and obtain clinical assessment.

3. IMPLEMENTATION AND GOVERNANCE IN PEDIATRIC EMERGENCY CARE

Implementing the model does not require creating a sport area within the emergency department. Two brief questions may be added to triage or discharge assessment: "What is the child most afraid of or most in need of right now?" and "Does the child have access to a safe play or movement environment and support after discharge?" In centers without a child-life specialist, nurses, physicians, and social workers may receive brief training in trauma-informed communication, simple play and distraction, red flags for suicide and safeguarding risk, and criteria for stopping an activity.

Discharge planning should replace binary statements such as "may exercise" or "should rest" with explicit information on medical restrictions, permitted activities, symptom-limited progression, signs of deterioration, and the follow-up point. Closed-loop referral pathways should link pediatric emergency care with child mental health services, physical therapy and rehabilitation, schools, municipalities, and trusted community sport programs.

Program providers should meet minimum standards for trauma-informed practice, safeguarding, first aid, disability accommodations, privacy, photo and video consent, and adverse-event reporting. Safe recruitment, codes of conduct, and complaint and reporting mechanisms should govern coach or volunteer contact with children. Scarcity of resources in disaster settings does not reduce these safety obligations.

4. TESTABLE PROPOSITIONS AND RESEARCH AGENDA

The value of the GÜVEN-HAREKET model should derive not from being a memorable mnemonic but from generating falsifiable and measurable propositions. The first proposition is that structured GÜVEN screening, compared with usual care, will increase identification of high-risk children and appropriate referrals. The second is that use of the transition gate will reduce inappropriate activity recommendations and adverse events. The third is that, among medically stable and willing children, a trauma-informed HAREKET program may improve functioning, social connectedness, and return to school but may not reduce all trauma symptoms equally.

The research program should be phased. In Phase 0, a Delphi panel involving experts in pediatric emergency medicine, child psychiatry, psychology, social work, physiotherapy, sport sciences, disaster medicine, and safeguarding, together with youth and caregiver representatives, should evaluate content validity. In Phase 1, multicenter feasibility studies should examine screening time, staff burden, acceptability, referral completion, and adverse events. Phase 2 may use a pilot randomized or cluster-randomized trial, followed in Phase 3 by a hybrid effectiveness-implementation design.

Priority outcomes should include safety events, worsening pain or injury, post-traumatic stress, depression and anxiety, sleep, child functioning, return to school, social connectedness, quality of life, caregiver distress, and health-care reattendance. Measurements may be planned at discharge, one week, and one, three, and six months. The effects of intervention components should be separated through mediation analyses involving physical activity, peer support, adult relationships, routine, and self-efficacy.

5. LIMITATIONS

This study is a targeted critical narrative review; it did not include a systematic search, protocol registration, dual-reviewer study selection, a full-text exclusion log, formal risk-of-bias assessment, or meta-analysis. Searching only PubMed/MEDLINE and selected institutional resources may have missed relevant literature in psychology, education, sport sciences, and humanitarian assistance. Source selection and interpretation may therefore be influenced by the field knowledge and judgment of a single author.

A substantial proportion of the evidence was transferred from studies of procedural anxiety in pediatric emergency care, non-disaster trauma populations, or exercise in general child mental health. Intervention heterogeneity, small samples, short follow-up, self-report, selection and publication bias, and inadequate reporting of adverse events may produce overly optimistic estimates of benefit. Some of the most recent disaster studies involved retrospective registration or small group sizes.

The GÜVEN-HAREKET model is the author's conceptual synthesis. Its content validity has not been evaluated through independent expert consensus; children and caregivers were not involved in development; feasibility has not been examined across different cultural and resource contexts; and clinical outcomes have not been tested prospectively. A memorable acronym is not evidence of accuracy, safety, or effectiveness.

6. CONCLUSION

In post-disaster pediatric emergency presentations, play may be a supportive care tool that facilitates communication and short-term regulation of anxiety in selected children. In contrast, there is no direct pediatric emergency evidence on the effects of sport or structured physical activity on disaster-related trauma outcomes. Current data do not support presenting sport as a stand-alone trauma treatment.

Play, movement, and sport should be considered only after medical stabilization and assessment of injury and psychosocial risk, and should be voluntary, developmentally appropriate, inclusive, gradual, supervised, and noncompetitive. The GÜVEN-HAREKET pathway is an evidence-aligned but unvalidated conceptual model intended to structure the transition from acute safety to restored routines and community participation. Before being translated into clinical practice or policy, it requires prospective evaluation of multidisciplinary consensus, feasibility, safety, equity, and effectiveness.

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M4503-Özet Metin

PEDIATRIC METATARSAL FRACTURES DELAYED BY TRADITIONAL BONE-SETTER INTERVENTION: A CASE REPORT

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INTRODUCTION

Pediatric foot trauma resulting from low-energy mechanisms, such as foot entrapment between bicycle components (wheel frame and pedal), can cause significant structural damage despite reassuring skin integrity. Traditional non-medical interventions often lead to delayed medical evaluation and expose pediatric patients to potential complications like compartment syndrome or malunion. This case highlights a displaced pediatric metatarsal fracture presentation delayed by two days due to traditional bone-setter intervention following a bicycle entrapment injury.

METHOD

A 10-year-old male presented to the emergency department with persistent left foot pain and progressive swelling. Two days prior, his left foot was entrapped between the bicycle wheel frame and pedal. Immediately after the trauma, the patient underwent traditional manipulation and massage by a bone-setter instead of receiving immediate medical care. Upon arrival to the emergency department, physical examination revealed localized dorsal foot edema and severe tenderness. Skin integrity was intact, and distal neurovascular examination was completely normal with no immediate signs of compartment syndrome.

RESULTS

Plain radiographs of the left foot demonstrated displaced oblique fractures of the second and third metatarsal shafts (Figure 1). Following immediate emergency stabilization, analgesia, and lower-extremity splint immobilization, the orthopedics team was consulted, and the patient was admitted for surgical intervention.



Figure 1: Plain anteroposterior radiograph demonstrating displaced oblique fractures of the second and third metatarsal shafts on the left foot.

CONCLUSION

Bicycle entrapment injuries in children can harbor severe underlying displaced fractures despite benign initial skin findings and intact distal neurovascular status. Emergency physicians must maintain a high index of suspicion for significant structural injury despite initially reassuring clinical findings and recognize that delayed presentation following traditional bone-setting manipulation may postpone definitive management. Timely radiological assessment and early orthopedic intervention are essential to prevent long-term functional morbidity and permanent deformities.

Keywords: Pediatric trauma, Metatarsal fracture, Bicycle injury, Bone-setter

M4504-Tam Metin

BAR IN PEDIATRIC BRONCHITIS AND BRONCHIOLITIS: ITS ASSOCIATION WITH LENGTH OF HOSPITAL STAY AND INTENSIVE CARE REQUIREMENT

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ABSTRACT

Objective: Bronchitis and bronchiolitis are common causes of pediatric emergency visits and hospitalization. This study aimed to evaluate the association of admission parameters and BAR with hospital stay and intensive care requirement.

Materials and Methods: This retrospective observational study included 25 patients aged 0–5 years hospitalized with bronchitis or bronchiolitis between January and February 2025. Admission laboratory and blood gas parameters and hospitalization data were recorded. BAR was calculated as the urea/albumin ratio, and $p<0.05$ was considered statistically significant.

Results: Of the 25 patients included in the study, 8 (32.0%) were admitted to the intensive care unit, and these patients had a significantly longer hospital stay ($p<0.001$). No significant differences were found in blood gas parameters according to intensive care unit admission status (all $p>0.05$). Length of hospital stay was negatively correlated with MetHb ($r=-0.508$; $p=0.010$) and positively correlated with BAR ($r=0.398$; $p=0.049$).

Conclusion: The association between BAR and length of hospital stay in pediatric patients hospitalized for bronchitis and bronchiolitis suggests that this easily calculated parameter may be useful in assessing the clinical course. The lack of an association between blood gas parameters and intensive care unit admission indicates that these values alone may not be sufficient to determine the need for intensive care. Clinical assessment should remain the primary consideration in pediatric bronchitis and bronchiolitis, while laboratory parameters should be used to support clinical evaluation. These findings need to be confirmed in larger prospective studies.

Keywords: Pediatric emergency, bronchiolitis, bronchitis, BAR, blood gas, intensive care, length of hospital stay

INTRODUCTION

Pediatric emergency departments play a critical role in the early diagnosis and treatment of acute illnesses in childhood. Respiratory tract infections account for a substantial proportion of pediatric emergency department visits, and accurate risk stratification of these patients is

important both for preventing unnecessary hospitalizations and for the early identification of severe cases (1).

Bronchitis and bronchiolitis are among the most common causes of emergency department visits and hospitalization, particularly in children under two years of age. The clinical presentation may range from mild symptoms to respiratory failure, and some patients may require intensive care support. Therefore, early identification of patients at risk of developing severe disease at the time of presentation is a key component of clinical management (2,3).

In recent years, the Blood Urea Nitrogen-to-Albumin Ratio (BAR), which can be easily calculated from routine laboratory tests, has emerged as a promising biomarker for predicting prognosis in various patient populations. BAR has been reported to reflect dehydration, impaired renal perfusion, catabolic processes, and systemic inflammation, while elevated BAR levels have been associated with adverse clinical outcomes and increased mortality (4,5).

Early prediction of the need for hospitalization and intensive care in children with bronchiolitis is important for planning appropriate patient management, ensuring efficient use of healthcare resources, and preventing potential complications. This study aimed to evaluate clinical and laboratory parameters at admission, particularly the potential role of BAR in predicting length of hospital stay and the need for intensive care in pediatric patients hospitalized with bronchitis and bronchiolitis.

MATERIALS AND METHODS

In this retrospective observational study, patients who presented to the pediatric emergency department between January 1, 2025, and February 28, 2025, and were hospitalized with a diagnosis of bronchitis or bronchiolitis were evaluated. A total of 35 patients were screened, and 25 patients who met the inclusion criteria were included in the study.

Patients aged 0–5 years who were hospitalized from the pediatric emergency department with a diagnosis of bronchitis or bronchiolitis were included. Patients with comorbid conditions that constituted the primary reason for hospitalization (e.g., congenital heart disease, chronic lung disease, immunodeficiency, or neuromuscular disease), those with missing clinical or laboratory data, and those hospitalized for other diagnoses were excluded.

Age, sex, laboratory and blood gas parameters at admission, length of hospital stay, and intensive care unit (ICU) admission status were recorded. The Blood Urea Nitrogen-to-Albumin Ratio (BAR) was calculated using urea and albumin values at admission according to the following formula: BAR = Urea (mg/dL) / Albumin (g/dL).

The primary outcome of the study was length of hospital stay, and the secondary outcome was the need for ICU admission.

Statistical analyses were performed using IBM SPSS Statistics Version 27.0. The normality of the data was assessed using the Shapiro–Wilk test. Normally distributed continuous variables were presented as mean ± standard deviation, whereas non-normally distributed variables were presented as median (interquartile range [IQR]). Between-group comparisons were performed using the independent-samples t-test or Mann–Whitney U test, as appropriate. Categorical variables were compared using the chi-square test or Fisher’s exact test. Relationships between

continuous variables were evaluated using Spearman's correlation analysis. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 25 patients were included in the study. Of these, 13 (52.0%) were male and 12 (48.0%) were female. The median age was 1.0 (IQR: 1.0–3.0) years. The median urea level was 18.1 (IQR: 14.4–24.7) mg/dL, pO_2 was 24.5 (IQR: 13.0–30.5) mmHg, hemoglobin level was 13.8 (IQR: 12.3–14.5) g/dL, and hematocrit was 42.4% (IQR: 37.8–44.6). The median pH was 7.38 (IQR: 7.35–7.40), carboxyhemoglobin level was 1.6% (IQR: 1.3–2.0), methemoglobin level was 2.6% (IQR: 2.5–2.7), and deoxyhemoglobin level was 22.8% (IQR: 13.8–34.1). The median base excess was 2.9 (IQR: 0.5–4.6), lactate level was 1.8 (IQR: 1.5–2.3) mmol/L, and total bilirubin level was 1.5 (IQR: 1.2–2.1) mg/dL.

The median length of hospital stay was 5.0 (IQR: 3.5–7.0) days, while the median ICU length of stay was 0.0 (IQR: 0.0–3.0) days. The median LAR and BAR values were 0.429 (IQR: 0.356–0.524) and 4.43 (IQR: 3.43–5.84), respectively. Median values and interquartile ranges of the clinical and laboratory parameters are presented in Table 1.

Table 1. Median and interquartile range values of clinical and laboratory parameters

Variable	Median (IQR)
Age (years)	1.0 (1.0–3.0)
Urea	18.1 (14.4–24.7)
pO_2	24.5 (13.0–30.5)
Hemoglobin (g/dL)	13.8 (12.3–14.5)
Hematocrit (%)	42.4 (37.8–44.6)
pH	7.38 (7.35–7.40)
Carboxyhemoglobin (COHb, %)	1.6 (1.3–2.0)
Methemoglobin (MetHb, %)	2.6 (2.5–2.7)
Deoxyhemoglobin (%)	22.8 (13.8–34.1)
Base excess	2.9 (0.5–4.6)
Lactate (mmol/L)	1.8 (1.5–2.3)
Total bilirubin (mg/dL)	1.5 (1.2–2.1)
Length of hospital stay (days)	5.0 (3.5–7.0)
ICU length of stay (days)	0.0 (0.0–3.0)
LAR	0.429 (0.356–0.524)
BAR	4.43 (3.43–5.84)

The mean albumin level was 4.18 ± 0.31 g/dL, calcium level was 9.92 ± 0.44 mg/dL, and glucose level was 105.24 ± 21.02 mg/dL. The mean TCO_2 level was 55.11 ± 5.80 mmol/L, sodium level was 135.64 ± 2.61 mmol/L, potassium level was 4.26 ± 0.39 mmol/L, and chloride level was 108.28 ± 2.72 mmol/L. The mean ionized calcium level was 1.30 ± 0.07 mmol/L, oxyhemoglobin level was 71.39 ± 13.52%, actual HCO_3 level was 27.28 ± 3.19 mmol/L, and standard HCO_3 level was 25.66 ± 2.57 mmol/L. The mean ± standard deviation values of the clinical and laboratory parameters are presented in Table 2.

Table 2. Mean ± standard deviation values of clinical and laboratory parameters

Variable	Mean ± SD
Albumin (g/dL)	4.18 ± 0.31
Calcium (mg/dL)	9.92 ± 0.44
Glucose (mg/dL)	105.24 ± 21.02
TCO_2 (mmol/L)	55.11 ± 5.80
Sodium (mmol/L)	135.64 ± 2.61
Potassium (mmol/L)	4.26 ± 0.39
Chloride (mmol/L)	108.28 ± 2.72
Ionized calcium (mmol/L)	1.30 ± 0.07
Oxyhemoglobin (%)	71.39 ± 13.52
Actual HCO_3 (mmol/L)	27.28 ± 3.19
Standard HCO_3 (mmol/L)	25.66 ± 2.57

Eight patients (32.0%) were admitted to the intensive care unit (ICU), whereas 17 (68.0%) were managed without ICU admission. The length of hospital stay was significantly longer in patients admitted to the ICU than in those who did not require ICU admission ($p<0.001$).

When patients with and without ICU admission were compared, no statistically significant differences were observed in any of the evaluated blood gas parameters, including pH, pCO_2, actual HCO_3, standard HCO_3, and base excess (all $p>0.05$).

Correlation analysis between length of hospital stay and laboratory parameters revealed a moderate negative correlation between length of hospital stay and methemoglobin level ($r=-0.508$; $p=0.010$) and a weak-to-moderate positive correlation between length of hospital stay and BAR ($r=0.398$; $p=0.049$). The results of the correlation analysis for laboratory parameters associated with length of hospital stay are presented in Table 3.

Table 3. Correlation analysis of laboratory parameters associated with length of hospital stay

Variables	r	p
Length of hospital stay – MetHb	-0.508	0.010
Length of hospital stay – BAR	0.398	0.049

DISCUSSION

In our study, a moderate negative correlation was observed between MetHb levels and length of hospital stay. However, studies evaluating the relationship between methemoglobin levels and length of hospital stay or prognosis in pediatric patients are very limited. Methemoglobin is physiologically maintained within a narrow range and primarily reflects oxidative stress or exposure to oxidizing agents (6). Therefore, studies with larger sample sizes are needed to clarify the clinical significance of this association.

In our study, a positive association was observed between BAR and length of hospital stay. In recent years, several studies have suggested that BAR may be useful for prognostic assessment in different patient populations in the emergency department. Higher BAR levels have been reported to be associated with increased in-hospital mortality and morbidity. BAR is a parameter based on the combined assessment of urea and albumin levels and may reflect conditions associated with disease severity, including dehydration, impaired renal perfusion, catabolic processes, and systemic inflammation (4,5). Therefore, the association between BAR

and longer hospital stay observed in our study suggests that BAR may be a practical biomarker for predicting clinical course. However, larger prospective studies are needed to confirm this finding.

In adult respiratory diseases, blood gas parameters play an important role in assessing disease severity and the need for advanced respiratory support, particularly in severe asthma and acute exacerbations of chronic obstructive pulmonary disease (COPD) (7). In contrast, none of the evaluated blood gas parameters, including pH, pCO_2, and HCO_3, were associated with ICU admission in our study. This finding suggests that blood gas values at admission alone may not be sufficient to determine the need for intensive care in pediatric patients hospitalized with bronchitis and bronchiolitis. Therefore, normal or near-normal blood gas results should not be interpreted as indicating a low clinical risk. Decisions regarding ward or ICU admission should primarily be based on the patient's clinical condition and clinical course during follow-up.

CONCLUSION

In this study, a positive association was observed between BAR and length of hospital stay, whereas a negative association was found between MetHb levels and length of hospital stay in pediatric patients hospitalized with bronchitis and bronchiolitis. As BAR can be easily calculated from routine laboratory parameters, it may serve as a practical marker to assist in predicting length of hospital stay. In contrast, the lack of an association between the evaluated blood gas parameters and ICU admission suggests that these parameters alone may not be sufficient to determine the need for intensive care. Therefore, clinical assessment should remain the primary consideration when making hospitalization and ICU admission decisions in pediatric patients with bronchitis and bronchiolitis, while laboratory parameters may be used to support clinical evaluation. Further prospective studies involving larger patient populations are needed to confirm these findings.

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M4505-Tam Metin

ÇOCUK HASTADA PATELLA DİSLOKASYONUNUN KETAMİN İLE GÜVENLİ YÖNETİMİ: ACİL SERVİSTEN BİR OLGU SUNUMU

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AMAÇ

Patella dislokasyonu (patellar dislocation), adolesan dönemdeki aktif bireylerde sık görülen, genellikle ani yön değiştirme veya doğrudan travma sonucu ortaya çıkan bir eklem yaralanmasıdır. Yaralanma tipik olarak diz hafif fleksiyondayken uygulanan valgus veya rotasyonel bir kuvvetle, medial patellofemoral ligamentin (MPFL) yırtılmasına yol açan non-kontakt bir mekanizmayla meydana gelir; olguların bir kısmında ise dizin medial yüzüne doğrudan bir darbe rol oynar. Fithian ve ark.'nın toplum tabanlı çalışmasında genel popülasyonda yıllık insidans 100.000'de 5,8 olarak bildirilirken, bu oran 10-17 yaş grubunda 100.000'de 29'a kadar yükselmektedir; kadın cinsiyet, artmış valgus dizilimi ve ligamentöz laksite gibi faktörler nedeniyle bu yaş grubu belirgin şekilde daha sık etkilenmektedir (Fithian ve ark., 2004). Futbol gibi ani yön değiştirme gerektiren sporlarda risk belirgin şekilde artmaktadır. Olguların büyük kısmı diz ekstansiyona getirildiğinde kendiliğinden ya da basit manipülasyonla redükte olurken, bir kısmında acil serviste manuel redüksiyon gerekmektedir. Acil serviste erken tanı, direkt grafi ile eşlik eden bir kırığın dışlanması ve uygun redüksiyon, eklem kıkırdağının ve çevre yumuşak dokuların daha fazla hasar görmesinin önlenmesi açısından kritik önem taşımaktadır (Longo ve ark., 2026). Bu olgu sunumunun amacı, futbol oynarken sol diz patella dislokasyonu gelişen 14 yaşında bir erkek hastanın acil servis yönetimini ve prosedürel sedasyon eşliğinde uygulanan redüksiyon yaklaşımını güncel literatür ışığında sunmaktır. ESSKA 2024 konsensüsüne göre ilk kez patella dislokasyonu, patellanın troklear oluktan tamamen ayrıldığı ve klinik veya radyolojik olarak doğrulanan ilk atak olarak tanımlanmakta olup, tekrarlayan ataklardan ayırt edilmesi acil değerlendirme ve tedavi planlaması açısından önem taşımaktadır (Longo ve ark., 2026).

YÖNTEM

On dört yaşında erkek hasta, futbol oynarken sol dizinde ani ağrı, “yerinden çıkma” hissi ve şekil bozukluğu şikayeti ile acil servise başvurdu. Fizik muayenede sol diz ekleminde belirgin deformite, patellanın laterale yer değiştirmiş olduğu, ciltte gerginlik (tenting) bulgusu ve hareket kısıtlılığı saptandı; nörovasküler muayene her iki tarafta da doğaldı. Fraktür varlığını değerlendirmek ve redüksiyon öncesi eşlik eden kemik patolojilerini dışlamak amacıyla ön-arka ve lateral direkt grafi çekildi; patellada eşlik eden bir fraktüre rastlanmadı. Hastaya, güncel klinik uygulama rehberinde önerilen dozlama aralığına uygun şekilde 1 mg/kg dozunda intravenöz ketamin ile prosedürel sedasyon uygulanarak, diz ekstansiyona getirilip patellaya medialden yönlendirilen bası ile manuel redüksiyon gerçekleştirildi (Green ve ark., 2011). İşlem boyunca hasta, ketamin sedasyonunda önerilen standart monitörizasyon protokolüne (oksijen satürasyonu, kalp hızı ve solunum takibi) uygun şekilde izlendi. Redüksiyon sonrası kontrol fizik muayene ve kontrol direkt grafi ile değerlendirme yapıldı. Sedasyon öncesi

hastanın açlık durumu, komorbiditeleri ve olası kontrendikasyonları (örneğin bilinen üst solunum yolu enfeksiyonu veya intrakraniyal patoloji) sorgulanarak ketamin uygulamasına uygunluğu değerlendirildi.

BULGULAR

Ketamin ile sedasyon sonrası uygulanan manuel redüksiyon tek seferde ve ek girişime gerek kalmadan başarılı oldu; işlem sırasında veya sonrasında kusma, ajitasyon ya da solunumsal bir komplikasyon gözlenmedi. Kontrol muayenede patellanın anatomik pozisyona döndüğü, eklem hareket açıklığının serbest olduğu, kontrol direkt grafide ise redüksiyonun tam olduğu doğrulandı. Nörovasküler muayenesi doğal olan hasta, uzun bacak atel ile immobilize edilerek ortopedi polikliniği kontrolü önerilmesiyle taburcu edildi. Güncel literatürde, pediatrik popülasyonda kırık/dislokasyon redüksiyonunda ketamin monoterapisinin ek girişim gerektirmeden %86 oranında başarılı olduğu, advers olay oranının ise yaklaşık %24 düzeyinde seyrettiği ve bu olayların çoğunlukla kusma ve hafif ajitasyon gibi kendini sınırlayan bulgular olduğu bildirilmektedir; solunumsal komplikasyon riski ise %1-5 gibi düşük bir düzeyde kalmaktadır (Alsabri ve ark., 2025). Bu olguda gözlenen sorunsuz klinik seyir, literatürdeki bu güvenlik profiliyle uyumludur. Literatürde ketamin monoterapisi sonrası ortalama sedasyon süresinin yaklaşık 42,6 dakika, toparlanma süresinin ise yaklaşık 44,1 dakika olduğu bildirilmekte olup, bu olgudaki klinik seyir söz konusu süre aralıklarıyla uyumlu bulunmuştur (Alsabri ve ark., 2025).

SONUÇ

Adolesan spor yaralanmaları sonrası gelişen patella dislokasyonunda, hızlı değerlendirme, fraktürün direkt grafi ile dışlanması ve sedasyon eşliğinde erken redüksiyon kritik öneme sahiptir. Patella dislokasyonuna dair acil serviste prosedürel sedasyon eşliğinde yapılan redüksiyon uygulamalarına ilişkin olgu bazlı veriler sınırlıdır ve mevcut kanıtlar büyük ölçüde heterojen çalışma tasarımlarına dayanmaktadır. Bu olgu; ketaminin adolesan yaş grubunda güvenli ve etkili bir sedasyon ajanı olduğunu, direkt grafi ile hızlı fraktür dışlanmasının ardından erken redüksiyon uygulanmasının pratik ve tekrarlanabilir bir iş akışı modeli sunduğunu ve cerrahi gerektirmeyen manuel redüksiyonun ilk basamak tedavi seçeneği olarak değerlendirilebileceğini vurgulamaktadır (Longo ve ark., 2017; Nietosvaara ve ark., 1994). Redüksiyon sonrası hastaların ortopedi polikliniğine yönlendirilmesi, olası eşlik eden yumuşak doku veya osteokondral yaralanmaların ileri görüntüleme ile değerlendirilmesi ve tekrarlayan instabilite riskinin izlenmesi açısından önem taşımaktadır. Bu olgu, sahada oluşan spor yaralanmalarına yönelik acil hekimi farkındalığının artırılmasına ve standardize edilmiş sedasyon-redüksiyon protokollerinin yaygınlaştırılmasına katkı sağlamayı amaçlamaktadır. Tek olgu sunumu düzeyinde elde edilen bu bulguların genellenebilirliği sınırlı olup, pediatrik acil servislerde patella dislokasyonu yönetimine yönelik standardize protokollerin geliştirilmesi ve daha büyük örneklem gruplarını içeren prospektif çalışmalarla desteklenmesi gerekmektedir.

Anahtar Kelimeler

Patella dislokasyonu, prosedürel sedasyon, ketamin, acil servis, spor yaralanması

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M4506-Özet Metin

PEDİYATRİK GRAVES HASTALARINDA KORNEA ENDOTEL HÜCRE PARAMETRELERİ VE KORNEA KALINLIĞININ SPEKÜLER MİKROSKOPİ İLE DEĞERLENDİRİLMESİ

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AMAÇ

Graves hastalığı, pediyatrik popülasyonda hipertiroidizmin en sık görülen nedeni olup otoimmün süreçlerle seyreden sistemik bir tablodur. Tiroid hormonlarındaki bozukluklar ve otoantikor yükü, oküler dokularda ve orbital yapılarda çeşitli değişikliklere yol açabilmektedir. Kornea endoteli ve kornea kalınlığı (pakimetri), oküler yüzey sağlığı ile korneal şeffaflığın sürdürülmesinde kritik rol oynar. Bu çalışmanın amacı; pediyatrik Graves hastalarında speküler mikroskopi ile değerlendirilen kornea endotel hücre parametrelerini ve kornea kalınlığını sağlıklı kontrol grubu ile karşılaştırmak, bu parametrelerin tiroid hormon ve otoantikor düzeyleriyle ilişkisini incelemek ve tanısal değerini analiz etmektir.

YÖNTEM

Kesitsel tasarıma sahip bu çalışmaya, pediyatrik Graves tanısı alan hastalar ile yaş ve cinsiyet açısından uyumlu sağlıklı bireyler dahil edildi. Tüm katılımcıların demografik verileri, tiroid fonksiyon testleri (serbest T3 dâhil) ve tiroid otoantikor düzeyleri (ATSH ve ATG) kaydedildi. Speküler mikroskopi değerlendirmesi ile kornea endotel hücre yoğunluğu (CD), varyasyon katsayısı (CV), heksagonal hücre oranı (HEX), analiz edilen hücre sayısı (NUM) ve kornea kalınlığı (PACH) ölçüldü. İki grup arasındaki farklar istatiksel olarak analiz edildi. Parametrelerin tiroid hormon ve antikor düzeyleriyle ilişkisi korelasyon analizi ile, PACH değerinin tanısal gücü ise ROC analizi ile değerlendirildi.

BULGULAR

Graves grubu ile kontrol grubu arasında yaş, kornea endotel hücre yoğunluğu (CD), varyasyon katsayısı (CV), heksagonal hücre oranı (HEX) ve analiz edilen hücre sayısı (NUM) açısından istatistiksel olarak anlamlı bir fark saptanmadı ($p>0.05$). Bu durum, pediyatrik Graves hastalarında kornea endotel yapısının ve morfolojisinin korunduğunu göstermektedir. Endotel parametrelerinin aksine, kornea kalınlığı (PACH) Graves hastalarında sağlıklı kontrollere kıyasla istatistiksel olarak belirgin şekilde daha düşük bulundu (568.75 ± 30.62 µm'ye karşılık 606.31 ± 36.41 µm; $p=0.001$). Kornea kalınlığının (PACH) ayırıcı tanısal değerini inceleyen ROC analizinde, ≤590 µm kestrim (cut-off) değerinin %69 duyarlılık ve %75 özgüllük sağladığı saptandı (AUC: 0.791, %95 CI: 0.661–0.921, $p=0.001$). ATSH (TSH reseptör antikoru) düzeyi ile endotel hücre yoğunluğu (CD; $r = -0.649$, $p = 0.007$) ve varyasyon katsayısı (CV; $r = -0.526$, $p = 0.037$) arasında negatif; heksagonal hücre oranı (HEX; $r = 0.563$, $p = 0.023$) ve kornea kalınlığı (PACH; $r = 0.516$, $p = 0.041$) arasında pozitif yönlü anlamlı ilişkiler

saptandı. Antitiroglobulin (ATG) düzeyi ile hücre yoğunluğu (CD; r = -0.546, p = 0.029) ve analiz edilen hücre sayısı (NUM; r = -0.661, p = 0.005) arasında negatif korelasyon izlendi. Serbest T3 (sT3) düzeyi ile kornea kalınlığı (PACH) arasında pozitif yönlü anlamlı bir ilişki saptandı (r = 0.570, p = 0.021).

SONUÇ

Elde ettiğimiz veriler, pediyatrik Graves hastalarında kornea endotel hücre yoğunluğunun ve hücresel morfolojisinin korunduğunu; ancak kornea kalınlığında belirgin bir azalma (incelme) meydana geldiğini göstermektedir. Pakimetride gözlemlenen bu incelmenin serbest T3 ve tiroid otoantikor seviyeleri (özellikle ATSH) ile yakın ilişki içerisinde olması, korneal stroma ve oküler yüzey dinamiklerinin sistemik tiroid otokontrolü ve immün reaktiviteden doğrudan etkilenebileceğini düşündürmektedir. Sonuç olarak; speküler mikroskopi ile elde edilen pakimetri ölçümleri, pediyatrik Graves hastalarının klinik değerlendirilmesinde ve subklinik oküler tutulumun takibinde pratik, non-invaziv ve yardımcı bir parametre olarak öne çıkmaktadır. Bu bulguların klinik pratiğe entegrasyonu ve altında yatan mekanizmaların netleştirilmesi için daha geniş serili çalışmalarla desteklenmesi gerekmektedir.

M4507-Tam Metin

THE PREDICTIVE VALUE OF C-REACTIVE PROTEIN, PROCALCITONIN, AND THE NEUTROPHIL-TO-LYMPHOCYTE RATIO FOR HOSPITALIZATION IN FEBRILE CHILDREN PRESENTING TO THE PEDIATRIC EMERGENCY DEPARTMENT

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ABSTRACT

Objective: Fever is one of the most common reasons for pediatric emergency department (PED) visits, and early identification of children requiring hospitalization is essential for appropriate clinical management. C-reactive protein (CRP), procalcitonin (PCT), and the neutrophil-to-lymphocyte ratio (NLR) have been increasingly used as inflammatory biomarkers for assessing infection severity. This study aimed to compare the diagnostic performance of CRP, PCT, and NLR in predicting hospital admission among febrile children presenting to the pediatric emergency department.

Materials and Methods: This retrospective, single-center study included 383 pediatric patients aged 1 month to 18 years who presented to the pediatric emergency department with fever (≥38°C) between January 1, 2023, and December 31, 2025. Patients were classified into two groups according to their clinical outcomes: discharged from the emergency department or hospitalized. Demographic characteristics, clinical findings, complete blood count parameters, CRP, and PCT levels were analyzed. NLR was calculated by dividing the absolute neutrophil count by the absolute lymphocyte count. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the predictive value of each biomarker for hospitalization. Independent predictors of hospital admission were identified using multivariate logistic regression analysis.

Results: Of the 383 enrolled patients, 241 (62.9%) were discharged, whereas 142 (37.1%) required hospitalization, including 24 (16.9%) admitted to the pediatric intensive care unit. Hospitalized patients had significantly higher CRP, PCT, leukocyte count, neutrophil count, and NLR values than discharged patients (all $p<0.001$). ROC analysis demonstrated that PCT had the highest diagnostic accuracy (AUC=0.874), followed by CRP (AUC=0.823) and NLR (AUC=0.801). Multivariate logistic regression identified elevated PCT (OR=3.12, 95% CI: 1.92–5.08; $p<0.001$) and NLR (OR=1.41, 95% CI: 1.18–1.73; $p<0.001$) as independent predictors of hospital admission.

Conclusion: Procalcitonin demonstrated the highest diagnostic performance for predicting hospitalization in febrile children presenting to the pediatric emergency department. Additionally, NLR, an inexpensive and readily available biomarker derived from routine complete blood count testing, was identified as an independent predictor of hospitalization. The

combined use of clinical assessment with PCT and NLR may improve early risk stratification and support timely decision-making in pediatric emergency practice.

Keywords: Fever; Pediatric emergency department; Procalcitonin; C-reactive protein;

INTRODUCTION

Fever is one of the most common reasons for presentation to pediatric emergency departments and is an important clinical finding requiring urgent evaluation, particularly in children younger than five years of age. Although the etiology of fever is most commonly related to viral infections, it may also be the initial manifestation of potentially life-threatening conditions such as serious bacterial infections, sepsis, meningitis, pyelonephritis, and pneumonia (1,2). Therefore, rapid evaluation of febrile children in pediatric emergency departments, timely initiation of appropriate treatment, and accurate determination of the need for hospitalization are of great importance both for patient prognosis and for the efficient use of healthcare resources (3).

In the pediatric population, differentiation between viral and bacterial infections based solely on clinical examination is not always possible. Particularly in young children, nonspecific symptoms, age-dependent variability in physical examination findings, and insufficient clinical findings during the early stages of infection necessitate the use of laboratory biomarkers (4). Currently, the most commonly used inflammatory markers in pediatric emergency departments include C-reactive protein (CRP), procalcitonin (PCT), and the neutrophil-to-lymphocyte ratio (NLR), which can be readily calculated from a complete blood count (5).

CRP is an acute-phase reactant synthesized in the liver in response to stimulation by various cytokines, particularly interleukin-6, and is markedly elevated in bacterial infections. However, because its synthesis begins to increase approximately 6–12 hours after the onset of infection, its diagnostic sensitivity may be limited during the early stages (6). In contrast, procalcitonin begins to increase during the first hours of infection in response to bacterial endotoxins and inflammatory cytokines and may demonstrate greater specificity than CRP in distinguishing bacterial infections from viral infections. It is considered an important biomarker for the early diagnosis of serious bacterial infections and sepsis (7,8).

In recent years, the neutrophil-to-lymphocyte ratio (NLR), which can be easily calculated from a complete blood count, has attracted attention in the assessment of systemic inflammation. This ratio, which reflects both an increase in the neutrophil count and a decrease in the lymphocyte count, is a practical, rapid, and low-cost biomarker reflecting infection, inflammation, and the stress response. The diagnostic and prognostic value of NLR has been demonstrated in many infectious diseases in children, including pneumonia, urinary tract infection, appendicitis, and sepsis, and its use in pediatric emergency departments has been expanding (9,10).

The decision to hospitalize a pediatric patient is based on a combination of clinical assessment, vital signs, laboratory findings, and underlying diseases. However, decision-making based solely on clinical assessment may sometimes be subjective and may result in unnecessary hospitalizations or failure to recognize serious infections. Therefore, determining the contribution of objective laboratory markers to predicting the need for hospitalization may provide an important contribution to the clinical decision-making process (11).

Although numerous studies have investigated the roles of CRP, PCT, and NLR in the diagnosis of bacterial infections, studies directly comparing the diagnostic performance of these biomarkers for predicting hospitalization in children presenting to pediatric emergency departments with fever remain limited, and the findings have not been entirely consistent (12–14). In particular, identifying readily available and low-cost biomarkers is important for reducing unnecessary hospital admissions and facilitating the early identification of high-risk patients.

The aim of this study was to compare the diagnostic performance of CRP, procalcitonin, and the neutrophil-to-lymphocyte ratio in predicting hospitalization among children presenting to the pediatric emergency department with fever, to evaluate the area under the curve (AUC) values of these biomarkers, and to determine independent risk factors associated with hospitalization.

MATERIALS AND METHODS

This retrospective, single-center, observational study was conducted by reviewing the electronic medical records of pediatric patients who presented to the Pediatric Emergency Department of Celal Bayar University Faculty of Medicine Hospital with fever between January 1, 2023, and December 31, 2025. Children aged between 1 month and 18 years with a body temperature of ≥38.0°C at presentation were included in the study. Demographic characteristics, clinical findings, laboratory results, and hospital information management system records were retrospectively evaluated.

Only patients who had complete blood count, C-reactive protein (CRP), and procalcitonin (PCT) measurements performed simultaneously at presentation were included. Patients presenting because of trauma, those diagnosed with a surgical pathology, patients with malignancy or primary immunodeficiency, those receiving immunosuppressive therapy, patients with chronic hematological diseases, patients with incomplete laboratory data, and patients with repeated presentations due to the same infection were excluded. In cases in which the same patient had multiple presentations, only the first presentation was included in the analysis.

Patients were divided into two groups according to their clinical outcomes: those who were discharged and those who were hospitalized. Among hospitalized patients, those admitted to the pediatric intensive care unit were additionally evaluated. Age, sex, body temperature at presentation, final diagnosis, and hospitalization status were recorded.

For laboratory evaluation, the first blood samples obtained at presentation were used. Leukocyte, absolute neutrophil, and absolute lymphocyte counts, as well as hemoglobin and platelet values, obtained from the complete blood count were recorded. CRP (mg/L) and PCT (ng/mL) levels were also evaluated. The neutrophil-to-lymphocyte ratio (NLR) was calculated by dividing the absolute neutrophil count by the absolute lymphocyte count.

The primary endpoint of the study was the need for hospitalization. Secondary endpoints included admission to the pediatric intensive care unit, length of hospital stay, and discharge status.

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA) and MedCalc Statistical Software Version 22.0 (MedCalc Software Ltd., Ostend, Belgium). The normality of continuous variables was assessed using the Shapiro–Wilk test. Normally distributed data were expressed as mean ± standard deviation, non-normally distributed data as median (minimum–maximum), and categorical variables as numbers and percentages. For comparisons between the two groups, the independent-samples t-test was used for normally distributed continuous variables, whereas the Mann–Whitney U test was used for non-normally distributed variables. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate.

The diagnostic performance of CRP, PCT, and NLR in predicting hospitalization was evaluated using Receiver Operating Characteristic (ROC) curve analysis. For each biomarker, the area under the curve (AUC), 95% confidence interval, optimal cutoff value, sensitivity, and specificity were calculated. Differences between ROC curves were compared using the DeLong test. Univariate analysis was initially performed to identify independent risk factors associated with hospitalization; variables with $p<0.10$ in univariate analysis were included in the multivariable logistic regression model. Results were reported as odds ratios (ORs), 95% confidence intervals (CIs), and p values. Statistical significance was defined as a two-sided $p<0.05$.

RESULTS

A total of 412 patients who presented to the pediatric emergency department with fever between January 1, 2023, and December 31, 2025, were initially evaluated. Eighteen patients with missing laboratory data and 11 patients with repeated presentations due to the same infection were excluded. A total of 383 patients were included in the final analysis. Of these patients, 214 (55.9%) were male and 169 (44.1%) were female, with a mean age of 5.8 ± 4.2 years.

Of the patients, 241 (62.9%) were discharged from the pediatric emergency department, whereas 142 (37.1%) were admitted to the pediatric ward. Among the hospitalized patients, 24 (16.9%) were monitored in the pediatric intensive care unit.

The most common diagnoses at presentation were upper respiratory tract infection (34.2%), lower respiratory tract infection (24.5%), acute gastroenteritis (12.8%), urinary tract infection (10.2%), sepsis (5.0%), meningitis (2.1%), and other infections (11.2%).

When discharged and hospitalized patients were compared, no significant differences were observed in terms of age or sex ($p=0.284$ and $p=0.611$, respectively). In contrast, the body temperature at presentation was significantly higher in hospitalized patients (39.1 ± 0.7°C vs. 38.5 ± 0.6°C, $p<0.001$).

Comparison of laboratory findings demonstrated that CRP, procalcitonin, leukocyte count, absolute neutrophil count, and NLR values were significantly higher in hospitalized patients than in discharged patients ($p<0.001$ for all comparisons). The lymphocyte count was significantly lower in the hospitalized group ($p=0.004$) (Table 2).

The mean CRP level was 24.8 ± 18.7 mg/L in the discharged group and 76.9 ± 44.3 mg/L in the hospitalized group ($p<0.001$). Similarly, the median procalcitonin level was 0.39 (0.05–1.12) ng/mL in discharged patients and 2.81 (0.18–18.4) ng/mL in hospitalized patients ($p<0.001$). NLR values were 2.9 ± 1.8 and 6.8 ± 3.7, respectively ($p<0.001$).

The diagnostic performance of CRP, procalcitonin, and NLR in predicting hospitalization was evaluated using ROC curve analysis (Figure 1). The highest diagnostic accuracy was observed for procalcitonin (AUC=0.874; 95% CI: 0.834–0.914). Procalcitonin was followed by CRP (AUC=0.823; 95% CI: 0.780–0.866) and NLR (AUC=0.801; 95% CI: 0.756–0.846). Comparison of the ROC curves demonstrated that the AUC of procalcitonin was significantly higher than those of CRP and NLR (DeLong test, $p=0.021$ and $p=0.008$, respectively) (Table 3).

According to ROC analysis, the optimal cutoff values for predicting hospitalization were 45 mg/L for CRP, 0.72 ng/mL for procalcitonin, and 4.5 for NLR. At these cutoff values, the sensitivity and specificity of procalcitonin were 84.5% and 82.6%, respectively. For NLR, sensitivity was 78.2% and specificity was 74.3%, whereas for CRP, sensitivity was 76.8% and specificity was 77.5%.

Univariate analysis demonstrated that body temperature at presentation, CRP, procalcitonin, leukocyte count, neutrophil count, and NLR were significantly associated with hospitalization ($p<0.05$ for all variables). These variables were included in the multivariable logistic regression analysis.

In the logistic regression analysis, procalcitonin level (OR: 3.12; 95% CI: 1.92–5.08; $p<0.001$) and NLR (OR: 1.41; 95% CI: 1.18–1.73; $p<0.001$) were identified as independent predictors of hospitalization. CRP level did not retain independent statistical significance after adjustment for other variables (OR: 1.18; 95% CI: 0.89–1.62; $p=0.118$).

When patients admitted to the pediatric intensive care unit were analyzed separately, procalcitonin and NLR levels were significantly higher in this group than in patients admitted to the pediatric ward ($p<0.001$ for both). The mean procalcitonin level in intensive care patients was 8.7 ± 5.2 ng/mL, while the mean NLR was 10.6 ± 4.9.

Overall, these findings demonstrate that, particularly procalcitonin and NLR, have higher diagnostic performance than CRP in predicting the need for hospitalization among children presenting to the pediatric emergency department with fever.

Table 1. Demographic and Clinical Characteristics of the Patients

Variable	Discharged (n=241)	Hospitalized (n=142)	p
Age (years)	5.6 ± 4.1	6.2 ± 4.3	0.284
Male sex, n (%)	131 (54.4)	83 (58.5)	0.611
Fever (°C)	38.5 ± 0.6	39.1 ± 0.7	<0.001
Intensive care admission, n (%)	–	24 (16.9)	–
Length of hospital stay (days)	–	4.8 ± 2.6	–

Table 2. Comparison of Laboratory Findings

Parameter	Discharged (n=241)	Hospitalized (n=142)	p
Leukocytes (×10³/μL)	11.8 ± 3.9	15.7 ± 5.1	<0.001
Neutrophils (×10³/μL)	6.8 ± 3.2	11.5 ± 4.6	<0.001
Lymphocytes (×10³/μL)	2.9 ± 1.4	2.0 ± 1.1	0.004
Hemoglobin (g/dL)	12.2 ± 1.1	11.9 ± 1.3	0.067
Platelets (×10³/μL)	327 ± 94	339 ± 101	0.298
CRP (mg/L)	24.8 ± 18.7	76.9 ± 44.3	<0.001
Procalcitonin (ng/mL)*	0.39 (0.05–1.12)	2.81 (0.18–18.40)	<0.001
NLR	2.9 ± 1.8	6.8 ± 3.7	<0.001

*Median (minimum–maximum)

Table 3. ROC Analysis Results

Parameter	AUC	95% CI	Cutoff	Sensitivity (%)	Specificity (%)	p
CRP	0.823	0.780–0.866	45 mg/L	76.8	77.5	<0.001
Procalcitonin	0.874	0.834–0.914	0.72 ng/mL	84.5	82.6	<0.001
NLR	0.801	0.756–0.846	4.5	78.2	74.3	<0.001
Leukocytes	0.729	0.680–0.778	13.4	69.8	68.5	<0.001
Neutrophils	0.812	0.769–0.855	8.4	79.6	75.9	<0.001

Table 4. Univariate Analysis

Variable	OR	95% CI	p
Fever	2.18	1.54–3.09	<0.001
CRP	1.031	1.021–1.041	<0.001
Procalcitonin	2.86	2.01–4.08	<0.001
Leukocytes	1.12	1.07–1.18	<0.001
Neutrophils	1.23	1.15–1.31	<0.001
Lymphocytes	0.81	0.69–0.95	0.011
NLR	1.45	1.29–1.63	<0.001

Table 5. Multivariable Logistic Regression Analysis

Variable	OR	95% CI	p
Fever	1.46	0.93–2.31	0.101
CRP	1.18	0.89–1.62	0.118
Procalcitonin	3.12	1.92–5.08	<0.001
NLR	1.41	1.18–1.73	<0.001
Leukocytes	1.06	0.97–1.16	0.182

Table 6. Distribution of Patients According to Diagnosis

Diagnosis	Discharged n (%)	Hospitalized n (%)	Total n (%)
Upper respiratory tract infection	112 (46.5)	19 (13.4)	131 (34.2)
Lower respiratory tract infection	49 (20.3)	45 (31.7)	94 (24.5)
Gastroenteritis	33 (13.7)	16 (11.3)	49 (12.8)
Urinary tract infection	17 (7.1)	22 (15.5)	39 (10.2)
Sepsis	1 (0.4)	18 (12.7)	19 (5.0)
Meningitis	0	8 (5.6)	8 (2.1)
Other	29 (12.0)	14 (9.8)	43 (11.2)

DISCUSSION

In this retrospective study, the diagnostic performance of C-reactive protein (CRP), procalcitonin (PCT), and the neutrophil-to-lymphocyte ratio (NLR) in predicting hospitalization was compared among children presenting to the pediatric emergency department with fever. The main findings of our study were that CRP, PCT, and NLR levels were significantly higher in hospitalized children, procalcitonin had the highest diagnostic accuracy in ROC analysis, and procalcitonin and NLR were identified as independent predictors of hospitalization in multivariable logistic regression analysis. In contrast, although CRP was significant in univariate analysis, it did not remain an independent risk factor in multivariable analysis (15,16).

Although fever is one of the most important reasons for presentation to pediatric emergency departments, the early differentiation of serious bacterial infections in febrile children remains a major clinical challenge. Although clinical assessment is often the first step, laboratory biomarkers play an important role in the decision-making process, particularly in younger children, because of nonspecific symptoms and limited physical examination findings. Accordingly, in recent years, increasing attention has been given not only to biomarkers for the early diagnosis of infection but also to biomarkers capable of predicting the need for hospitalization (17,18).

Our study demonstrated that procalcitonin levels were significantly higher in hospitalized children and that procalcitonin achieved the highest area under the curve (AUC) value in ROC analysis. Procalcitonin is considered one of the most reliable biomarkers for the evaluation of serious bacterial infections because it increases early in response to inflammatory cytokines during bacterial infections and generally remains low in viral infections. Several studies have

reported that procalcitonin has higher sensitivity and specificity than CRP, particularly in serious infections such as sepsis, bacteremia, and pneumonia. Our findings support the existing literature and indicate that procalcitonin is a strong biomarker capable of predicting not only the presence of infection but also the need for hospitalization (19–21).

Although CRP has long been one of the most important acute-phase reactants used in the evaluation of pediatric infections, its diagnostic performance during the early phase of infection may be limited because of its biological half-life and kinetics of elevation. In our study, CRP levels were significantly higher in hospitalized patients; however, CRP did not remain an independent predictor in logistic regression analysis. This finding suggests that although CRP is valuable for demonstrating systemic inflammation, it may be insufficient to explain the need for hospitalization when used alone. Similarly, previous studies have reported that CRP provides more accurate results when evaluated in combination with other biomarkers rather than as a standalone parameter (22,23).

In recent years, NLR, which can be easily calculated from a complete blood count, has become an increasingly recognized biomarker for the assessment of systemic inflammation. Its low cost, lack of requirement for additional laboratory testing, and ease of calculation in emergency departments are important advantages. In our study, NLR was shown to be an independent determinant of hospitalization both in univariate analysis and in multivariable logistic regression analysis. Furthermore, the AUC obtained in ROC analysis was relatively close to that of CRP, suggesting that NLR may be a reliable biomarker for clinical application. Particularly in healthcare settings with limited resources, NLR may be used as a rapid and cost-effective risk stratification tool (24–26).

Another notable finding of our study was that both procalcitonin and NLR levels were significantly higher in patients admitted to the pediatric intensive care unit than in patients admitted to the pediatric ward. This finding suggests that these biomarkers increase as the severity of the inflammatory response increases. Although the number of intensive care patients in our study was limited, this finding suggests that these biomarkers may reflect not only the need for hospitalization but also disease severity (20,25).

One of the major strengths of our study is that the three inflammatory biomarkers most commonly used in routine clinical practice in pediatric emergency departments were comparatively evaluated in the same patient population. In addition, the combined use of ROC analysis and multivariable logistic regression analysis allowed the independent diagnostic performance of the biomarkers to be assessed in detail. Furthermore, the evaluation of a parameter such as NLR, which does not require additional costs, increases the applicability of the study findings to daily clinical practice.

Nevertheless, our study has several limitations. First, the retrospective and single-center design represents an important limitation that may introduce selection bias. The fact that hospitalization decisions were influenced by multiple factors, including clinician experience, the patient's overall condition, and comorbidities, rather than laboratory results alone, may also

have affected the results. Furthermore, because procalcitonin was not routinely measured in all febrile children, the sample size may have been reduced. Another limitation that should be considered is that microbiological confirmation of bacterial and viral infections was not available for all patients in our study (27).

In conclusion, procalcitonin demonstrated the highest diagnostic performance for predicting hospitalization among children presenting to the pediatric emergency department with fever. In addition, NLR, which can be easily calculated from a complete blood count and does not require additional costs, was shown to be an independent predictor and may serve as a valuable adjunctive parameter for early risk stratification in pediatric emergency departments. Although CRP is useful for assessing inflammation, its ability to predict the need for hospitalization when used alone appears to be limited. Confirmation of these findings in larger, multicenter, prospective populations will contribute to the development of biomarker-based clinical decision algorithms in pediatric emergency departments (28).

CONCLUSION

In this study, the diagnostic performance of C-reactive protein (CRP), procalcitonin (PCT), and the neutrophil-to-lymphocyte ratio (NLR) in predicting hospitalization was evaluated in children presenting to the pediatric emergency department with fever. The results demonstrated that CRP, PCT, and NLR levels were significantly higher in hospitalized children than in discharged patients. In ROC analysis, procalcitonin was identified as the biomarker with the highest diagnostic accuracy, while multivariable logistic regression analysis demonstrated that procalcitonin and NLR were independent predictors of hospitalization. In contrast, although CRP was significant in univariate analysis, it did not retain its independent predictive value in multivariable analysis.

Our findings demonstrate that procalcitonin has high diagnostic performance, particularly in the evaluation of serious infections, whereas NLR may be a valuable biomarker in daily clinical practice because it is easy to calculate, inexpensive, and does not require additional laboratory testing. Particularly in healthcare facilities with limited resources, NLR may represent a practical parameter that can contribute to the early risk stratification of patients.

In the evaluation of febrile children in pediatric emergency departments, rather than relying on a single laboratory marker, the combined assessment of CRP, procalcitonin, and NLR together with clinical findings may contribute to a more accurate determination of the need for hospitalization. This approach may help reduce unnecessary hospital admissions, facilitate earlier recognition of serious bacterial infections, and promote more efficient use of healthcare resources.

Nevertheless, the retrospective and single-center design of the study, the possibility of selection bias, and the potential influence of clinician experience on hospitalization decisions are

important limitations. Therefore, the findings should be validated in larger, multicenter, prospective studies conducted across different healthcare centers.

In conclusion, procalcitonin was found to have the highest diagnostic performance for predicting hospitalization, while the neutrophil-to-lymphocyte ratio also emerged as a low-cost, easily applicable, and independent biomarker. The use of these biomarkers in conjunction with clinical assessment in pediatric emergency departments may facilitate early risk stratification and improve the effectiveness of patient management. These findings may contribute to the development of future clinical decision algorithms and support the use of biomarker-based approaches in pediatric emergency practice.

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M4508-Tam Metin

PRIMARY OMENTAL TORSION MIMICKING ACUTE APPENDICITIS IN A FIVE-YEAR-OLD GIRL: A CASE REPORT

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Introduction / Aim

Primary omental torsion is a rare cause of acute abdomen in children and is frequently misdiagnosed as acute appendicitis because of its nonspecific clinical presentation. Early recognition is challenging, and definitive diagnosis is usually established during surgery. We present a rare pediatric case of primary omental torsion successfully treated surgically after initial suspicion of acute appendicitis.

Methods

A 5-year-old girl was admitted to the pediatric emergency department with acute right lower quadrant abdominal pain. Clinical examination and laboratory findings suggested acute appendicitis. Abdominal ultrasonography was inconclusive. Because of persistent abdominal pain and ongoing clinical suspicion of an acute surgical abdomen, the patient was closely observed and subsequently underwent surgical exploration.

Results

Intraoperative examination revealed torsion of the greater omentum with ischemic and necrotic changes, while the appendix appeared macroscopically normal. Partial omentectomy was performed, and the necrotic omental tissue was excised completely. Histopathological examination confirmed hemorrhagic infarction secondary to primary omental torsion. The postoperative course was uneventful, and the patient was discharged in good clinical condition without complications.

Conclusion

Although uncommon, primary omental torsion should be considered in the differential diagnosis of pediatric patients presenting with right lower quadrant abdominal pain mimicking acute appendicitis. Early surgical intervention provides both definitive diagnosis and effective treatment, resulting in excellent clinical outcomes.

Keywords: Pediatric emergency, Acute abdomen, Omental torsion, Acute appendicitis, Case report.

Introduction

Acute abdominal pain is one of the most common reasons for presentation to pediatric emergency departments and is of great importance in the early recognition of conditions that may require surgical intervention. Although the etiology of acute abdomen in children varies according to age, acute appendicitis, intussusception, mesenteric lymphadenitis, gastroenteritis, and constipation are among the most common causes. However, some rare surgical pathologies may present with similar clinical findings and consequently pose diagnostic challenges. Primary omental torsion is one such rare condition and may lead to misdiagnosis or delayed diagnosis, particularly because it can mimic acute appendicitis (1,2).

The greater omentum is a fat-rich peritoneal structure originating from the greater curvature of the stomach and proximal duodenum, extending over the transverse colon and covering the anterior surface of the small intestines. It is highly active in terms of immunological and vascular functions. Because of its important roles in limiting intra-abdominal infections, releasing inflammatory mediators, angiogenesis, and tissue repair, it has also been described as the “policeman of the abdomen.” The extensive mobility and rich vascular supply of the omentum predispose it to circulatory disturbances, ischemia, and infarction when torsion occurs (3,4).

Primary omental torsion is a rare condition that occurs when the greater omentum rotates around its own axis in the absence of any predisposing intra-abdominal pathology. Following torsion, venous return is initially impaired, followed by compromise of the arterial circulation, ultimately resulting in hemorrhagic infarction and fat necrosis. Unlike secondary omental torsion, the primary form is not associated with an underlying cause such as hernia, adhesions, mass, or inflammatory focus (2,5).

Primary omental torsion is reported to be very rare during childhood. It is estimated to account for less than 0.1–0.5% of pediatric acute abdomen cases. Although it is more commonly observed in boys, an increasing number of cases have been reported in girls in recent years. The disease most commonly occurs between 5 and 15 years of age. Because the right side of the omentum is anatomically longer and more mobile, approximately 90% of cases occur on the right side, resulting in a clinical presentation that closely resembles acute appendicitis (2,5,6).

The etiology of primary omental torsion remains unclear. Anatomical variations, bifid omentum, accessory omentum, irregular fat distribution, obesity, sudden body movements, strenuous exercise, trauma, excessive food intake, coughing attacks, and sudden increases in intra-abdominal pressure have been proposed as contributing factors. In particular, an increased risk of torsion has been reported in obese children due to the increased amount of omental adipose tissue (4,5,7).

Clinical findings generally consist of sudden-onset right lower quadrant abdominal pain. The pain is usually continuous and progressively increases in severity. Nausea, vomiting, and low-

grade fever may accompany the pain, although these findings are less frequent than in acute appendicitis. Physical examination may reveal localized tenderness, voluntary guarding, and occasionally rebound tenderness. Laboratory investigations may demonstrate mild leukocytosis and elevated C-reactive protein levels; however, these findings are nonspecific (2,5,8).

Imaging modalities play an important role in diagnosis. Although ultrasonography is the first-line imaging modality in pediatric patients, its diagnostic sensitivity is limited because it is operator-dependent. A noncompressible hyperechoic fatty mass may be observed on ultrasonography; however, a definitive diagnosis cannot be established in most cases. Computed tomography has the highest diagnostic accuracy in adults, and the characteristic "whirl sign," consisting of concentric linear densities within the fatty tissue, is highly valuable for diagnosis. Nevertheless, because of exposure to ionizing radiation, computed tomography is generally reserved for selected cases in children (5,8,9).

Currently, two approaches, conservative and surgical treatment, are available for the management of primary omental torsion. Conservative treatment may be considered in stable patients with a definitive diagnosis established by computed tomography; however, in childhood, the diagnosis is frequently made during surgical exploration. Laparoscopic omentectomy has increasingly been preferred in recent years because of its minimally invasive nature, shorter hospital stay, and faster recovery. Nevertheless, open surgery remains a reliable treatment option in centers where laparoscopy is not feasible (5,8–10).

In this case report, we present a five-year-old girl who presented to the pediatric emergency department with a preliminary diagnosis of acute appendicitis, was found to have primary omental torsion during surgical exploration, and achieved complete recovery following successful surgical treatment. The aim of this report is to emphasize the importance of considering this rare condition in the differential diagnosis of acute abdomen in children.

Case Presentation

A five-year-old girl presented to the pediatric emergency department with abdominal pain. Clinical evaluation revealed that the pain was particularly prominent in the right lower quadrant. Acute appendicitis was initially considered the most likely diagnosis, and the patient was placed under close clinical observation. During follow-up, because the abdominal pain persisted and acute surgical abdomen could not be excluded, a decision was made to proceed with surgical exploration.

During the operation, the appendix did not appear consistent with acute inflammation. In contrast, the greater omentum was found to be twisted around its own axis and showed ischemic changes. The torsed and necrotic omentum was surgically resected. The postoperative course was uneventful, and the patient was discharged in good general condition.

Discussion

Primary omental torsion, first described by Eitel in 1899, is a rare cause of acute abdomen in childhood (11). Primary omental torsion (POT) is a rare acute abdominal condition resulting from rotation of the greater omentum around its longitudinal axis. This rotation initially impairs venous return and subsequently affects arterial circulation, leading to hemorrhagic infarction and necrosis. Because of its rarity in childhood, the diagnosis is frequently established during surgical exploration. It has been reported to account for less than 0.1–0.5% of pediatric acute abdomen cases. Therefore, it is not usually among the initial diagnoses considered in pediatric emergency departments and is frequently confused with acute appendicitis (12,13).

Two types of omental torsion have been described: primary and secondary. Primary omental torsion develops in the absence of an underlying pathology, whereas secondary torsion is more commonly associated with inguinal hernia, tumors, cysts, adhesions, or inflammatory diseases. A substantial proportion of cases occurring in children are of the primary type (13,14).

Although the pathophysiology of the disease has not been fully elucidated, anatomical variations of the omentum, the greater length and mobility of the right side of the omentum, obesity, sudden body movements, strenuous exercise, trauma, and sudden changes in intra-abdominal pressure are considered predisposing factors. Because the right side of the omentum is longer, the majority of cases are located in the right lower quadrant, resulting in a clinical presentation that closely resembles acute appendicitis (14,15).

The most common clinical manifestation of primary omental torsion is sudden-onset localized right lower quadrant abdominal pain. The pain is generally continuous and progressively increases in severity. Although nausea and vomiting may occur, these symptoms are less frequent than in acute appendicitis. Fever is usually low-grade or absent. Physical examination may reveal localized tenderness, voluntary guarding, and occasionally rebound tenderness. In our patient, right lower quadrant abdominal pain was the predominant finding, and the patient was followed with a preliminary diagnosis of acute appendicitis based on the clinical evaluation before a decision was made to proceed with surgery (12,15,16).

Laboratory findings are generally nonspecific. Although mild leukocytosis and elevated C-reactive protein levels may be observed, these parameters are not diagnostic. Therefore, laboratory findings alone are insufficient to differentiate primary omental torsion from acute appendicitis (13,16).

Although imaging modalities play an important role in diagnosis, they have certain limitations, particularly in pediatric patients. Ultrasonography is the first-line imaging modality; however, its diagnostic sensitivity is limited because it is operator-dependent. A hyperechoic, noncompressible fatty tissue mass may be observed on ultrasonography. Computed tomography significantly improves diagnostic accuracy in adults. The “whirl sign,” characterized by concentric linear strands within the fatty tissue, is considered characteristic of primary omental torsion on CT. However, CT is not routinely preferred in children because of exposure to

ionizing radiation. Consequently, in many pediatric cases, the definitive diagnosis is established only during surgical exploration (15–17).

There is some controversy regarding conservative versus surgical treatment. Although conservative management has been recommended in selected adult patients in whom a definitive diagnosis can be established by computed tomography, laparoscopic or open surgical treatment remains the most commonly applied approach in pediatric patients because the diagnosis is frequently established intraoperatively. Following surgical resection, symptoms generally resolve rapidly, hospital stays are shortened, and the complication rate is very low (17–20).

In our case, a five-year-old girl presented to the pediatric emergency department with clinical findings suggestive of acute appendicitis. Following clinical observation, surgical exploration was performed, and primary omental torsion was identified intraoperatively. After resection of the necrotic omentum, the postoperative course was uneventful, and the patient was discharged in good condition. This case demonstrates that primary omental torsion, although rare, should be considered in the differential diagnosis of children presenting with right lower quadrant abdominal pain (18–20).

Conclusion

Although primary omental torsion is rare in childhood, it is an important surgical pathology that can mimic acute appendicitis. Because its clinical and laboratory findings are nonspecific, preoperative diagnosis is challenging. Although ultrasonography and computed tomography may contribute to the diagnosis, a definitive diagnosis is established during surgical exploration in many cases. Primary omental torsion should be considered in the differential diagnosis of pediatric patients presenting with right lower quadrant abdominal pain, particularly when imaging findings are not typical. Early surgical intervention allows both confirmation of the diagnosis and successful treatment, thereby preventing the development of complications.

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M4509-Tam Metin

EVALUATION OF CLINICAL AND LABORATORY FACTORS PREDICTING HOSPITALIZATION IN CHILDREN PRESENTING TO THE PEDIATRIC EMERGENCY DEPARTMENT WITH FEBRILE SEIZURES

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ABSTRACT

Objective: Febrile seizures are the most common type of seizure in childhood and represent one of the important causes of pediatric emergency department visits. Although the majority of patients have a favorable prognosis, some cases may require hospitalization. While clinical evaluation is the main determinant in hospitalization decisions, the contribution of laboratory markers remains unclear. This study aimed to evaluate the clinical and laboratory factors predicting hospitalization in children presenting to the pediatric emergency department with febrile seizures.

Materials and Methods: This retrospective study included patients aged between 1 month and 6 years who presented to the pediatric emergency department with febrile seizures between January 1, 2023, and December 31, 2025. Demographic characteristics, body temperature, seizure type (simple/complex), seizure duration, whether it was the first seizure episode, family history of febrile seizures, laboratory parameters [white blood cell count, neutrophil count, lymphocyte count, C-reactive protein (CRP), serum sodium levels, and neutrophil-to-lymphocyte ratio (NLR)], final diagnoses, and hospitalization status were evaluated. Independent risk factors associated with hospitalization were investigated using multivariable logistic regression analysis.

Results: A total of 326 children were included in the study. The mean age of the patients was 24.6±13.8 months, and 58.3% were male. While 242 patients (74.2%) were discharged from the emergency department, 84 patients (25.8%) were hospitalized. Complex febrile seizures, prolonged seizure duration, elevated CRP levels, increased NLR, and lower serum sodium levels were significantly more frequent among hospitalized patients ($p<0.05$ for all comparisons). In multivariable analysis, complex febrile seizures (OR=3.84; 95% CI: 2.01–7.31), hyponatremia (OR=2.47; 95% CI: 1.28–4.76), and elevated NLR (OR=1.38; 95% CI: 1.12–1.69) were identified as independent predictors of hospitalization.

Conclusion: Complex febrile seizures, hyponatremia, and elevated NLR are important predictors of hospitalization in children presenting to the pediatric emergency department with febrile seizures. The use of these parameters together with clinical evaluation may contribute to early risk stratification and facilitate patient management.

Keywords: Febrile seizure, pediatric emergency department, hospitalization, neutrophil-to-lymphocyte ratio, C-reactive protein, hyponatremia.

INTRODUCTION

Febrile seizure is defined as a seizure occurring in association with fever, generally in children between 6 months and 5 years of age, without evidence of central nervous system infection, metabolic disturbance, or a previous history of afebrile seizures (1). It is the most common type of seizure during childhood and occurs at least once in approximately 2–5% of all children. Although its incidence varies among countries and ethnic groups, it remains one of the important causes of presentation to pediatric emergency departments (2,3).

Febrile seizures are classified into two groups: simple and complex. Simple febrile seizures are generalized, last less than 15 minutes, and occur only once within a 24-hour period. Complex febrile seizures are characterized by a duration longer than 15 minutes, focal features, or recurrence more than once within 24 hours (1,4). Although simple febrile seizures generally have a benign course, hospitalization, further diagnostic evaluation, and close clinical monitoring are more frequently required in patients with complex febrile seizures (5).

Genetic predisposition, infections, immune response, and environmental factors are thought to act together in the etiopathogenesis of febrile seizures. Viral upper respiratory tract infections, influenza, respiratory syncytial virus (RSV), adenovirus, and, in recent years, SARS-CoV-2 infection are among the most commonly associated pathogens. It has also been reported that the rate of increase in body temperature, in addition to the absolute fever level, may influence the development of seizures (6,7).

The primary objectives in the evaluation of patients with febrile seizures in pediatric emergency departments are to exclude central nervous system infections, identify the underlying source of infection, and recognize children who require hospitalization at an early stage (8). Therefore, not only clinical assessment but also laboratory biomarkers play an important role in patient management. Complete blood count parameters, C-reactive protein (CRP), serum electrolytes, and the neutrophil-to-lymphocyte ratio (NLR), which has gained increasing attention in recent years, are among the commonly used markers for assessing systemic inflammation (9).

CRP is one of the major acute-phase reactants synthesized in the liver in response to infection and is markedly elevated in bacterial infections. However, CRP levels alone have been reported to be insufficient for predicting the severity of febrile seizures or the need for hospitalization (10). In recent years, the NLR, which can be readily calculated from a complete blood count, has been shown to be an inexpensive, easily applicable, and reliable biomarker reflecting systemic inflammation. Its prognostic value has been demonstrated in numerous studies involving sepsis, pneumonia, urinary tract infections, and other pediatric infections (11,12).

On the other hand, the association between decreased serum sodium levels and the development and recurrence of febrile seizures has been debated for many years. Although some studies have

demonstrated that hyponatremia may be associated with complex febrile seizures and the need for hospitalization, contradictory results have been reported in the literature (13,14). Similarly, there is no clear consensus regarding the roles of leukocyte count, neutrophil predominance, and inflammatory markers in predicting clinical outcomes.

Currently, the decision to hospitalize patients presenting to pediatric emergency departments because of febrile seizures is primarily based on clinical assessment. However, identifying readily accessible laboratory parameters capable of predicting hospitalization at an early stage may contribute significantly both to reducing unnecessary admissions and to the early recognition of high-risk patients. In particular, integrating low-cost biomarkers routinely obtained in clinical practice into the decision-making process may help reduce the workload of emergency departments and facilitate more efficient use of healthcare resources (15).

The aim of this study was to evaluate the demographic and clinical characteristics of patients presenting to the pediatric emergency department with febrile seizures, to identify clinical and laboratory factors affecting hospitalization, and particularly to investigate the diagnostic value of CRP, serum sodium, and the neutrophil-to-lymphocyte ratio in predicting hospitalization. It was hypothesized that the findings would contribute to early risk stratification and improve patient management in pediatric emergency departments.

MATERIALS AND METHODS

Study Design and Population

This study was designed as a retrospective, single-center, observational study conducted in the Pediatric Emergency Department of a tertiary-care university hospital, Celal Bayar University. Patients aged between 6 months and 5 years who presented to the pediatric emergency department with a diagnosis of febrile seizure between January 1, 2023, and December 31, 2025, were included. Patient data were retrospectively reviewed through the hospital's electronic medical record system.

The diagnosis of febrile seizure was established according to the criteria of the American Academy of Pediatrics (AAP) and was defined as a seizure occurring in children with a body temperature of ≥38°C, without evidence of central nervous system infection, metabolic disturbance, or a previously known history of epilepsy. Seizures lasting less than 15 minutes, having a generalized character, and occurring only once within 24 hours were classified as simple febrile seizures, whereas seizures lasting longer than 15 minutes, showing focal features, or recurring more than once within 24 hours during the same febrile illness were classified as complex febrile seizures.

Only patients who met the age criteria, were diagnosed with febrile seizure, and had complete clinical and laboratory data were included in the study. Patients with a previous diagnosis of epilepsy, central nervous system infection, metabolic disease or structural neurological disease, seizures associated with trauma, or incomplete medical records were excluded.

For each patient, age, sex, body temperature at presentation, seizure duration, seizure type (simple or complex), history of a first febrile seizure, family history of febrile seizures, source of infection, final diagnosis, hospitalization status, requirement for pediatric intensive care unit admission, and length of hospital stay were recorded from the electronic medical records.

Laboratory parameters obtained from the first blood samples collected at presentation were evaluated. The laboratory variables examined included leukocyte count, absolute neutrophil count, absolute lymphocyte count, hemoglobin, platelet count, C-reactive protein (CRP), serum sodium, and serum glucose levels. The neutrophil-to-lymphocyte ratio (NLR) was calculated by dividing the absolute neutrophil count by the absolute lymphocyte count.

The patients included in the study were divided into two groups according to their clinical outcomes. The first group consisted of patients discharged from the pediatric emergency department, whereas the second group consisted of patients hospitalized for treatment. Hospitalized patients were additionally evaluated in subgroups according to admission to the pediatric ward or pediatric intensive care unit.

The primary endpoint of the study was the need for hospitalization. Secondary endpoints included admission to the pediatric intensive care unit, development of complex febrile seizure, and length of hospital stay.

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). The normality of continuous variables was assessed using the Shapiro–Wilk test. Normally distributed data were expressed as mean ± standard deviation, whereas non-normally distributed data were expressed as median (minimum–maximum). Categorical variables were presented as numbers and percentages. For comparisons between groups, the Student's t-test was used for normally distributed continuous variables, while the Mann–Whitney U test was used for non-normally distributed variables. Categorical variables were compared using the chi-square test or Fisher's exact test when appropriate.

The diagnostic performance of CRP, serum sodium, and NLR in predicting hospitalization was evaluated using Receiver Operating Characteristic (ROC) curve analysis. The area under the curve (AUC), optimal cutoff value, sensitivity, and specificity were calculated for each parameter. Univariate analysis was initially performed to identify independent risk factors associated with hospitalization; variables with $p<0.10$ were subsequently included in a multivariable logistic regression analysis. Results were reported as odds ratios (ORs) with 95% confidence intervals (CIs). A p value of <0.05 was considered statistically significant.

RESULTS

During the study period, a total of 326 patients who presented to the pediatric emergency department with febrile seizures and met the study criteria were evaluated. The mean age of the patients was 24.6±13.8 months; 190 (58.3%) were male and 136 (41.7%) were female. The age, sex, and basic demographic characteristics of the patients are presented in Table 1.

Of the patients, 242 (74.2%) were discharged from the pediatric emergency department, whereas 84 (25.8%) were hospitalized for clinical observation and treatment. Among the hospitalized patients, 78 (92.9%) were admitted to the pediatric ward and 6 (7.1%) were admitted to the pediatric intensive care unit. The median length of hospital stay was 3 days (1–12 days).

When the clinical characteristics of the patients were evaluated, the rate of complex febrile seizures was significantly higher in the hospitalized group than in the discharged group. Complex febrile seizures occurred in 42.9% of patients in the hospitalized group compared with 15.3% of discharged patients ($p<0.001$). Similarly, longer seizure duration was significantly associated with hospitalization. A history of seizures lasting longer than 15 minutes was more frequently observed among hospitalized patients ($p=0.002$).

No significant differences were observed between the groups regarding the proportion of patients presenting with their first febrile seizure, a family history of febrile seizures, or the maximum body temperature measured at presentation ($p>0.05$). However, lower respiratory tract infections and acute otitis media were more frequently identified as sources of infection among hospitalized patients.

When laboratory parameters were compared, CRP levels were significantly higher in the hospitalized group. The mean CRP level was 32.6±28.4 mg/L in the hospitalized group and 18.7±20.1 mg/L in the discharged group ($p<0.001$). Similarly, the neutrophil-to-lymphocyte ratio (NLR) was significantly higher in hospitalized patients ($p<0.001$).

When serum sodium levels were evaluated, the rate of hyponatremia was higher among hospitalized patients. The proportion of patients with a serum sodium level below 135 mmol/L was 34.5% in the hospitalized group and 17.8% in the discharged group ($p=0.003$).

No statistically significant differences were found between the two groups in terms of leukocyte count, absolute neutrophil count, lymphocyte count, hemoglobin, platelet, or glucose levels ($p>0.05$).

Analysis of Factors Predicting Hospitalization

In univariate analyses, complex febrile seizure, prolonged seizure duration, elevated CRP level, elevated NLR, and low serum sodium level were significantly associated with hospitalization ($p<0.05$).

Variables with $p<0.10$ in the univariate analysis were included in the multivariable logistic regression model. The analysis demonstrated that complex febrile seizure, hyponatremia, and elevated NLR were independent risk factors for hospitalization.

The presence of a complex febrile seizure increased the risk of hospitalization by approximately 3.8-fold (OR=3.84; 95% CI: 2.01–7.31; $p<0.001$), while the presence of hyponatremia was

associated with an approximately 2.5-fold increased risk of hospitalization (OR=2.47; 95% CI: 1.28–4.76; p=0.007). An increase in NLR was also independently associated with an increased risk of hospitalization (OR=1.38; 95% CI: 1.12–1.69; p=0.002).

ROC Analysis

The diagnostic performance of laboratory markers used to predict hospitalization was evaluated using ROC analysis.

For NLR, the area under the curve (AUC) was 0.71 (95% CI: 0.64–0.78). The optimal cutoff point was determined as NLR ≥3.2. At this value, the sensitivity was 68% and the specificity was 70%.

For CRP, the AUC was 0.69 (95% CI: 0.62–0.76). The optimal threshold for CRP was 25 mg/L, and levels above this value were associated with an increased risk of hospitalization.

For serum sodium, the AUC was 0.64 (95% CI: 0.57–0.71). The need for hospitalization increased as serum sodium levels decreased.

Table 1. Demographic and Clinical Characteristics of the Patients

Variable	Total (n=326)	Discharged (n=242)	Hospitalized (n=84)	p value
Age (months), mean ± SD	24.6±13.8	24.1±13.6	26.0±14.1	0.286
Male sex, n (%)	190 (58.3)	139 (57.4)	51 (60.7)	0.611
First febrile seizure, n (%)	216 (66.3)	164 (67.8)	52 (61.9)	0.336
Family history of FS, n (%)	104 (31.9)	81 (33.5)	23 (27.4)	0.310
Maximum temperature (°C)	39.1±0.6	39.0±0.6	39.3±0.7	0.067
Complex FS, n (%)	82 (25.2)	37 (15.3)	36 (42.9)	<0.001
Seizure duration >15 min, n (%)	46 (14.1)	22 (9.1)	24 (28.6)	<0.001
Hospitalization, n (%)	84 (25.8)	–	–	–

SD: Standard deviation; FS: Febrile seizure.

Laboratory Findings

Comparison of laboratory values at presentation demonstrated higher inflammatory marker levels among hospitalized patients. CRP levels and the neutrophil-to-lymphocyte ratio (NLR) were significantly higher in the hospitalized group than in the discharged group.

Serum sodium levels were lower among hospitalized patients. The proportion of patients with hyponatremia (Na <135 mmol/L) was significantly higher in the hospitalized group.

No significant differences were observed between the two groups in terms of leukocyte count, hemoglobin, platelet count, or serum glucose levels (Table 2).

Table 2. Comparison of Laboratory Findings

Laboratory parameter	Discharged (n=242)	Hospitalized (n=84)	p value
Leukocytes (/mm³)	11,420±4,230	12,180±4,650	0.184
Neutrophils (/mm³)	6,120±3,150	7,540±3,720	0.002
Lymphocytes (/mm³)	4,010±1,820	3,420±1,540	0.009
NLR	1.82±1.14	3.21±2.08	<0.001
CRP (mg/L)	18.7±20.1	32.6±28.4	<0.001
Serum Na (mmol/L)	137.4±2.8	135.9±3.1	<0.001
Hyponatremia (<135 mmol/L), n (%)	43 (17.8)	29 (34.5)	0.003
Hemoglobin (g/dL)	11.8±1.2	11.7±1.3	0.612
Platelets (/mm³)	285,400±82,600	291,800±91,400	0.576
Glucose (mg/dL)	108±26	112±31	0.279

NLR: Neutrophil-to-lymphocyte ratio; CRP: C-reactive protein.

Table 3. Sources of Infection and Clinical Outcomes

Variable	Discharged (n=242)	Hospitalized (n=84)	p value
Upper respiratory tract infection, n (%)	146 (60.3)	41 (48.8)	0.067
Lower respiratory tract infection, n (%)	32 (13.2)	21 (25.0)	0.013
Acute otitis media, n (%)	28 (11.6)	15 (17.9)	0.145
Gastroenteritis, n (%)	21 (8.7)	5 (6.0)	0.437
No apparent source of infection, n (%)	15 (6.2)	2 (2.3)	0.176
Pediatric intensive care admission, n (%)	0	6 (7.1)	<0.001

Table 4. Independent Risk Factors Predicting Hospitalization (Logistic Regression Analysis)

Variable	OR	95% CI	p value
Complex febrile seizure	3.84	2.01–7.31	<0.001
Hyponatremia	2.47	1.28–4.76	0.007
Elevated NLR	1.38	1.12–1.69	0.002
Prolonged seizure duration	1.71	0.91–3.22	0.094
Elevated CRP	1.02	0.99–1.04	0.083

OR: Odds ratio; CI: Confidence interval; NLR: Neutrophil-to-lymphocyte ratio.

DISCUSSION

Febrile seizure is the most common type of seizure during childhood and accounts for a significant proportion of pediatric emergency department visits. Although the majority of cases have a favorable prognosis and represent self-limited clinical conditions, some patients may require hospitalization because of seizure characteristics, accompanying signs of infection, or metabolic abnormalities. Therefore, the primary objective in pediatric emergency departments is to identify children at risk of serious disease at an early stage and appropriately classify patients requiring observation and further management (16).

In this study, 326 patients presenting to the pediatric emergency department with febrile seizures were evaluated, and 25.8% of the patients were hospitalized. Hospitalization rates for febrile seizures vary among studies in the literature. These differences are thought to be associated with patient age, characteristics at presentation, healthcare system practices, and the

tertiary-care nature of the center in which the study was conducted. In particular, complex febrile seizures, prolonged seizure duration, and accompanying signs of serious infection play important roles in the decision to hospitalize patients (17,18).

In our study, the presence of a complex febrile seizure was identified as one of the strongest independent predictors of hospitalization (OR=3.84; 95% CI: 2.01–7.31). Complex febrile seizures are defined as seizures lasting longer than 15 minutes, having focal features, or recurring during the same febrile illness, and they require further evaluation more frequently than simple febrile seizures. Because the likelihood of central nervous system infection, metabolic abnormalities, or an underlying neurological disorder may be higher in these patients, the need for hospital observation is increased (19,20).

Although prolonged seizure duration was more frequently observed among hospitalized patients in our study, it was not identified as an independent risk factor in multivariable analysis. Previous studies have reported that prolonged seizure duration may be associated with a more severe clinical course in febrile seizures. However, seizure duration should not be evaluated in isolation but rather in conjunction with seizure type, severity of infection, and the patient's overall clinical condition (20,21).

One of the important findings of this study was the identification of hyponatremia as an independent risk factor for hospitalization (OR=2.47; 95% CI: 1.28–4.76). During febrile illnesses, increased antidiuretic hormone secretion, increased fluid intake, and infection-related hormonal changes may lead to a decrease in serum sodium levels. Hyponatremia has been suggested to increase neuronal excitability by lowering the seizure threshold and may contribute to more complex seizure presentations. Previous studies have reported that low serum sodium levels may be associated with recurrence of febrile seizures and complex seizures (22,23).

The neutrophil-to-lymphocyte ratio (NLR) has become an important biomarker for assessing systemic inflammation in recent years. In this study, an elevated NLR was identified as an independent predictor of hospitalization (OR=1.38; 95% CI: 1.12–1.69). Because NLR reflects both increased neutrophil activation and lymphocyte suppression during the inflammatory response, it may provide information regarding the severity of infection. Several studies have demonstrated an association between NLR and disease severity and clinical outcomes in pediatric infections (24,25).

Inflammatory processes are known to play an important role in the development of febrile seizures. Increased cytokine levels, inflammatory mediators, and alterations in the immune response during infection may affect central nervous system excitability. Therefore, elevated NLR values may indicate not only the presence of infection but also a more pronounced inflammatory response and a more severe clinical condition (25,26).

Although CRP levels were significantly higher in the hospitalized group in our study, CRP was not identified as an independent predictor in the multivariable analysis. CRP is a widely used acute-phase reactant in childhood infections and provides clinicians with important

information, particularly in the evaluation of bacterial infections. However, because CRP levels may be influenced by the timing of infection onset, the causative microorganism, and individual differences in the inflammatory response, CRP alone may be insufficient for determining the need for hospitalization (27).

Studies investigating the prognostic value of inflammatory markers in children with febrile seizures have reported inconsistent findings. Some studies have demonstrated that elevated CRP, neutrophil count, and inflammatory markers are associated with complex febrile seizures, whereas other studies have shown that these parameters do not have sufficient predictive value when used alone. These differences may be attributable to patient characteristics, underlying causes of infection, and the clinical assessment criteria used (28).

An important clinical implication of our study is that routinely available parameters may be used to predict the risk of hospitalization. Currently, the decision to hospitalize children with febrile seizures is largely based on clinical assessment. However, adding objective parameters such as NLR, serum sodium, and seizure characteristics to clinical assessment may facilitate early risk stratification in emergency departments and enable high-risk patients to be identified more rapidly (29,30).

Our study has several limitations. First, because of its retrospective and single-center design, the generalizability of the findings to different patient populations is limited. In addition, long-term neurological follow-up and recurrence of febrile seizures could not be evaluated. Nevertheless, the strengths of the study include the evaluation of a relatively large patient population, assessment of routinely available laboratory parameters, and identification of independent predictors of hospitalization using multivariable analysis.

In conclusion, complex febrile seizures, hyponatremia, and elevated NLR were identified as independent predictors of hospitalization among patients presenting to the pediatric emergency department with febrile seizures. The use of these parameters together with clinical assessment may contribute to early risk stratification and facilitate more effective patient management in pediatric emergency departments.

CONCLUSION

In this study, clinical and laboratory factors affecting the need for hospitalization were evaluated in children presenting to the pediatric emergency department with febrile seizures. Our findings demonstrated that the decision to hospitalize patients with febrile seizures may be supported not only by seizure history and clinical assessment but also by readily accessible laboratory parameters.

The hospitalization rate in our study was 25.8%, and complex febrile seizures, hyponatremia, and an elevated neutrophil-to-lymphocyte ratio (NLR) were identified as independent risk factors for hospitalization. In particular, the presence of complex febrile seizures was found to

markedly increase the risk of hospitalization, indicating that these patients require closer clinical monitoring.

The association between decreased serum sodium levels and hospitalization highlights the importance of metabolic changes during febrile illness in the clinical decision-making process. Similarly, the identification of an elevated NLR as an independent predictor suggests that the systemic inflammatory response may play an important role in the clinical course of patients with febrile seizures. Although CRP levels were higher in the hospitalized group, the absence of an independent association in multivariable analysis suggests that inflammatory markers should be evaluated together with clinical findings rather than used in isolation.

Based on these findings, the combined use of parameters such as seizure type, seizure duration, serum sodium level, and NLR in the evaluation of patients presenting to pediatric emergency departments with febrile seizures may contribute to early risk stratification. This approach may facilitate timely recognition of high-risk patients while helping to reduce unnecessary hospitalizations among low-risk patients.

In conclusion, complex febrile seizures, hyponatremia, and elevated NLR are important clinical markers that may be used to predict the need for hospitalization in children presenting to the pediatric emergency department with febrile seizures. Future multicenter, prospective studies are required to validate the predictive value of these parameters in different patient populations and to incorporate them into clinical decision-support models.

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M4510-Tam Metin

DEMOGRAPHIC CHARACTERISTICS, ETIOLOGY, AND CLINICAL OUTCOMES OF TRAUMA ADMISSIONS IN CHILDREN AGED 0–5 YEARS

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ABSTRACT

Objective: Children aged 0–5 years are highly susceptible to accidents due to incomplete development of motor skills, inability to evaluate environmental hazards, and dependence on adult supervision. This study aims to analyze the demographic characteristics, trauma etiology, and clinical outcomes of pediatric patients presenting to the emergency department to provide data for preventive measures and emergency management.

Materials and Methods: A total of 194 trauma cases aged 0–5 years who presented to the Emergency Department of Malatya Training and Research Hospital between January and June 2026 were retrospectively reviewed. Data obtained based on age, sex, type of injury, location of occurrence, and radiological imaging criteria were evaluated using descriptive statistical methods with SPSS software.

Results: Of the 194 cases examined, 73.2% (n=142) were male and 26.8% (n=52) were female. The primary cause of trauma was falls at 61.3%, followed by burns (14.4%), foreign body exposures (10.3%), sharp/penetrating instrument injuries (7.7%), and traffic accidents (6.2%). Most cases were preventable, indicating that the frequency of such incidents can be reduced through parental education and increased safety measures.

Keywords: Pediatric trauma, emergency department, demographic characteristics, prevention strategies.

INTRODUCTION AND OBJECTIVE

Injuries are the leading cause of preventable death in the pediatric population over 1 year of age worldwide. World Health Organization data show that accidents threaten millions of children and can lead to permanent disability. Children aged 0–5 years, who are newly acquiring skills such as walking and climbing, are at high risk as they cannot comprehend hazards.

In this age group, who spend most of their time at home, various events such as falls, scalding, poisonings, foreign body aspiration, and sharp object injuries can develop. Collecting local data, identifying risk factors, and developing community-based prevention strategies are of paramount importance. The objective of this study is to retrospectively examine the demographic characteristics, etiological factors, and clinical course of patients presenting to the emergency department in this age group.

MATERIALS AND METHODS

In this study, data from 194 patients aged 0–5 years who presented to the Emergency Department of Malatya Training and Research Hospital between January 1 and June 1, 2026, were retrospectively analyzed. Patients were grouped by sex and trauma mechanism (fall, burn, foreign body, sharp/penetrating injury, traffic accident); their monthly distribution was evaluated using descriptive statistical methods in SPSS software.

RESULTS

Demographic Data and Etiology

Of the 194 patients included in the study, 73.2% (n=142) were male and 26.8% (n=52) were female. The higher proportion in males can be explained by their higher activity levels and tendency toward risky behaviors. Socioeconomic status and inadequate parental supervision are also factors that increase the risk of domestic accidents.

Trauma Mechanism	Number of Patients (n)	Percentage (%)
Falls	119	61.3%
Burns	28	14.4%
Foreign Body	20	10.3%
Sharp/Penetrating Instrument Injury	15	7.7%
Traffic Accident	12	6.2%
Total	194	100%

The most common type of accident was falls at 61.3%. Fall cases were notably concentrated during the March–June period, corresponding to warmer weather and increased outdoor/balcony use. Burns ranked second (14.4%), mostly occurring as scalding from hot liquids in the kitchen and bathroom. Foreign body aspiration and ingestion ranked third (10.3%).

Clinical Outcomes

Injuries ranged broadly from simple soft tissue injuries to severe traumatic brain injuries. Head trauma represents the main source of morbidity and mortality in this age group. Additionally, extremity fractures (particularly elbow and wrist) as well as fluid loss and infection risks associated with burns are notable. Ingestion of corrosive substances or poisonings causing systemic toxicity are other factors that worsen the clinical course.

DISCUSSION AND CONCLUSION

Our data confirm, in line with the literature, that trauma in the 0–5 age group occurs most frequently in males and through fall mechanisms. The increase in fall cases during spring and summer months highlights the importance of seasonal prevention strategies.

A significant portion of domestic accidents is preventable. Simple measures such as installing window and stair safety locks, keeping hot liquids out of reach, and storing medications and chemicals in locked cabinets can substantially reduce injury frequency.

In conclusion, domestic trauma in children aged 0–5 years accounts for a significant portion of pediatric emergency admissions. Emergency department physicians' familiarity with this demographic and etiological profile will play a critical role both in case management and in public awareness efforts.

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M4511-Özet Metin

TRAUMATIC TESTICULAR EXTRUSION DUE TO BLUNT BICYCLE TRAUMA IN A PEDIATRIC PATIENT: A CASE REPORT

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Introduction:

Pediatric genital trauma, relatively rare compared to soft tissue contusions or extremity injuries, represents a critical surgical emergency requiring immediate diagnostic evaluation and intervention. In young children, blunt scrotal trauma frequently occurs as a result of supra-groin sitting mechanisms, sports-related impacts, or bicycle accidents. High-energy blunt force against fixed objects such as bicycle frames or handlebars can apply severe compressive stress to the scrotal sac, leading to scrotal rupture and open testicular dislocation or extrusion. Rapid clinical assessment and emergency intervention are crucial to ensure organ viability, prevent ischemic necrosis, and minimize potential long-term reproductive and endocrine complications.

Case Report:

We report a case of a 7-year-old boy who suffered acute testicular trauma when his scrotum struck the handlebars of his bicycle during a fall.

Physical examination revealed a tear in the scrotal wall and the right testicle protruding beyond the scrotal skin.



The patient's vital signs remained hemodynamically stable. Due to the lack of an on-call pediatric surgeon at our hospital, an urgent Urology consultation was requested. Following specialist urology evaluation, surgical treatment under general anesthesia was planned; this treatment included repositioning the testicle back into the scrotal sac and primary scrotal repair/suturing. The patient was admitted to the Urology department for preoperative preparation and definitive surgical care.

Conclusion:

Traumatic testicular extrusion is a rare and serious consequence of blunt trauma in pediatric patients. Rapid physical examination and clinical diagnosis are crucial to prevent ischemic organ damage. In emergency situations where a specialized pediatric surgery unit is not available, effective multidisciplinary collaboration with urology departments ensures timely surgical reduction, scrotal restoration, and preservation of testicular function.

Keywords: testicular trauma, scrotal injury, testicular repair

M4512-Tam Metin

ELECTRICAL INJURIES AND RESUSCITATION IN CHILDREN: A PERSPECTIVE BASED ON MEDIA-REPORTED CASES

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Objective

To examine media-reported pediatric electrical injuries and identify priorities for electrical safety, rescuer protection, and community resuscitation.

Methods

YouTube news videos identified using Turkish equivalents of “child electrical injury,” “child electric shock,” and “child electrical burn” were reviewed; duplicate reports were consolidated.

Results

Six incidents involved 11 children. Residential cases involved children aged 1.5 and eight years; the restaurant case involved a five-year-old. Reports differed regarding the park-lighting victim’s age. Balcony, bathroom, park-lighting, and restaurant incidents each involved one reported death. Five children on electric ride-on toys were reportedly well; one of two ornamental-pool victims died. Balcony footage showed the mother carrying her child without visible CPR (cardiopulmonary resuscitation); private transport was reported. These incomplete accounts cannot establish nonintervention or whether earlier intervention would have changed the outcome [1,2].

This selected sample’s five deaths and six survivors cannot establish representative mortality rates. Unconsciousness does not confirm arrest, and absent CPR reporting does not establish nonintervention. Initial rhythms, no-flow intervals, intervention details, ROSC (return of spontaneous circulation), and neurological outcomes were largely unavailable, precluding individual causal assessments.

Conclusion

Relevant literature emphasizes early recognition, scene safety, 112 activation, and bystander CPR [3,5,9,10,17]. Media reports highlight potential preparedness gaps rather than establish clinical effectiveness or justify blame [1,2,4]. Prevention requires infrastructure maintenance and inspection [1,2,4], including wiring, insulation, grounding, residual-current protective devices, and child-resistant sockets [7,8].

Power must be disconnected before contact; in high-voltage or infrastructure-related incidents, rescuers should maintain safe distances while authorized teams isolate power [7,8]. A relative’s electrical injury during the balcony rescue illustrates secondary risk [1]. Once the scene is safe, unresponsiveness with absent or abnormal breathing warrants immediate 112 activation and CPR [5,13,14,16]. Early CPR is associated with better survival and neurological outcomes, without establishing individual preventability [5,13,14,16]. Dispatcher guidance may increase

CPR initiation and may be associated with favorable neurological outcomes [3]. Higher ROSC rates with bystander CPR support early intervention without establishing pediatric electrical-injury-specific causality [9,10]. Dispatch evaluation should track arrest recognition, initial instructions, and first-compression timing [3,9,10].

Trained rescuers should add rescue breaths, as conventional pediatric CPR may be associated with better neurological outcomes [6]; those unable to ventilate should provide dispatcher-guided compressions [3,5,6]. Electrical current can trigger ventricular fibrillation, supporting early AED (automated external defibrillator) access [17]. AED use complements CPR; unnecessary compression interruptions should be avoided [9,10,17]. Burying victims offers no physiological benefit and risks infection, tetanus, and resuscitation delays [7]. Burn care follows stabilization [7,8]; private transport cannot replace CPR.

Repeated, practical school training should address fear and include rescue breaths [6]. Swedish training coincided with bystander CPR increasing from 31% to 55%, although this change cannot be attributed to one component [11,12]. Teacher-led instruction, family knowledge transfer, and one trained person per household are preparedness goals [11,12]. Registries should track CPR, compression delays, AED use, ROSC, survival to hospital discharge, and neurological outcomes [9,10,15].

Infrastructure safety and resuscitation capacity require integrated assessment [1,2,4]. Safe power isolation, early recognition, 112 activation, dispatcher-assisted CPR, ventilation, and appropriate AED use form complementary links in the chain of survival [3,6,8,17]. Ambulance waiting must not mean inactivity; coordinated electrical safety and community education should support early intervention.

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M4513-Tam Metin

WINDOW INSECT SCREENS AS AN INADEQUATE CHILD-SAFETY BARRIER: PEDIATRIC MULTITRAUMA FOLLOWING A FOURTH-FLOOR FALL

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Objective

Falls from windows are an important cause of preventable morbidity and mortality in young children. Although window screens are designed primarily to prevent insects from entering, they may be mistakenly perceived as safety barriers. Trauma is a leading cause of childhood morbidity and mortality, and many injuries are preventable through environmental modifications and injury-prevention strategies [1]. This case highlights severe pediatric multitrauma following detachment of a fiberglass window screen and emphasizes engineering-based prevention strategies.

Case Presentation

A three-year-five-month-old boy was evaluated after falling approximately 10 meters from a fourth-floor window. He had leaned against an insect screen installed on an open window, after which the screen detached and he fell onto a grass-covered soil surface. The incident occurred during a brief period when he was not directly accompanied by his family. Immediately after the fall, he was initially unresponsive but opened his eyes and responded when called.

Primary and secondary trauma assessments were performed. His pediatric GCS(Glasgow Coma Scale) score was 15 and vital signs were stable. Initial laboratory investigations showed hemoglobin 10.8 g/dL, AST 1037 U/L, and ALT 452 U/L. Cranial and cervical CT(Computed tomography) showed no acute pathology. Thoracic CT revealed a minimal right pneumothorax, approximately 1 cm hemothorax, right clavicle and seventh and eighth rib fractures. Abdominal CT demonstrated a 1.5-cm hepatic contusion, while pelvic imaging revealed a left femoral neck fracture.

The patient was transferred to our tertiary pediatric center. On admission, he was conscious and cooperative, with a GCS of 15; blood pressure was 114/74 mmHg, heart rate 124 beats/min, respiratory rate 32 breaths/min, and oxygen saturation 93%. eFAST demonstrated findings compatible with pneumothorax, without pericardial or intra-abdominal free fluid. Repeat laboratory testing showed hemoglobin 10.4 g/dL, AST 998 U/L, ALT 379 U/L, and high-sensitivity troponin I 0.294 ng/mL. The patient was evaluated by Pediatric Surgery, Orthopedics and Traumatology, Pediatrics, and Neurosurgery. No clinical deterioration occurred during emergency department observation, and he was admitted to Pediatric Surgery.

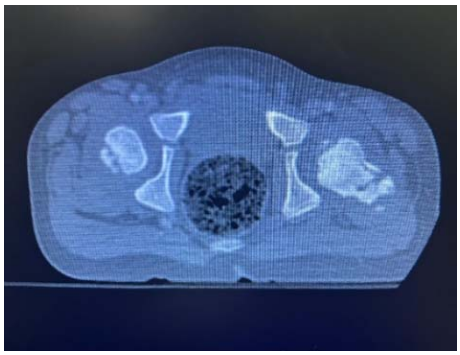


Fig. 1. Pelvic CT showing left femoral neck fracture.

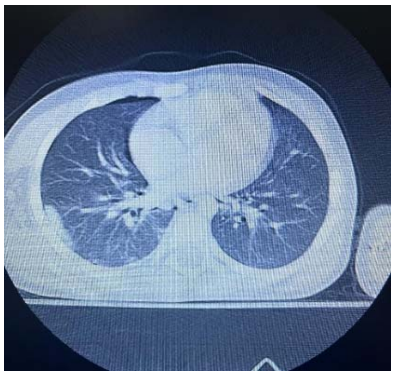


Fig. 2. Thoracic CT showing right pneumothorax and hemothorax.

Discussion

Falls from windows are an important cause of pediatric trauma, particularly among children younger than five years. Developmental characteristics, increasing mobility, curiosity, and limited hazard recognition make young children particularly vulnerable [2]. Harris et al. reported an estimated 98,415 children treated in United States emergency departments for window fall-related injuries between 1990 and 2008, with children aged 0–4 years having a greater risk of serious outcomes [3].

The distinctive feature of this case is that the child did not simply fall through an unprotected window; he leaned against an insect screen, which detached from its frame. Insect screens are designed to prevent insects from entering and are not structural barriers intended to withstand a child's weight. Their appearance may nevertheless create a false perception of protection.

Prevention should extend beyond caregiver supervision. Environmental modifications, window guards, and engineering-based interventions have been associated with reductions in injuries from falls from buildings [4]. Pediatric window falls may occur in various housing environments and are not limited to high-rise buildings [5]. Haddon emphasized modifying environmental factors to prevent injuries before they occur [6]. Accordingly, window-opening restrictors, child-resistant locking systems, mechanically durable protective barriers, appropriate safety standards, and clear product labeling should be considered. Caregiver education should complement these measures.

Conclusion

Window insect screens should not be considered child-safety or fall-prevention barriers. Their perceived protective function may create a false sense of security, while detachment can result in severe multitrauma. This case demonstrates the need for engineering-based prevention strategies, including window-opening restrictors, mechanically appropriate protective systems, safety testing, and parental education, to reduce potentially life-threatening pediatric window falls.

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M4514-Tam Metin

SECONDARY PNEUMOMEDIASTINUM IN CHILDREN A CASE REPORT

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Aim: Pneumomediastinum (PM) is characterized by the presence of free air in the mediastinal space and is classified as either spontaneous or traumatic. Although rare in childhood, traumatic pneumomediastinum (TPM) is a significant clinical finding that can indicate serious thoracic injuries. In this report, we present a pediatric case of TPM diagnosed following a simple, superficial skin laceration in the upper cervical region, despite normal physical examination findings. Our aim is to review the diagnosis and treatment process of a pediatric patient who developed TPM following a cervical injury—drawing on the literature—and to offer practical recommendations for the management of such cases.

Methods: A 2.5-year-old male patient presented after striking his left upper cervical region against iron bars while playing in a park. Physical examination revealed no pathological findings other than a 2-cm superficial skin laceration in the left submandibular region, approximately 2 cm lateral to the trachea. Radiological imaging (cervical CT) showed deep subcutaneous emphysematous changes in the soft tissues extending anteriorly into the mediastinum (Figure 1). Thoracic CT revealed air densities in the parapharyngeal space, the mediastinum, and the subcutaneous tissues adjacent to the course of the left carotid artery (Figure 2). Consultations were obtained from the departments of Thoracic Surgery and Otorhinolaryngology; the patient was transferred to a tertiary center capable of performing pediatric bronchoscopy and was admitted to the pediatric surgical intensive care unit. The patient was monitored closely; intravenous hydration, analgesic therapy, ceftriaxone, and an oral diet (Regimen 1) were initiated. Oral intake was gradually increased; no crepitus developed upon examination, and no drop in oxygen saturation occurred during follow-up. After a two-day hospitalization, the patient—who had no further complaints—was discharged with a prescription and a recommendation for a follow-up outpatient visit in two weeks.



Figure 1: The image shows a free-aired appearance on the left side of the neck.



Figure 2: Pneumomediastinum was observed on thoracic CT scan.

Results: Pneumomediastinum (PM) is defined as the presence of air within the mediastinum. PM can be classified as primary or secondary, or as spontaneous, iatrogenic, or traumatic. While the mechanism underlying primary PM often remains unclear, secondary PM can develop following trauma, infection, or interventional procedures involving the aerodigestive tract (Caceres, Braud, et al.). Although traumatic pneumomediastinum (TPM) is more common in children, it is a rare condition that can arise from various etiologies and occur even in the absence of trauma. Blunt chest trauma is the most frequent cause of secondary PM. Beyond thoracic trauma, TPM can also result from injuries to the head, neck, and oral cavity (DeMers et al.). Patients with TPM may present with symptoms such as dyspnea, chest pain, and cyanosis (Uscategui-Florez et al.). Clinical presentation may also include neck swelling, cough, dysphagia, nasal voice, rhinolalia, fever, anxiety, and fatigue (Mondello et al.). In children, the approach is conservative if vital signs are stable. Treatment involves a 24- to 48-hour observation period, bed rest, monitoring, and pain control via analgesia to reduce respiratory effort. Administration of high-flow 100% oxygen alters the partial pressure balance of gases in the mediastinum, thereby accelerating the absorption of nitrogen (nitrogen washout) and, consequently, the free air by the tissues. Oral intake is restricted until the suspicion of esophageal injury is completely ruled out. Pediatric patients with isolated TPM whose symptoms resolve during a 24–48 hour observation period, who have no concomitant injuries, and who show no increase in air volume on follow-up radiographs can be safely discharged with recommendations for activity restriction (avoiding heavy lifting and Valsalva maneuvers) and close outpatient follow-up. Early diagnosis and the use of appropriate imaging modalities are critical for preventing life-threatening complications. Early intervention in our patient prevented the development of complications and ensured discharge without sequelae.

Conclusion: It is emphasized that in pediatric cases—even with seemingly minor cervical trauma—systematic assessment, advanced imaging when necessary, and close monitoring are required to prevent the development of complications.

Key words: Trauma, Childhood, Mediastinal emphysema.

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M4515-Tam Metin

THE INTERMEDIATE-RISK GROUP IN MINOR PEDIATRIC HEAD TRAUMA: OBSERVATION OR COMPUTED TOMOGRAPHY? A SCOPING REVIEW BASED ON CURRENT EVIDENCE

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ABSTRACT

Objective: Although most cases of minor pediatric head trauma resolve without treatment, a small proportion of children may develop clinically important traumatic brain injury (ciTBI). This review aimed to compare the clinical decision rules used in minor pediatric head trauma and present a practical approach to choosing between observation and computed tomography (CT), particularly in intermediate-risk children.

Methods: This scoping review was conducted in accordance with the PRISMA-ScR and Joanna Briggs Institute recommendations. PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar were searched for studies published between January 1, 2020, and August 6, 2026. Foundational derivation and validation studies of clinical decision rules were reviewed without date restrictions. Clinical studies, systematic reviews, and guidelines evaluating patients younger than 18 years with blunt minor head trauma and a Glasgow Coma Scale score of 14–15 were included. The findings were synthesized comparatively and descriptively.

Results: PECARN was developed using the largest cohort and had undergone the most extensive external validation. Its sensitivity for ciTBI was reported as 100% in children younger than 2 years and 96.8% in those aged 2 years and older. Although CATCH2 demonstrated high sensitivity, it was associated with lower specificity and a higher predicted CT rate. CHALICE provided higher specificity but may miss some clinically important injuries. According to PECARN, the probability of ciTBI in the intermediate-risk group is approximately 0.8–0.9%. In stable children without high-risk criteria, structured observation for 4–6 hours from the time of injury may reduce CT utilization without delaying the diagnosis of ciTBI. CT should not be delayed in the presence of clinical deterioration, altered mental status, a focal neurological deficit, or signs of a skull fracture. When imaging is required, pediatric-specific low-dose protocols should be used. Rapid magnetic resonance imaging and point-of-care ultrasonography may be helpful in selected patients but do not replace CT in the initial evaluation of intracranial injury.

Conclusion: Imaging decisions in minor pediatric head trauma should be based on the combined assessment of risk level and clinical course. In intermediate-risk children, structured observation and selective imaging rather than routine CT may provide an appropriate balance between diagnostic safety and radiation protection.

Keywords: Pediatric head trauma, computed tomography, PECARN, clinical observation, radiation, rapid MRI, POCUS

INTRODUCTION

Acute head trauma is a common reason for emergency department visits during childhood. Most cases involve minor trauma with a Glasgow Coma Scale (GCS) score of 14–15 and resolve without requiring treatment. However, a small number of children may develop intracranial hemorrhage, cerebral contusion, or clinically important traumatic brain injury (ciTBI) requiring neurosurgical intervention [1,2]. Therefore, the primary objective is to identify significant injuries without delay while avoiding unnecessary imaging in low-risk children.

Non-contrast cranial computed tomography (CT) is the principal imaging modality for the rapid evaluation of acute hemorrhage and skull fractures. However, performing CT in all children is inappropriate because of its low diagnostic yield, associated costs, and exposure to ionizing radiation. Clinical decision rules such as PECARN, CATCH/CATCH2, and CHALICE have therefore been developed [2,9–11]. Current evidence supports structured observation and selective imaging rather than routine CT, particularly in the intermediate-risk group [1,3,6]. This review aims to compare clinical decision rules for minor pediatric head trauma and present a practical imaging approach for intermediate-risk children.

METHODS

This study was designed as a scoping review, and the PRISMA-ScR and Joanna Briggs Institute recommendations were followed for reporting [7,8]. PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar were searched for studies published between January 1, 2020, and August 6, 2026, using the terms “pediatric head trauma,” “computed tomography,” “PECARN,” “clinical observation,” “radiation,” “rapid MRI,” and “point-of-care ultrasound.” The foundational derivation and validation studies of the decision rules were reviewed without date restrictions. Clinical studies, systematic reviews, and guidelines evaluating patients younger than 18 years with blunt minor head trauma and a GCS score of 14–15 were included; moderate-to-severe or penetrating trauma and injuries related to abuse were excluded. Data extracted from the studies included the patient population, clinical decision rule used, CT rate, frequency of ciTBI, sensitivity, specificity, duration of observation, and diagnostic performance of alternative methods. Because of clinical and methodological heterogeneity, a meta-analysis was not performed; the findings were synthesized comparatively and descriptively.

CLINICAL DECISION RULES AND MANAGEMENT OF THE INTERMEDIATE-RISK CHILD

PECARN was developed using the largest cohort of children with minor blunt head trauma and is the clinical decision rule with the most extensive external validation. It evaluates children younger than 2 years separately from those aged 2 years and older. In the original study, the sensitivity for ciTBI was 100% and 96.8%, respectively. A multicenter prospective study published in 2024 also confirmed its reliability in identifying children at very low risk [2,3]. The purpose of PECARN is not to recommend CT for every positive finding but to identify children in whom CT can safely be avoided. A GCS score of ≤14, altered mental status, and a palpable skull fracture in children younger than 2 years or signs of a basilar skull fracture in those aged 2 years and older are high-risk indicators. In children younger than 2 years, intermediate-risk variables include a non-frontal scalp hematoma, loss of consciousness lasting at least 5 seconds, a severe mechanism of injury, or not acting normally according to the parent.

In children aged 2 years and older, loss of consciousness, vomiting, a severe mechanism of injury, and severe headache are intermediate-risk variables [2].

Table 1. Comparison of the principal decision tools for pediatric head trauma

Tool	Population	Core approach	Clinical interpretation
PECARN [2,3]	GCS 14–15; children <2 and ≥2 years assessed separately	No CT for very-low-risk patients; CT or observation for intermediate-risk patients	Highest sensitivity; clinical course guides management in intermediate-risk patients
CATCH2 [9,10]	Symptomatic patients with GCS 13–15	CT based on eight clinical variables	High sensitivity; low specificity and a higher CT rate
CHALICE [11,12]	Children <16 years; broad trauma population	CT if any history, examination, or mechanism criterion is present	Higher specificity; may miss some cases of ciTBI
NICE 2023 [4]	Children <16 years with head trauma	CT within 1 hour for high-risk patients; observation for ≥4 hours when a single intermediate-risk factor is present	Practical clinical pathway; not an independent clinical decision rule

CATCH2 was derived from the validation of CATCH by adding four or more episodes of vomiting and demonstrated a sensitivity of 99.5% for acute brain injury. However, its specificity of approximately 48% and the predicted CT rate in more than half of patients limit its ability to reduce unnecessary imaging [9,10]. In its derivation cohort, CHALICE demonstrated a sensitivity of approximately 98% and a specificity of 87% [11]. In a direct comparison study, PECARN showed the highest sensitivity for ciTBI, whereas CHALICE, despite being more specific, missed some clinically important injuries [12]. Therefore, PECARN may be used as the preferred risk-stratification tool in children with minor head trauma and a GCS score of 14–15. Nevertheless, clinical decision rules alone are insufficient in the presence of a bleeding disorder, inconsistency between the history of trauma and clinical findings, or suspected abuse [1].

According to PECARN, the probability of ciTBI is approximately 4% in the high-risk group and below 0.05% in the very-low-risk group. In the intermediate-risk group, the risk is approximately 0.8–0.9%, and the recommendation is “CT or observation” [2]. The presence of multiple risk factors, altered mental status, progressively worsening headache, recurrent vomiting, or neurological deterioration should favor CT. Very young age, the inability to ensure reliable observation, and difficulty returning to a healthcare facility may also lower the threshold for imaging. The decision should be based on the number and severity of risk factors together with the clinical course of symptoms, the physician’s experience, and the caregiver’s preference. Conversely, observation may be preferred in stable children with a GCS score of 15, a normal neurological examination, and isolated vomiting, brief loss of consciousness, a severe mechanism of injury, or a non-frontal scalp hematoma.

Current recommendations support serial neurological assessments for 4–6 hours from the time of injury in symptomatic children without high-risk criteria [1,4]. Longer observation has been associated with reduced CT utilization without delaying the diagnosis of ciTBI [13]. This process is not passive waiting but an active form of risk stratification involving repeated assessment of the level of consciousness, behavior, vomiting, headache, and neurological examination findings at predetermined intervals. Children whose symptoms improve and who maintain a GCS score of 15 with a normal examination may be discharged after caregivers are provided with return precautions for recurrent vomiting, worsening headache, altered consciousness, seizures, or abnormal behavior. CT should be performed if clinical deterioration occurs. This approach is consistent with current evidence demonstrating that interventions combining a clinical decision rule with structured observation can reduce CT ordering [6].

In practice, the first step is to assess the GCS score and perform a neurological examination. If altered mental status, a focal neurological deficit, or signs of a skull fracture are present, non-contrast CT should not be delayed. Imaging is not recommended in children without any PECARN variables. In children with only an intermediate-risk variable, observation should be initiated instead of performing immediate CT; imaging should be pursued if new findings emerge or existing symptoms worsen. Thus, the decision is based on the combined assessment of the level of risk and the clinical course rather than on a single finding at initial presentation.

RADIATION RISK AND ALTERNATIVE IMAGING

Children are more sensitive to ionizing radiation than adults. The EPI-CT cohort estimated that approximately 1–2 radiation-attributable hematological malignancies may develop among every 10,000 children and adolescents for each mean exposure of 8 mGy [5]. Because the absolute risk is low, this finding should not be interpreted as a reason to delay a clinically indicated CT examination. Appropriate patient selection is the most effective radiation-protection measure; when imaging is required, a low-dose protocol adjusted for the patient's age and body size should be used.

The standard examination for acute minor head trauma is non-contrast, single-phase cranial CT. The scan range should be restricted to the required anatomy, and the direct application of adult scanning parameters to children and unnecessary repeat examinations should be avoided. Automatic exposure control, iterative reconstruction, and monitoring of dose indices (CTDIvol and DLP) against institutional reference levels contribute to radiation-dose reduction [14]. Protocols defined according to age, head circumference, and patient size should be updated through regular dose audits conducted collaboratively by radiologists, emergency physicians, medical physicists, and radiologic technologists.

Rapid MRI does not involve ionizing radiation and may be considered in clinically stable children, particularly for follow-up imaging. However, because of motion artifacts, limited availability, and lower sensitivity for skull fractures, it should not replace emergency CT in high-risk patients [15]. Variations in protocols and hemorrhage-sensitive sequences among institutions also limit its routine use as a first-line imaging modality. POCUS may detect skull fractures in selected children with a localized scalp hematoma. Although a recent meta-analysis reported a sensitivity of 90% and a specificity of 98%, POCUS cannot evaluate intracranial injuries and should therefore be used only as an adjunct to clinical decision rules [16].

The role of these alternative modalities should be determined according to institutional resources. When an urgent surgical lesion is suspected or altered mental status or neurological deterioration is present, imaging should not be delayed, and CT should be preferred. The most appropriate role of radiation-free modalities is to support clinical decision-making in stable intermediate-risk patients and reduce the cumulative radiation burden in children requiring repeated imaging.

CONCLUSION

In minor pediatric head trauma, CT should not be delayed in high-risk patients, whereas imaging should be avoided in children at very low risk. In the intermediate-risk group, the primary approach should be 4–6 hours of structured observation and selective CT based on the clinical course rather than routine CT. When CT is required, pediatric-specific low-dose protocols should be used. Although rapid MRI and POCUS may be helpful in selected patients, they do not currently replace PECARN, serial neurological assessment, or clinical judgment.

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M4516-Tam Metin

ORGANIZATIONAL FAULT IN PEDIATRIC EMERGENCY DEPARTMENTS AND THE LEGAL LIABILITY OF THE ADMINISTRATION

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ABSTRACT

Introduction: Pediatric emergency departments are critical healthcare units due to the physiological characteristics of children and the rapid progression of their illnesses. Delays or disruptions in healthcare delivery may lead to serious consequences, arising not only from individual medical practices but also from deficiencies in service organization.

Objective: This study aimed to evaluate disruptions that may occur in the organization of healthcare services in pediatric emergency departments from the perspective of administrative law and to examine the legal liability of the administration arising from organizational fault in light of legislation, legal doctrine, and judicial decisions.

Materials and Methods: This qualitative legal and medical study reviewed constitutional provisions, pediatric emergency medicine and health law literature, and relevant judicial decisions on organizational fault in pediatric emergency departments.

Results: When legislation, literature, and judicial decisions were evaluated together, deficiencies related to staffing, infrastructure, and service organization in pediatric emergency departments were considered within the scope of organizational fault and could give rise to the legal liability of the administration due to service fault.

Conclusion: Not all adverse outcomes in pediatric emergency departments result from individual physician error. Systemic deficiencies in healthcare organization may also give rise to administrative liability due to service fault. Given the time-sensitive nature of pediatric emergencies, effective organization requires a high standard of care and should be evaluated from both medical and administrative law perspectives.

Keywords: Pediatric emergency, health law, administrative liability, service fault, organizational fault

Introduction

The administration comprises the State and public legal entities responsible for providing public services. In healthcare, this includes the Ministry of Health, university hospitals, city hospitals, training and research hospitals, and other public healthcare institutions. Its responsibilities extend beyond operating hospitals to organizing healthcare personnel, duty schedules, medical equipment, intensive care capacity, and the continuity of healthcare services. Therefore, adverse outcomes in pediatric emergency departments may result not only from medical treatment but also from organizational deficiencies attributable to the administration (1–3).

Administrative Liability for Healthcare Services

The administration is responsible for ensuring that public services, including healthcare, are provided continuously and properly (2). Healthcare services may be delivered directly by public authorities or by private entities under administrative supervision.

Article 56 of the Turkish Constitution requires the State to protect individuals' physical and mental health and to fulfill this obligation by utilizing and supervising public and private healthcare institutions (1). Accordingly, the administration has primary responsibility for the organization and supervision of healthcare services.

Damage arising during the provision of healthcare services may result in administrative liability, which is generally classified as fault-based liability (service fault) or strict liability (4). Service fault arises when healthcare services fail to function, function inadequately, or function with delay because of deficiencies in their organization, operation, or supervision (4,5). Fault-based liability requires that the resulting harm be attributable to a fault of the administration or a public official (4,5). Examples may include administering an inappropriate adult medication dose to an infant or failing to adequately investigate a child whose appendicitis is initially misdiagnosed, resulting in delayed treatment and serious complications.

Where a service fault exists, liability for the resulting damage is attributed to the administration rather than directly to its agents (5). A distinction is required, however, when the public official acts with personal fault. Personal fault refers to harm caused by conduct involving circumstances such as gross negligence, intent, bad faith, or personal hostility while performing a public service (6).

When a public official's fault is inseparable from the performance of public service, liability rests with the administration, since public officials are considered part of the administrative organization (6). The administration selects, trains, appoints, and authorizes its personnel; therefore, personal faults closely connected with the service are treated as service faults. This approach has also been adopted by the Turkish Council of State (7). Accordingly, compensation claims arising from faults inseparable from public service are primarily brought against the administration before administrative courts. The administration may subsequently seek recourse against the public official in proportion to their personal fault (4). In contrast, where

the personal fault is separable from the public service, the public official may be held directly liable (4).

The administration may also be subject to **strict liability** for damage arising from healthcare services even when no fault can be attributed to the administration or its personnel (8). For example, serious harm following a medically appropriate mandatory vaccination may give rise to liability despite the absence of any medical error.

Consequently, the administration bears responsibility for the provision of healthcare services. In public hospitals, organizational or operational deficiencies may give rise to liability based on service fault, whereas damage resulting from the inherent risks of healthcare services or broader social obligations may, under appropriate circumstances, result in strict liability even in the absence of fault, negligence, or organizational deficiency (9).

Administrative Liability in Pediatric Emergency Services

Emergency departments have a distinct role within healthcare services because they are designed to provide rapid intervention in life-threatening, time-sensitive conditions by minimizing bureaucratic, logistical, and physical barriers. Pediatric emergency departments require a separate organizational structure because children differ substantially from adults in their anatomy, physiology, psychology, and medical needs.

A. Critical Reasons for the Independent Organization of Pediatric Emergency Departments

Children are particularly vulnerable to emergencies because of their lower physiological reserves, immature immune systems, and the potential for rapid disease progression. Conditions such as dehydration, respiratory failure, infections, and neurological emergencies may rapidly deteriorate. Consequently, delays in diagnosis or treatment may result in permanent organ damage, neurological sequelae, or death. This vulnerability requires a high level of organization and coordination in pediatric emergency services.

Time is particularly critical in conditions such as sepsis, meningitis, status epilepticus, severe trauma, intussusception, testicular torsion, acute airway obstruction, and anaphylaxis. In these emergencies, organizational delays in diagnosis, treatment, consultation, or referral may lead to particularly serious consequences in pediatric patients.

B. Organizational Failures in Pediatric Emergency Services

Effective healthcare requires an organized structure encompassing adequate facilities and equipment, qualified personnel, patient safety, proper record keeping, protection of personal data, and compliance with professional duties (Hasan Özkan and Sunay Akyıldız, Hasta ve Hekim Hakları ve Yükümlülükleri, 1st ed., Seçkin Publishing, Ankara, 2008, pp. 432–433). In pediatric emergency departments, organizational deficiencies are particularly important because children may deteriorate rapidly.

1. Inadequate or inexperienced staff: Insufficient numbers of healthcare professionals experienced in pediatric emergencies may delay triage, assessment, diagnosis, and treatment. Increased workload may also impair patient safety and contribute to staff burnout.

2. Lack of appropriate equipment: Pediatric emergency departments require equipment suitable for different ages and body sizes. For example, airway equipment must be available in appropriate sizes for infants and older children. Deficiencies in monitoring devices or temperature-control equipment may similarly compromise patient safety.

3. Inadequate duty scheduling: Duty schedules that do not reflect patient volume and clinical needs may result in insufficient specialist coverage. Lack of adequate pediatric specialists, subspecialty support, or backup personnel may delay diagnosis, treatment, and consultation.

4. Failures in the referral system: Limited pediatric intensive care capacity, delays in patient acceptance, bureaucratic barriers, inappropriate referrals, inadequate pediatric transport resources, and incomplete transfer of medical information may delay definitive care and increase clinical risk.

5. Hospital Information Management System (HIMS) failures: System outages or errors may prevent timely access to previous medical records, laboratory and imaging results, medications, allergies, and chronic diseases. They may also disrupt consultation and referral processes, resulting in treatment delays, repeated investigations, and patient safety risks.

6. Laboratory and imaging delays: Because children may deteriorate rapidly, delays in diagnostic testing can postpone diagnosis and treatment. This is particularly important in time-sensitive conditions such as sepsis and meningitis. Delayed processing may also require repeated blood sampling in children. Furthermore, delayed laboratory or imaging results may prolong emergency department occupancy, restrict bed availability, and consequently delay care for newly arriving critically ill patients.

Table 1. Clinical consequences of organizational failures

Organizational Failure	Clinical Consequence
Staff shortage	Delayed examination
Incorrect triage	Critical patient waits
Laboratory delay	Delayed treatment
CT delay	Delayed diagnosis
Lack of ICU capacity	Delayed referral
Lack of ambulance	Delayed transfer
HIMS failure	Medication/dosage errors

C. Evaluation of Administrative Liability in Light of Judicial Decisions

Under Article 125 of the Turkish Constitution, the administration is liable for damages arising from its acts and actions (1). Accordingly, deficiencies in the organization and operation of

healthcare services may constitute a service fault. In pediatric emergency departments, where patients are particularly vulnerable and timely intervention is critical, organizational deficiencies are assessed more strictly within the framework of the objective duty of care (8).

Several decisions of the Turkish Council of State illustrate this approach. In one case involving a child who presented to the emergency department with a finger injury, the patient was treated and discharged without orthopedic consultation. Although the subsequent condition was considered a complication, the Council of State regarded the failure to provide orthopedic consultation during the initial admission as an organizational failure in healthcare delivery (Council of State, 15th Chamber, E.2014/5867, K.2015/2320, 21.04.2015) (10).

In another case, a newborn with respiratory distress and cyanosis required transfer because of insufficient neonatal intensive care capacity. Further transfer to a more advanced center was delayed because of the lack of available beds, and the infant subsequently died. The Council of State concluded that, despite the absence of physician fault, deficiencies in diagnostic facilities, intensive care capacity, and the failure to develop alternative solutions for an urgent patient demonstrated that the healthcare service had not been properly organized and constituted a service fault (Council of State, 15th Chamber, E.2013/3865, K.2014/1691, 12.03.2014) (11). Similarly, organizational liability may arise when diagnosis is delayed in a pediatric patient and necessary surgical consultation is not obtained promptly despite critical findings, such as marked leukocytosis, particularly when these failures contribute to a fatal outcome.

In another decision, the court emphasized that healthcare institutions and professionals must comply with current medical standards and exercise a high degree of care throughout diagnosis and treatment. This obligation is particularly important in pediatric patients, who may be unable to clearly express their symptoms. Therefore, objective findings, such as marked leukocytosis, should be carefully evaluated together with the clinical condition. Failure to obtain timely consultation from relevant specialists when the diagnosis remains uncertain or the patient's condition deteriorates may constitute a breach of medical standards. Serious outcomes resulting from such delays cannot necessarily be regarded as mere complications. On this basis, the court found an organizational fault attributable to the administration (12).

Another case concerned the assignment of resident physicians undergoing specialty training in non-emergency disciplines to mandatory emergency department duties, including triage, in order to address staffing shortages. In its decision dated September 17, 2014 (E.2014/6295), the 5th Chamber of the Council of State considered the administration's use of duty schedules contrary to applicable regulations to compensate for personnel shortages in pediatric emergency services as an administrative fault (13).

CONCLUSION

Not all adverse outcomes in pediatric emergency departments result from physician error. Organizational deficiencies, inadequate staffing, infrastructure problems, and failures in coordination may also give rise to administrative liability as service faults. Given the time-sensitive nature of pediatric emergencies, the administration’s duty to properly organize healthcare services requires a particularly high standard of care.

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M4517-Tam Metin

EXERCISE-INDUCED BRONCHOCONSTRICTION IN SCHOOL-AGED CHILDREN BORN VERY PRETERM: PREVALENCE AND ASSOCIATED CLINICAL FACTORS

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OBJECTIVE

Children born very preterm may have persistent airway abnormalities into school age. Exercise-induced bronchoconstriction (EIB) can cause dyspnea, cough, wheezing, and activity limitation, yet objective data in this population remain limited (1,2). This study aimed to determine the prevalence of EIB in children born at <=32 weeks of gestation using a standardized exercise challenge and to examine associated neonatal, atopic, and pulmonary function characteristics. We also examined whether routinely available neonatal and clinical variables could identify children at higher risk of exercise-related airway dysfunction during long-term follow-up.

METHODS

This single-center cross-sectional observational study included 42 children born at <=32 weeks and assessed at 7-8 years. Perinatal and neonatal data were obtained from medical records. Baseline spirometry followed American Thoracic Society/European Respiratory Society standards (3). Participants completed a treadmill challenge at 85-90% of age-predicted maximum heart rate for at least 6 minutes. Spirometry was repeated 5, 10, 15, and 30 minutes after exercise. EIB was defined as a >=10% fall in forced expiratory volume in one second (FEV1) from baseline at any post-exercise time point, according to the American Thoracic Society guideline (4). EIB-positive and EIB-negative groups were compared using appropriate parametric or nonparametric tests; $p<0.05$ was significant.

RESULTS

Of the 42 children, 27 (64.2%) were girls. Median age was 7 years (range, 7-8), median gestational age 29 weeks (25-32), and median birth weight 1.23 kg (0.75-2.35). Bronchopulmonary dysplasia was present in 13 (31.0%), neonatal sepsis in 28 (66.7%), and mechanical ventilation had been required in 17 (40.5%). EIB was identified in 13 children (31.0%) despite relatively preserved baseline spirometry. The principal exercise challenge findings are shown in Table 1. Dyspnea was the most frequent exercise-related symptom (38.0%); 9.5% required bronchodilator treatment after testing.

Table 1. Baseline spirometric and exercise challenge findings

Variable	Result
FEV1, % predicted, mean +/- SD	89.19 +/- 8.48

FVC, % predicted, mean +/- SD	82.69 +/- 7.83
FEF25-75, % predicted, mean +/- SD	101.92 +/- 23.02
Overall, EIB positivity	13 (31.0%)
EIB positivity at 5 min	4 (9.5%)
EIB positivity at 10 min	7 (16.7%)
EIB positivity at 15 min	5 (11.9%)
EIB positivity at 30 min	4 (9.5%)

Children with EIB (n=13) and without EIB (n=29) did not differ significantly in gestational age, birth weight, bronchopulmonary dysplasia, neonatal apnea, mechanical ventilation, oxygen therapy duration, neonatal intensive care unit stay, asthma, family history of asthma, total immunoglobulin E, or eosinophil count (all $p>0.05$). Baseline FEV1 and forced expiratory flow at 25-75% of forced vital capacity (FEF25-75) were numerically higher in the EIB-positive group, but the differences were not significant. Selected comparisons are presented in Table 2. These findings reflect the heterogeneity of post-prematurity respiratory outcomes and indicate that neonatal history or resting spirometry alone may not identify exercise-related airway narrowing (1,5).

Table 2. Selected clinical and neonatal comparisons according to EIB status

Variable	EIB (+), n=13	EIB (-), n=29	p value
Gestational age, weeks, median (min-max)	31 (25-32)	29 (26-32)	0.519
Birth weight, kg, median (min-max)	1.4 (0.75-2.0)	1.2 (0.8-2.35)	0.747
BPD, n (%)	2 (15.4)	11 (37.9)	0.278
Mechanical ventilation, n (%)	3 (23.1)	14 (48.3)	0.231
Baseline FEV1, % predicted, mean +/- SD	93.23 +/- 10.07	87.37 +/- 7.14	0.075
Baseline FEF25-75, % predicted, mean +/- SD	112.30 +/- 27.93	97.27 +/- 19.22	0.096
Total IgE, IU/mL, median (min-max)	39.5 (5.7-194)	60.8 (12.7-552)	0.501

EIB: exercise-induced bronchoconstriction; BPD: bronchopulmonary dysplasia; FEV1: forced expiratory volume in one second; FVC: forced vital capacity; FEF25-75: forced expiratory flow at 25-75% of FVC; IgE: immunoglobulin E.

CONCLUSION

EIB was detected in approximately one-third of school-aged children born very preterm despite relatively preserved baseline spirometry. No conventional demographic, neonatal, atopic, or

baseline pulmonary function characteristic clearly distinguished children with EIB. Objective exercise challenge testing may therefore add clinically useful information, particularly for preterm-born children with exertional dyspnea, cough, wheezing, reduced exercise performance, or avoidance of physical activity. This approach assessed whether resting evaluation could miss clinically important dynamic obstruction during physical activity.

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M4518-Tam Metin

EIGHT-YEAR MULTIDOMAIN MORBIDITY AFTER VERY PRETERM BIRTH AND ASSOCIATED PERINATAL AND NEONATAL FACTORS

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OBJECTIVE

Advances in neonatal care have improved survival after very preterm birth, shifting attention toward long-term health and functional outcomes. Neurodevelopmental, behavioral, academic, respiratory, sensory, and growth-related difficulties may persist into school age [1,2], and these problems may cluster as multimorbidity [3]. This study aimed to determine the burden of morbidity and multimorbidity at 7–8 years of age among children born very preterm and to examine associated perinatal and neonatal factors.

METHODS

This single-center observational cohort study included 63 children followed in a tertiary neonatal intensive care unit and assessed at 7–8 years of age. Perinatal and neonatal data were obtained retrospectively from medical records. Long-term outcomes were assessed through clinical evaluation, parental interviews, and existing records across five domains: respiratory, neurological/neurodevelopmental, sensory, growth-related, and educational/behavioral. Morbidity involving two or more domains was defined as multimorbidity. Categorical variables were compared using the Pearson chi-square or Fisher exact test and continuous variables using the Mann–Whitney U test. A two-sided $p<0.05$ was considered statistically significant.

RESULTS

Among the 63 children, 26 (41.3%) were male. Median gestational age was 30 weeks (range, 25–32) and median birth weight was 1.23 kg (range, 0.52–2.38). Fifteen children (23.8%) were small for gestational age (SGA). Neonatal sepsis occurred in 37 (58.7%), bronchopulmonary dysplasia in 19 (30.2%), and intraventricular hemorrhage in 12 (19.0%). At school age, 44 children (69.8%) had morbidity in at least one domain and 24 (38.1%) had multimorbidity. Educational/behavioral morbidity was the most frequent domain. The main long-term outcomes are summarized in Table 1.

Table 1. Main morbidity outcomes at 8 years of age

Outcome	n (%)
Any morbidity	44 (69.8)
≥2 morbidity domains	24 (38.1)
Educational/behavioral morbidity	37 (58.7)
Respiratory morbidity	27 (42.9)
Neurological/neurodevelopmental morbidity	20 (31.7)
Sensory morbidity	18 (28.6)
Growth-related morbidity	18 (28.6)
Moderate-to-poor mathematics performance	17 (27.0)

Attention-deficit/hyperactivity disorder	13 (20.6)
Speech and language delay	18 (28.6)

Growth-related morbidity was associated with lower birth weight and SGA status, consistent with previous evidence in very preterm children born SGA [4]. Neurological/neurodevelopmental morbidity was associated with chorioamnionitis, longer continuous positive airway pressure (CPAP) treatment, longer oxygen therapy, and neonatal sepsis. These statistically significant associations are summarized in Table 2. The association between neonatal sepsis and later neurodevelopmental morbidity is also supported by systematic evidence in very preterm infants [5]. No statistically significant associations were identified between the evaluated perinatal or neonatal factors and respiratory or educational/behavioral morbidity.

Table 2. Significant perinatal and neonatal factors associated with morbidity domains

Morbidity domain	Associated factor	Finding	p value
Growth-related	Birth weight	Median 0.97 kg (0.52–2.22)	0.006
Growth-related	SGA	12/18 (66.7%)	<0.001
Neurological/neurodevelopmental	Chorioamnionitis	8/20 (40.0%)	0.03
Neurological/neurodevelopmental	CPAP duration	Median 16 days (2–82)	0.04
Neurological/neurodevelopmental	Oxygen therapy duration	Median 14 days (4–96)	0.01
Neurological/neurodevelopmental	Neonatal sepsis	16/20 (80.0%)	0.03

SGA: small for gestational age; CPAP: continuous positive airway pressure.

CONCLUSION

Children born very preterm carry a substantial multidomain morbidity burden into school age. Educational and behavioral difficulties were particularly common, indicating that follow-up should extend beyond major neurological and respiratory sequelae. Lower birth weight and SGA status were associated with growth-related morbidity, whereas chorioamnionitis, neonatal sepsis, and longer respiratory support were associated with neurological/neurodevelopmental morbidity. These findings support multidisciplinary and multidimensional follow-up of very preterm children through school age.

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M4519-Tam Metin

PERIPHERAL AIRWAY DYSFUNCTION ASSESSED BY IMPULSE OSCILLOMETRY IN SCHOOL-AGED CHILDREN BORN PRETERM

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OBJECTIVE

Preterm birth may interrupt alveolar and peripheral airway development, and respiratory abnormalities can persist into school age (1,2). Impulse oscillometry (IOS) measures respiratory resistance and reactance during tidal breathing and may detect peripheral airway abnormalities not apparent on conventional testing (3). We aimed to compare IOS parameters between school-aged children born at ≤32 weeks of gestation and healthy term-born controls, determine the frequency of abnormal findings, and assess whether differences persisted after anthropometric adjustment.

METHODS

This single-center cross-sectional comparative study included 46 children born at ≤32 weeks and 40 independently recruited healthy term-born controls. IOS was performed according to European Respiratory Society standards (3). R5, R20, R5–R20, X5, X20, area of reactance (AX), and resonance frequency (Fres) were recorded. Parameter-specific z-scores were calculated using published reference equations (4,5). Abnormality was defined as $z>+1.645$ for R5, R20, R5–R20, AX, and Fres and $z<-1.645$ for X5 and X20. Multivariable linear regression adjusted for age, height z-score, and weight z-score.

RESULTS

The preterm group was a median gestational age of 29 weeks (Q1–Q3, 28–32); 34.8% had bronchopulmonary dysplasia, 41.3% required mechanical ventilation, and 87.0% received continuous positive airway pressure. Children born preterm had significantly higher R5, R5–R20, and AX than controls, whereas R20, X5, X20, and Fres did not differ significantly (Table 1). R5–R20 was the most frequently abnormal parameter, affecting 16/46 children (34.8%); abnormal R5 and AX occurred in 26.1% and 21.7%, respectively. After adjustment for age, height z-score, and weight z-score, prematurity remained associated with higher R5, R5–R20, and AX (Table 2). Sensitivity analyses excluding children with asthma and/or recurrent wheezing produced similar findings. Within the preterm cohort, R5–R20 was not significantly associated with gestational age, bronchopulmonary dysplasia, mechanical ventilation, oxygen duration, neonatal intensive care stay, total IgE, or peripheral eosinophil count. Height and weight z-scores were lower in the preterm group ($p=0.016$ and $p=0.024$), making anthropometric adjustment particularly relevant. The adjusted models explained 12.2%, 25.1%, and 12.5% of the variance in R5, R5–R20, and AX, respectively.

Table 1. Key between-group oscillometric findings

Variable	Preterm (n=46)	Control (n=40)	p
R5, kPa·s/L	0.75 (0.56–0.83)	0.48 (0.43–0.70)	0.001
R5–R20, kPa·s/L	0.37 (0.24–0.49)	0.19 (0.12–0.24)	0.001
AX, kPa/L	2.93 (1.98–3.82)	1.41 (1.11–2.74)	0.001
R20, kPa·s/L	0.36 (0.30–0.45)	0.33 (0.25–0.45)	0.459

Values are median (Q1–Q3). R5: resistance at 5 Hz; R20: resistance at 20 Hz; R5–R20: frequency-dependent difference in resistance; AX: area of reactance.

Table 2. Association of prematurity status with IOS outcomes after adjustment for age, height z-score, and weight z-score

Outcome	Adjusted B (95% CI)	β	p
R5	0.149 (0.047–0.252)	0.329	0.005
R5–R20	0.181 (0.101–0.260)	0.474	<0.001
AX	1.007 (0.393–1.621)	0.370	0.002

B: unstandardized regression coefficient; β: standardized regression coefficient; CI: confidence interval.

CONCLUSION

School-aged children born preterm showed persistent differences in respiratory mechanics, particularly in peripheral airway resistance. The approximately twofold higher median R5–R20 and persistence of differences after anthropometric adjustment suggest that smaller body size alone does not explain the findings. IOS may provide complementary information during follow-up. Longitudinal studies should establish the prognostic significance of these abnormalities.

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M4522-Tam Metin

PREDICTABILITY OF LENGTH OF HOSPITAL STAY IN PEDIATRIC APPENDICITIS: EVALUATION OF THE CLINICAL VALUE OF THE C-REACTIVE PROTEIN-TO-ALBUMIN RATIO (CAR)

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ABSTRACT

Title: Predictability of Length of Hospital Stay in Pediatric Appendicitis: Evaluation of the Clinical Value of the C-Reactive Protein-to-Albumin Ratio (CAR)

Objective

Acute appendicitis is one of the leading causes of emergency abdominal surgery in children and is associated with increased morbidity and prolonged length of hospital stay (LOS) when diagnosis is delayed. Conventional inflammatory biomarkers, such as white blood cell (WBC) count and C-reactive protein (CRP), have limited accuracy in predicting disease severity. This study aimed to evaluate the association between the C-reactive protein-to-albumin ratio (CAR), other inflammatory parameters, and length of hospital stay in pediatric patients with acute appendicitis.

Materials and Methods

This retrospective study included 41 patients aged 0–18 years who were diagnosed with acute appendicitis at the Pediatric Emergency Department of Malatya Training and Research Hospital between May 2026 and August 2026. Demographic characteristics, laboratory parameters (white blood cell count, neutrophil count, monocyte count, hemoglobin, CRP, and albumin), CAR values, and length of hospital stay were recorded. Data distribution was assessed using the Shapiro–Wilk test. Correlations between laboratory parameters and hospital stay were analyzed using Spearman's correlation analysis. A p value <0.05 was considered statistically significant.

Results

Among the 41 patients included in the study, 13 (31.7%) were female and 28 (68.3%) were male. The mean age was 12.41 ± 3.36 years, and the mean length of hospital stay was 5.75 ± 2.66 days. The mean CRP level and CAR were 26.43 ± 32.10 mg/L and 0.61 ± 0.77, respectively.

Correlation analysis demonstrated a significant positive association between length of hospital stay and both CRP (r = 0.495, p = 0.001) and CAR (r = 0.582, p = 0.001). Compared with CRP, CAR showed a stronger correlation with hospital stay (r = 0.582 vs. r = 0.495). No significant associations were found between length of hospital stay and age, white blood cell count, neutrophil count, monocyte count, hemoglobin level, or albumin level (p > 0.05).

Conclusion
Both CRP and CAR were significantly associated with the length of hospital stay in pediatric patients with acute appendicitis. However, CAR demonstrated a stronger correlation than CRP alone. As an inexpensive and easily calculated biomarker requiring no additional laboratory testing, CAR may serve as a valuable predictor of hospital stay in pediatric appendicitis patients presenting to the emergency department.

Keywords: Pediatric appendicitis; C-reactive protein-to-albumin ratio; CAR; length of hospital stay; inflammation; pediatric emergency medicine.

INTRODUCTION

Acute appendicitis is the most common cause of an acute abdomen requiring emergency surgical intervention during childhood [1,2]. In pediatric patients, factors such as atypical clinical presentation, communication difficulties, and poor cooperation during physical examination complicate the diagnostic process, thereby increasing the risk of complications including perforation, abscess formation, and peritonitis [3,4]. Delayed diagnosis not only increases morbidity but also significantly prolongs the length of hospital stay (LOS) and healthcare costs [4,5].

In addition to clinical assessment, laboratory parameters are widely used in the diagnosis of pediatric appendicitis and in evaluating disease severity [6]. White blood cell (WBC) count, absolute neutrophil count, and C-reactive protein (CRP) levels are the most commonly used conventional inflammatory biomarkers in routine clinical practice [6,7]. However, the limited sensitivity and specificity of these markers when used individually have highlighted the need for more reliable and dynamic biomarkers [7,8].

In recent years, composite indices reflecting both the systemic inflammatory response and nutritional/acute-phase status have attracted increasing attention [8,9]. One such index is the C-reactive protein-to-albumin ratio (CAR), which is calculated by dividing the serum CRP level, a positive acute-phase reactant, by the serum albumin level, a negative acute-phase reactant [9,10]. CAR has been reported to more accurately reflect both the severity of systemic inflammation and tissue injury and to demonstrate a stronger correlation with clinical outcomes than conventional inflammatory markers [8,10].

The present study aimed to evaluate the clinical and laboratory characteristics of pediatric patients with acute appendicitis, with particular emphasis on CAR and conventional inflammatory biomarkers, and to investigate their association with the length of hospital stay.

MATERIALS AND METHODS

This retrospective study was conducted by reviewing the medical records of patients admitted to the Pediatric Emergency Department of Malatya Training and Research Hospital with a preliminary diagnosis of acute appendicitis. A total of 41 pediatric patients aged 0–18 years who were diagnosed and treated between May 2026 and August 2026 were included in the study. Ethical approval was obtained from the Institutional Clinical Research Ethics Committee, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

The inclusion criteria comprised pediatric patients presenting with acute abdominal pain who were diagnosed with acute appendicitis based on clinical, ultrasonographic, and/or laboratory findings, had complete blood count, CRP, and serum albumin measurements obtained at admission, and whose length of hospital stay was completely documented. Patients with incomplete medical or laboratory records, known chronic liver, kidney, rheumatologic, or hematologic diseases, or active infections or malignancies other than appendicitis were excluded from the study.

Demographic characteristics, laboratory findings obtained at emergency department admission, and length of hospital stay were retrieved from the Hospital Information Management System (HIMS). Laboratory parameters included white blood cell count, neutrophil count, monocyte count, hemoglobin, C-reactive protein (CRP), and serum albumin. The C-reactive protein-to-albumin ratio (CAR) was calculated by dividing the CRP level by the serum albumin concentration measured at admission.

Statistical analyses were performed using IBM SPSS Statistics software. The normality of continuous variables was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Normally distributed variables were expressed as mean ± standard deviation (SD), whereas non-normally distributed variables were reported as median and interquartile range (IQR). Categorical variables were presented as frequencies and percentages. Spearman's rank correlation analysis was used to evaluate the relationship between laboratory parameters and length of hospital stay. A p value <0.05 was considered statistically significant.

RESULTS

A total of 41 pediatric patients diagnosed with acute appendicitis were included in the study. Of these, 13 (31.7%) were female and 28 (68.3%) were male.

The normality of the data was assessed using the Shapiro–Wilk test. Albumin, white blood cell count, neutrophil count, monocyte count, and hemoglobin were normally distributed, whereas age, CRP, length of hospital stay, and the C-reactive protein-to-albumin ratio (CAR) showed non-normal distributions ($p<0.05$).

The mean age of the patients was 12.41 ± 3.36 years (median: 13.0 years). The median length of hospital stay was 5 days (IQR: 4–7 days). The median CRP level was 10.5 mg/L (IQR: 3.0–38.7 mg/L), the mean serum albumin level was 44.72 ± 2.90 g/L, and the median CAR was 0.22 (IQR: 0.0621–0.8647). The median white blood cell count was 14.13 × 10^3/μL (IQR: 10.76–17.64 × 10^3/μL), while the mean neutrophil count, monocyte count, and hemoglobin level were 11.16 ± 4.94 × 10^3/μL, 0.94 ± 0.39 × 10^3/μL, and 13.53 ± 1.17 g/dL, respectively.

Spearman's correlation analysis demonstrated a statistically significant moderate positive correlation between length of hospital stay and both CRP ($r = 0.495$, $p = 0.001$) and CAR ($r = 0.582$, $p = 0.001$). CAR exhibited a stronger correlation with length of hospital stay than CRP alone ($r = 0.582$ vs. $r = 0.495$). In contrast, no statistically significant correlations were found between length of hospital stay and age, white blood cell count, neutrophil count, monocyte count, hemoglobin level, or serum albumin level ($p>0.05$).

DISCUSSION

Acute appendicitis is one of the most common causes of acute abdomen in pediatric emergency departments and is associated with increased complications and prolonged hospitalization when diagnosis is delayed [1,3]. In the present study, the mean length of hospital stay was 5.75 days. Previous studies have demonstrated that the duration of hospitalization in pediatric appendicitis is closely associated with the severity of inflammation and the levels of inflammatory biomarkers at presentation [1,5]. Delayed diagnosis may exacerbate the inflammatory process, thereby prolonging hospitalization.

We found significant positive correlations between length of hospital stay and both CRP ($r = 0.495$) and CAR ($r = 0.582$) measured at admission. Similarly, Fennell et al. reported that elevated CRP levels were associated with greater disease severity and longer hospitalization in children presenting to the emergency department with acute appendicitis [5].

A notable finding of our study was that CAR demonstrated a stronger correlation with length of hospital stay than CRP alone. Likewise, Hou et al. reported that CAR had superior diagnostic accuracy compared with conventional inflammatory markers for diagnosing complicated appendicitis and monitoring clinical outcomes in pediatric patients [10]. This superior performance may be explained by the fact that CAR combines both a positive acute-phase reactant (CRP) and a negative acute-phase reactant (albumin), providing a more comprehensive assessment of inflammatory burden and tissue injury [8,10]. Therefore, evaluation of both positive and negative acute-phase reactants may improve the assessment of inflammatory status.

In contrast, no significant association was observed between length of hospital stay and white blood cell count, neutrophil count, or hemoglobin level. Similarly, Atema et al. emphasized that conventional cellular inflammatory markers alone have limited ability to predict disease severity in children with suspected acute appendicitis and should ideally be complemented by additional biomarkers [6,7]. Moreover, leukocytosis may be influenced by factors other than appendicitis, such as vomiting or physiological stress.

Overall, our findings suggest that CAR, an inexpensive and easily calculated index, may be a more reliable biomarker than CRP alone for predicting clinical course and length of hospital stay in pediatric acute appendicitis. Nevertheless, the present study has several limitations, including its single-center retrospective design and relatively small sample size. Larger, multicenter prospective studies are warranted to validate these findings.

CONCLUSION

In this study, we evaluated the clinical value of C-reactive protein (CRP) and the C-reactive protein-to-albumin ratio (CAR) in predicting the length of hospital stay among pediatric patients presenting to the emergency department with acute appendicitis.

Our findings demonstrated that both CRP and CAR were significantly and positively associated with the length of hospital stay. These results are consistent with previous studies indicating that acute-phase reactants measured at presentation are closely related to disease severity and prolonged hospitalization.

The principal finding of this study was that CAR showed a stronger correlation with length of hospital stay than CRP alone. This observation supports previous evidence suggesting that composite biomarkers incorporating both positive and negative acute-phase reactants provide a more accurate reflection of the inflammatory burden than conventional inflammatory markers.

In conclusion, CAR is an inexpensive, readily available biomarker that can be easily calculated from routine laboratory tests without incurring additional costs. Compared with CRP alone, CAR appears to be a more effective predictor of clinical course and length of hospital stay in pediatric patients with acute appendicitis. Early incorporation of CAR into routine clinical practice may improve patient management and facilitate more efficient healthcare resource planning.

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M4523-Tam Metin

AN ANALYSIS OF THE PRE-RADIOTHERAPY PROCESS IN CHILDHOOD PONTINE TUMORS: A RADIATION ONCOLOGY PERSPECTIVE

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ABSTRACT

Introduction / Aim

Pontine tumors carry a poor prognosis and are treated with radiotherapy (RT); their presentation may mimic other diseases. This study examined the diagnostic and referral pathways followed at our center according to patients' unit of first admission.

Methods

Data from 22 patients treated between April 2015 and March 2026 were retrospectively reviewed (median age 9 years, range 5–15). Eight patients (36.3%) were diagnosed by biopsy as H3K27- mutant midline glioma; the remainder received a radiological diagnosis via contrast-enhanced cranial MRI. Presenting findings were brainstem signs (n=10), ocular signs (n=7), and altered consciousness/increased intracranial pressure (ICP) (n=5). First admission was to the emergency department (n=8, altered consciousness/ICP or brainstem signs), pediatric outpatient clinic (n=5,brainstem or ocular signs), ophthalmology clinic (n=5, strabismus/eye deviation), or neurosurgery (n=4, ICP or altered consciousness); emergency patients were referred onward after CT/MRI. Patient-related delay (PRD), total duration, and healthcare system duration (HSD) were calculated as mean (±SD, min–max) days.

Results

Median follow-up was 13 months; 2-year survival was 16.7% (Figure 1). PRD averaged 17.5±14.5 days (range 1–58), varying by symptom: altered consciousness 2.50±0.70, brainstem signs 11.50±9.43, ICP 13.3±7.31, and strabismus/eye deviation 28.14±17.7 days. Total duration was 43.3±28.04 days and HSD was 31.5±27.6 days. Time from first intervention to reaching the treatment clinic averaged 14.31±23.23 days.

Conclusion

Presenting symptoms largely determine the management pathway of pontine tumors. An active National Referral Chain may help shorten the time to reach treatment centers.

Keywords: Poor prognosis, pediatric pontine tumor, radiotherapy, national referral chain

INTRODUCTION

Diffuse pontine gliomas (DIPG) are childhood tumors with a poor prognosis.The clinical presentation of patients varies widely and can mimic other diseases. Cerebellar dysfunction and

cranial nerve deficits are the most common symptoms. Diagnosis is based on the patient's clinical presentation and radiographic findings of the tumor within the pons. Magnetic resonance imaging (MRI) is the gold standard for diagnosing DIPG. Radiotherapy (RT) is the standard treatment for these patients.[1] In this study, we examined the diagnostic and referral processes for DIPG patients managed at our center, categorized by their initial point of presentation.

MATERIALS AND METHODS

Data from 22 patients treated between April 2015 and March 2026 were retrospectively reviewed (median age 9 years, range 5–15). Eight patients (36.3%) were diagnosed by biopsy as H3K27-mutant midline glioma; the remainder (%63,6) received a radiological diagnosis via contrast-enhanced cranial MRI. Presenting findings were brainstem signs (n=10), ocular signs (n=7), and altered consciousness/increased intracranial pressure (ICP) (n=5). First admission was to the emergency department (n=8, altered consciousness/ICP or brainstem signs), pediatric outpatient clinic (n=5, brainstem or ocular signs), ophthalmology clinic (n=5, strabismus/eye deviation), or neurosurgery (n=4, ICP or altered consciousness); emergency patients were referred onward after CT/MRI. Patient-induced delay (PRD), total delay, and healthcare system delay (HSD) were defined as follows:

Patient-related delay (PRD): The time elapsed between the onset date of findings and the date of initial hospital admission.Healthcare system-related delay (HSD): The difference between Total Delay Time and Patient Delay Time (This time corresponds to the period from initial consultation to the start of radiotherapy.)Total Delay Time: The time elapsed between the onset date of findings and the start date of RT. All definitions were presented as mean (±SD, min–max) days.

FINDINGS

Median follow-up was 13 months; 2-year survival was 16.7%. PRD averaged 17.5±14.5 days (range 1–58), varying by symptom: altered consciousness 2.50±0.70, brainstem signs 11.50±9.43, ICP 13.3±7.31, and strabismus/eye deviation 28.14±17.7 days. Total duration was 43.3±28.04 days and HSD was 31.5±27.6 days. Time from first intervention to reaching the treatment clinic averaged 14.31±23.23 days.

DISCUSSION

In DIPG, a prolonged interval between symptom onset and diagnosis is associated with worse neurological outcomes. In the literature[2] found that among pediatric patients with midline cerebral tumors, presenting with vision-related symptoms significantly prolonged the time between the initial medical consultation and diagnosis. They emphasized that raising awareness regarding brain tumor diagnosis among emergency physicians could reduce diagnostic delays and improve neurological outcomes in these patients. In our study, covering a mean follow-up period of 13 months, PRD was found to be longest consistent with the literature in patients whose presenting symptom was ocular in nature (28.14 ± 17.7 days).

There is no standard guideline for evaluating altered consciousness in pediatric patients. Bowker et al[3] highlighted the lack of evidence regarding initial diagnostic test recommendations for these patients, as well as the insufficient specificity of the symptoms. Myers et al [4]

demonstrated a wide range of etiologies such as acute encephalomyelitis, arteriovenous malformation and brain tumors in children presenting to the emergency department with altered consciousness. They emphasized the importance of conducting comprehensive initial diagnostic tests, including blood and urine analyses and cranial CT/MRI imaging, to elucidate the underlying etiology in these patients. Further analysis is needed to improve the diagnostic approach for pediatric patients presenting to the emergency department with altered consciousness. Of the 22 patients in our study, 8 initially presented to the emergency department with altered consciousness. Cranial CT/MRI imaging was requested for all of these patients.

While ordering a cranial CT scan is an option for pediatric patients presenting to the emergency department with signs of brainstem involvement requesting this test exposes children to unnecessary radiation if no such symptoms are present at the time of presentation. A more prudent approach would be to refer the patient to a pediatric neurologist for outpatient MRI and electroencephalography (EEG).[5] Once acute stabilization is achieved, consulting the appropriate specialist regarding the etiology at the right time prevents unnecessary testing and avoids delays in life-saving interventions. It was determined that five of the patients presenting to our emergency department required consultations with other departments (neurology, ophthalmology, neurosurgery) regarding the imaging studies performed.

Conclusion

A longer time interval between symptom onset and diagnosis and treatment of a pons tumor does not affect the survival rate of these patients, but it is associated with worse neurological outcomes. Presenting symptoms largely determine the management pathway of pontine tumors. Although the rate of cancer development is low among all pediatric patients, awareness training can be prioritized to increase the index of suspicion in these patients.
An active National Referral Chain may help shorten the time to reach treatment centers.

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M4524-Özet Metin

SUPRAVENTRICULAR TACHYCARDIA IN THE PEDIATRIC EMERGENCY DEPARTMENT: A SINGLE-CENTER EXPERIENCE

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Introduction / Aim

Supraventricular tachycardia (SVT) is an important symptomatic tachyarrhythmia in children. This study aimed to evaluate the clinical and electrocardiographic characteristics and acute treatment responses of children presenting with SVT.

Methods

Patients presenting with SVT to the Pediatric Emergency Department of Malatya Training and Research Hospital between June 2015 and June 2016 were retrospectively evaluated. Fourteen SVT episodes in 13 patients were included. Clinical characteristics, electrocardiographic findings, treatments, and treatment responses were analyzed.

Results

Palpitations were present in all patients (100%), while three (23.1%) also had chest pain. All 14 episodes were hemodynamically stable and presented as narrow-QRS tachycardia. The mean heart rate at presentation was 210.4 ± 20.6 beats/min (range, 180–250). Wolff-Parkinson-White pattern was identified in one patient (7.7%). Vagal maneuvers were attempted in 10 episodes and restored sinus rhythm without pharmacological treatment in five (50%); modified Valsalva terminated two episodes. Eleven episodes (78.6%) were controlled with vagal maneuvers and/or adenosine. No electrical cardioversion was required, and final rhythm control was achieved in all episodes.

Conclusion

Vagal maneuvers and adenosine are effective acute treatments for hemodynamically stable pediatric SVT. In adenosine-unresponsive narrow-QRS tachycardia, reassessment of the underlying tachycardia mechanism is important.

Keywords: Supraventricular tachycardia; children; adenosine; vagal maneuver

M4527-Tam Metin

INCIDENTAL ASYMPTOMATIC CALCIFIED INTRAVENTRICULAR MASS IN A 17-YEAR-OLD MALE: A CASE REPORT

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Abstract

Background

Intraventricular tumors are rare intracranial lesions that may present with a wide spectrum of clinical manifestations, ranging from symptoms related to increased intracranial pressure and obstructive hydrocephalus to completely asymptomatic incidental findings. Their deep anatomical location and close relationship with critical neurovascular and eloquent neural structures make their diagnosis and management challenging.

Case Presentation

A 17-year-old male patient was admitted to the emergency department following a motor vehicle accident. He had no known chronic medical conditions and was not taking any regular medications. On admission, his vital signs were within normal limits. Neurological examination revealed an alert, cooperative, and oriented patient with a Glasgow Coma Scale score of 15, without lateralizing neurological findings or motor deficits. A frontal abrasion related to blunt head trauma was noted. Routine laboratory investigations revealed no significant abnormalities. Non-contrast brain computed tomography performed as part of the trauma evaluation incidentally demonstrated a 2

× 1 cm mass-like lesion at the level of the right thalamus, adjacent to the lateral ventricle. The patient was evaluated by the Neurosurgery and Neurology departments. As no emergency intervention was considered necessary, outpatient follow-up was recommended.

Conclusion

Intraventricular lesions may remain clinically silent and can occasionally be detected incidentally during neuroimaging performed for unrelated indications. Although lesions involving the lateral and third ventricles may present significant diagnostic and surgical challenges because of their deep location and proximity to critical neurovascular and white matter structures, incidental detection in asymptomatic patients should also be considered. This case emphasizes the importance of careful evaluation of neuroimaging findings obtained during trauma assessment, even in neurologically intact patients.

Keywords: Intraventricular mass; incidental finding; lateral ventricle; calcified lesion; brain tumor; adolescent; trauma; emergency department

Introduction

Intraventricular tumors are uncommon intracranial lesions, accounting for approximately 0.8–1.6% of intracranial neoplasms according to recent literature (Chong et al.). Their deep anatomical location and close relationship with critical diencephalic and brainstem structures make them technically challenging lesions from a surgical perspective (Agarwal and Kanekar). Although intraventricular tumors have previously been reported to account for approximately 10% of central nervous system neoplasms, the reported incidence varies considerably among studies. Recent reviews have estimated that primary intraventricular tumors comprise approximately 0.8–1.6% of all intracranial neoplasms (Havryliv and Smolanka; Chong et al.).

Intraventricular lesions may produce neurological symptoms through mass effect, obstruction of cerebrospinal fluid (CSF) circulation, development of hydrocephalus, or compression of adjacent deep neural structures. Clinical manifestations may therefore include symptoms associated with increased intracranial pressure, such as headache, nausea, vomiting, gait disturbance, and cognitive impairment. Nevertheless, some intraventricular lesions may remain clinically silent and may be discovered incidentally during imaging performed for unrelated indications (Haldeman et al.; Manjila et al.).

Computed tomography (CT) and magnetic resonance imaging (MRI) play complementary roles in the evaluation of intraventricular lesions. CT is particularly useful for identifying calcification and acute hemorrhage, whereas MRI provides superior characterization of lesion location, size, contrast enhancement, vascularity, relationship with adjacent structures, and possible invasion. Evaluation of ventricular anatomy, peritumoral edema, and CSF circulation is also important when surgical treatment is being considered (Agarwal and Kanekar; Chong et al.).

We present the case of an asymptomatic 17-year-old male in whom an intraventricular mass adjacent to the right thalamus was incidentally detected during CT imaging performed following a motor vehicle accident.

Case Presentation

A 17-year-old male patient was brought to the emergency department following a motor vehicle accident. He had no known chronic medical conditions and was not receiving any regular medications.

On admission, his blood pressure was 130/80 mmHg, peripheral oxygen saturation was 98%, heart rate was 80 beats/min, respiratory rate was 16 breaths/min, and body temperature was 36.6°C. Systemic examination revealed a soft abdomen without guarding or rebound tenderness, and pulmonary auscultation was normal.

Neurological examination demonstrated an alert, cooperative, and oriented patient with a Glasgow Coma Scale (GCS) score of 15. No lateralizing neurological findings or motor deficits were identified. A frontal abrasion compatible with blunt head trauma was present.

Routine laboratory investigations were performed during the emergency department evaluation, and no major abnormalities were detected. As part of the trauma assessment, a non-contrast brain CT scan was obtained. The CT scan demonstrated a 2 × 1 cm mass-like lesion at the level of the right thalamus, adjacent to the lateral ventricle (Figure 1)

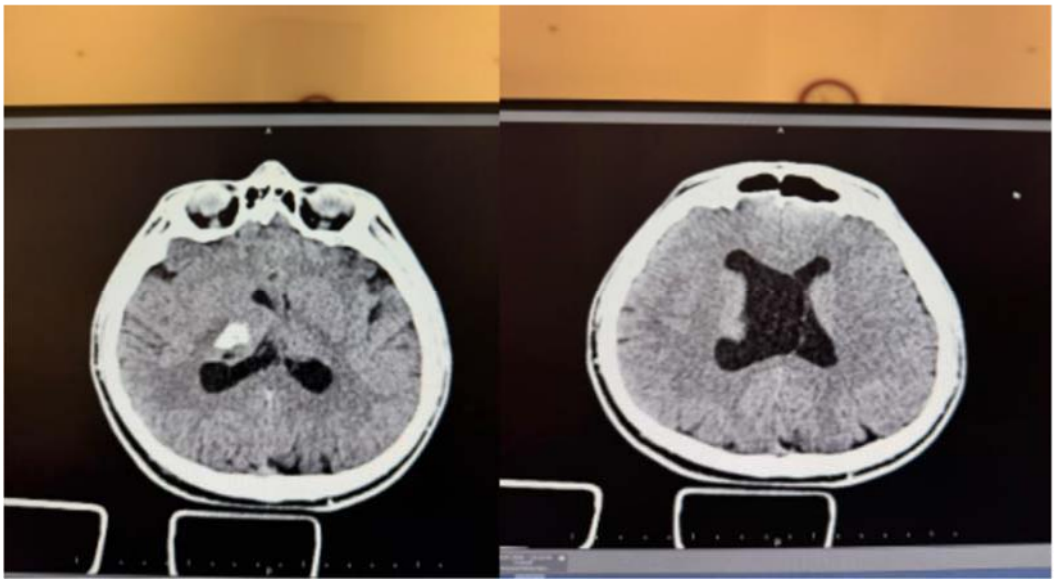


Figure 1. Non-contrast brain computed tomography demonstrating a 2 × 1 cm mass-like lesion at the level of the right thalamus, adjacent to the lateral ventricle.

The patient was subsequently evaluated by the Departments of Neurosurgery and Neurology. Following multidisciplinary assessment of the available imaging findings, no emergency neurosurgical intervention was considered necessary. The patient was therefore referred to the Neurosurgery and Neurology outpatient clinics for further evaluation and follow-up.

Discussion

The lateral and third ventricles are anatomically complex regions that present considerable challenges for surgical access. Their deep location and close relationships with critical neurovascular structures, as well as the need to traverse cortical and subcortical brain tissue to establish an appropriate surgical corridor, increase the potential risk of neurological morbidity.

Lesions involving these ventricular compartments may be located in close proximity to functionally important structures, including the thalamus, fornix, corpus callosum, caudate nucleus, internal capsule, and optic radiations, as well as deep arterial and venous structures. Consequently, the primary objective of surgical management is to achieve adequate visualization and access to the lesion while minimizing injury to eloquent cortical regions, subcortical white matter tracts, and surrounding neurovascular structures (Cikla et al.; Güngör et al.

Several surgical approaches have been described for lesions of the lateral and third ventricles, including trans-cortical, transcallosal, transsylvian, and various interhemispheric approaches. Selection of the optimal surgical corridor depends on the size, location, extent, and anatomical relationships of the lesion. Importantly, surgical planning should consider not only the cortical entry point but also the white matter tracts traversed along the surgical trajectory. The optic radiations, corona radiata, internal capsule, cingulum, corpus callosum, and fornix are among the major white matter structures whose anatomical relationships should be considered when planning ventricular surgery (Güngör et al.; Cikla et al.).

The clinical presentation of lateral and third ventricular lesions is variable and depends largely on their anatomical location, size, and effect on CSF circulation. Obstructive hydrocephalus and increased intracranial pressure may lead to headache, nausea and vomiting, gait disturbances, and cognitive impairment. In a series of 127 patients with lateral and third ventricular lesions, signs and symptoms associated with increased intracranial pressure were reported in 85% of patients. Cognitive impairment, motor weakness, seizures, and visual disturbances were also reported in 44%, 33%, 13%, and 17% of patients, respectively (Elwatidy et al.).

Despite the potential for significant neurological manifestations, intraventricular lesions may remain asymptomatic and may be discovered incidentally. In the present case, the patient had no active neurological or intracranial symptoms, and the lesion was identified incidentally during neuroimaging performed because of a motor vehicle accident. This finding is clinically relevant because it illustrates that intraventricular lesions can be detected before the development of symptoms related to mass effect, hydrocephalus, or increased intracranial pressure.

The present case has an additional important feature in that the lesion was described as calcified on the basis of the original case title, while the available case data do not provide MRI characterization or histopathological confirmation. Therefore, a definitive pathological diagnosis cannot be established from the available information. Further radiological characterization and clinical follow-up would be required to determine the precise nature of the lesion.

Conclusion

Intraventricular lesions are uncommon and may present substantial diagnostic and therapeutic challenges because of their deep anatomical location and close relationship with critical neural and neurovascular structures. Although many lesions become clinically apparent through hydrocephalus, increased intracranial pressure, or focal neurological deficits, some may remain asymptomatic and be discovered incidentally.

This case demonstrates the importance of carefully evaluating neuroimaging obtained for unrelated clinical indications, particularly in trauma patients who may have no neurological deficits. An incidentally detected intraventricular mass warrants appropriate neurological and neurosurgical assessment and, when indicated, further radiological characterization and longitudinal follow-up.

Keywords

Intraventricular mass; lateral ventricle; incidental finding; calcified lesion; brain tumor; adolescent; head trauma; emergency department

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M4526-Tam Metin

ASSOCIATION BETWEEN INTRAOPERATIVE TESTICULAR VIABILITY AND POSTOPERATIVE ATROPHY IN ADOLESCENTS WITH TESTICULAR TORSION

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Introduction/Aim: Testicular torsion requires emergency surgery to prevent testicular loss. During exploration, preservation or orchiectomy is guided by viability after detorsion; however, preserved testes may subsequently atrophy. We investigated the association between intraoperative viability and ultrasonographically detected testicular atrophy.

Materials and Methods: Patients aged 10–17 years who underwent surgery for testicular torsion over 10 years were retrospectively reviewed; appendix testis torsion was excluded. Testes were classified as viable or of questionable viability based on color, perfusion, turgor, response to warming, and parenchymal bleeding after tunica albuginea incision. Patients treated with detorsion and scrotal fixation who underwent ultrasonography at 3, 6, or 12 months were analyzed. Atrophy was defined as ≥50% lower affected-testis volume relative to the contralateral testis on the latest ultrasonography. Groups were compared using Fisher's exact test.

Results: Fifty-five patients were included. Orchiectomy was performed in 7 (12.7%), while 48 (87.3%) underwent detorsion and scrotal fixation. Follow-up ultrasonography was available for 32 of 48 patients (66.7%) after testis-preserving surgery; 11 (34.4%) developed atrophy. Of 9 testes preserved despite questionable viability, 8 had follow-up data. Atrophy developed in 6 of 8 testes (75%) with questionable viability and 5 of 24 viable testes (20.8%; p=0.010). No atrophy developed in 2 testes (25%) with questionable viability.

Conclusion: Although atrophy was more frequent with questionable intraoperative viability, 25% remained free of atrophy, suggesting preservation may be considered when viability remains questionable. Larger multicenter studies are needed to validate these findings and establish objective criteria for intraoperative decision-making.

Keywords: Testicular torsion, testicular atrophy, intraoperative viability, adolescent

Amaç

Testis torsiyonu, spermatik kordun kendi ekseni etrafında dönmesi sonucunda testiküler kan akımının bozulduğu ve gecikmiş tedavide geri dönüşümsüz iskemik hasar ile testis kaybına yol açabilen önemli bir ürolojik acildir [1]. Testisin korunabilmesi, başta semptomların başlangıcından detorsiyona kadar geçen süre ve torsiyon derecesi olmak üzere çeşitli klinik faktörlerden etkilenmektedir [2,3].

Detorsiyon sonrasında testisin korunması veya orşiektomi kararı, intraoperatif viabilite değerlendirmesine dayanır [4]. Bu değerlendirmede testisin rengi, sıcak uygulamaya yanıtı ve tunika albuginea insizyonu sonrası parankimal kanama varlığı kullanılmaktadır [5–7]. Bununla birlikte, standartlaştırılmış objektif ölçütlerin bulunmaması ve mevcut bulguların cerrahın yorumundan etkilenmesi, intraoperatif karar sürecini öznel hâle getirmektedir [8]. Özellikle detorsiyon sonrasında viabilitesi şüpheli olarak değerlendirilen testislerde, geri dönüş potansiyeli bulunan bir testisin çıkarılması ile korunmasına rağmen

uzun dönemde atrofi gelişebilecek bir testisin yerinde bırakılması arasındaki karar önemli bir klinik güçlük oluşturmaktadır [6,9].

Detorsiyon sonrasında viabilitesi yeterli kabul edilerek korunan testislerde dahi izlem sırasında testiküler atrofi gelişebilmektedir [10,11]. Bununla birlikte, mevcut çalışmalar çoğunlukla testis koruyucu cerrahi uygulanan hastaların genel sonuçlarını ele almakta; özellikle intraoperatif viabilitesi şüpheli olmasına rağmen korunan testislerin uzun dönem sonuçlarına ilişkin veriler sınırlı kalmaktadır [6,10,11]. Bu nedenle, intraoperatif viabilite bulguları ile postoperatif testiküler atrofi arasındaki ilişkinin değerlendirilmesi, testis koruyucu cerrahinin uzun dönem sonuçlarının anlaşılması açısından önem taşımaktadır.

Bu çalışmada, adölesan testis torsiyonu olgularında intraoperatif viabilite değerlendirmesi ile postoperatif ultrasonografik atrofi arasındaki ilişkinin araştırılması amaçlandı.

Yöntem

Bu tek merkezli, retrospektif ve gözlemsel çalışmada, İnönü Üniversitesi Turgut Özal Tıp Merkezinde 2015–2025 yılları arasında testis torsiyonu nedeniyle cerrahi tedavi uygulanan 10–17 yaşındaki hastalar değerlendirildi. Testis torsiyonu tanısı cerrahi eksplorasyonda doğrulanan hastaların demografik, klinik, radyolojik, intraoperatif ve postoperatif verileri hastane kayıtlarından elde edildi.

İntraoperatif viabilite; detorsiyon sonrasında testisin rengi, turgoru, kanlanmanın geri dönmesi, sıcak uygulamaya yanıtı ve uygulanan olgularda tunika albuginea insizyonu sonrası parankimal kanama varlığına göre değerlendirildi. Viabilite bulguları yeterli olan ve korunan testisler "viabilitesi belirgin"; canlılığı konusunda kesin kanaat oluşmamasına rağmen korunan testisler "viabilitesi şüpheli" olarak sınıflandırıldı. Cerrahi yöntem, orşiektomi veya detorsiyon ve skrotal fiksasyon olarak kaydedildi.

Postoperatif sonuç analizine, testis koruyucu cerrahi uygulanan ve 3, 6 veya 12. aylarda karşılaştırmalı testis hacimlerini içeren en az bir ultrasonografik incelemesi bulunan hastalar dahil edildi. Testiküler atrofi, son incelemede etkilenen testis hacminin karşı testise göre en az %50 azalmış olması olarak tanımlandı. Atrofi oranları viabilite grupları arasında karşılaştırıldı; takip yanlılığını değerlendirmek amacıyla ultrasonografik takibi bulunan ve bulunmayan hastalar yaş ve viabilite dağılımı açısından incelendi. Sürekli değişkenler ortalama±standart sapma (SS), kategorik değişkenler sayı ve yüzde olarak sunuldu. Karşılaştırmalarda Welch t-testi ve Fisher'ın kesin testi kullanıldı; rölatif risk (RR) ve %95 güven aralığı (GA) hesaplandı. $p<0,05$ anlamlı kabul edildi.

Bulgular

Çalışmaya yaş ortalaması 13,9±1,6 yıl (10–17) olan 55 hasta dahil edildi. Yedi hastaya (%12,7) orşiektomi, 48 hastaya (%87,3) detorsiyon ve skrotal fiksasyon uygulandı. İntraoperatif değerlendirmede 39 testisin (%70,9) viabilitesi belirgin, 9'unun (%16,4) şüpheli, 7'sinin (%12,7) viabilitesi olmayan grupta olduğu değerlendirildi. Viabilitesi olmayan testislere orşiektomi uygulanırken, viabilitesi şüpheli 9 testisin tamamı korundu.

Tablo 1. Hastaların klinik ve cerrahi özellikleri

Özellik	Değer
Hasta sayısı	55
Yaş, ortalama±SS (aralık)	13,9±1,6 (10–17)
Orşiektomi	7 (%12,7)
Detorsiyon ve skrotal fiksasyon	48 (%87,3)
Viabilitesi belirgin	39 (%70,9)
Viabilitesi şüpheli	9 (%16,4)
Viabilitesi olmayan	7 (%12,7)

Testis koruyucu cerrahi uygulanan 48 hastanın 32'sinde (%66,7) ultrasonografik takip mevcuttu ve 11'inde (%34,4) atrofi saptandı. Takibi bulunan ve bulunmayan hastalar arasında yaş ve viabilite dağılımı açısından anlamlı fark yoktu (sırasıyla p=0,996 ve p=0,238).

Takibi bulunan testislerin 24'ü viabilitesi belirgin, 8'i şüpheli gruptaydı. Atrofi, viabilitesi belirgin testislerin 5'inde (%20,8), şüpheli testislerin 6'sında (%75) gelişti (p=0,010). Viabilitesi şüpheli testislerde atrofi riski 3,6 kat daha yüksekti (RR=3,60; %95 GA: 1,50–8,65). Bununla birlikte, viabilitesi şüpheli olmasına rağmen korunan 8 testisin 2'sinde (%25) atrofi gelişmedi.

Tablo 2. İntraoperatif viabiliteye göre postoperatif atrofi

Viabilite	Takip edilen testis	Atrofi	Atrofi yok
Belirgin	24	5 (%20,8)	19 (%79,2)
Şüpheli	8	6 (%75)	2 (%25)

Fisher'ın kesin testi: p=0,010; RR=3,60; %95 GA: 1,50–8,65.

Bu bulgular, intraoperatif viabilitenin şüpheli olarak değerlendirilmesinin atrofi riskini artırdığını, ancak geri dönüşümsüz testiküler kaybı kesin olarak göstermediğini düşündürmektedir. Shirasaki ve arkadaşları, makroskopik kanlanması yetersiz görünen bir testiste floresan görüntülemeyle perfüzyon saptanması üzerine testisi korumuş ve altı aylık takipte atrofi gelişmediğini bildirmiştir [12]. Komatsu ve arkadaşları da floresan sinyali saptanan testislerin hacimlerinin 12 aylık takipte büyük ölçüde korunduğunu göstermiştir [13]. Öte yandan Tian ve arkadaşları, intraoperatif yetersiz kanlanmanın postoperatif atrofiyle ilişkili olduğunu bildirmiştir [14]. Bu veriler, intraoperatif bulguların orşiektomi için kesin ölçüt değil, atrofi riskinin göstergesi olarak değerlendirilmesini desteklemektedir. Atrofik değişikliklerin çoğu ameliyattan sonraki 3–6 ayda ortaya çıktığından, üçüncü ayda başlayan ve 12 aya kadar sürdürülen ultrasonografik takip önemlidir. Retrospektif ve tek merkezli tasarım, şüpheli viabilite grubunun küçüklüğü ve standart takip zamanlarının bulunmaması çalışmanın başlıca kısıtlılıklarıdır.

Sonuç

İntraoperatif viabilitesi şüpheli testislerde atrofi riski yüksek olmakla birlikte, bu bulgu geri dönüşümsüz testiküler kaybı kesin olarak göstermemektedir. Viabilitesi şüpheli testislerin %25'inde ultrasonografik takipte atrofi gelişmemesi, yalnızca intraoperatif görünüme dayalı orşiektomi kararının canlılığını sürdürebilecek testislerin kaybına yol açabileceğine işaret etmektedir. Bu nedenle, kesin nekroz bulguları bulunmayan ve detorsiyon sonrasında sınırlı da olsa viabilite bulguları gösteren testislerde koruyucu yaklaşım göz önünde bulundurulmalıdır. Bu

hastalarda olası atrofinin saptanması ve testisin uzun dönem durumunun değerlendirilmesi için düzenli ultrasonografik takip gereklidir.

Destek: Bu çalışma için herhangi bir kurum veya kuruluştan destek alınmamıştır.
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M4528-Tam Metin

PEDİATRİK TRAVMADA MASİF TRANSFÜZYON PROTOKOLLERİ VE GÜNCEL YAKLAŞIMLAR: DERLEME

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ÖZET

Amaç: Pediatrik travmatik hemorajik şok, erken tanınmadığında yüksek mortaliteyle seyreden ancak önlenebilir ölüm nedenlerinden biridir. Bu derlemede pediatrik masif transfüzyon protokollerinin tanımı, aktivasyon ölçütleri, kan ürünü stratejileri, güncel hemostatik yaklaşımlar ve komplikasyonların yönetimi değerlendirilmiştir.

Genel Bilgiler: Pediatrik masif transfüzyon için evrensel bir tanım bulunmamakla birlikte, 24 saat içinde ≥40 mL/kg kan ürünü verilmesi araştırmalarda sık kullanılan bir ölçüttür. Bununla birlikte bu tanım acil aktivasyon için geç kalabileceğinden, devam eden yaşamı tehdit eden kanama, doku hipoperfüzyonu ve bir saat içinde >20 mL/kg kan ürünü gereksinimi erken uyarı ölçütleri olarak değerlendirilmelidir. Güncel yaklaşım; kristaloid kullanımının sınırlandırılmasını, kan ürünlerine erken geçilmesini ve kilo temelli dengeli eritrosit, plazma ve trombosit replasmanını içermektedir. Uygun merkezlerde düşük titreli grup O tam kan kullanılabilir. İlk ampirik resüsitasyonun ardından standart koagülasyon testleri ve mümkünse TEG/ROTEM rehberliğinde hedefe yönelik tedaviye geçilmelidir. Traneksamik asit yaralanmadan sonraki ilk üç saat içinde seçilmiş hastalarda düşünülebilir. Hipotermi, asidoz, hipokalsemi ve elektrolit bozukluklarının eş zamanlı izlenmesi önemlidir.

Sonuç: Pediatrik masif transfüzyon yönetimi; erken protokol aktivasyonu, hızlı kanama kontrolü, dengeli hemostatik resüsitasyon ve multidisipliner koordinasyona dayanmalıdır. Bununla birlikte mevcut önerilerin önemli bölümü gözlemsel çalışmalara dayandığından, pediatrik popülasyona özgü ileri araştırmalara ihtiyaç bulunmaktadır.

Anahtar kelimeler: Pediatrik travma, masif transfüzyon, hemorajik şok, hemostatik resüsitasyon, tam kan

GİRİŞ

Travma, çocukluk çağında önlenebilir ölüm ve sakatlığın başlıca nedenlerinden biridir. Ağır travmalı çocuklarda travmatik beyin hasarı ölüm nedenleri arasında öne çıkmakla birlikte, kontrolsüz kanama erken ve potansiyel olarak önlenebilir ölümlerin önemli bir bölümünden sorumludur. Pediatrik travmatik hemorajik şokun hızlı tanınması; kanama kontrolü, hemostatik resüsitasyon ve kan bankası ile eş zamanlı koordinasyonun gecikmeden başlatılması açısından kritik öneme sahiptir (1,2).

Geçmişte travmatik şok tedavisi büyük hacimli kristaloid boluslarına dayanırken, güncel yaklaşım aktif kanaması ve şok bulguları bulunan çocuklarda kristaloid yükünü sınırlandırmayı ve kan ürünlerine erken geçmeyi öne çıkarmaktadır. Fazla kristaloid uygulanması dilüsyonel koagülopati,

doku ödemi, hipotermi ve kan ürünlerine ulaşmada gecikmeyle ilişkilidir. Çok merkezli pediatrik veriler de tekrarlanan kristaloid boluslarının daha uzun ventilasyon, yoğun bakım ve hastane yatışı gibi olumsuz sonuçlarla ilişkili olabileceğini göstermektedir (1,3).

Hemostatik resüsitasyon; dolaşan hacmi ve oksijen taşıma kapasitesini düzeltirken plazma, trombosit ve fibrinojen eksikliklerini erken dönemde karşılamayı, hipotermi-asidoz-hipokalsemi döngüsünü önlemeyi ve hastayı kesin kanama kontrolüne ulaştırmayı amaçlar. Bu yaklaşımın sistematik biçimde uygulanması için kilo temelli pediatrik masif transfüzyon protokolleri (P-MTP) geliştirilmiştir. Bununla birlikte pediatrik kanıtların önemli bölümü gözlemsel çalışmalara ve erişkin verilerinin uyarlanmasına dayandığından, önerilerin gücü her başlıkta aynı değildir (1,2).

Bu derlemenin amacı; pediatrik travmada masif transfüzyonun tanımını, P-MTP aktivasyon ölçütlerini, dengeli kan ürünü kullanımını, tam kan ve hedefe yönelik tedavi seçeneklerini, farmakolojik destekleri ve tedavi sırasında gelişebilecek komplikasyonların yönetimini güncel literatür doğrultusunda değerlendirmektir.

PEDİATRİK TRAVMATİK HEMORAJİK ŞOK VE KOAGÜLOPATİ

Çocuklar vazokonstriksiyon ve taşikardi yoluyla kan kaybını uzun süre kompanse edebilir; bu nedenle normal kan basıncı yeterli dolaşımın güvenilir göstergesi değildir. Hipotansiyon genellikle geç ve ciddi dekompansasyon bulgusudur. Eşlik eden travmatik beyin hasarı olasılığı da dikkate alındığında, çocuklarda erişkinlerdeki gibi rutin "permisif hipotansiyon" hedefi önerilmemekte; yaşa uygun organ perfüzyonu ve oksijen sunumunun korunması amaçlanmaktadır (1).

Tahmini kan hacmi yaşa göre değişir; yenidoğan ve küçük bebeklerde kilogram başına daha yüksek, büyük çocuk ve adölesanlarda daha düşüktür. Klinik uygulamada yaklaşık 70–90 mL/kg aralığı kullanılır. Bu nedenle erişkinde küçük görünen mutlak bir kan kaybı, düşük kilolu bir çocukta dolaşan hacmin büyük bölümüne karşılık gelebilir. Kan kaybının değerlendirilmesi yalnızca ölçülen dış kanamaya değil; yaralanma mekanizmasına, görüntüleme bulgularına, periferik perfüzyona, mental duruma, idrar çıkışına ve seri fizyolojik değişikliklere dayanmalıdır (2).

Travmaya bağlı koagülopati, yalnızca sıvılarla oluşan dilüsyonun sonucu değildir. Doku hasarı ve hipoperfüzyon; endotel ve glikokaliks hasarı, trombin oluşumunda bozulma, trombosit disfonksiyonu, fibrinojen tüketimi ve fibrinolizin düzensizleşmesiyle erken koagülopatiye yol açabilir. Protein C ve doku plazminojen aktivatörü yolları bu süreçte rol oynasa da pediatrik mekanizmalar erişkinler kadar ayrıntılı doğrulanmamıştır. Bu nedenle travmaya bağlı koagülopati, yalnızca "hiperfibrinoliz" ile açıklanmamalı; hiperfibrinolizden fibrinoliz kapanmasına kadar değişebilen heterojen bir tablo olarak değerlendirilmelidir (1,4).

Devam eden kanama ve resüsitasyon sırasında hipotermi, asidoz, koagülopati ve hipokalsemi birbirini ağırlaştırır. Soğuk ürünlerin hızlı verilmesi, çevresel ısı kaybı ve açık vücut boşlukları hipotermiyi; yetersiz perfüzyon laktik asidozu; kristaloid yükü ve kan kaybı ise faktör/trombosit dilüsyonunu artırır. Güncel yaklaşım bu bozuklukların seri olarak izlenmesini ve resüsitasyonun başlangıcından itibaren eş zamanlı düzeltilmesini gerektirir (1,2,4).

MASİF TRANSFÜZYONUN TANIMI VE P-MTP AKTİVASYONU

Pediatrik masif transfüzyon için evrensel olarak kabul edilmiş tek bir tanım yoktur. Literatürde; 24 saatte tahmini kan hacmine eşit ürün verilmesi, 3 saatte kan hacminin yarısından fazlasının replasmanı ve 24 saatte toplam kan ürünlerinin ≥40 mL/kg olması gibi farklı tanımlar

kullanılmıştır. Geniş bir pediatrik savaş travması kohortunda ≥40 mL/kg/24 saat eşiği erken ve hastane içi mortalite riski yüksek grubu ayırt etmiş ve araştırmalarda sık kullanılan pratik tanım hâline gelmiştir (2,5).

Ancak 24 saatlik toplam hacme dayalı tanımlar geriye dönük sınıflandırma sağlar ve acil serviste aktivasyon kararını geciktirebilir. Yakın tarihli bir pediatrik çalışmada herhangi bir kan ürününün bir saat içinde >20 mL/kg verilmesi; mortalite, acil kanama kontrolü gereksinimi ve yeniden yaşamı tehdit eden kanama ile ilişkili "kritik uygulama eşiği" olarak önerilmiştir. Bu eşik, kanama sürerken P-MTP aktivasyonu veya aktivasyonun devamı için kullanılabilecek pratik bir uyarıdır; yine de tek başına bütün hastalara uygulanacak kesin bir kural değildir (6).

P-MTP aktivasyonu için en önemli durum, devam eden veya kuvvetle şüphe edilen yaşamı tehdit eden kanamaya doku hipoperfüzyonu bulgularının eşlik etmesidir. Aşağıdaki bulgular birlikte değerlendirilmelidir (1,2,6,7):

1. Kontrol edilemeyen dış kanama veya toraks, abdomen, pelvis ya da retroperitoneumda önemli iç kanama şüphesi.

2. Yaşa göre taşikardi, zayıf periferik nabız, uzamış kapiller dolum, soğuk ekstremite, mental durum bozukluğu, oligüri veya hipotansiyon.

3. İlk resüsitasyona yetersiz ya da geçici yanıt ve devam eden kan ürünü gereksinimi.

4. Pozitif FAST, penetran gövde travması, instabil pelvis veya acil cerrahi/girişimsel kanama kontrolü gerektiren yaralanma.

5. Artmış yaşa uyarlanmış şok indeksi (SIPA), yükselen laktat, artan baz açığı, asidoz, uzamış PT/INR-aPTT, düşük fibrinojen ya da viskoelastik test bozukluğu.

Erişkin "Assessment of Blood Consumption" skorunun pediatrik performansı sınırlıdır. Penetran mekanizma, pozitif FAST, anormal SIPA, laktat ve baz açığını içeren pediatrik ABC-D yaklaşımları erken öngörüyü iyileştirebilse de duyarlılık ve özgüllükleri kullanılan eşiğe göre değişmektedir. Bu skorlar klinik değerlendirmeyi destekleyebilir; deneyimli hekimin kanama örüntüsü ve fizyolojik gidişe dayalı kararının yerini almamalıdır (7).

Başlangıç hemoglobin değerinin akut kan kaybını olduğundan düşük göstermeyebileceği unutulmamalıdır. P-MTP aktivasyonu hemoglobinin düşmesini beklememeli; seri vital bulgular, perfüzyon, kanama hızı, görüntüleme ve erken kan ürünü gereksinimine dayanmalıdır. Aktivasyon kadar protokolün sonlandırılması da aktif bir karardır. Kanama kontrol altına alındığında ve dolaşım düzelmeye başladığında sabit oranlı ampirik ürün verilmesi durdurularak laboratuvar ve/veya viskoelastik test rehberli hedefe yönelik tedaviye geçilmelidir (1,2).

HEMOSTATİK RESÜSİTASYON VE KAN ÜRÜNÜ STRATEJİSİ

Kristaloidin sınırlandırılması ve erken kan ürünü

Aktif hemorajik şokta ilk öncelik kanama kontrolüdür; transfüzyon bunun yerine geçen bir tedavi değildir. Doğrudan bası, uygun hastada turnike ve pelvik stabilizasyon gibi geçici yöntemler uygulanırken cerrahi, endoskopik veya girişimsel radyolojik kesin kontrol geciktirilmemelidir. Damar yolu açılamıyorsa intraosseöz erişim kullanılabilir. Kristaloid gerekiyorsa ısıtılmış dengeli solüsyon küçük ve yeniden değerlendirilen boluslar hâlinde verilmeli; devam eden şokta tekrarlayan büyük kristaloid hacimleri yerine kan ürünleri öncelenmelidir (1,3).

Dengeli komponent tedavisi

Pediatrik konsensus, başlangıç ampirik resüsitasyonunda P-MTP içinde dengeli kan ürünlerini önermektedir. Komponent tedavisi kullanıldığında amaç plazma oranını yaklaşık 1:1'e ve kilo/hacim temelli trombosit desteğini yüksek orana yaklaştırarak plazma ve trombosit açığını azaltmaktır. Bu yaklaşım pratikte sıklıkla "1:1:1" olarak ifade edilse de çocuklarda erişkin ünite sayılarını doğrudan uygulamak yerine ürünlerin hacmi, içerikleri, hastanın kilosu ve kurumun pediatrik paketleri esas alınmalıdır (1,8).

Gözlemsel pediatrik çalışmalarda daha yüksek plazma oranları ve daha düşük plazma açığı, daha iyi 24 saatlik sağkalımla ilişkilendirilmiştir. Bununla birlikte sonuçlar randomize pediatrik çalışmalarla doğrulanmamıştır ve sağkalım yanlılığı olasılığı vardır; uzun süre yaşayan hastaların plazma ve trombosite ulaşma fırsatı daha fazladır. Bu nedenle 1:1:1 yaklaşımı güçlü bir pediatrik mortalite kanıtı değil, erken ampirik hemostatik resüsitasyon için güncel konsensus hedefi olarak yorumlanmalıdır (8).

P-MTP paketleri kilo gruplarına göre hazırlanmalıdır. Kurumlar arasında değişmekle birlikte başlangıçta eritrosit süspansiyonu ve plazma için yaklaşık 10–20 mL/kg, trombosit için 5–10 mL/kg gibi kilo temelli dozlar kullanılmaktadır. Kriyopresipitat veya fibrinojen konsantresi rutin olarak her hastaya değil, düşük fibrinojen veya viskoelastik testte fibrin temelli pıhtı zayıflığı saptandığında verilmelidir. Paket içeriği, ürün hazırlama süresi, acil salım grubu, ışınlama gereksinimi ve maksimum infüzyon hızı hastanenin kan bankasıyla önceden standardize edilmelidir (1,2,9).

Düşük titreli grup O tam kan

Düşük titreli grup O tam kan (LTOWB), eritrosit, plazma ve trombositleri tek üründe sunması; daha az katkı sıvısı ve sitrat yükü oluşturması ve lojistik kolaylık sağlaması nedeniyle yeniden önem kazanmıştır. Pediatrik gözlemsel çalışmalarda LTOWB kullanımı daha hızlı şok düzelmesi, daha az komponent gereksinimi ve kabul edilebilir güvenlilik ile ilişkilendirilmiştir (10).

Güncel pediatrik konsensus, uygun ürün ve transfüzyon altyapısı mevcutsa LTOWB'nin komponentlere tercih edilebileceğini koşullu ve çok düşük kesinlikte bir öneri olarak belirtmektedir. ABO dışı transfüzyon, anti-A/anti-B titreleri, RhD seçimi, yenidoğan ve küçük bebeklerde ürün özellikleri ile yerel kan bankası politikaları dikkate alınmalıdır. Bu nedenle tam kan "kanıtlanmış üstün standart" olarak değil, deneyimli merkezlerde uygulanabilen güçlü bir hemostatik resüsitasyon seçeneği olarak sunulmalıdır (1,10).

GÜNCEL İZLEM VE HEDEFE YÖNELİK TEDAVİ

Standart laboratuvar ve viskoelastik testler

Tam kan sayımı, PT/INR, aPTT, fibrinojen, kan gazı, laktat, baz açığı, elektrolitler ve iyonize kalsiyum başlangıçta alınmalı; devam eden kanama ve hızlı transfüzyon sırasında kısa aralıklarla tekrarlanmalıdır. PT/INR ve aPTT plazma temelli testlerdir; sonuçlanmaları zaman alabilir ve pıhtı oluşumu ile fibrinolizin bütün dinamiklerini göstermez. Yine de viskoelastik test bulunmayan merkezlerde seri standart testler klinik değerlendirmeyle birlikte kullanılmalıdır (1,4).

Tromboelastografi (TEG) ve rotasyonel tromboelastometri (ROTEM), pıhtı başlangıcı, pıhtı gücü ve fibrinoliz hakkında daha hızlı ve bütüncül bilgi sağlayabilir. Pediatrik çalışmalarda bazı viskoelastik parametreler transfüzyon gereksinimi, yaşam kurtarıcı girişim, sakatlık ve mortalite

ile ilişkilidir. Konsensus, ulaşılabiliyorsa P-MTP'nin ilk ampirik fazından sonra viskoelastik izlemin standart testlere yardımcı olarak kullanılmasını önermektedir; ancak çocuklarda mortalite yararı ve test eşikleri kesinleşmemiştir (1,11).

Hedefe yönelik aşamada uzamış pıhtılaşma zamanı plazma/faktör eksikliğini, düşük pıhtı gücü trombosit veya fibrinojen yetersizliğini, fibrin temelli düşük pıhtı amplitüdü ise hipofibrinojenemiyi düşündürebilir. Tedavi, kullanılan cihazın pediatrik referansları ve kurum algoritmasına göre düzenlenmelidir. Viskoelastik testte fibrinoliz görülmemesi TXA verilmemesi veya fibrinoliz görülmesi mutlaka TXA verilmesi için tek başına yeterli kanıt değildir (1).

Fibrinojen replasmanı

Fibrinojen ağır kanama sırasında erken azalabilen temel pıhtılaşma proteinidir. Ancak pediatrik travmada kriyopresipitat veya fibrinojen konsantresinin bütün hastalara ampirik ve rutin verilmesini destekleyen yeterli kanıt yoktur. Konsensus, replasmanı ölçülmüş hipofibrinojenemi veya viskoelastik testte fibrin temelli pıhtı yetersizliği varlığında önermektedir. Birçok protokol 1,5–2,0 g/L aralığını müdahale eşiği olarak kullansa da kesin pediatrik eşik ve optimal ürün standardize değildir (1,2,9).

Traneksamik asit ve diğer hemostatik ajanlar

Traneksamik asit (TXA), plazminojenin fibrine bağlanmasını engelleyerek fibrinolizi azaltır. Pediatrik travmada randomize etkinlik çalışması bulunmamaktadır. Gözlemsel çalışmalar yarar olasılığı gösterse de sistematik derlemeler kanıt kesinliğinin düşük olduğunu vurgulamaktadır (12).

Güncel konsensus, travmatik hemorajik şoku olan çocukta yaralanmadan sonraki ilk 3 saat içinde ampirik TXA'nın düşünülebileceğini koşullu ve çok düşük kesinlikte önermektedir. Yaygın kullanılan pratik rejim, 15 mg/kg IV yükleme dozunun (en çok 1 g) 10 dakikada verilmesini ve ardından 2 mg/kg/saat infüzyonun 8 saat sürdürülmesini içerir; ancak doz yerel pediatrik travma/ilaç protokolüyle doğrulanmalıdır. TXA, kanama kontrolü ve dengeli transfüzyonun alternatifi değildir; üç saatten sonra rutin uygulama önerilmez (1,12).

Protrombin kompleks konsantresi ve rekombinant faktör VIIa'nın pediatrik travmatik hemorajik şokta ampirik kullanımını destekleyen yeterli kanıt yoktur. Bu ajanlar rutin P-MTP bileşeni olmamalı; yalnızca standart kanama kontrolü, dengeli ürün replasmanı ve hipotermi, asidoz, hipokalsemi, trombosit ve fibrinojen bozuklukları düzeltildiği hâlde süren seçilmiş refrakter kanamalarda hematoloji/transfüzyon tıbbı ve travma ekibi kararıyla değerlendirilmelidir (1,2).

P-MTP KOMPLİKASYONLARI VE GÜVENLİK İZLEMİ

Masif transfüzyon sırasında kanama kontrolüyle eş zamanlı olarak vücut sıcaklığı, elektrokardiyografi, kan basıncı, oksijenasyon, idrar çıkışı, kan gazı, laktat, glukoz, potasyum ve iyonize kalsiyum izlenmelidir. Kan ürünleri uygun onaylı cihazlarla ısıtılmalı, hasta aktif dış ısıtma ile korunmalı ve hat/cihaz seçimi küçük çocuklarda aşırı hızlı infüzyon ile dolaşım yükü riskini azaltacak şekilde yapılmalıdır (1,2).

Sitrat içeren ürünler iyonize kalsiyumu düşürerek pıhtılaşmayı, trombosit işlevini, miyokart kontraktilitesini ve damar tonusunu bozabilir. Transfüzyon gerektiren pediatrik travma hastalarında başvuru hipokalsemisi daha yüksek ürün gereksinimi ve mortaliteyle ilişkilendirilmiştir. İyonize kalsiyum erken ve seri ölçülmeli; hipokalsemi saptandığında veya klinik olarak kuvvetle düşünüldüğünde kalsiyum klorür ya da kalsiyum glukonat yaşa, kiloya, damar yoluna ve yerel protokole göre verilmelidir. Pediatrik travmada optimal ampirik doz ve kesin tedavi eşiği henüz belirlenmemiş olduğundan aşırı replasmandan da kaçınılmalıdır (1,13).

Depolanmış eritrositlerden potasyum sızıntısı özellikle yenidoğanlarda, küçük bebeklerde, böbrek işlev bozukluğunda ve çok hızlı transfüzyonda hiperkalemiye yol açabilir. Buna karşılık sitrat yükü, alkaloz ve hücre içi kaymalar hipokalemi de oluşturabilir. Seri potasyum ve EKG izlemi yapılmalı; ağır elektrolit bozuklukları standart acil tedavi algoritmalarıyla yönetilmelidir (2).

Transfüzyona bağlı akut akciğer hasarı (TRALI), transfüzyon ilişkili dolaşım yüklenmesi (TACO), alerjik/hemolitik reaksiyonlar, tromboz ve enfeksiyon nadir fakat ciddi komplikasyonlardır. Yeni hipoksemi ve pulmoner ödemde TRALI, TACO, akciğer kontüzyonu ve akut solunum sıkıntısı sendromu birlikte değerlendirilmelidir. Küçük çocuklarda toplam verilen kristaloid ve kan ürünü hacmi mL/kg olarak görünür biçimde kaydedilmeli; protokol sonlandırıldığında kullanılmayan ürünler hızla kan bankasına iade edilmelidir (2,14).

P-MTP nadir uygulanan, yüksek riskli ve çok ekipli bir süreçtir. Güncel merkezler arasında aktivasyon eşiği, paket oranı, tam kan, TXA, kalsiyum ve viskoelastik test kullanımında belirgin değişkenlik bulunmaktadır. Bu nedenle yazılı kilo temelli protokol, görev paylaşımı, kan bankasıyla doğrudan iletişim, hazır doz çizelgeleri, düzenli simülasyon ve her aktivasyon sonrası kalite değerlendirmesi hasta güvenliğinin temel unsurlarıdır (9).

SONUÇ

Pediatrik travmatik hemorajik şokta başarılı yönetim; kanamanın erken tanınması, gecikmeden anatomik kontrol, kristaloidin sınırlandırılması ve P-MTP çerçevesinde erken hemostatik resüsitasyona dayanır. Masif transfüzyon için ≥40 mL/kg/24 saat araştırmalarda yararlı bir tanım olmakla birlikte, acil aktivasyon kararı devam eden kanama, fizyolojik bozulma ve hızlı ürün gereksinimine dayanmalıdır. Bir saat içinde >20 mL/kg ürün gereksinimi önemli bir erken uyarıdır.

Komponent tedavisinde kilo/hacim temelli dengeli plazma-eritrosit-trombosit desteği, uygun merkezlerde LTOWB kullanımı ve ilk ampirik fazdan sonra laboratuvar/viskoelastik test rehberli hedefe yönelik tedavi güncel yaklaşımın temelini oluşturur. TXA ilk üç saat içinde seçilmiş hemorajik şok hastalarında düşünülebilir; fibrinojen, kalsiyum ve diğer faktörler ölçülmüş veya kuvvetle şüphe edilen eksikliğe göre replase edilmelidir. P-MTP uygulamasının süreçleri hızlandırdığı ve dengeli ürün sunumunu kolaylaştırdığı gösterilmiş olsa da pediatrik mortalite yararına ilişkin kanıt sınırlıdır. Bu nedenle protokoller mevcut konsensusla uyumlu hazırlanmalı, yerel olanaklara göre uyarlanmalı ve düzenli kalite izlemiyle güncellenmelidir.

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M4529-Tam Metin

MULTIPLE ORTHOPEDIC INJURIES FOLLOWING A FALL FROM A HEIGHT IN CHILDHOOD: A CASE REPORT

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Introduction

Falls in childhood are a significant reason for emergency department visits and hospital admissions. Falls from height, in particular, may result in serious injuries involving the head, spine, abdomen, and extremities. In a retrospective study of pediatric patients who sustained falls from height, head and musculoskeletal injuries were among the most frequently observed major injuries, demonstrating the potential for significant morbidity following these events (Lallier et al.). More recent evidence has also shown that falls from height, particularly from windows and elevated residential structures, may result in significant morbidity and, in some cases, mortality, with increasing fall height associated with greater severity of injury (Al-Hajjaj et al.).

The severity and pattern of injury are influenced not only by the height of the fall but also by the age of the child, the mechanism of the fall, the initial point of impact, and the characteristics of the surface on which the child lands. Therefore, detailed assessment of trauma severity, systematic physical examination, and early identification of associated injuries are essential in the emergency management of pediatric patients following falls from height.

Keywords: Falls from height, pediatric trauma, knee dislocation

Case Report

A 14-year-old male patient presented to the emergency department following a fall from a height.

His vital signs were as follows: blood pressure, 120/70 mmHg; oxygen saturation, 97%; pulse rate, 110 beats/min; and body temperature, 36.7°C. During the initial assessment, trauma-related deformity and pain were detected in the right upper and lower extremities, and an orthopedic consultation was requested.

Orthopedic examination revealed pain and tenderness in the right hip region, accompanied by shortening and external rotation of the right lower extremity. Pain, tenderness, and deformity were also observed in the right wrist and forearm. Neurological and neurovascular examinations were normal.

Based on the clinical examination and imaging findings, preliminary diagnoses of right femoral fracture, right knee dislocation, and right radial fracture were considered.

Closed reduction was performed in the emergency department. The patient was subsequently immobilized with a long-arm splint and a hip-spica-style splint. Following stabilization, admission to the orthopedic clinic was deemed appropriate for definitive treatment and follow-up.

Discussion

Falls from height are an important cause of pediatric trauma and may result in substantial morbidity. Previous studies have demonstrated that head and musculoskeletal injuries represent important components of the injury pattern following falls from height, while multisystem injuries may also occur (Lallier et al.). In a more recent pediatric series, falls from height were associated with hospitalization, intensive care admission, surgical intervention, and mortality, with fall height identified as an important predictor of morbidity (Al-Hajjaj et al.).

The injury pattern is determined by several interacting factors, including fall height, mechanism, initial point of impact, and the characteristics of the impact surface. Consequently, fall height should not be considered in isolation when estimating injury severity. A comprehensive evaluation of the mechanism and potential associated injuries is required.

Clinical findings such as loss of consciousness, seizures, repeated vomiting, focal neurological deficits, and hemodynamic instability should raise concern for significant traumatic injury and prompt appropriate further evaluation. In pediatric trauma, a systematic approach using the ABCDE assessment remains essential, together with appropriate cervical spine precautions and evaluation for associated injuries.

Diagnostic imaging should be guided by the clinical findings and the expected impact of the imaging result on patient management. Current recommendations emphasize minimizing low-value advanced imaging in children because of the potential risks associated with ionizing radiation. When computed tomography is necessary, pediatric-specific protocols and dose optimization consistent with the ALARA principle should be used (Marin et al.; Frush and Frush).

Conclusion

Assessment of children following falls from height requires a comprehensive evaluation of the fall mechanism, fall distance, impact surface, initial point of contact, neurological status, hemodynamic condition, and associated injuries. Early and systematic trauma assessment is essential for identifying severe injuries and initiating appropriate treatment. Careful use of diagnostic imaging, with avoidance of unnecessary radiation exposure, is also an important component of high-quality pediatric emergency care (Marin et al.). Timely intervention and appropriate multidisciplinary management may contribute to reducing trauma-related morbidity and mortality.

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M4531-Tam Metin

COMPARATIVE PERFORMANCE AND RESPONSE CONSISTENCY OF LARGE LANGUAGE MODELS AND EMERGENCY HEALTHCARE PROFESSIONALS ON PEDIATRIC ADVANCED LIFE SUPPORT (PALS) KNOWLEDGE ASSESSMENT

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Purpose: It is important to have up-to-date knowledge regarding the management of pediatric cardiac arrest and life-threatening emergencies. Pediatric Advanced Life Support (PALS) provides a systematic approach to the assessment of critically ill pediatric patients and the management of cardiac arrest. The use of large language models (LLMs) in medical education and access to medical information is on the rise, and their performance on multiple-choice medical questions has been evaluated in various studies [1–3]. However, in a field such as PALS—which is clinically critical and based on current guidelines—data on the accuracy of LLMs' information and the consistency of their responses across repeated applications is limited. The aim of this study is to compare the levels of PALS knowledge among healthcare professionals working in emergency medical services using four different LLMs, to evaluate the accuracy and consistency of the LLMs in repeated applications, and to examine the relationship between the professional characteristics of healthcare professionals and their perceptions of PALS self-efficacy.

Method: This cross-sectional, comparative, and methodological study included 51 healthcare professionals working in emergency departments and the 112 Emergency Medical Services. Participants were administered 10 questions assessing their sociodemographic and occupational characteristics, 10 five-point Likert-scale questions assessing PALS self-efficacy, and 30 multiple-choice questions with five options and a single correct answer, prepared based on current PALS guidelines. Correct answers were scored as 1, while incorrect or blank answers were scored as 0, and the total knowledge score was calculated on a scale of 0 to 30. ChatGPT, Gemini, Perplexity, and Microsoft Copilot were used in the LLM evaluation. Each model answered the same 30 questions, using a standard prompt, in 10 new, independent sessions. No previous conversation history was used, and the models were asked only to specify the letter of the response they selected. Statistical analyses were performed using SPSS 27.0.

Findings: It was determined that 90.2% of the participants did not have a valid PALS certification and that 74.5% had not previously received PALS training. While the mean PALS knowledge score for healthcare professionals was 26.3 ± 4.7, it was 30.0 ± 0.2 in the LLM group, and the difference was statistically significant ($p < 0.001$). No significant difference was found among the LLMs ($p=0.095$); ChatGPT, Gemini, and Perplexity scored 30.0±0.0, while Microsoft Copilot scored 29.8±0.4.

The knowledge scores of healthcare professionals varied by occupational group (p=0.027). Participants with more than five years of professional experience scored 28.3±1.5, while those with five years or less of experience scored 25.3±5.4 (p=0.024). Those who have worked in emergency medical services for more than five years also had higher scores (25.1±5.4 vs. 28.4±1.5; p=0.009). Those who had previously been actively involved in a real pediatric cardiac arrest case had a score of 27.7 ± 2.8, while those who had not been involved had a score of 24.1 ± 6.1 (p = 0.005). (Table 1)

Table-1: Table 2. A Comparison of the Performance of Artificial Intelligence Models and Healthcare Professionals on the PALS Knowledge Test, and an Evaluation of Healthcare Professionals' Total Number of Correct Answers on the PALS Test Based on Professional Experience, PALS Certification, and Experience with Pediatric Cardiac Arrest

		Total Number of Correct Answers in PALS			p
		Min-Max	Median	Average.±ss	
Made by	Personnel	7.0 - 30.0	27.0	26.3 ± 4.7	***0.000*** m
	Art. Intelligence	29.0 - 30.0	30.0	30.0 ± 0.2	
Artificial Intelligence Group	ChatGPT	30.0 - 30.0	30.0	30.0 ± 0.0	0.095 K
	Gemini	30.0 - 30.0	30.0	30.0 ± 0.0	
	Perplexity	30.0 - 30.0	30.0	30.0 ± 0.0	
	Microsoft Copilot	29.0 - 30.0	30.0	29.8 ± 0.4	
Profession	[1] Emergency Medicine Specialist	27.0 - 30.0	29.5	29.1 ± 1.1	***0.027*** K
	[2] Emer. Med. Resident / General Practitioner	20.0 - 30.0	27.0[1]	26.3 ± 3.0	
	[3]İntern Doctor	10.0 - 30.0	27.0[1]	24.9 ± 5.8	
	[4] Healthcare Personnel	7.0 - 30.0	27.0[1]	25.5 ± 5.7	
Institution	Hospital	7.0 - 30.0	28.0	26.2 ± 5.0	0.638 m
	112 Emergency	23.0 - 30.0	27.0	26.9 ± 2.1	
Length of Professional Experience	≤5 Years	7.0 - 30.0	27.0	25.3 ± 5.4	***0.024*** m
	>5 Years	24.0 - 30.0	28.0	28.3 ± 1.5	
Work Hours in Emergency Health Services	≤5 Years	7.0 - 30.0	27.0	25.1 ± 5.4	***0.009*** m
	>5 Years	24.0 - 30.0	28.5	28.4 ± 1.5	
Valid PALS Certificate	No	7.0 - 30.0	27.0	26.1 ± 4.9	0.405 m
	Yes	27.0 - 30.0	28.0	28.2 ± 1.3	
Intervention for Cases of Pediatric Cardiac Arrest or Those Requiring Advanced Life Support Within One Month	No	7.0 - 30.0	27.0	25.5 ± 5.4	0.147 m
	Yes	17.0 - 30.0	28.0	27.3 ± 3.3	
Previous Experience Working Actively in a Real-Life Pediatric Cardiac Arrest Case	No	7.0 - 30.0	26.0	24.1 ± 6.1	***0.005*** m
	Yes	17.0 - 30.0	28.0	27.7 ± 2.8	

[A] ANOVA / [K] Kruskal-wallis (Mann-whitney u test) / [t] Independent-sample t-test

[1] The Difference with an Emergency Medicine Specialist p>0.05

The mean PALS self-efficacy score was 37.6 ± 8.4; it was 42.5 ± 3.0 in the LLM group and 33.6 ± 9.2 among healthcare professionals, and the difference was statistically significant (p < 0.001).

Among healthcare professionals, longer professional experience, longer tenure in emergency medical services, a valid PALS certification, and actual experience with pediatric cardiac arrest were found to be associated with higher self-efficacy scores. (Table 2)

Table- 2: A Comparison of PALS Self-Efficacy Scores Among Healthcare Professionals and Artificial Intelligence Models, and an Evaluation of Healthcare Professionals' PALS Self-Efficacy Scores Based on Sociodemographic, Professional, and Clinical Characteristics

		Psychological State Tendency Perception Score			P	
		Min-Max	Median	Average.±ss		
Evaluator	Personnel	11.0 - 50.0	35.0	33.6 ± 9.2	***0.000***	t
	Art. Intelligence	37.0 - 50.0	42.0	42.5 ± 3.0		
Artificial Intelligence Group	ChatGPT	39.0 - 45.0	43.5	43.1 ± 1.8	0.264	A
	Gemini	41.0 - 50.0	42.5	43.7 ± 3.0		
	Perplexity	37.0 - 49.0	41.0	41.9 ± 3.8		
	Microsoft Copilot	37.0 - 46.0	41.0	41.3 ± 2.8		
Profession	[1] Emergency Medicine Specialist	11.0 - 42.0	37.0	34.7 ± 8.6	***0.001***	K
	[2] Emer. Med. Resident / General Practitioner	18.0 - 50.0	34.0	33.9 ± 9.8		
	[3]İntern Doctor	18.0 - 32.0	25.0[123]	25.2 ± 4.9		
	[4] Healthcare Personnel	14.0 - 48.0	39.5	37.9 ± 8.3		
Institution	Hospital	11.0 - 50.0	34.5	33.0 ± 9.6	0.209	t
	112 Emergency	27.0 - 45.0	39.0	37.7 ± 5.6		
Length of Professional Experience	≤5 Years	14.0 - 50.0	31.0	30.9 ± 8.4	***0.000***	m
	>5 Years	11.0 - 48.0	40.0	39.1 ± 8.6		
Work Hours in Emergency Health Services	≤5 Years	14.0 - 50.0	30.0	30.8 ± 8.5	***0.001***	m
	>5 Years	11.0 - 48.0	40.0	38.8 ± 8.4		
Valid PALS Certificate	No	11.0 - 50.0	34.5	32.6 ± 9.2	***0.006***	m
	Yes	40.0 - 45.0	44.0	42.8 ± 2.6		
Intervention for Cases of Pediatric Cardiac Arrest or Those Requiring Advanced Life Support Within One Month	No	18.0 - 48.0	33.5	32.6 ± 8.4	0.357	t
	Yes	11.0 - 50.0	37.0	35.0 ± 10.4		
Previous Experience Working Actively in a Real-Life Pediatric Cardiac Arrest Case	No	18.0 - 50.0	30.0	30.8 ± 8.8	***0.045***	m
	Yes	11.0 - 48.0	37.0	35.4 ± 9.2		

[A] ANOVA / [K] Kruskal-wallis (Mann-whitney u test) / [t] Independent-sample t-test /

[1] The Difference with an Emergency Medicine Specialist p>0.05; [2] The Difference with an Emergency Medicine Resident / a General Practitioner p>0.05

[4] The Difference with Healthcare Professionals p>0.05

Discussion: The main finding of this study is that the LLM group scored higher than healthcare professionals on the PALS knowledge test. This result is generally consistent with studies examining the performance of LLMs on multiple-choice medical questions and various medical exams [1–3]. However, high performance on a knowledge test should not be considered an indicator of clinical competence or success in actual patient management. PALS requires not only theoretical knowledge but also clinical assessment, timely decision-making, teamwork, communication, and hands-on resuscitation skills [4]. The fact that some LLMs demonstrate high consistency across 10 independent

sessions indicates high reproducibility under standardized conditions. However, previous studies have shown that LLM responses may vary across repeated queries [5,6]. Therefore, the current finding does not indicate that LLMs provide consistent responses under all conditions, but rather that they produce consistent results under the standard protocol used. Although the finding that experience and actual exposure to pediatric cardiac arrest among healthcare professionals are associated with higher knowledge scores suggests the importance of clinical experience, a causal relationship cannot be established due to the cross-sectional design. The small sample size and the low number of participants with valid PALS certification are also limitations of the study.

Conclusion: In this study, which evaluated four different LLMs, the LLM group's average score on the PALS knowledge test was found to be higher than that of healthcare professionals, and no significant differences were observed among the LLMs. High response consistency was observed in some models during repeated independent sessions. Among healthcare professionals, longer professional experience and actual experience with pediatric cardiac arrest were found to be associated with higher knowledge scores. While LLMs are potential tools that could be explored for PALS knowledge assessment and training, it should be noted that theoretical test performance does not reflect clinical competence. Future studies are encouraged to incorporate simulation, clinical scenarios, and the assessment of hands-on resuscitation skills.

Keywords: Pediatric Advanced Life Support, Large Language Models, Artificial Intelligence.

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M4532-Tam Metin

IMAGING AND FOLLOW-UP IN PEDIATRIC SOLID ORGAN INJURIES: WHEN IS REPEAT IMAGING NECESSARY? A REVIEW

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ABSTRACT

Objective: The need for repeat imaging in pediatric solid organ injuries remains controversial. This review aimed to evaluate the initial imaging approach, indications for repeat imaging, and available follow-up modalities for splenic, hepatic, renal, and pancreatic injuries in light of current evidence.

Methods: Current pediatric trauma guidelines, consensus reports, systematic reviews, meta-analyses, and relevant clinical studies were narratively reviewed with respect to initial imaging strategies, organ-specific complications, indications for repeat imaging, and the roles of ultrasonography (US), contrast-enhanced ultrasonography (CEUS), computed tomography (CT), and magnetic resonance imaging (MRI) in follow-up.

Results: There is insufficient evidence to support routine follow-up CT in clinically improving, hemodynamically stable, and asymptomatic children with low-grade splenic, hepatic, or renal injuries. Repeat imaging should instead be guided by clinical and laboratory findings such as new or worsening pain, hemodynamic deterioration, a decline in hemoglobin, fever, jaundice, persistent hematuria, impaired renal function, or elevated pancreatic enzyme levels. High-grade injury, vascular abnormalities on initial imaging, renal collecting system involvement, and suspected pancreatic duct injury should lower the threshold for reassessment. Pancreatic trauma represents an important exception because early CT findings may be normal or equivocal; targeted repeat CT or MRI/magnetic resonance cholangiopancreatography (MRCP) should be considered within 12–24 hours when clinical suspicion remains high. US and CEUS provide radiation-free follow-up options in stable patients, whereas contrast-enhanced CT is preferred when active bleeding or multiple complications are suspected. MRI/MRCP is particularly valuable for evaluating the biliary system and pancreatic duct.

Conclusion: Repeat imaging in pediatric solid organ injuries should not be based solely on injury grade or a predetermined schedule. An organ- and patient-centered approach that selects the modality according to the clinical question and suspected complication can minimize radiation exposure and unnecessary imaging while enabling the timely detection of delayed complications.

Keywords: Pediatric trauma; solid organ injury; repeat imaging; computed tomography; contrast-enhanced ultrasonography; magnetic resonance imaging

INTRODUCTION

Blunt abdominal trauma is an important cause of morbidity and mortality in children. The spleen, liver, and kidneys are among the most commonly injured abdominal solid organs, whereas pancreatic injuries occur less frequently but warrant particular attention because of diagnostic

delays and duct-related complications. Most solid organ injuries in children are managed nonoperatively when patients are hemodynamically stable. This shift has expanded the role of imaging beyond merely detecting injuries to include accurate grading, early recognition of complications, and the development of a safe follow-up plan (1).

Although computed tomography (CT) provides detailed anatomical information during the initial assessment, it involves ionizing radiation and the administration of iodinated contrast material. Therefore, repeating CT solely to "document healing" is not appropriate in children. Conversely, repeat imaging may be lifesaving when complications such as delayed hemorrhage, pseudoaneurysm, biliary or urinary leakage, abscess, pancreatic duct injury, or pseudocyst are clinically suspected.

This review aims to summarize the initial imaging approach to pediatric solid organ injuries, evaluate the indications for repeat imaging in splenic, hepatic, renal, and pancreatic injuries, and outline the current roles of ultrasonography (US), contrast-enhanced ultrasonography (CEUS), CT, and magnetic resonance imaging (MRI) in follow-up.

INITIAL IMAGING APPROACH

The patient's hemodynamic status is the primary determinant when selecting an imaging modality. In a hemodynamically unstable child who does not respond to resuscitation, imaging should not delay hemorrhage control. Focused Assessment with Sonography in Trauma (FAST) is a rapid bedside method for detecting hemoperitoneum and pericardial fluid; however, a negative FAST examination does not exclude a solid organ injury. Its sensitivity is particularly limited in children with only a small amount of free fluid or isolated parenchymal injury.

In a child who is hemodynamically stable or has been stabilized and in whom clinical and laboratory findings raise suspicion of intra-abdominal injury, intravenous contrast-enhanced CT of the abdomen and pelvis is the main imaging modality. In most patients, a properly timed single portal venous phase is sufficient for diagnosis. An arterial phase should be added selectively when active bleeding or vascular injury is suspected, whereas a delayed excretory phase should be obtained when injury to the renal collecting system or ureter is considered. The scan range and number of phases should be limited to the clinical question, and low-dose protocols adjusted for the child's age and body size should be used (2).

Splenic, hepatic, and renal injuries are generally classified from grade I to grade V according to the American Association for the Surgery of Trauma Organ Injury Scale (AAST-OIS). Updated classification systems consider not only parenchymal damage but also vascular findings such as active bleeding, pseudoaneurysm, arteriovenous fistula, and devascularization (3). Although injury grade helps predict the risk of complications, decisions regarding the level of care, intervention, and discharge in children should not be based solely on CT grade; hemodynamic status and clinical course should remain the principal considerations.

FUNDAMENTAL PRINCIPLES FOR DECIDING ON REPEAT IMAGING

Follow-up imaging should answer a specific clinical question. There is insufficient evidence that routine CT alters outcomes in asymptomatic, hemodynamically stable children with low-grade splenic, hepatic, or renal injuries whose laboratory values are improving. The APSA systematic review likewise does not support routine follow-up imaging in uncomplicated low-grade injuries, whereas the evidence for high-grade injuries remains more limited (4).

The following clinical or laboratory changes should prompt consideration of repeat imaging:

1. New-onset or worsening abdominal, left shoulder, back, or flank pain.
2. Unexplained tachycardia, hypotension, syncope, or impaired peripheral perfusion.
3. An unexpected decline in hemoglobin level or a new transfusion requirement.
4. Persistent fever, leukocytosis, or elevated inflammatory markers.
5. Jaundice, increased bilirubin levels, bilious drainage, or abdominal distension.
6. Persistent hematuria, oliguria, increased creatinine levels, or significant flank pain.
7. Persistent vomiting, inability to tolerate feeding, epigastric pain, or increasing amylase and lipase levels.
8. New trauma or clinical deterioration after discharge.

The timing and modality of repeat imaging should be determined by the suspected complication. When active bleeding is suspected, urgent contrast-enhanced CT or catheter angiography should be performed. For biliary, urinary, or pancreatic complications, US, CEUS, delayed-phase CT, MRI, or magnetic resonance cholangiopancreatography (MRCP) may be selected according to the clinical circumstances.

IMAGING AND FOLLOW-UP OF THE SPLEEN

Nonoperative management is the standard approach to splenic injury in hemodynamically stable children. The updated APSA guideline bases admission and discharge decisions primarily on clinical status rather than injury grade and recommends post-discharge imaging only for symptomatic patients (5). Accordingly, routine US or CT is not required merely to demonstrate the resolution of a hematoma or laceration in a child with a clinically improving grade I–II splenic injury.

The 2022 WSES consensus likewise found no demonstrated benefit of routine imaging follow-up in children. Nevertheless, follow-up US or CEUS may be considered in selected cases involving high-grade injury, a vascular abnormality on initial CT, persistent pain, an unexplained decline in hemoglobin, or a need for individualized risk assessment before return to activity. The recommendation for imaging before return to high-risk sports is based on low-quality evidence and should not be regarded as mandatory for every child (6).

Delayed splenic hemorrhage and pseudoaneurysm are rare but serious complications. A pseudoaneurysm may be asymptomatic or may present with abdominal pain, a decline in hemoglobin, or hemodynamic deterioration. A pediatric case series demonstrated that CEUS may provide an ionizing radiation-free screening option for the follow-up of hepatic and splenic pseudoaneurysms (7). However, this finding does not constitute sufficient multicenter evidence to replace the APSA symptom-driven approach. Therefore, rather than performing CT within 48–72 hours in every child solely on the basis of injury grade, the clinical course, initial vascular findings, and institutional experience should be considered together.

IMAGING AND FOLLOW-UP OF THE LIVER

Routine follow-up CT is not recommended in stable children with hepatic injuries. According to the WSES guideline, CT follow-up is unnecessary unless new abdominal pain, fever, jaundice, an inflammatory response, or a decline in hemoglobin develops. When a clinical complication is

suspected, contrast-enhanced CT can simultaneously evaluate delayed hemorrhage, pseudoaneurysm, biloma, bile leak, abscess, and hepatic necrosis. Particularly in high-grade injuries, US may be useful for serial evaluation of bilomas or biliary complications (8).

The presence of active contrast extravasation, a contained vascular injury, marked devascularization, or a central parenchymal injury on initial CT should lower the threshold for follow-up imaging. Although hepatic pseudoaneurysm is rare, rupture can cause life-threatening hemorrhage. Therefore, targeted follow-up with CEUS or contrast-enhanced CT may be considered after multidisciplinary discussion in selected children with high-grade injuries or initial vascular findings, even when they are clinically stable. Nevertheless, the optimal timing has not been established, and pediatric evidence supporting routine screening remains limited (5,7,8).

Bile leaks and bilomas usually develop over several days. In the presence of new right upper quadrant pain, fever, jaundice, increased bilirubin levels, or persistent abdominal distension, US may be used as the initial examination. Contrast-enhanced CT may be preferred to assess the anatomy of a fluid collection and accompanying vascular complications, whereas hepatobiliary contrast-enhanced MRI or MRCP may be used to demonstrate the relationship between the leak and the biliary tract. Imaging findings should be interpreted in conjunction with the clinical picture to determine the need for percutaneous drainage, endoscopic intervention, or surgery.

IMAGING AND FOLLOW-UP OF THE KIDNEYS

Most blunt renal injuries in children are managed nonoperatively. In hemodynamically stable patients, this approach reduces renal loss; in high-grade injuries with ongoing or delayed hemorrhage, angioembolization may preserve more renal parenchyma than surgery. Routine blood pressure measurement is recommended during long-term follow-up because of the risk of post-traumatic hypertension (9).

When the initial CT raises suspicion of a deep parenchymal laceration, collecting system injury, urinary extravasation, or ureteropelvic junction injury, delayed excretory-phase imaging should be performed. The WSES-AAST guideline does not consider routine follow-up imaging necessary for minor renal injuries and recommends that follow-up in moderate and severe injuries be guided by the clinical condition. In severe renal injuries, excretory-phase CT within the first 48 hours or US/CEUS in an appropriate patient may be considered. Although CEUS can demonstrate parenchymal perfusion and vascular complications, the contrast agent is not excreted in the urine and therefore cannot reliably exclude a collecting system leak (10).

Although some adult-based urotrauma guidelines recommend routine follow-up CT within 48–72 hours for grade IV–V renal injuries, pediatric data support a more selective approach. A study of asymptomatic children reported that routine repeat imaging made only a limited contribution to treatment modification and could be avoided in clinically well children (11). Injury grade alone should therefore not be considered an automatic indication for CT. When fever, increasing flank pain, persistent hematuria, an unexplained decline in hemoglobin, abdominal distension, oliguria, or an increased creatinine level is present, delayed-phase contrast-enhanced CT should be performed to evaluate for urinoma, persistent extravasation, infection, and vascular complications.

Follow-up US can evaluate hydronephrosis, perirenal collections, and renal size without radiation exposure. CEUS may be useful for assessing parenchymal perfusion, lacerations, and pseudoaneurysms. MRI or MR urography can provide radiation-free anatomical and functional

information in selected non-urgent cases; however, availability, examination duration, and the potential need for sedation in young children must be considered. During late follow-up, scintigraphy or functional MRI should be reserved for selected patients in whom the detection of renal functional loss would alter treatment or follow-up planning.

IMAGING AND FOLLOW-UP OF THE PANCREAS

Pancreatic injury requires a different follow-up approach from splenic and hepatic injuries. Because of the retroperitoneal location of the pancreas and the subtle radiological findings during the early period, initial CT may underestimate the injury or damage to the main pancreatic duct. Clinical suspicion should be maintained despite a negative or equivocal initial CT when there is a mechanism of direct epigastric trauma, such as a bicycle handlebar impact, persistent epigastric pain, vomiting, or increasing amylase and lipase levels.

The WSES-AAST guideline recommends repeat CT 12–24 hours after the initial examination in a hemodynamically stable patient when there is a high clinical suspicion of duodenopancreatic injury, nonspecific initial CT findings, persistent pain, or increasing pancreatic enzyme levels. MRI/MRCP is a second-line modality that allows radiation-free evaluation of the pancreatic parenchyma and main pancreatic duct and may be preferred in children when it is readily available (12). This represents the principal exception in which repeat imaging may be required not only to detect complications but also to identify an initially occult injury.

Pediatric case series have reported that CT has limited accuracy for assessing the integrity of the main pancreatic duct, whereas MRCP has greater accuracy (13). Nevertheless, a negative MRCP does not invariably exclude a small ductal injury. When clinical and imaging findings are discordant, endoscopic retrograde cholangiopancreatography may be considered for both diagnosis and treatment; however, because it is invasive, it should be reserved for selected patients at experienced pediatric centers.

During follow-up of a known pancreatic injury, peripancreatic collections, necrosis, fistula, pseudocyst, and vascular complications should be investigated when pain increases, oral intake remains inadequate, fever develops, or enzyme levels remain elevated. US may be used to follow superficial and large collections, whereas MRI/MRCP can more clearly demonstrate the relationship of a collection to the pancreatic duct and associated parenchymal changes. In acute deterioration or when active bleeding is suspected, contrast-enhanced CT is faster and more comprehensive.

ROLE OF US, CEUS, CT, AND MRI IN FOLLOW-UP

Conventional US is valuable in follow-up because it can be performed at the bedside, does not require sedation, and does not involve ionizing radiation. It can demonstrate free fluid, biloma, urinoma, hydronephrosis, and large hematomas. However, a normal US examination cannot reliably exclude a parenchymal or vascular complication; image quality is affected by operator experience, bowel gas, and patient cooperation.

By using intravascular microbubbles, CEUS depicts parenchymal perfusion and active vascular lesions in greater detail than conventional US. A recent meta-analysis of four studies involving 364 children reported a pooled sensitivity of 88.5% and specificity of 98.5% for detecting traumatic solid organ injuries in children (14). These results indicate that CEUS is a valuable option, particularly for targeted follow-up of stable patients and for reducing radiation exposure.

However, CEUS is not equivalent to trauma CT for excluding all abdominal injuries and has limitations in the assessment of deep lesions, bowel and mesenteric injuries, collecting system leaks, and polytrauma.

Contrast-enhanced CT provides the fastest and most comprehensive assessment of active bleeding, pseudoaneurysm, infarction, devascularization, abscess, and multiorgan complications. It should therefore be preferred in patients with clinical deterioration or when an urgent intervention is planned. In follow-up examinations, rather than repeating every phase of the previous scan, a single-phase or targeted protocol tailored to the specific clinical question should be used.

MRI and MRCP do not involve ionizing radiation and are superior for evaluating the biliary system, pancreatic duct, soft tissues, and fluid collections. Their disadvantages include longer examination times, limited availability in emergency settings, motion artifacts, and the potential need for sedation in young children. They should therefore be used in selected hemodynamically stable patients who do not require urgent intervention.

PRACTICAL ORGAN-SPECIFIC APPROACH TO REPEAT IMAGING

Organ	Routine follow-up in asymptomatic patients	Findings that should prompt consideration of repeat imaging	Preferred modality
Spleen	Not recommended for low-grade injuries; individualized for high-grade injuries	Increasing pain, a decline in hemoglobin, tachycardia, an initial vascular finding, or new trauma	US/CEUS in stable patients; contrast-enhanced CT or angiography when bleeding is suspected
Liver	Not recommended in clinically improving patients	Pain, fever, jaundice, increased bilirubin levels, a decline in hemoglobin, or a high-grade central or vascular injury	US/CEUS; contrast-enhanced CT when a complication is suspected; MRI/MRCP for biliary complications
Kidney	Generally unnecessary in uncomplicated grade I–III injuries	Urinary leakage, selected follow-up in grade IV–V injuries, hematuria, fever, flank pain, oliguria, or increased creatinine levels	US/CEUS; delayed-phase CT or MR urography for assessment of the collecting system
Pancreas	No fixed routine schedule	Negative or equivocal early CT despite high clinical suspicion, persistent pain or vomiting, increasing enzyme levels, or suspected ductal injury or collection	Targeted repeat CT or MRI/MRCP after 12–24 hours; US/MRI for follow-up of collections

ESSENTIAL ELEMENTS OF THE RADIOLOGY REPORT

The initial CT report should be structured to support appropriate follow-up decisions. In addition to identifying the injured organ and its AAST grade, the report should clearly document the following features:

1. The depth, extent, and segmental location of the laceration.
2. The size of any subcapsular or intraparenchymal hematoma.
3. Differentiation between active contrast extravasation and a contained vascular injury.
4. The presence of pseudoaneurysm, arteriovenous fistula, infarction, or devascularization.
5. The volume and distribution of hemoperitoneum.
6. Findings suggestive of biliary or urinary leakage.
7. The integrity of the renal collecting system and ureteropelvic junction.

8. The relationship of a pancreatic laceration to the main pancreatic duct and the presence of peripancreatic fluid.

9. Associated bowel, mesenteric, adrenal, vascular, and osseous injuries.

10. Diagnostic limitations, including the phases obtained, motion artifacts, or incomplete imaging.

The follow-up report should describe not only changes in lesion size but also any new active bleeding, vascular complication, infected collection, biloma, urinoma, ductal dilatation, or other finding that may require treatment, with comparison to the previous examination.

CONCLUSION

In pediatric solid organ injuries, the decision to perform repeat imaging should not be based solely on the AAST grade or a predetermined time point. Routine follow-up CT is unnecessary in clinically improving, hemodynamically stable, and asymptomatic children with low-grade splenic, hepatic, or renal injuries. Repeat imaging should instead be guided by clinical and laboratory findings such as new pain, hemodynamic deterioration, a decline in hemoglobin, fever, jaundice, persistent hematuria, worsening renal function, or elevated pancreatic enzyme levels.

High-grade injury, an initial vascular abnormality, renal collecting system injury, or suspected pancreatic duct injury should lower the threshold for follow-up imaging. In pancreatic trauma, clinicians should recognize that early CT findings may be normal or equivocal; when clinical suspicion remains high, targeted repeat CT or MRI/MRCP should be considered within 12–24 hours. During follow-up, US and CEUS can help reduce radiation exposure, whereas contrast-enhanced CT is the preferred modality when active bleeding or multiple complications are suspected, and MRI/MRCP has a central role in evaluating the biliary system and pancreatic duct.

The optimal approach is to plan each follow-up examination according to the specific clinical question and to select the modality that provides adequate diagnostic information with the lowest possible radiation burden. Organ- and patient-centered follow-up conducted collaboratively by pediatric surgery, emergency medicine, radiology, interventional radiology, and, when necessary, pediatric urology and gastroenterology can reduce unnecessary imaging while enabling timely detection of delayed complications.

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M4533-Tam Metin

ANESTHETIC AIRWAY MANAGEMENT IN PEDIATRIC VENTRICULOPERITONEAL SHUNT SURGERY: INSTITUTIONAL APPROACH AND ILLUSTRATIVE CASES

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Introduction/Aim: Pediatric patients undergoing ventriculoperitoneal (VP) shunt surgery for hydrocephalus represent a significant population at our center, with close to 200 cases annually, roughly two-thirds performed under emergency conditions. Patient age ranges from the neonatal period (day 0) to 18 years. Etiology includes congenital (aqueduct stenosis, Chiari malformations, craniofacial syndromes) and acquired (hemorrhage, tumor, post-infectious) causes, most commonly congenital hydrocephalus or myelomeningocele-associated hydrocephalus. In this population, difficult airway is anticipated rather than exceptional, particularly due to macrocephaly. This report presents our approach with illustrative extreme cases.

Methods: A standardized protocol is applied to all patients: routine ear-to-sternal-notch alignment with shoulder support; C-MAC videolaryngoscopy first-line, LMA rescue, fiberoptic bronchoscopy advanced rescue; IV induction (thiopental or propofol, fentanyl, rocuronium; agent chosen by severity of intracranial hypertension); laryngoscopy performed under deep anesthesia, with lidocaine (1 mg/kg) and fentanyl (1-2 mcg/kg IV) to blunt the sympathetic response, plus mild hyperventilation, to prevent tonsillar herniation; maintenance with sevoflurane 1 MAC, switching to TIVA alone when intracranial pressure is markedly elevated; analgesia with paracetamol and fentanyl; fasting adherence when feasible, with true emergencies managed via RSI.

Results: Applying this protocol, three representative extreme presentations were managed successfully: craniofacial dysmorphism with macrocephaly; myelomeningocele-associated positioning difficulty; and a neonate with craniofacial deformity and scalp venous congestion managed without airway difficulty despite an extreme appearance. No airway-related complications occurred across the presented cases.

Conclusion: Difficult airway in pediatric shunt surgery should be regarded as anticipated, warranting routine standardized preparation combined with a stepwise airway device strategy.

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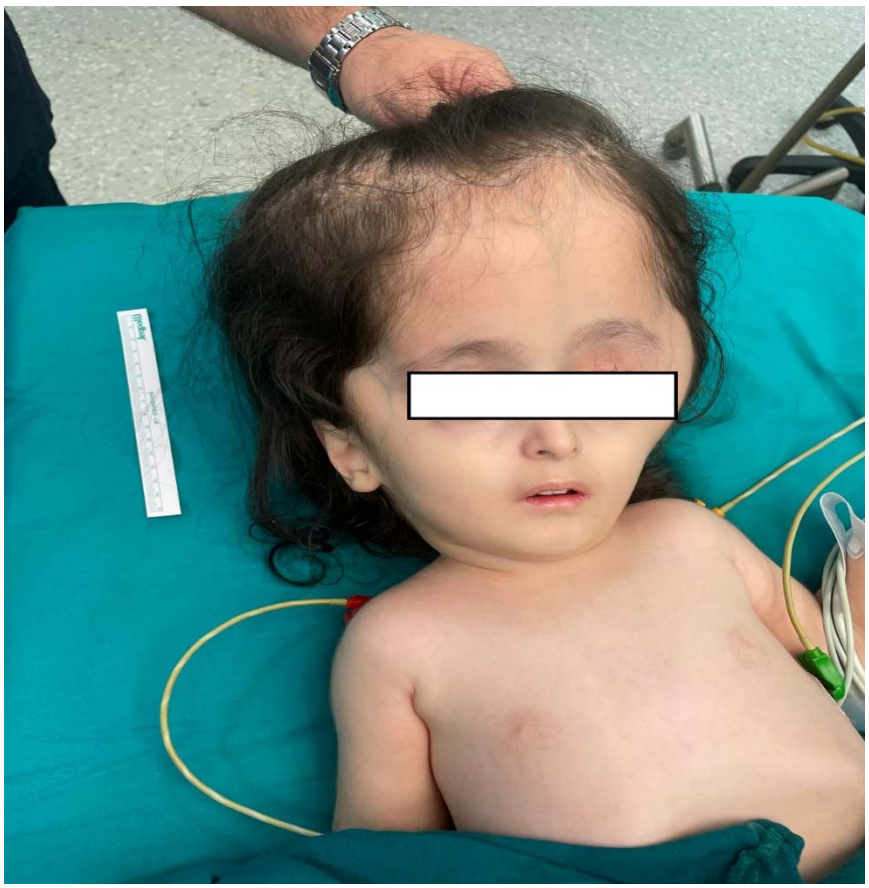
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M4534-Tam Metin

HER TRAVMA HASTASINA TETANOZ PROFİLAKSİSİ YAPILMALI MI? 3 YILLIK VERİLERİMİZİN DEĞERLENDİRMESİ

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Giriş

Tetanoz, *Clostridium tetani* tarafından üretilen tetanospazmin toksininin neden olduğu, kontrol edilemeyen kas spazmları ve nörolojik bulgularla seyreden, yaşamı tehdit eden bir enfeksiyon hastalığıdır. Tetanoz, toprakta ve insan ile sıcakkanlı hayvanların bağırsaklarında yaygın olarak bulunan, gram pozitif, spor oluşturan, hareketli anaerobik bir bakteri olan Clostridium tetani'den kaynaklanır. Hastalık, tıbbi müdahale olmaksızın şiddetli vakalarda %100'e yaklaşan önemli bir ölüm oranına sahiptir (1).

Tetanoza karşı bağışıklama süreci, adaptif bağışıklık koruması oluşturmak için patojenik ekzotoksinin formaldehit ile inaktive edilmiş bir formu olan tetanoz toksoidi (TT) içeren aşıları kullanır. TT bağışıklama geçmişi eksik veya belirsiz olan yetişkinler için, koruyucu antikor titrelerine ulaşmak için aşının üç dozluk (0, 1 ve 6. aylarda uygulanan) tam bir serisi gereklidir (1,2). Bağışıklık yanıtı kademeli olarak gelişirken, tam bağışıklama 5-10 yıl süren koruma sağlar ve takviye dozlarıyla bu süre on yıldan daha uzun süreye uzatılabilir (2).

Amaç

Bu çalışmada, hastanemiz acil servisine başvuran travma hastalarında tetanoz profilaksisi uygulamalarının değerlendirilmesi ve özellikle rutin çocukluk çağı aşılamaları tamamlanmış çocuk hastalarda aşı öyküsü değerlendirilmeden yapılan gereksiz tetanoz aşılarına dikkat çekilmesi amaçlanmıştır.

Materyal ve Metot

Çalışmaya 2023, 2024 ve 2025 yıllarında hastanemiz acil servisine başvuran ve tetanoz profilaksisi kapsamında Td (Tetanoz-Difteri) aşısı uygulanan hastalara ait veriler dahil edilmiştir.Veriler hastanemiz otomasyon sistemi ve Aşı Birimi kayıtlarından retrospektif olarak elde edilmiştir.

Bulgular

2023 yılında hastanemiz acil servisine başvuran 12.530 hastaya Td aşısı uygulanmış olup, bunların 874'ünü çocuk yaş grubundaki hastalar oluşturmuştur.2024 yılında toplam 9.137 hastaya Td aşısı uygulanmış, bu hastaların 601'i çocuk yaş grubunda değerlendirilmiştir.2025 yılında ise 9.301 hastaya Td aşısı uygulanmış ve bunların 518'inin çocuk yaş grubunda olduğu görülmüştür.

Tartışma

Tetanozun; yenidoğan, lokalize, sefalik ve generalize olmak üzere dört klinik formu bulunmaktadır. Yenidoğan tetanozu, yaşamın ilk 28 günü içerisinde ortaya çıkan, mortalitesi yüksek ve büyük ölçüde önlenebilir bir hastalıktır. Olguların ortaya çıkmasında yetersiz maternal bağışıklama, doğum öncesi sağlık hizmetlerine erişimin ve bakımın yetersiz olması ile hijyenik olmayan perinatal uygulamalar önemli rol oynamaktadır. Yenidoğan tetanozu, gebelik sırasında veya düşük, ölü doğum, kürtaj ya da doğumdan sonraki ilk altı hafta içerisinde ergen ve erişkin kadınlarda görülen maternal tetanoz ile yakından ilişkilidir (3).

Dünya Sağlık Örgütü (DSÖ), 1974 yılından itibaren evrensel çocukluk çağı tetanoz toksoid aşılamasını önermektedir (4). Tetanoza karşı yeterli bağışıklığın sağlanabilmesi açısından aşılama serisinin tamamlanması büyük önem taşımaktadır. Seri aşılama sonucunda oluşan güçlü IgG yanıtı ile maternal antikorlar plasenta aracılığıyla fetüse aktarılmakta ve bu nedenle kız çocuklarının etkin şekilde aşılanması, ilerleyen yaşlarda gebelik döneminde oluşacak maternal bağışıklık yoluyla yenidoğan tetanozunun önlenmesine katkı sağlamaktadır. Üç dozluk primer aşılama serisinin klinik tetanoza karşı yaklaşık tam koruma sağladığı ve bu koruyuculuğun en az beş yıl devam ettiği bildirilmektedir (3). Dolayısıyla anne ve bebeğin tetanozdan korunmasında en etkili yaklaşım, annenin gebelik öncesinde veya gebelik sırasında tam bağışıklamasının sağlanmasıdır. Ülkemiz de Sağlık Bakanlığı tarafından yürütülen bağışıklama programları etkin bir şekilde uygulanmaktadır. Maternal-Neonatal Tetanoz Eliminasyon Programı 1994 yılında başlatılmış olup, Nisan 2009 itibarıyla Türkiye yenidoğan tetanozunu elimine eden ülkeler arasına girmiştir (5).

Çocukluk çağı aşılarının yaşına uygun olarak tamamlandığı çocuklarda, özellikle temiz ve basit yaralanmalar sonrasında ek tetanoz profilaksisine çoğu durumda gerek bulunmamaktadır. Bu hastalarda öncelikli yaklaşım yaranın uygun şekilde temizlenmesi ve çocuğun aşılanma öyküsünün değerlendirilmesidir.

Sonuç

Çalışmamızda hastanemize ait üç yıllık veriler değerlendirildiğinde, tetanoz profilaksisinin güncel öneriler doğrultusunda her zaman doğru şekilde uygulanmadığı ve özellikle çocukluk çağı aşıları tamamlanmış çocuklarda, basit ve temiz yaralanmalar sonrasında dahi gereksiz tetanoz aşılaması yapıldığı görülmüştür. Bu bulgular, acil servislerde tetanoz profilaksisi uygulanırken hastanın aşılanma öyküsünün sistematik olarak değerlendirilmesinin ve yaranın özellikleri ile birlikte güncel profilaksi algoritmalarına göre karar verilmesinin önemini ortaya koymaktadır. Endikasyon bulunmaksızın uygulanan aşılar yalnızca gereksiz tıbbi müdahaleye yol açmakla kalmayıp sağlık kaynaklarının gereksiz kullanımına ve ek ekonomik yüke de neden olmaktadır.

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M4535-Tam Metin

CLINICAL SEVERITY, EMERGENCY DEPARTMENT MANAGEMENT, AND MEDICOLEGAL OUTCOMES OF PEDIATRIC FORENSIC TRAUMA CASES: A ONE-YEAR RETROSPECTIVE STUDY

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Abstract

Aim. Pediatric forensic trauma requires concurrent clinical and medicolegal management. This study evaluated clinical severity, emergency department (ED) management, and medicolegal outcomes among children presenting with traumatic forensic events.

Methods. A retrospective cohort of 646 patients aged <18 years registered as medicolegal cases at Ankara Etlik City Hospital ED between 1 January and 31 December 2025 was analyzed. Predictors of intensive care unit (ICU) admission or mortality were assessed by multivariable logistic regression.

Results. Median age was 12 years (IQR 7–16) and 65.6% were male. Leading mechanisms were traffic accidents (31.4%), falls (24.6%), and assault (22.6%). GCS <15 was present in 7.0% and ISS ≥16 in 5.6%. Overall, 68.0% were discharged, 6.7% were admitted to the ICU, and mortality was 0.8%. Injuries were classified as amenable to simple medical intervention in 65.2% and life-threatening in 10.5%. ISS ≥16 (adjusted OR 18.6; 95% CI 9.2–37.8) and GCS <15 (adjusted OR 7.9; 95% CI 4.0–15.6) independently predicted ICU admission or mortality.

Conclusion. Although most injuries were minor, traffic-related and high-severity trauma accounted for disproportionate resource use and adverse outcomes. Standardized severity assessment and complete medicolegal documentation should be integrated into pediatric trauma care.

Keywords: pediatric trauma; forensic case; emergency department; Injury Severity Score; medicolegal report

1. Introduction

Trauma remains the leading cause of death and acquired disability in childhood, and a substantial proportion of injured children presenting to emergency departments (EDs) are simultaneously registered as forensic cases. In Türkiye, any injury that may have arisen from a traffic accident, an assault, a suspicious fall, self-harm, or suspected neglect or abuse obliges the treating physician to complete a forensic report alongside clinical care. The physician therefore carries two parallel responsibilities: stabilizing and treating the child, and producing an accurate, contemporaneous medicolegal record that may later determine criminal or civil liability. These tasks pull in different directions — clinical priorities emphasize rapid triage, imaging and disposition, whereas medicolegal documentation requires a structured description of every lesion, its mechanism, and a formal severity classification.

Objective severity instruments, namely the Glasgow Coma Scale (GCS) and the Injury Severity Score (ISS), can anchor both processes to the same reproducible measurements, but they are not uniformly recorded in pediatric forensic practice. Published Turkish series have described sociodemographic profiles and injury patterns, yet few have linked objective severity scores to both clinical outcomes and the statutory medicolegal classification within a single cohort. This study therefore describes the clinical severity, ED management, and medicolegal outcomes of pediatric forensic trauma presentations over one calendar year at a tertiary center, and identifies independent predictors of intensive care unit (ICU) admission or in-hospital mortality.

2. Materials and Methods

Study design and participants. This single-center, retrospective observational cohort study was conducted in the Emergency Department of Ankara Etlik City Hospital, a tertiary referral center in Ankara, Türkiye. All patients aged under 18 years who presented between 1 January and 31 December 2025 and for whom a forensic report was issued because of a traumatic event were eligible. Patients whose forensic registration was non-traumatic and those with incomplete records for the primary outcome were excluded, leaving 646 patients.

Variables and outcomes. Data were extracted from the hospital information system and archived forensic report forms: age, sex, trauma mechanism, multi-region involvement, fracture or dislocation, GCS at first assessment, ISS, imaging including computed tomography (CT), specialist consultation, surgical intervention, ED disposition, and the statutory medicolegal classification (whether the injury was amenable to simple medical intervention and whether it was life-threatening). The primary outcome was a composite of ICU admission or in-hospital mortality.

Statistical analysis. Continuous variables are presented as median with interquartile range (IQR) and categorical variables as counts with percentages. Groups were compared with the Mann–Whitney U test and the chi-square or Fisher exact test as appropriate. Variables associated with the primary outcome on univariable testing were entered into a multivariable logistic regression model, with results expressed as adjusted odds ratios (OR) with 95% confidence intervals (CI). A two-sided p value below 0.05 was considered significant.

3. Results

A total of 646 pediatric forensic trauma cases were analyzed. The median age was 12 years (IQR 7–16) and 424 patients (65.6%) were male. The leading mechanisms were traffic accidents (203 patients, 31.4%), falls (159, 24.6%), and assault (146, 22.6%); the remaining 138 patients (21.4%) presented after other mechanisms (Figure 1). Injury involved more than one body region in 176 patients (27.2%), and fracture or dislocation was identified in 155 (24.0%).

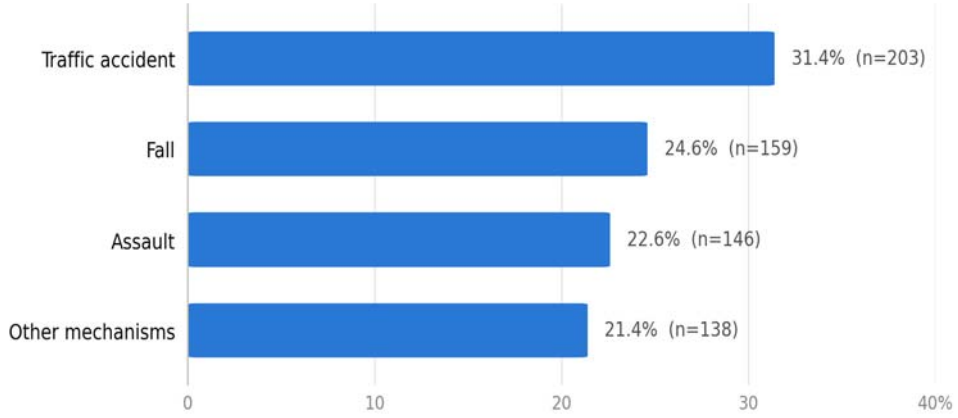


Figure 1. Distribution of pediatric forensic trauma mechanisms (N = 646).

Objective severity was low in most of the cohort: GCS was below 15 in 45 patients (7.0%) and ISS was 16 or above in 36 (5.6%). Diagnostic and therapeutic intensity nevertheless remained considerable. CT was performed in 234 patients (36.2%), specialist consultation was requested in 401 (62.1%), and 71 patients (11.0%) underwent a surgical intervention.

With respect to disposition, 439 patients (68.0%) were discharged directly from the ED, 137 (21.2%) were admitted to a ward, 43 (6.7%) were admitted to the ICU, and 22 (3.4%) were transferred to another hospital. Five patients died in hospital, giving a mortality of 0.8%. On medicolegal classification, the injury was considered minor enough to be managed by simple medical intervention in 421 patients (65.2%), whereas 68 patients (10.5%) sustained a life-threatening injury. The full distribution of demographic, clinical, management, and medicolegal characteristics is presented in Table 1.

In the multivariable logistic regression model, two objective severity markers independently predicted ICU admission or in-hospital mortality: an ISS of 16 or above (adjusted OR 18.6; 95% CI 9.2–37.8) and a GCS below 15 at first assessment (adjusted OR 7.9; 95% CI 4.0–15.6) (Table 2). Traffic accidents accounted for a disproportionate share of severe presentations relative to their overall frequency, whereas assault and low-energy falls were overwhelmingly associated with minor injury and direct discharge.

Table 1. Demographic, clinical, management, and medicolegal characteristics (N = 646)

Indicator	Result	Indicator	Result
Male sex	424 (65.6%)	Median age	12 years (IQR 7–16)
Traffic accident	203 (31.4%)	Fall	159 (24.6%)
Assault	146 (22.6%)	Other mechanisms	138 (21.4%)
Multi-region injury	176 (27.2%)	Fracture/dislocation	155 (24.0%)
GCS <15	45 (7.0%)	ISS ≥16	36 (5.6%)
Computed tomography	234 (36.2%)	Specialist consultation	401 (62.1%)
Surgical intervention	71 (11.0%)	Discharged from ED	439 (68.0%)
Ward admission	137 (21.2%)	ICU admission	43 (6.7%)
Interhospital transfer	22 (3.4%)	In-hospital mortality	5 (0.8%)
Simple medical intervention	421 (65.2%)	Life-threatening injury	68 (10.5%)

GCS: Glasgow Coma Scale; ISS: Injury Severity Score; ICU: intensive care unit; ED: emergency department; IQR: interquartile range.

Table 2. Independent predictors of ICU admission or in-hospital mortality (multivariable logistic regression)

Predictor	Adjusted OR	95% CI	p
ISS ≥16	18.6	9.2–37.8	<0.001
GCS <15	7.9	4.0–15.6	<0.001

OR: odds ratio; CI: confidence interval. Model adjusted for age, sex, and trauma mechanism.

4. Discussion

In this one-year cohort the dominant picture was low-severity injury in an adolescent, male-predominant population: two thirds of patients were discharged from the ED and almost two thirds were classified as treatable by simple medical intervention. Traffic accidents led the mechanism distribution at 31.4%, closely matching the 35.1% reported by Arslan and Demir in a large Turkish pediatric forensic series, whereas a recent single-center trauma-specific cohort found physical assault to predominate (43.3%). Such variation between centers most likely reflects catchment population and referral pattern rather than a difference in injury epidemiology, and argues for caution in extrapolating mechanism profiles from one hospital to another.

The clinical importance of this cohort lies not in the low-severity majority but in the small high-severity minority that accounted for virtually all adverse outcomes. The regression analysis makes that concentration explicit: an ISS of 16 or above increased the odds of ICU admission or death roughly eighteen-fold, and a GCS below 15 almost eightfold, after adjustment. Both scores are simple, reproducible and available at first contact, and their performance here is consistent with multicenter pediatric data in which the ISS discriminates in-hospital mortality well and compares favorably with alternative trauma scores. The practical implication is that ISS and GCS should be recorded routinely rather than selectively, since together they identify at triage the roughly one child in twenty whose trajectory differs fundamentally from the rest.

The medicolegal dimension deserves particular emphasis. The proportion classified as having a life-threatening injury (10.5%) exceeded the proportion with ISS ≥16 (5.6%), reflecting that the statutory categories and the anatomical severity scores measure related but distinct constructs: the former incorporates the potential for a fatal outcome from lesions such as intracranial hemorrhage that may score modestly on the ISS. Trauma scores should therefore support rather than replace the legal classification — but a report documenting GCS, ISS, imaging findings and the timing of each assessment is far more defensible than one relying on narrative description alone. The high rate of CT use (36.2%) alongside a low rate of high-severity injury invites similar reflection: part of this imaging is clinically indicated, and part is plausibly driven by the wish to document the absence of injury, which competes with the imperative to limit ionizing radiation in children.

Limitations. This study is retrospective and single-center, so tertiary referral patterns may over-represent severe injury. Scoring depended on documentation quality, and cases with incomplete records were excluded, which may have introduced selection bias. Long-term functional outcomes and the judicial disposition of the forensic reports were not captured, and suspected abuse and neglect were not analyzed separately.

5. Conclusion

Most pediatric forensic trauma presentations were minor and resolved with discharge from the ED, but a small subgroup defined by an ISS of 16 or above or a GCS below 15 accounted for the great

majority of ICU admissions and deaths, and traffic accidents were the mechanism most consistently associated with severe injury. Routine, standardized recording of objective severity scores at first contact — integrated into, rather than appended to, the statutory forensic report — would improve both early risk stratification and the evidentiary quality of pediatric medicolegal documentation.

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M4536-Tam Metin

PEDIATRIC HEAD TRAUMA WITH GCS 15 DESPITE SEVERE INTRACRANIAL INJURIES: DEPRESSED PARIETAL SKULL FRACTURE, PNEUMOCEPHALUS, AND SUBARACHNOID HEMORRHAGE

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Introduction

Pediatric head trauma may cause significant intracranial injuries despite an initially normal neurological examination. Depressed skull fractures and basilar skull fractures are associated with dural injury, cerebrospinal fluid (CSF) leakage, pneumocephalus, and intracranial hemorrhage. Therefore, early neuroimaging and neurosurgical evaluation are essential (Kochanek et al.).

Case Presentation

A 10-year-old boy was brought to the emergency department by emergency medical services after his father accidentally ran over the child's head with the front wheel of a tractor while reversing. The patient presented with severe headache, nausea, and two episodes of projectile vomiting. On arrival, the airway was patent, breathing and circulation were stable, and the Glasgow Coma Scale (GCS) score was 15 (E4V5M6). Pupils were isochoric with bilateral normal light reflexes, and no focal neurological deficit was identified. Physical examination revealed a prominent left parietal scalp hematoma with palpable depression and tenderness. Serosanguineous discharge was observed from the left external auditory canal, raising suspicion of CSF leakage. Non-contrast cranial computed tomography demonstrated a depressed and displaced left parietal skull fracture extending toward the skull base, associated with mild subarachnoid hemorrhage and prominent pneumocephalus within the subdural space and basal cisterns. No significant midline shift or intracranial hematoma requiring surgical evacuation was detected. The patient was admitted for close neurological observation in collaboration with neurosurgery and pediatric intensive care. The head of the bed was elevated to 30°, and supportive treatment was provided. Prophylactic antiseizure therapy was administered in accordance with the clinical assessment (Kochanek et al.).

Conclusion

Follow-up CT at 24 hours demonstrated marked regression of pneumocephalus and subarachnoid hemorrhage, while the suspected CSF leakage resolved clinically. The patient was discharged neurologically intact on the sixth day. This case emphasizes that a GCS score of 15 does not exclude clinically significant cranial and intracranial injuries in children. Depressed skull fractures accompanied by skull base fracture, pneumocephalus, and suspected CSF leakage warrant prompt imaging, neurosurgical consultation, and close clinical monitoring.

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M4538-Özet Metin

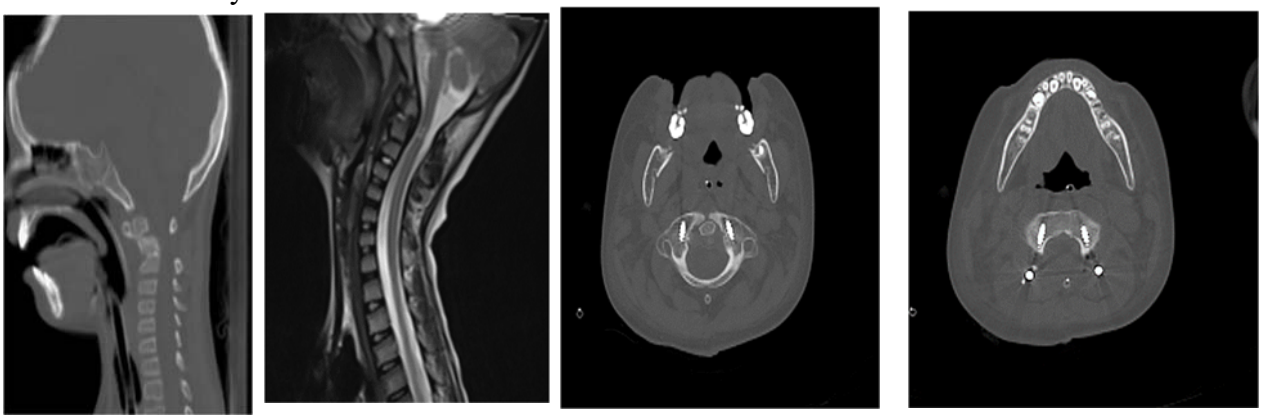
C2 VERTEBRAL FRACTURE AND ATLANTOAXIAL INSTABILITY IN A PEDIATRIC PATIENT WITH DOWN SYNDROME: ACUTE TETRAPARESIS FOLLOWING MINOR TRAUMA

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Introduction/Aim: Atlantoaxial instability (AAI) is an important craniovertebral junction pathology that is relatively common in children with Down syndrome and is often asymptomatic. Even minor trauma may result in severe cervical injury and neurological deficits. We present a pediatric patient with Down syndrome who developed acute tetraparesis following a seizure and was diagnosed with a C2 fracture and AAI.

Case: A 10-year-old boy with Down syndrome and epilepsy was evaluated for tetraparesis that developed following a seizure and had persisted for approximately three days. Although there was no clear history of trauma, low-energy trauma occurring during the seizure was considered a possible mechanism. Cervical computed tomography (CT) revealed a C2 fracture with posterior angulation of the dens and marked atlantoaxial instability. Magnetic resonance imaging (MRI) demonstrated narrowing of the anterior epidural space and signal changes within the spinal cord consistent with myelomalacia.



Treatment: Due to the neurological deficit and spinal cord compression, C1–C2 posterior stabilization and fusion, together with C2 total laminectomy, were performed.

Conclusion: New-onset neurological deficits following seizures in children with Down syndrome and epilepsy should not be attributed solely to a postictal state. Rapid cervical imaging should be performed to evaluate for C2 fracture and AAI, even in the absence of a clear history of trauma. When symptomatic instability and spinal cord compression are identified, early neurosurgical evaluation and appropriate surgical treatment should not be delayed.

M4539-Özet Metin

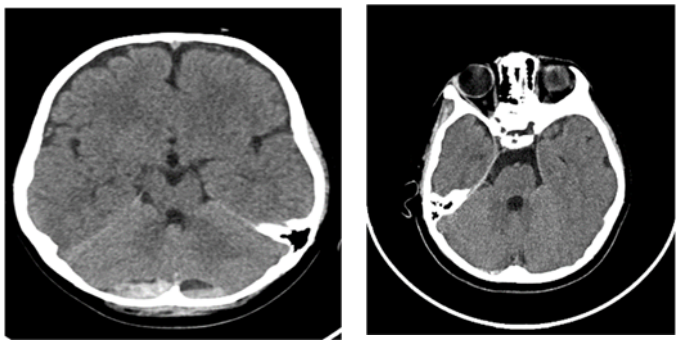
CONSERVATIVE MANAGEMENT OF PEDIATRIC POSTERIOR FOSSA EPIDURAL HEMATOMA: A CASE REPORT

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Introduction / Aim: Posterior fossa epidural hematoma (PFEDH) is a rare but potentially life-threatening condition, accounting for 1.2–12.9% of all epidural hematomas. It is particularly associated with occipital trauma and skull fractures. Due to the limited anatomical volume of the posterior fossa, even small hematomas may cause compression of the brainstem and fourth ventricle. We aimed to present a pediatric patient with PFEDH associated with a linear occipital fracture who was successfully managed conservatively.

Methods: A pediatric patient evaluated after trauma had an initial Glasgow Coma Scale (GCS) score of 15. Cranial computed tomography (CT) revealed a linear occipital fracture and posterior fossa epidural hematoma. Because the fracture was adjacent to the sagittal and transverse sinuses, the patient was closely monitored clinically and radiologically for possible venous sinus injury. Serial CT scans were performed to monitor hematoma size and neurological status.



Results: No neurological deterioration occurred during follow-up, and serial CT scans demonstrated no increase in hematoma size. Therefore, surgical treatment was not required. After approximately 10 days of clinical observation, the patient was discharged with a GCS score of 15. At the one-week follow-up, the patient remained neurologically intact, and CT demonstrated early hematoma resorption. One month later, complete resolution of the hematoma was observed.

Conclusion: Pediatric PFEDH is a rare traumatic condition that may have serious consequences. In selected patients who are clinically stable, neurologically intact, and show no hematoma progression on serial imaging, conservative management with close clinical and radiological follow-up can be successful. Treatment should be individualized based on clinical and radiological findings.

M4540-Tam Metin

SEVERE LACTIC ACIDOSIS AND ACUTE KIDNEY INJURY FOLLOWING STRENUOUS PHYSICAL EXERTION: A RARE CASE REPORT FROM THE PEDIATRIC EMERGENCY DEPARTMENT

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ABSTRACT

Background: Lactic acidosis and acute kidney injury (AKI) rarely manifest together in pediatric emergency settings secondary to strenuous exertion and dehydration without rhabdomyolysis. We report the diagnostic workup, management, and complete recovery of an adolescent presenting with severe lactic acidosis and AKI following prolonged physical labor.

Case Presentation: A 17-year-old male presented with nausea, vomiting, dizziness, and presyncope after working in an orchard for two weeks with inadequate sleep and hydration. On admission, he was hypotensive (84/52 mmHg). Initial blood gas analysis revealed severe metabolic acidosis (pH: 7.10, HCO_3^-: 9.5 mmol/L, lactate: 20 mmol/L, glucose: 60 mg/dL). Laboratory findings demonstrated serum creatinine of 2.96 mg/dL, urea of 46.7 mg/dL, and leukocytosis (29.5 × 10^3/μL), while creatine kinase levels remained normal, ruling out rhabdomyolysis. Following ICU admission for aggressive intravenous fluid resuscitation, sodium bicarbonate infusion, and close monitoring, the patient achieved complete clinical and metabolic resolution within 48 hours (lactate: 1.5 mmol/L, creatinine: 0.8 mg/dL) and was discharged without sequelae.

Conclusion: Strenuous exertion combined with fluid restriction can precipitate profound metabolic collapse in otherwise healthy adolescents. Early blood gas analysis, prompt fluid resuscitation, and thorough history-taking regarding physical activity are essential for preventing complications and achieving rapid recovery in pediatric emergency practice.

Keywords: Acute Kidney Injury; Dehydration; Lactic Acidosis; Pediatric Emergency Department; Physical Exertion.

Introduction

Lactic acidosis is a clinically significant metabolic disorder resulting from an imbalance between lactate production and clearance. It is characterized by metabolic acidosis and requires prompt identification of the underlying cause. Various metabolic and systemic conditions, particularly tissue hypoperfusion and impaired oxygen delivery, may lead to substantial elevations in serum

lactate levels. Early recognition of severe lactic acidosis and rapid correction of the underlying cause are essential for improving clinical outcomes (1,2).

Strenuous physical exertion and inadequate fluid intake may predispose patients to acute kidney injury (AKI), particularly in the setting of intravascular volume depletion. Although rhabdomyolysis is an important cause of AKI following strenuous exercise, it was considered less likely in the present case because creatine kinase (CK) levels were within the normal range and there were no additional clinical findings suggestive of rhabdomyolysis (3,4).

This report describes the diagnostic evaluation, treatment, and clinical course of severe lactic acidosis and AKI occurring after prolonged strenuous physical exertion and inadequate fluid intake in an adolescent presenting to the emergency department.

Case Presentation

A 17-year-old male presented to the emergency department with nausea, vomiting, dizziness, and presyncope. On admission, he was alert, cooperative, and fully oriented, with a Glasgow Coma Scale score of 15. His blood pressure was 84/52 mmHg, heart rate was 112 beats/min, body temperature was 36.3 °C, and oxygen saturation was 96% on room air. Capillary blood glucose was 60 mg/dL, and electrocardiography showed normal sinus rhythm.

Routine laboratory tests were obtained, and intravenous fluid resuscitation and 5% dextrose infusion were initiated. Initial blood gas analysis revealed a pH of 7.10, bicarbonate (HCO_3^-) level of 9.5 mmol/L, lactate level of 20 mmol/L, and glucose level of 63 mg/dL. Repeat blood gas analysis confirmed severe metabolic acidosis and marked hyperlactatemia. Systematic interpretation of blood gas findings is essential for identifying metabolic acidosis and recognizing concomitant acid–base disturbances (2).

A detailed history revealed no recent illness, chronic disease, regular medication use, substance use, or excessive analgesic consumption. Further questioning revealed that the patient had been working with his family in an apricot orchard for approximately two weeks, sleeping only 4–5 hours per day and spending most of the day performing strenuous physical activity.

Laboratory investigations showed a leukocyte count of 29.5 × 10^3/μL, neutrophil count of 26 × 10^3/μL, serum glucose of 49 mg/dL, urea of 46.7 mg/dL, creatinine of 2.96 mg/dL, and C-reactive protein level of 7.7 mg/L. CK and CK-MB levels were within normal limits. Urinalysis was unremarkable, and the remaining hematologic and biochemical parameters were within normal ranges. Abdominal ultrasonography, posteroanterior chest radiography, and upright abdominal radiography revealed no pathological findings.

The elevated serum creatinine level and clinical presentation were considered consistent with AKI. Changes in serum creatinine and urine output are the principal parameters used to define and stage AKI (6). Rhabdomyolysis was considered in the differential diagnosis because of the history of strenuous physical exertion; however, it was considered unlikely because CK levels were normal and no additional clinical findings supported this diagnosis (3,4).

The patient was transferred to the resuscitation area for close monitoring. Intravenous fluid therapy was continued, and urine output was closely monitored. Internal medicine and nephrology consultations were obtained. The patient was subsequently admitted to the intensive care unit for continued intravenous hydration, fluid input–output monitoring, sodium bicarbonate infusion, and close monitoring of vital signs.

Although the role of bicarbonate therapy in severe metabolic acidosis should be individualized according to the clinical context, correction of the underlying cause and restoration of adequate circulation remain the mainstays of treatment. Sodium bicarbonate may provide benefit in selected patients with severe acidemia accompanied by AKI; however, treatment decisions should be individualized according to the patient's clinical characteristics (5).

Based on the clinical history, laboratory findings, and overall clinical course, the patient was considered to have severe lactic acidosis and AKI associated with strenuous physical exertion and inadequate fluid intake.

On the first day of intensive care follow-up, blood gas analysis showed a pH of 7.30, HCO_3^- of 14.9 mmol/L, and lactate of 11.9 mmol/L. Serum creatinine decreased to 2.3 mg/dL and urea to 25.7 mg/dL, while the leukocyte and neutrophil counts decreased to $18 \times 10^3/\mu L$ and $16 \times 10^3/\mu L$, respectively. Medical treatment and close monitoring were continued.

On the second day, the patient's general condition and vital signs remained stable, and he was transferred to the inpatient ward. Subsequent laboratory evaluation showed a pH of 7.38, HCO_3^- of 22.2 mmol/L, lactate of 1.5 mmol/L, creatinine of 0.8 mg/dL, urea of 15.4 mg/dL, leukocyte count of $8.1 \times 10^3/\mu L$, neutrophil count of $4.8 \times 10^3/\mu L$, and C-reactive protein level of 0.5 mg/L. The marked reductions in lactate and creatinine levels were accompanied by complete clinical and metabolic recovery. Serial lactate measurements can be useful for assessing metabolic status and response to treatment (1,2).

Following complete clinical and laboratory recovery, the patient was discharged with recommendations for outpatient follow-up in the nephrology and internal medicine clinics.

Conclusion

Strenuous physical exertion combined with inadequate fluid intake may predispose even otherwise healthy adolescents to severe metabolic disturbances and AKI, particularly in the setting of intravascular volume depletion. In patients presenting to the emergency department with nonspecific symptoms such as hypotension, nausea, vomiting, dizziness, or presyncope, a detailed history and early blood gas analysis may facilitate the prompt recognition of severe metabolic abnormalities (1,2).

Rhabdomyolysis should be considered in the differential diagnosis of AKI following strenuous physical exertion. In the present case, however, normal CK levels and the absence of supportive clinical findings made rhabdomyolysis unlikely (3,4).

Early recognition, intravenous fluid resuscitation, close hemodynamic and laboratory monitoring, and a multidisciplinary approach were associated with rapid and complete resolution of severe lactic acidosis and AKI in this patient. This case highlights the importance of obtaining a detailed history regarding physical exertion, fluid intake, working conditions, and potential metabolic disturbances when evaluating adolescents with nonspecific symptoms in the pediatric emergency setting.

Keywords: Acute Kidney Injury; Dehydration; Lactic Acidosis; Pediatric Emergency Department; Physical Exertion.

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M4541-Özet Metin

THE EFFECT OF WAITING TIME ON PARENTAL SATISFACTION AND PERCEIVED QUALITY OF CARE IN A PEDIATRIC EMERGENCY DEPARTMENT

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Introduction: To examine the relationship between waiting time and parental satisfaction and perceived quality of care in a pediatric emergency setting.

Methods: This descriptive cross-sectional study was conducted with 187 parents in the Pediatric Emergency Department of Malatya Training and Research Hospital between January and April 2026. Data were collected using a sociodemographic form, hospital records for waiting times, and the Perceived Quality of Care Scale. Parental satisfaction was additionally assessed with a single 5-point Likert question. Pearson correlation, ANOVA, t-tests, and multiple regression were used for analysis ($p<0.05$).

Results: The mean age of participants (62.6% mothers) was 32.4±6.1 years. The mean waiting time was 47.3±22.6 minutes, with 41.2% waiting over 60 minutes. A significant negative correlation was found between waiting time and perceived care quality ($r=-0.52$, $p<0.001$). The "communication" subscale was most affected ($r=-0.58$, $p<0.001$), while "technical competence" showed no significant difference ($p=0.082$). Mean satisfaction scores were 4.3±0.5 for <30 min, 3.7±0.6 for 30–60 min, and 3.1±0.7 for >60 min ($F=28.4$, $p<0.001$). Parents informed by nurses had higher satisfaction (4.0±0.6 vs. 3.4±0.7, $p=0.004$). In regression analysis, waiting time ($\beta=-0.41$) and nurse information ($\beta=0.29$) were significant predictors, explaining 38% of the variance. First-time visitors reported lower satisfaction than repeat visitors ($p=0.021$).

Conclusion: Prolonged waiting time negatively affects perceived care quality and parental satisfaction. Despite this, nurse-provided information significantly mitigates the adverse effect. Structured information interventions during the waiting process may be an effective strategy to enhance parental satisfaction and perceived care quality in pediatric emergency services.

Keywords: Pediatric emergency, waiting time, parental satisfaction, quality of care, nursing

M4543-Tam Metin

AKUT ASTIM ATAĞI İLE BAŞVURAN ADÖLESANLARDA SİSTEMİK İNFLAMATUVAR İNDEKSLER İLE KAN GAZI PARAMETRELERİ ARASINDAKİ İLİŞKİ

Lale Şahin Gür

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Amaç: Akut astım atağı ile başvuran adölesanlarda sistemik inflamatuvar indeksler ile venöz kan gazı parametreleri arasındaki ilişkinin değerlendirilmesi amaçlandı.

Gereç ve Yöntem: Retrospektif olarak yürütülen çalışmada, 1 Ocak–30 Haziran 2026 tarihleri arasında çocuk acil servise akut astım atağı ile başvuran hastalar incelendi. Eksik verileri bulunan 12 hasta dışlandı ve 28 hasta çalışmaya dahil edildi. Nötrofil-lenfosit oranı (NLR), trombosit-lenfosit oranı (PLR), sistemik immün-inflamasyon indeksi (SII), sistemik inflamasyon yanıt indeksi (SIRI) ve HALP skorları hesaplandı. İnflamatuvar indeksler ile kan gazı parametreleri arasındaki ilişkiler Spearman korelasyon analiziyle değerlendirildi.

Bulgular: Hastaların medyan yaşı 17 (IQR:12,5–18,25) yıl olup %50'si erkekti. PLR ile pH arasında negatif (r=-0,584; p=0,001), PLR ile pCO_2 arasında pozitif korelasyon (r=0,423; p=0,025) saptandı. SII ile laktat arasında pozitif korelasyon bulundu (r=0,509; p=0,006). HALP ile pH arasında da pozitif ilişki saptandı (r=0,412; p=0,029). NLR ve SIRI ile temel kan gazı parametreleri arasında anlamlı ilişki bulunmadı.

Sonuç: Özellikle PLR ve SII'nin akut astım atağında kan gazındaki fizyolojik değişikliklerle ilişkili olabileceği düşünülmektedir. Bu kolay hesaplanabilir indekslerin klinik değerinin daha geniş prospektif çalışmalarla değerlendirilmesi gerekmektedir.

Anahtar Kelimeler: Astım; Adölesan; Sistemik İnflamatuvar İndeks; Kan Gazı.

GİRİŞ

Astım, çocukluk çağının sık görülen kronik inflamatuvar hava yolu hastalıklarından biridir ve akut alevlenmeler pediatrik acil başvurularının önemli nedenlerindendir. Atak sırasında bronkokonstriksiyon, mukozal ödem ve artmış sekresyon ventilasyon-perfüzyon dengesini bozarak hipoksemi, hiperkapni ve asit-baz değişikliklerine yol açabilir. Kan gazı bu fizyolojik bozuklukları gösterirken sistemik inflamatuvar yanıt hakkında sınırlı bilgi sağlamaktadır (1).

Son yıllarda tam kan sayımından kolaylıkla hesaplanan nötrofil-lenfosit oranı (NLR), trombosit-lenfosit oranı (PLR), sistemik immün-inflamasyon indeksi (SII) ve sistemik inflamasyon yanıt indeksi (SIRI)gibi hematolojik indeksler, sistemik inflamasyonun değerlendirilmesinde dikkat çekmektedir. Düşük maliyetli ve kolay erişilebilir olmaları bu belirteçlerin klinik kullanımını artırmaktadır. Özellikle PLR ve SII'nin inflamatuvar yanıtın farklı bileşenlerini birlikte yansıtması, akut inflamatuvar süreçlerin değerlendirilmesinde potansiyel yarar sağlayabileceğini düşündürmektedir (2).

Çocukluk çağı astımında sistemik inflamatuvar indekslere yönelik çalışmalar artmakla birlikte, araştırmalar çoğunlukla astım tanısı, kontrolü ve hastalık şiddetine odaklanmıştır. Özellikle SII'nin astım alevlenmelerinde inflamatuvar yükü yansıtabileceği bildirilmiştir. Ancak akut astım

atağında bu indekslerin kan gazı değişiklikleriyle ve dolayısıyla gaz değişimindeki fizyolojik bozulmalarla ilişkisi henüz yeterince açıklığa kavuşturulamamıştır (3).

Bu çalışmada, akut astım atağı nedeniyle çocuk acil servise başvuran hastalarda sistemik inflamatuvar indeksler (NLR, PLR, SII, SIRI ve HALP) ile venöz kan gazı parametreleri arasındaki ilişkinin araştırılması amaçlandı. Çalışmamızın temel hipotezi, özellikle PLR ve SII'nin, akut pediatrik astım atağında gelişen kan gazı bozuklukları ile en güçlü ilişki gösteren sistemik inflamatuvar indeksler olduğu ve bu kolay hesaplanabilir biyobelirteçlerin çocuk acil servisinde ilk değerlendirmeye katkı sağlayabileceğidir.

MATERYAL METOD

Katılımcıların Seçimi

Malatya Eğitim ve Araştırma Hastanesi acil servise başvuran adölesan yaş grubundaki hastalar değerlendirildi. 1 Ocak 2026-30 Haziran 2026 tarihleri arasında hastane bilgi sistemine ICD-10 kodlamasına göre tanı kodu J45.9 (Bronşiyal astım, tanımlanmamış) olarak kaydedilmiş 40 hasta datasına ulaşıldı. Hastaların hastane bilgi sistemindeki epikriz raporları detaylıca incelendi. Verileri eksik olan 12 hasta çalışma dışı bırakıldı. Çalışma 28 hasta ile yapıldı.

İstatistiksel Analiz

İstatistiksel analizler için IBM SPSS Statistics for Windows, version 27.0 (IBM Corp.; Armonk, New York USA) programı kullanıldı. Parametrelerin normal dağılıma uygunluğu Shapiro-Wilk testi ile değerlendirildi. Tanımlayıcı istatistiksel metodlar; ortalama, ortanca, standart sapma, yüzde [25-75% (Inter Quantile Range-IQR)] ve frekans olarak verildi. Kan gazı parametreleri ile inflamatuvar indeksler ve kan parametreleri arasında Spearman korelasyon analizi yapıldı.

Bulgular

Çalışmaya akut astım atağı ile çocuk acil servise başvuran toplam 28 hasta dahil edildi. Hastaların yaş medyanı ve %25–75 çeyrekler arası aralığı sırasıyla 17 (12,5–18,25) yıl olup, 14'ü (%50) erkek ve 14'ü (%50) kadın cinsiyetindeydi. Hastaların yalnızca 1'i (%3,6) hastaneye yatırılırken, 27'si (%96,4) acil servisten taburcu edildi. İnflamatuvar indekslerin medyan değerleri NLR için 1,65 (1,20–2,48), PLR için 112,2 (101,7–149,1), SII için 442,15 (260,5–618,9), SIRI için 0,85 (0,53–1,58) ve HALP için 5,70 (4,23–6,95) olarak bulundu.

Spearman korelasyon analizinde PLR ile pH arasında orta-güçlü düzeyde negatif korelasyon saptandı (r=-0,584; p=0,001). Buna karşılık PLR ile pCO_2 arasında pozitif yönde anlamlı korelasyon bulundu (r=0,423; p=0,025). SII ile laktat düzeyi arasında orta düzeyde pozitif korelasyon izlendi (r=0,509; p=0,006). HALP skoru ile pH arasında ise pozitif yönde anlamlı ilişki saptandı (r=0,412; p=0,029). NLR ve SIRI ile temel kan gazı parametreleri arasında istatistiksel olarak anlamlı ilişki saptanmadı.

TARTIŞMA

Bu çalışmada akut astım atağı nedeniyle çocuk acil servise başvuran hastalarda sistemik inflamatuvar indeksler ile kan gazı parametreleri arasında anlamlı ilişkiler saptandı. En dikkat çekici bulgular, PLR ile pH arasında negatif, PLR ile pCO_2 arasında pozitif ve SII ile laktat arasında pozitif korelasyon bulunmasıydı. Ayrıca HALP skoru ile pH arasında pozitif ilişki saptandı. Bu sonuçlar, rutin hemogram parametrelerinden hesaplanan bazı inflamatuvar

indekslerin akut astım atağı sırasında ortaya çıkan fizyolojik değişiklikleri yansıtabileceğini düşündürmektedir.

Astım, hava yollarındaki kronik inflamasyonun farklı hücresel mekanizmalarla şekillendiği heterojen bir hastalıktır. Nötrofiller ve lenfositlerin yanı sıra trombositlerin de bronkokonstriksiyon, hava yolu hiperreaktivitesi ve inflamatuvar hücrelerin akciğere göçünde rol oynadığı bilinmektedir. Bu nedenle trombosit ve lenfosit sayılarını birlikte değerlendiren PLR, astımdaki inflamatuvar yükün basit bir göstergesi olabilir. Güncel bir sistematik derleme ve meta-analizde astımlı çocuklarda NLR ve PLR'nin sağlıklı kontrollere göre daha yüksek olduğu ve bu indekslerin klinik durumdaki değişikliklerden etkilenebildiği bildirilmiştir [4]. Pediatrik referans aralıklarının yaşa göre değişebilmesi ise bu indekslerin çocuklarda yorumlanmasında yaşın dikkate alınması gerektiğini göstermektedir [5,6].

Çalışmamızda PLR'nin pH ile negatif, pCO_2 ile pozitif korelasyon göstermesi özellikle dikkat çekicidir. Artan pCO_2 ve azalan pH, akut astımda alveoler ventilasyonun bozulması ve solunum kas yorgunluğu ile ortaya çıkabilecek fizyolojik değişikliklerdir. PLR'nin bu iki parametreyle zıt yönlü ilişkisi, trombosit-lenfosit dengesindeki değişimin yalnızca inflamasyonu değil, atağın oluşturduğu fizyolojik yükü de dolaylı olarak yansıtabileceğini düşündürmektedir. Bununla birlikte çalışmamız korelasyon temelli olduğundan, PLR'nin solunumsal bozulmayı öngördüğü veya hastalık şiddetini doğrudan gösterdiği sonucuna varılamaz.

Bir diğer önemli bulgumuz SII ile laktat arasındaki pozitif korelasyondur. SII; nötrofil, trombosit ve lenfosit sayılarını tek bir indekste birleştirerek inflamatuvar ve immün yanıtı birlikte yansıtmaktadır. Geniş popülasyonlu bir çalışmada SII'nin astım ve astımla ilişkili klinik olaylarla ilişkili olduğu, bu ilişkinin 20 yaş altındaki bireylerde de belirgin olduğu bildirilmiştir [7]. Ayrıca SII ve benzeri kompozit indekslerin pediatrik inflamatuvar hastalıklarda potansiyel biyobelirteçler olduğu gösterilmiştir [8,9].

Akut astımda laktat artışı ise yalnızca doku hipoksisini göstermeyebilir. Özellikle β_2-agonist tedavisi adrenerjik metabolizmayı artırarak hiperlaktatemiye katkıda bulunabilir ve pediatrik akut astım çalışmalarında laktat, pH ve salbutamol maruziyeti arasındaki ilişki gösterilmiştir [10]. Salbutamol tedavisinin oksijenasyon üzerinde geçici değişikliklere yol açabileceği de bildirilmiştir [11]. Bu nedenle çalışmamızdaki SII-laktat ilişkisi inflamatuvar yük açısından dikkat çekici olmakla birlikte, tedavi öncesi ve sonrası örnekleme zamanı bilinmeden nedensel bir ilişki şeklinde yorumlanmamalıdır.

Son olarak HALP ile pH arasında saptanan pozitif korelasyon, inflamasyon ve beslenme durumunu birlikte yansıtan bu kompozit skorun astımda araştırılabileceğini düşündürmektedir. HALP'ın astımdaki prognostik değerine ilişkin yeni veriler bulunmakla birlikte pediatrik akut astım konusunda kanıtlar henüz sınırlıdır [12].

SONUÇ

Sonuç olarak bulgularımız, özellikle PLR ve SII'nin akut pediatrik astım atağında kan gazındaki fizyolojik değişikliklerle ilişkili olabileceğini düşündürmektedir. Bununla birlikte küçük örneklem büyüklüğü, retrospektif tasarım ve klinik şiddet skorlarının bulunmaması sonuçların genellenebilirliğini sınırlandırmaktadır. Daha geniş, prospektif ve astım şiddet skorlarını içeren çalışmalarla bu indekslerin çocuk acil pratiğindeki klinik değerinin doğrulanması gerekmektedir.

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M4544-Özet Metin

THE EFFECT OF PARENTAL EDUCATION ON POST-DISCHARGE READMISSION RATES IN A PEDIATRIC EMERGENCY DEPARTMENT

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Introduction: This randomized controlled study evaluated the efficacy of structured discharge education provided to parents in a pediatric emergency department—covering fever management, medication dosing, home care, and warning sign recognition—on readmission rates within 72 hours and 7 days post-discharge.

Materials and Methods: Conducted at Malatya Training and Research Hospital Pediatric Emergency Department between January and April 2026, the study enrolled 250 families of children discharged with fever, upper respiratory tract infection, or gastroenteritis. Participants were randomized into intervention (n=125, nurse-led face-to-face structured education plus written materials) and control (n=125, standard discharge) groups. Data were collected via sociodemographic questionnaire, validated parental knowledge scale, and electronic health records. Chi-square tests, independent t-tests, and binary logistic regression were employed ($p<0.05$).

Results: Post-intervention knowledge scores were significantly higher in the intervention group (85.4±6.2) compared to controls (68.7±8.1) ($p<0.001$). The 72-hour readmission rate was 4.8% (n=6) in the intervention group versus 12.8% (n=16) in the control group ($p=0.024$). The 7-day readmission rate was 8.0% (n=10) versus 20.0% (n=25), respectively ($p=0.006$). Logistic regression identified education as an independent protective factor against readmission (OR=0.34, 95% CI=0.18–0.64, $p=0.001$). Parents receiving education on fever management and warning signs demonstrated the lowest readmission rates.

Conclusion: Nurse-administered structured discharge education significantly enhances parental knowledge and markedly reduces post-discharge readmission rates. Integrating comprehensive education-oriented discharge protocols into routine pediatric emergency practice is strongly recommended to optimize patient outcomes and reduce unnecessary healthcare utilization.

Keywords: Pediatric emergency, discharge education, readmission, parental education, nursing

M4545-Tam Metin

THE ROLE OF NON-CONTRAST-ENHANCED MAGNETIC RESONANCE ANGIOGRAPHY IN THE EVALUATION OF EARLY RENAL ALLOGRAFT DYSFUNCTION

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Introduction

Early renal allograft dysfunction demands prompt differentiation of reversible vascular complications from parenchymal causes. Thrombosis, arterial dissection or stenosis, venous obstruction, ureteral obstruction, acute tubular injury, drug toxicity, and rejection may present with impaired graft function. Some causes require urgent surgery, whereas others require biopsy and medical therapy. Doppler ultrasonography (US) is the first-line examination because it is rapid, repeatable, and provides real-time assessment of arterial and venous flow. However, complex arterial anatomy, postoperative conditions, multiple vessels, and focal pathology may limit its ability to identify the cause of dysfunction [1,2].

Non-contrast-enhanced magnetic resonance angiography (NCE-MRA) can provide additional vascular and parenchymal information without ionizing radiation or contrast material. We present two early renal allograft dysfunction cases in which NCE-MRA assisted clinical decision-making after nondefinitive Doppler US.

Case Presentation

Case 1

A 52-year-old man with diabetic nephropathy underwent living-donor renal transplantation. On postoperative day 7, serum creatinine increased unexpectedly. The graft had multiple renal arteries. Doppler US raised concern for vascular compromise but did not establish whether emergency surgical revision was necessary. NCE-MRA demonstrated marked lateral segmental hypoperfusion of the graft. This focal pattern suggested a regional arterial complication rather than diffuse parenchymal dysfunction. Emergency exploration revealed a 4 × 4 cm ischemic area with dissection and thrombosis of the segmental renal arteries supplying that territory. Revascularization restored graft perfusion, and graft function was preserved.

Case 2

A 17-year-old girl with hypertensive nephropathy underwent living-donor renal transplantation. During the early postoperative period, oliguria and an inadequate decline in serum creatinine were observed. Doppler US showed increased vascular resistance but no definitive anatomical lesion. NCE-MRA revealed heterogeneous graft parenchymal signal while main renal arterial and intrarenal vascular flow were preserved. These findings reduced the likelihood of a major vascular inflow or flow-limiting intrarenal lesion and directed the evaluation toward nonvascular causes.

Surgical exploration excluded vascular pathology, and graft biopsy confirmed acute antibody-mediated rejection. Renal function gradually improved with immunosuppressive therapy.

Discussion

These cases show two complementary uses of NCE-MRA. In the first case, it identified a focal perfusion abnormality in a graft with multiple arteries and increased confidence that vascular compromise required urgent exploration. Operative findings confirmed segmental arterial dissection and thrombosis. Thus, an equivocal Doppler examination should not exclude a clinically important regional arterial lesion, particularly in grafts with complex arterial anatomy.

In the second case, NCE-MRA provided reassurance that main and intrarenal flow were preserved despite an elevated Doppler resistance pattern. Increased vascular resistance is nonspecific and may occur in both vascular and parenchymal disorders. Although NCE-**MRA** cannot diagnose rejection, preserved flow can support a diagnostic pathway toward nonvascular causes and biopsy when clinically appropriate [3,4].

NCE-MRA should complement, not replace, Doppler US. It may be especially useful when the Doppler findings are technically limited or do not explain deterioration in graft function. This is particularly relevant when a timely vascular decision is required but immediate contrast-enhanced imaging is undesirable. Its lack of ionizing radiation and contrast requirement is attractive in patients with impaired renal function and may be particularly advantageous in pediatric recipients who may require repeated imaging. Practical limitations include access to MRI, acquisition time, motion sensitivity, and possible need for sedation in children.

This report is limited by its two-case design and does not establish diagnostic accuracy or a universal imaging algorithm. Nevertheless, it suggests that NCE-MRA can be a valuable problem-solving tool in selected transplant recipients.

Conclusion

NCE-MRA contributed to the recognition of segmental ischemia requiring revascularization in an adult recipient and supported a nonvascular diagnostic pathway in a pediatric recipient with acute antibody-mediated rejection. It may provide useful additional information when Doppler US is equivocal and contrast administration is undesirable.

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Figure Legends

Figure 1. Case 1. Non-contrast-enhanced magnetic resonance angiography demonstrates hypoperfusion of the renal allograft parenchyma, corresponding to segmental renal arterial dissection and thrombosis at surgical exploration.

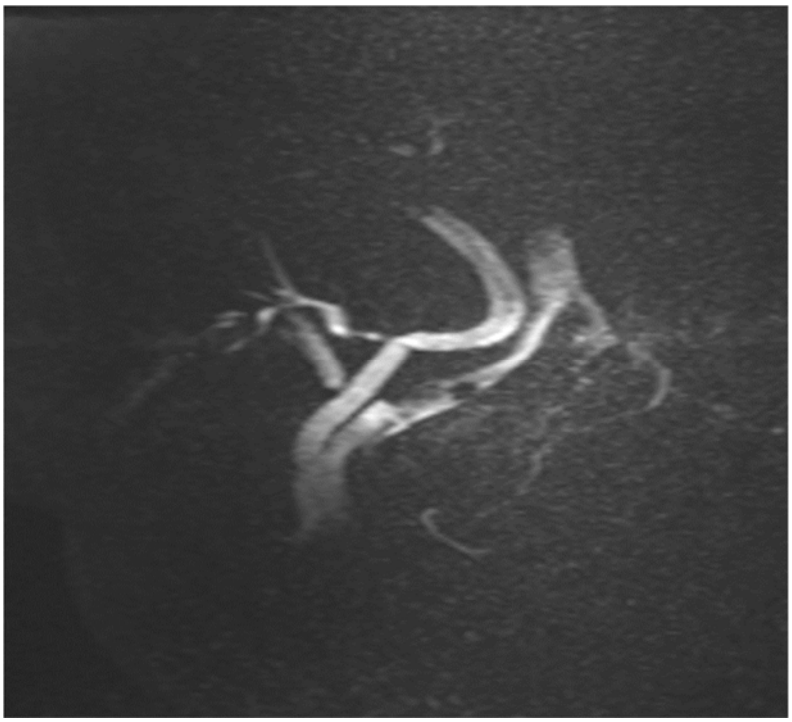
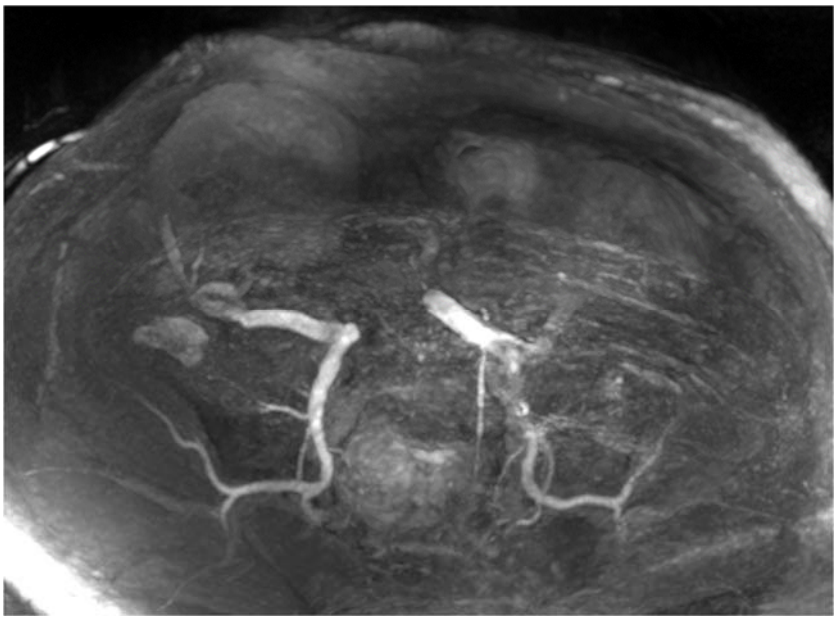


Figure 2. Case 2. Non-contrast-enhanced magnetic resonance angiography shows heterogeneous graft parenchymal signal with preserved main renal arterial and intrarenal vascular flow.



M4546-Özet Metin

TRAVMATİK TANSİYON PNÖMOTORAKS OLGU SUNUMU

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AMAÇ

Tansiyon pnömotoraks, pediatrik politravma hastalarında acil klinik tanınma ve ivedi dekompresyon gerektiren, yaşamı tehdit eden bir durumdur. Bu olgu sunumunun amacı, ikincil basamak acil serviste obstrüktif şok tablosuyla başvuran pediatrik bir hastanın sevk öncesi stabilizasyonunda yatak başı tanı ile acil tüp torakostomi uygulamasının kritik rolünü ve klinik önemini vurgulamaktır.

YÖNTEM

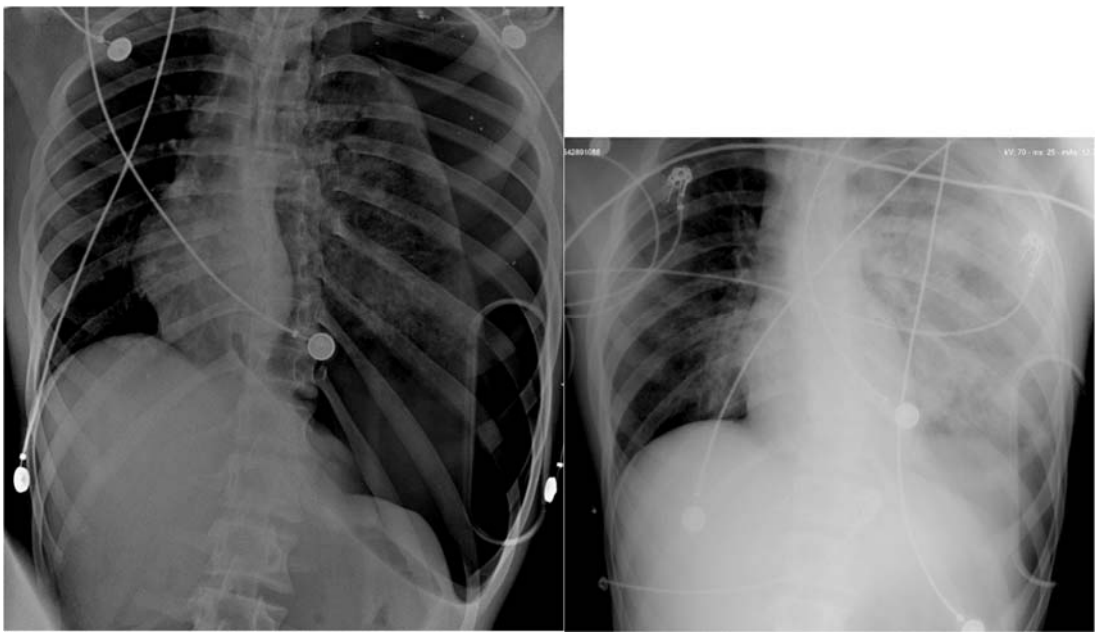
Yüksek enerjili motosiklet kazası sonrası entübe şekilde getirilen 15 yaşında erkek hasta değerlendirildi. İlk fiziki muayenede Glasgow Koma Skalası (GKS) skoru 3 olan derin nörolojik depresyon, belirgin hipotansiyon (kan basıncı: 80/40 mmHg), sinüs taşikardisi, sol hemitoraksta solunum seslerinin alınamaması ve juguler venöz dolgunluk saptandı. Hastaya klinik olarak sol tansiyon pnömotoraks tanısı konularak eş zamanlı spinal immobilizasyon ve resüsitasyon protokolleri başlatıldı.

BULGULAR

Sol hemitoraksa acil tüp torakostomi uygulandı. Tüp yerleşimi sonrası sağlanan hızlı plevral dekompresyon ile kan basıncı 110/80 mmHg düzeyine yükseldi ve vital bulgular stabilize oldu. Bilgisayarlı tomografi (BT) incelemesinde intraabdominal kanama saptanmadı. Görüntülemelerde T4–T5 torakal ve sakral vertebra kırıkları, sol akciğerde re-ekspansiyon ve altında akciğer kontüzyonu (pulmoner kontüzyon) izlendi. Biyokimyasal parametrelerde lökosit (WBC) değeri 13.000/μL; laktat seviyesi ise tüp torakostomi öncesinde 15 mmol/L iken işlem sonrasında 10 mmol/L olarak ölçüldü. Periferik sıyrık ve laserasyonlar tedavi edildikten sonra hasta üçüncü basamak pediatrik yoğun bakım ünitesine güvenle sevk edildi. (Hasta transfer edildiği merkezde kardiyak arrest nedeniyle hayatını kaybetmiştir.)

SONUÇ

Pediatrik politravma olgularında tansiyon pnömotoraks, radyolojik doğrulama beklenmeksizin doğrudan klinik olarak teşhis edilmelidir. İkinci basamak acil servislerde zaman kaybetmeden uygulanan tüp torakostomi, hemodinamik stabiliteyi hızla sağlayarak ileri merkeze sevk öncesinde hayat kurtarıcı müdahale oluşturmaktadır.



M4547-Özet Metin

COEXISTENCE OF MINOR BLOOD GROUP INCOMPATIBILITY AND G6PD DEFICIENCY IN A PRETERM INFANT WITH PROLONGED JAUNDICE

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[1]Malatya Training and Research Hospital

Introduction: Jaundice occurs in more than 50% of newborns and is generally transient. Prolonged jaundice is defined as indirect hyperbilirubinemia persisting beyond 14 days in term infants and beyond 21 days in preterm infants. Although breast milk jaundice is the most common cause, other conditions associated with prolonged jaundice, including blood group incompatibility and other hemolytic disorders, congenital hypothyroidism, pyloric stenosis, Crigler-Najjar syndrome, Gilbert syndrome, sepsis, and infections, should be excluded. In this report, we aimed to present the clinical findings, diagnostic process, and follow-up of a preterm infant with prolonged jaundice associated with the coexistence of minor blood group incompatibility and glucose-6-phosphate dehydrogenase (G6PD) deficiency.

Case: A male infant was born by emergency cesarean section at 33+2 weeks of gestation due to preterm labor to a 31-year-old mother whose pregnancy was complicated by gestational diabetes. He was admitted to the neonatal unit for prematurity and monitored for respiratory and nutritional support. During follow-up, he developed prolonged jaundice and hemolytic anemia.

As no major blood group incompatibility was identified, minor blood group testing was performed in both the infant and the mother, revealing minor blood group incompatibility due to anti-e antibodies. Although the initial G6PD enzyme level was within the normal range, the infant subsequently experienced an episode of late-onset sepsis requiring antibiotic treatment, followed by a recurrence of jaundice and anemia. Therefore, the G6PD enzyme level was reassessed and was found to be low.

As no other source of bleeding was identified, the persistent anemia and prolonged jaundice were attributed to the coexistence of G6PD deficiency and minor blood group incompatibility. During follow-up, the infant received two transfusions of irradiated, leukocyte-filtered packed red blood cells and was discharged on postnatal day 37.

Conclusion: Minor blood group incompatibility and G6PD deficiency may coexist in newborns with prolonged jaundice. Particularly in the presence of recurrent hemolytic episodes, G6PD enzyme levels should be reassessed. When counseling families, a list of foods and medications that may trigger hemolysis should be provided.

Keywords: Prematurity, prolonged jaundice, minor blood group incompatibility, G6PD deficiency

M4548-Tam Metin

FROM APPRENTİCESHİP TO ARTİFİCİAL INTELLİGENCE: THE EVOLUTİON OF PEDİATRİC EMERGENCY CARE EDUCATİON AND THE DESKİLLİNG PARADOX

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[1]Etlik Şehir Hastanesi
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ABSTRACT

Introduction and Objective. Medical education has evolved from the master-apprentice relationship to institutional hospital-based training, and subsequently to science-based (Flexner, 1910), problem- and competency-based models; it has now entered an era in which large language models (LLMs) are integrated into clinical reasoning. In this review, this evolution has been mapped, evidence regarding the artificial intelligence (AI) era has been evaluated from the perspective of pediatric emergency care, and the educational agenda for the upcoming period has been discussed.

Methods. Structured review. PubMed/MEDLINE and institutional sources (WHO, AAMC, TEPDAD, European Commission) were searched up to July 2026. Each citation was verified via PMID or DOI and screened for retractions; no numerical data that could not be verified were included in the text. Since no human or animal subjects were used, ethics committee approval was not required.

Results. Three transitions were identified. From authority to evidence: bedside teaching, structured residency (Johns Hopkins, 1889), and science-based curriculum standardized education. From rote memorization to access: PubMed, point-of-care resources, FOAM, and simulation democratized access; however, quality remained variable (MOOC completion median 12.6%). From access to reasoning: model performance differentiates sharply according to task type. While GPT-4 demonstrated 86.7% accuracy in USMLE practice material, the same model identified the final diagnosis in only 39% of 70 New England Journal of Medicine clinicopathologic conference cases; the previous generation model (ChatGPT-3.5) reached an incorrect diagnosis in 83 out of 100 pediatric case riddles. In a randomized study, access to LLMs did not improve physicians' diagnostic reasoning (median 76% vs. 74%; p=0.60); real-world data documented a decrease in adenoma detection rates after exposure to AI (from 28.4% to 22.4%). In contrast, a high level of pediatric readiness, consisting largely of educational components, was found to be associated with 60–76% lower in-hospital mortality compared to the lowest readiness quartile.

Conclusion. Technology has repeatedly changed the tools of medical education but has not changed its core. In pediatric emergency care, AI should be positioned as a supervised assistant that does not replace taught, supervised, and independent clinical reasoning.

Keywords: Medical Education; Pediatric Emergency Medicine; Artificial Intelligence; Clinical Competence; Clinical Reasoning

1. INTRODUCTION

The history of medical education is not the history of how knowledge is transferred, but of how the physician learns to reason. In this process, which extends from the master–apprentice relationship of antiquity to hospital-based institutional training, to university and laborator science, and subsequently to problem- and competency-based reforms, the tools have changed repeatedly, while the core competency intended to be imparted has remained largely constant [1].

Two major technological disruptions have occurred in the last thirty years. The first is the internet: PubMed, point-of-care resources, and open-access educational platforms have externalized the physician's memory. The second, which is currently ongoing, is large language models. These models do not just retrieve information; they also suggest reasoning. The qualitative difference lies here, and it poses a much deeper problem for medical education than the internet.

Pediatric emergency care is one of the fields where this debate is experienced most acutely. Exposure to critically ill patients is rare, clinical presentations vary by age, and error tolerance is minimal. Furthermore, evidence has accumulated that the impressive performance of models measured in examination settings [2] cannot be directly transferred to open-ended diagnostic tasks [3] and, especially, to pediatric patients [4].

The aim of this study is to map the historical evolution of medical education, to critically evaluate the evidence emerging in the artificial intelligence era from the perspective of pediatric emergency care, and to discuss the educational agenda of the upcoming period.

2. METHODS

Data sources and search. PubMed/MEDLINE and institutional sources (World Health Organization, AAMC, TEPDAD, European Commission, and the Official Journal of the European Union) were searched up to July 2026. Search terms covered the history of medical education, undergraduate and residency training, digital learning, simulation, free open access medical education (FOAM), large language models, diagnostic accuracy, deskilling, and pediatric emergency care.

Selection criteria. Peer-reviewed studies reporting educational or diagnostic outcomes were prioritized and included in the numbered reference list. Early historical data and information regarding national institutional regulations were compiled from academic secondary literature based on primary sources and institutional official records, and are indicated as such in the text. Sources published in predatory journals were excluded.

Verification. In accordance with the zero-hallucination principle, every citation in the numbered reference list was verified via PMID or DOI; author lists, journal name, volume, issue, and page information were cross-checked with the source itself, and a search for retracted publications was conducted. No numerical data that could not be verified were included in the text. Non-peer-reviewed preprints were explicitly marked within the text and the reference list. The model version was specifically recorded for every LLM study evaluated; the model generation directly affects the interpretation of the results, as shown below.

Ethics. Ethics committee approval was not required as no human or animal subjects were used.

3. RESULTS

3.1. From authority to evidence

Standardization and licensing are not concepts unique to the modern era. In the Islamic Golden Age, following the death of a patient due to medical error in Baghdad in 931, the mandatory examination of physicians is accepted as the first compulsory medical licensing practice in history; secondary sources report that more than 860 physicians were examined in Baghdad in the first year. In Anatolia, according to the crown gate inscription, the Gevher Nesibe Darüşşifa (Hospital) and Gıyasiye Medical Madrasa, dating back to 1205–1206, created an early example of the current faculty–teaching hospital model by positioning the madrasa and the hospital adjacently. In Europe, the Constitutions of Melfi of 1231 linked the practice of medicine to the Salerno diploma and one year of supervised practice.

In Turkey, the institutional beginning of modern medical education is the opening of Tıphane-i Âmire and Cerrahhane-i Âmire on March 14, 1827; after the school was relocated to the building in Galatasaray and reorganized, it was named Mekteb-i Tıbbiye-i Adliye-i Şahane (commonly referred to as Mekteb-i Tıbbiye-i Şahane) in 1839. In the Republican era, the 1933 University Reform institutionalized academic medicine, and in 1963, Hacettepe became the pioneer of the integrated curriculum. Institutional quality assurance began with the National Medical Education Accreditation Board (UTEAK), established in 2007 upon the initiative of the Council of Medical Deans; due to the necessity for the board to become an independent legal entity, the Association for Evaluation and Accreditation of Medical Education Programs (TEPDAD) was established in 2011 and registered by the Council of Higher Education (YÖK).

On a global scale, two shifts are decisive. With the opening of Johns Hopkins Hospital in 1889, the structured residency system was born through Osler and Halsted; the medical school opened four years later, in 1893. This four-year interval allowed the residency model to mature independently of the faculty curriculum. The Flexner Report of 1910 placed medicine on a scientific foundation. However, Flexner's legacy is twofold: while it raised scientific standards, it led to the closure of more than half of the medical schools in North America and caused long-term harm to the education of minority and female physicians [5].

3.2.From memorization to access

The opening of PubMed to the public and the widespread adoption of the Cochrane Library and point-of-care resources transformed the physician's burden of recalling information into the skill of finding and evaluating it. On the assessment side, the OSCE, defined by Harden et al. in 1975, provided a structured alternative to classical case examinations that carried validity and reliability issues [6]. Shifting assessment from the "knows" level to the "does" level is conceptually based on the pyramid proposed by Miller in 1990 [7]; the OSCE is the instrumental counterpart of this framework.

Emergency medicine gained a unique position during this period. The FOAM (Free Open Access Medical Education) movement, defined in 2012, carried educational content to blog and podcast platforms [8]. However, it was soon realized that open access did not provide quality assurance; upon finding intuitive quality assessment unreliable, structured scores such as ALiEM AIR [9] and the revised METRIQ [10] were developed.

The most striking data showing that access is not equivalent to learning comes from massive open online courses (MOOCs): in an analysis covering 221 MOOCs, completion rates varied between 0.7% and 52.1%, with the median remaining at 12.6% [11]. It should be noted that this data set closed at the end of 2013 and completion information was available for only 129 courses.

1.1. From access to reasoning: the divergence of exam performance and diagnostic performance

The performance of large language models in medicine varies sharply depending on the task with which it is measured. To interpret the literature correctly, three levels must be kept separate.

Multiple-choice exam performance. Kung et al. reported that ChatGPT produced results near the passing threshold in the USMLE [12]; shortly after, Nori et al. reported that GPT-4 exceeded the passing threshold by more than 20 points, reaching 86.65% and 86.7% accuracy in self-assessment and sample exam materials published by the National Board of Medical Examiners (NBME), respectively [2]. It should be emphasized that these measurements were made not in a real USMLE session, but in official practice materials. Turkish data is similar: in 1,440 questions compiled from six TUS sessions, GPT-4 showed 70.56% accuracy, while the success rate of physicians participating in the same study was reported as 38.14% [13]. Conversely, it has also been emphasized that models lagged behind clinicians in Med-PaLM evaluations [14].

Adult diagnostic reasoning. Exam success does not directly translate to diagnostic success. Kanjee et al. evaluated GPT-4 in 70 New England Journal of Medicine clinicopathologic conference cases; the model's final diagnosis matched the correct diagnosis in only 39% (27/70) of the cases, and the correct diagnosis was included in the differential diagnosis list in 64% (45/70) [3]. While the same model showed 86.7% accuracy in multiple-choice exam materials, it remained at 39% in open-ended adult diagnostic puzzles.

Pediatric diagnostic reasoning. Barile et al. presented 100 pediatric diagnostic puzzles—60 from *JAMA Pediatrics* clinical challenges and 40 from Massachusetts General Hospital pediatric case records—to ChatGPT version 3.5 and obtained incorrect diagnoses in 83 cases [4]. Of these errors, 72 were found to be completely wrong, and 11 were clinically relevant but too broad to allow for a decision. 47 of the errors (56.7%) belonged to the correct organ system; in contrast, the correct diagnosis was included in the model's differential diagnosis list in only 36% of the cases. That is, the model did not contain the correct answer in the majority of cases, not only in the final diagnosis but also in the list presented to the physician as reasoning material.

When these three levels are read together, two separate gradients emerge: the task difficulty gradient (from multiple-choice to open-ended diagnosis) and the patient population gradient (from adult to child). It should be explicitly stated that the Barile study was conducted with a previous model generation (ChatGPT-3.5, July 2023); therefore, the difference between adult and pediatric diagnostic accuracy cannot be attributed solely to pediatric difficulty; the model generation also differs. An equivalent pediatric case evaluation conducted with current-generation models was not found in the search of this review; closing this gap is the most concrete research proposal of the study.

1.2. Deskilling: the first real-world signal

The most important evidence regarding clinical benefit is the randomized clinical trial by Goh et al. [15]. No significant difference was found in diagnostic reasoning scores between physicians with access to LLMs and physicians using traditional resources (median 76% vs. 74%; adjusted difference 2 points, 95% CI −4 to 8; p=0.60). In a secondary and exploratory analysis, the model alone outperformed the traditional resource group by 16 points (95% CI 2–30; p=0.03). The study was conducted with 50 physicians and six simulated vignettes. This finding suggests that the limiting factor is not the model's ability, but the physician's skill in using the model.

The first real-world signal regarding deskilling was published in 2025. In a retrospective observational study conducted by Budzyń et al. in four centers in Poland, the three-month periods before and after the implementation of the computer-aided detection (CADe) system were compared; the adenoma detection rate in colonoscopies performed without AI support decreased from 28.4% (226/795) to 22.4% (145/648) (absolute difference −6.0 points; 95% CI −10.5 to −1.6; p=0.0089) [16]. In multivariate analysis, AI exposure remained an independent factor (odds ratio 0.69; 95% CI 0.53–0.89). The authors interpreted the finding in cautious language, suggesting that continuous AI exposure might decrease the adenoma detection rate of standard colonoscopy and may have a negative effect on endoscopist behavior. The observational and pre-post nature of the design limits causal inference.

The authors discuss this picture alongside the knowledge that the same technology increases the adenoma detection rate when used simultaneously [16]. The emerging paradox is clear: the tool increases performance the moment it is used, but regular exposure can erode core skill in the long term.

1.1. The impact of education on outcomes in pediatric emergency care

It has been strongly demonstrated that education is a direct outcome variable in pediatric emergency care. In a retrospective cohort study by Newgard et al. covering 796,937 children in 983 emergency departments across 11 states, when emergency departments in the highest quartile of pediatric readiness were compared with those in the lowest quartile, the odds of in-hospital death were found to be 60% lower for children with trauma (adjusted odds ratio 0.40; 95% CI 0.26–0.60) and 76% lower for medical patients (adjusted odds ratio 0.24; 95% CI 0.17–0.34) [17]. This benefit persisted up to one year after discharge. If all emergency departments were in the highest readiness quartile, an estimated 288 trauma and 1,154 medical deaths—a total of 1,442 child deaths—could have been prevented.

The components of the pediatric readiness metric—coordination, staff training and competency, quality improvement, safety, policies and procedures, and equipment—are largely educational structures. Therefore, education in pediatric emergency care is not a matter of comfort but a direct mortality intervention.

2. DISCUSSION

The findings indicate that while the tools have constantly changed throughout the long journey of medical education, the core content imparted has remained unchanged. From the Jundishapur bimaristan to the Gevher Nesibe in Kayseri, from the Padua anatomy theater to the Johns Hopkins ward, and to the command line of today, the constant element remains the guidance of the

experienced physician provided to the student. What has changed is the axis of competence: from memorizing knowledge (Galenic authority) to finding knowledge (internet), and from there to managing knowledge and reasoning with it (AI era). The three generations of reform defined by the Lancet Commission in 2010—science-based, problem-based, and systems-based—expand within this framework toward a fourth generation, a technology-enhanced but human-centered model [1].

Evidence regarding artificial intelligence should be interpreted in two directions. On one hand, LLMs demonstrate impressive performance in exam environments; they carry concrete educational value in areas such as case generation, virtual patient simulation, feedback, and personalized learning [18]. On the other hand, the Goh study demonstrates that the presence of technology alone does not improve physician performance [15], while the Budzyń study demonstrates that regular exposure can erode fundamental skills [16]. When these two findings are considered together, the emerging conclusion is clear: the problem is not technological; it is educational.

Regarding pediatric emergency care, the picture is more sensitive. While the study by Barile et al. shows that pediatric scenarios are the area where models struggle most, it did not separately analyze the contribution of variables such as age, weight, developmental stage, and atypical presentation [4]; therefore, the influence of these variables remains at the level of a reasonable hypothesis rather than proof. Nevertheless, the authors' emphasis on the necessity of accounting for age in pediatric scenarios aligns with the defining elements of the field. In this field, where exposure to critically ill patients is rare, the risk of skill loss carries a higher cost compared to adult practice. As shown by the Newgard data, education here is a direct mortality intervention [17].

Future projection. Four developments stand out. First, as LLMs pass multiple-choice exams, the discriminatory power of this format is decreasing, and a transition to performance-and workplace-based assessment is being debated. Second, the proliferation of multimodal models is expected, and the 2024 guidance from the World Health Organization targets this transition [19]. Third, periodic measurement of non-AI performance may turn into a new quality indicator. Fourth, the regulatory framework has matured: the Digital Omnibus regulation, which amends the European Union Artificial Intelligence Act, was published in the Official Journal of the European Union on July 24, 2026, as Regulation (EU) 2026/1744, and entered into force on July 27, 2026 [20]. With this regulation, the compliance date for independent high-risk systems under Annex III (including educational applications) has been postponed to December 2, 2027, and for systems embedded in products within the scope of European Union product legislation (including medical devices) to August 2, 2028. It should be emphasized that these four points are in the nature of foresight, not evidence..

Recommendations for practice. (i) AI literacy should be defined as a clear competency in the National Core Education Program and residency training curricula; the AAMC and WHO frameworks offer ready-made references [19]. (ii) AI-supported clinical decisions should be audited, and automation bias should be measured. (iii) Independent clinical reasoning should be preserved through regular "AI-free" practice and simulation sessions. (iv) Training and validating models with pediatric data in pediatric emergency care, and assessing current-generation models in pediatric cases, should be a priority research agenda.

Limitations. This study is a structured review, not a systematic review; no meta-analytic synthesis was performed. The LLM literature is rapidly becoming outdated, and reported model performances may lose their validity in a short time; indeed, the pediatric data belong to a previous model generation [4]. The Goh study relies on simulated cases [15], and the Budzyń study is based on a single country, a limited sample, and an observational pre-post design [16]; the generalizability of both is limited. The evidence for deskilling was obtained from endoscopy, and its direct transfer to pediatric emergency care has not been demonstrated. The number of preventable deaths reported in the Newgard study is the sum of the estimates provided separately for trauma and medical cohorts [17]. Information regarding early historical data and national institutional regulations relies on secondary literature and institutional records and is not included in the numbered reference list; these data may show minor differences between sources. The Nori [2] and Kılıç [13] sources are not peer-reviewed journal articles, but arXiv and medRxiv preprints, respectively.

1. CONCLUSION

Technology has repeatedly changed the tools of medical education; it has not changed its core. The artificial intelligence era is transforming the physician from a carrier of knowledge into a decision-maker who manages knowledge and reasons with it. In pediatric emergency care, where exposure to critically ill patients is rare and error tolerance is minimal, artificial intelligence must be included in the curriculum as a supervised assistant that never replaces taught, supervised, and independent clinical reasoning. The real question is not whether artificial intelligence will replace the physician, but whether the physician who has learned to use artificial intelligence responsibly will replace the one who has not.

DECLARATIONS

Ethics Statement. This study is a review and does not involve human or animal subjects; ethics committee approval was not required.

Conflict of Interest. The author reports no conflict of interest.

Funding. No financial support was received for this study.

Artificial Intelligence Usage Statement. AI-assisted tools were used during the literature review and drafting stages in the preparation of the text. All citations were verified by the author by comparing them with the source itself via PMID/DOI, and the bibliographical details and numerical data were confirmed individually

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M4549-Tam Metin

Parental Refusal of Treatment in the Pediatric Emergency Department: The Best Interests of the Child, Harm Threshold, and the Physician's Approach

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ABSTRACT

Objective: Treatment refusal in pediatric emergency care presents a complex clinical and legal challenge because medical decisions are generally made by parents or legal representatives, while the primary consideration remains the best interests of the child. This review aimed to evaluate the limits of parental treatment refusal and to provide a practical framework for emergency physicians.

Methods: International conventions, national legislation, judicial decisions, and current literature on pediatric medical decision-making and parental treatment refusal were narratively reviewed. The concepts of the best interests of the child, parental decision-making authority, harm threshold, emergency intervention, and child protection mechanisms were evaluated from an emergency care perspective.

Results: Parental decision-making authority is broad but not unlimited. Refusal of a medical intervention should be assessed according to the severity and imminence of potential harm, the expected benefit and necessity of the proposed intervention, the availability of less restrictive alternatives, and the urgency of the clinical condition. Not all refusals have the same clinical or legal consequences. When delay may result in serious and imminent harm, necessary and proportionate emergency intervention may take priority. In non-immediate situations where refusal still places the child at significant risk, child protection and judicial mechanisms may be considered. The child's views should also be given increasing weight according to age and maturity.

Conclusion: Management of treatment refusal in pediatric emergency care should not be based solely on whether the parent accepts or refuses treatment. The central question should be the potential harm to the child if the refusal is accepted. A structured assessment based on the best interests of the child, harm threshold, urgency, medical necessity, proportionality, and available alternatives may support both clinically and legally appropriate decision-making.

Keywords: pediatric emergency medicine; treatment refusal; parental consent; best interests of the child; harm threshold; informed consent

1. Introduction

A child is defined under the United Nations Convention on the Rights of the Child as every person below the age of 18 years, unless majority is attained earlier under the law applicable to the child (1). The World Health Organization defines individuals aged 10–19 years as adolescents (2).

In healthcare decisions concerning children, decision-making authority generally rests with the parent or other legal representative. For children who are not under parental custody, a guardian appointed by the court is responsible for protecting the child's interests and representing the child in legal matters. However, the authority to make decisions on behalf of a child is not unlimited; current recommendations on pediatric decision-making recognize that parents have broad but not unlimited decision-making authority (3).

The best interests of the child constitute a fundamental consideration in decisions concerning children. The United Nations Committee on the Rights of the Child defines this concept as a substantive right, a legal interpretative principle, and a procedural rule in decision-making processes (4). The child's views should also be taken into account according to the child's age and maturity (5). States have an obligation to protect children's rights to life and health, and in Türkiye, health-related protective measures may be implemented when necessary under Child Protection Law No. 5395 (6). However, in the Halime Sare Aysal decision, the Constitutional Court of Türkiye emphasized that interventions affecting a child's bodily integrity must have a sufficient and foreseeable legal basis (7).

As a general rule, medical interventions require the informed consent of the patient or the patient's legal representative. The Oviedo Convention requires authorization from the legal representative for interventions involving minors who are unable to provide valid consent themselves and provides that the child's opinion should be given increasing weight according to age and maturity. However, in emergency situations where appropriate consent cannot be obtained, the Convention allows medically necessary interventions to be carried out without delay (8).

Unlike in adults, treatment refusal in pediatric patients often results from a decision made by a parent or legal representative on behalf of the child. Therefore, treatment refusal should be evaluated by considering the best interests of the child, the severity and imminence of potential harm, medical necessity, and urgency together (3). Studies conducted in Türkiye have also shown that parents may refuse treatment for their children for various reasons and that treatment refusal is a genuine issue encountered in clinical practice (9).

This review aims to evaluate the physician's approach when a parent refuses a medically necessary intervention in the pediatric emergency department, within the framework of the best interests of the child, the limits of parental decision-making authority, the emergency intervention exception, and the state's duty to protect the child.

2. Treatment Refusal in Pediatric Patients: Key Questions

In pediatric patients, unlike adults, the medical decision-making process involves the child, the parent or legal representative, and the physician. Although parents have broad authority to make healthcare decisions for their children, this authority is not considered unlimited when its exercise exposes the child to serious and preventable harm (3). As the child's age and maturity increase, greater weight should also be given to the child's own views in the decision-making process (5,8).

At this point, several key questions arise for pediatric emergency physicians: Who has the authority to make medical decisions on behalf of the child? Can a parent refuse a treatment considered medically necessary? What are the limits of this right to refuse? To what extent should the child's own views be considered? Does every treatment refusal conflict with the best interests of the child? Under what circumstances should the physician or the state intervene? Can parental refusal prevent medical intervention in an emergency?

Answering these questions cannot depend solely on whether the parent accepts or refuses the proposed treatment. Parental decision-making authority must be considered together with the best interests of the child and the state's duty to protect the child (1,4). Current approaches to pediatric decision-making emphasize the nature of the refused intervention, the severity and imminence of potential harm resulting from non-treatment, the expected benefit of the proposed intervention, and the availability of less restrictive alternatives (3).

Therefore, the central question in pediatric patients is not "Can the parent refuse treatment?" but rather:

"At what point does parental refusal of treatment create an unacceptable risk of harm to the child?"

This distinction is important because refusal of a diagnostic procedure, refusal of hospitalization, and refusal of life-saving treatment may not have the same medical and legal consequences. Therefore, determining the limits of treatment refusal requires a combined assessment of parental decision-making authority, the best interests of the child, and the harm threshold (3).

3. Parental Decision-Making Authority and the Harm Threshold

Parents have broad authority to make healthcare decisions for their children; however, this authority is not unlimited when it exposes the child to serious and preventable harm (3). Nevertheless, the fact that the treatment recommended by the physician may be more beneficial is not, by itself, sufficient to override parental decision-making. When evaluating treatment refusal, the severity and imminence of potential harm, the likelihood that the proposed intervention will prevent such harm, and the availability of less restrictive alternatives should be considered together (3,10).

This approach can be described as the "harm threshold." In the pediatric emergency setting, the assessment can be reduced to four key questions: Will non-treatment cause serious harm? Is the

harm imminent? Can the proposed intervention prevent this harm? Is there a less restrictive alternative? (10).

When the potential harm is serious and imminent and the intervention cannot be delayed, the situation should be further evaluated within the context of emergency medical intervention.

4. Urgency, Medical Necessity, and Proportionality

In cases where parents refuse treatment, a delay in intervention that may result in serious and imminent harm to the child requires consideration of the situation as a medical emergency. Article 8 of the Oviedo Convention allows medically necessary interventions to be carried out without delay in emergency situations where appropriate consent cannot be obtained (8).

However, an emergency does not grant physicians unlimited authority to intervene. The intervention must be medically necessary, unable to be delayed, and proportionate to the existing risk. Therefore, the fundamental approach to parental refusal in pediatric emergency care can be summarized by three concepts: urgency, medical necessity, and proportionality.

5. Child Protection Mechanisms in Non-Emergency Situations

If treatment refusal seriously endangers the child's health but delaying the intervention does not pose an imminent threat to life, child protection and judicial mechanisms may be considered. Under Child Protection Law No. 5395, a health-related protective measure may be implemented to protect and treat the child's physical and mental health (6).

However, the best interests of the child alone do not provide unlimited authority to intervene. In the *Halime Sare Aysal* decision, the Constitutional Court of Türkiye emphasized that interventions affecting a child's bodily integrity must be based on a sufficient and foreseeable legal basis (7).

6. Clinical Scenarios: Same Treatment Refusal, Different Approaches

Parental refusal of treatment alone is not sufficient to justify intervention. The potential harm resulting from refusal, the urgency of the situation, and the child's age should be evaluated separately in each case. The following scenarios illustrate these differences.

Scenario 1

A four-year-old child presents to the emergency department with high fever, altered mental status, tachycardia, hypotension, and prolonged capillary refill. Septic shock is suspected. The physician plans to establish intravenous access and initiate fluid resuscitation and empirical intravenous antibiotic therapy. However, the parents state that they believe antibiotics have previously harmed their child and refuse intravenous access, antibiotic treatment, and hospitalization, requesting to take the child home.

In this situation, the potential harm resulting from non-treatment is serious, imminent, and foreseeable. The proposed treatments are intended to address the immediate threat, and delaying intervention until legal procedures are completed may result in severe consequences for the child. Therefore, the principles of urgency, medical necessity, and proportionality take priority; inability to obtain appropriate consent should not delay necessary emergency treatment (8).

Scenario 2

A three-year-old child presents to the emergency department with high fever, vomiting, drowsiness, and neck stiffness. Bacterial meningitis is suspected. The physician recommends hospitalization, blood cultures, intravenous antibiotic therapy, and lumbar puncture. The parents agree to hospitalization and antibiotic treatment but refuse the lumbar puncture.

In this scenario, the family is not leaving the child entirely untreated. Therefore, refusal of lumbar puncture alone cannot be evaluated in the same way as refusal of life-saving treatment. The diagnostic value of the refused procedure, the potential consequences of not performing it for treatment and clinical course, and available alternatives should be assessed separately (3,10).

Scenario 3

An eight-year-old child presents with fever and extremity pain lasting several days. Osteomyelitis is suspected, and hospitalization with intravenous antibiotic therapy is recommended. The child is in good general condition, hemodynamically stable, and has no immediate life-threatening condition. The parents refuse hospitalization and treatment and state that they wish to monitor the child at home.

Refusal of treatment may have serious consequences for the child; however, unlike in the first scenario, there is no imminent threat to life requiring intervention within minutes. The family should be thoroughly informed, the reasons for refusal should be explored, and acceptable alternatives should be considered. If the refusal continues to place the child’s health at significant risk, child protection and health-related protective mechanisms may be considered rather than relying on the emergency intervention exception (6,7).

Scenario 4

A sixteen-year-old adolescent is evaluated in the emergency department for severe gastrointestinal bleeding and symptomatic anemia. The physician recommends blood transfusion. The parents consent to treatment, but the adolescent states that they understand the proposed intervention and refuse the blood transfusion.

This scenario raises a different question: Can the decision be reduced solely to whether the parents consent? The Convention on the Rights of the Child and the Oviedo Convention require that the child’s views be taken into account according to age and maturity (5,8). Therefore, the clearly expressed wishes of a 16-year-old adolescent cannot be approached in the same way as

those of a three-year-old child. However, taking the child's views into account does not necessarily mean that the refusal has the same legal effect as treatment refusal by an adult with decision-making capacity.

Scenario 5

A six-year-old child is evaluated in the emergency department for a displaced forearm fracture. The orthopedic team recommends closed reduction under sedation. The parent refuses to have the procedure performed at that hospital and states that they wish to take the child to another pediatric orthopedic center on the same day. The child has a normal neurovascular examination, and according to the physician's assessment, a short delay is not expected to cause serious harm.

In this situation, parental refusal of the physician's recommendation does not necessarily mean that the child is being deprived of necessary medical care. The availability of a safe and reasonable alternative is an important consideration when assessing the harm threshold (3,10).

7. The Physician's Approach in Pediatric Emergency Care

The physician's goal when faced with treatment refusal is not to directly override the parent's decision, but to assess the risk that the refusal poses to the child and to protect the child using the least restrictive approach possible (3,10). Therefore, a stepwise approach should be followed.

I. **The reason for refusal should be identified.**
The physician should determine why the family is refusing treatment. Misunderstanding, fear, communication problems, or a preference for an alternative treatment should first be addressed.

II. **The family should be informed again.**
The purpose, benefits, and risks of the proposed intervention, as well as the potential consequences of refusing it, should be explained clearly and understandably (3).

III. **The child's views should be considered.**
If the child has sufficient age and maturity to understand the situation, their views should be sought and they should be involved in the decision-making process. Greater weight should be given to the child's views as age and maturity increase (5,8).

IV. **The harm threshold and urgency should be assessed.**
The potential harm resulting from treatment refusal should be evaluated in terms of its severity, imminence, and preventability (3,10).

V. **The least restrictive approach should be chosen.**
If a safe alternative is available, it should be considered first. In non-emergency situations where refusal still seriously threatens the child's health, child protection and judicial mechanisms may be considered (6).

VI. **Necessary intervention should not be delayed in an emergency that cannot wait.**
When delay may result in serious and imminent harm, action should be taken according to the principles of urgency, medical necessity, and proportionality (8).

VII. **The process should be documented.**
The child's clinical condition, proposed and refused interventions, risks explained to the family, reasons for refusal, alternatives offered, and the final decision should be clearly documented in the medical record.

8. Conclusion

In pediatric patients, parental authority to make medical decisions is broad but not unlimited. When treatment is refused, the primary consideration should not be parental preference alone, but the best interests of the child and the potential harm resulting from refusal (3,4).

Not all treatment refusals have the same consequences. The nature of the refused intervention, the severity and imminence of potential harm, the urgency of the clinical situation, and the availability of safe alternatives should be considered together. While communication and child protection mechanisms should be prioritized in non-emergency situations, when delay may result in serious and imminent harm, protecting the child's right to life and health takes priority within the principles of medical necessity and proportionality (6,8).

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M4551-Tam Metin

FOREIGN-BODY EMERGENCIES IN CHILDREN: A THREE-YEAR ANALYSIS OF A RISING TREND

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Aim

Foreign-body (FB) exposures, including ingestion, aspiration and insertion into the nose, ear or eye, are among the most common preventable emergencies of early childhood. Most events are benign, yet airway impaction and high-risk ingestions such as button batteries and multiple magnets are time-critical, and choking remains a leading cause of unintentional injury death in young children [2]. Population-based data from the United States show that emergency department (ED) visits for FB ingestion nearly doubled between 1995 and 2015 [1], but contemporary data from high-volume pediatric EDs in Türkiye are limited. We aimed to define the burden, anatomical spectrum, temporal trend and outcomes of FB-related visits in the pediatric ED of a high-volume secondary-level state hospital.

Method

All visits by children younger than 18 years to the pediatric ED of Konya Meram State Hospital between 1 July 2023 and 30 June 2026 were retrospectively extracted from the hospital information system as fully anonymized administrative records; no patient-identifying information was used. FB-related visits were identified from International Classification of Diseases, 10th Revision (ICD-10) discharge codes T15-T19, complemented by a free-text diagnosis search and screening of external-cause codes (W44, W79, W80). Rates were expressed per 1,000 pediatric ED visits with Wilson 95% confidence intervals (CI). The trend across three consecutive 12-month periods was tested with the chi-square test for trend, and the rate ratio (RR) compared the last period with the first.

Findings

Of 236,611 pediatric ED visits, 405 visits by 394 children were FB-related: 1.71 per 1,000 visits (95% CI 1.55-1.89), approximately one in every 584 visits. Median age was 4 years (interquartile range 2-9); 52.1% of children were younger than 5 years, the largest single age band was 1-2 years (29.1%), and 58.0% were boys. The alimentary tract was involved in 45.4% of visits, the eye in 23.5%, the lower or unspecified airway in 16.0%, the nose in 12.1%, the ear in 3.7% and the genitourinary tract in 0.2% (Figure 1); a visit could involve more than one site, so site counts total 409. The FB visit rate rose from 1.27 (95% CI 1.05-1.54) to 1.53 (1.28-1.82) and 2.39 (2.06-2.77) per 1,000 visits across the three periods (chi-square for trend 28.1, $p<0.001$), an 88% relative increase (RR 1.88) while total pediatric ED volume declined (Table 1). Presentations clustered in the evening, with 61.5% arriving between 16:00 and 24:00, and showed an early-summer peak (May and June together, 23.0%). Most children (97.8%) were brought by their families' own means; 68.9% were triaged yellow, 26.7% green and 4.4% red. Only two children (0.5%) were hospitalized at our center and no in-ED deaths occurred.

Table 1. Foreign-body-related visits and rates by 12-month period.

Period	FB visits, n	Total ED visits	Rate /1,000 (95% CI)
2023-24	104	81,720	1.27 (1.05-1.54)
2024-25	122	79,990	1.53 (1.28-1.82)
2025-26	179	74,901	2.39 (2.06-2.77)
Total	405	236,611	1.71 (1.55-1.89)

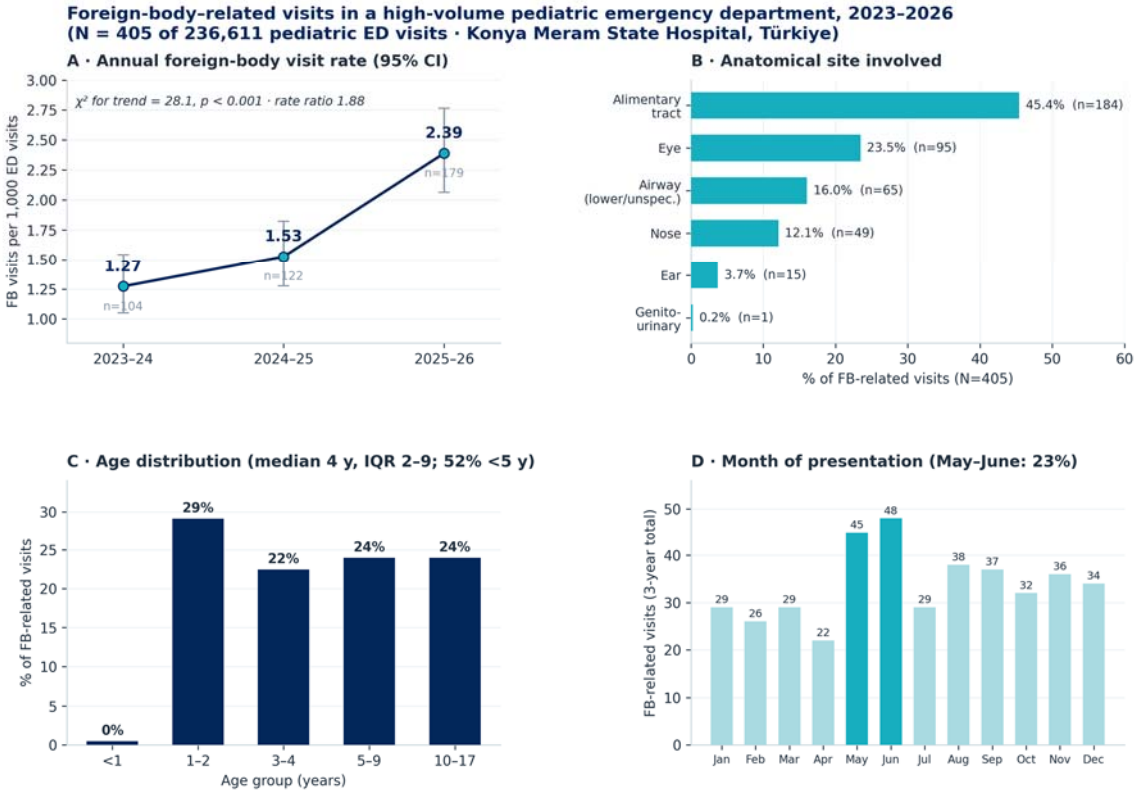


Figure 1. Foreign-body-related visits: (A) annual rate with 95% CI, (B) anatomical site, (C) age distribution, (D) month of presentation.

Conclusion

FB-related visits to our pediatric ED nearly doubled within three years, mirroring in a compressed time frame the 91.5% two-decade rise reported from the United States [1], and concentrated in boys, children under five, evening hours and early summer. Outcomes were reassuring, but the benign aggregate should not obscure the time-critical minority: esophageal button batteries, multiple magnets and airway FBs require protocolized recognition and emergent intervention as defined by the current guidance of the North American and European societies for pediatric gastroenterology, hepatology and nutrition (NASPGHAN and ESPGHAN) [3,4]. The rising trend calls for caregiver education targeting families of children under five in line with American Academy of Pediatrics choking-prevention policy [2], awareness campaigns timed before the early-summer peak, assured after-hours access to endoscopy, bronchoscopy and otorhinolaryngology, and prospective surveillance that records FB type.

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M4552-Tam Metin

HAIR TOURNIQUET SYNDROME IN AN INFANT PRESENTING WITH IRRITABILITY: THE IMPORTANCE OF A HEAD-TO-TOE EXAMINATION- A CASE REPORT

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ABSTRACT

Introduction:
Hair tourniquet syndrome is a rare but serious condition in which a strand of hair or a textile fiber encircles a body appendage, leading to vascular compromise and ischemia. The toes, fingers, and genital region are the most commonly affected sites. As a moist hair strand dries, it constricts more tightly around the surrounding tissue, and progressive edema may delay diagnosis. This condition, most frequently encountered during infancy, highlights the importance of a careful physical examination in infants presenting with irritability.

Case:
A five-month-old infant was brought to the emergency department with irritability; vital signs were age-appropriate and stable throughout evaluation. She was born at term via normal vaginal delivery, with no known comorbidities. Systemic examination was unremarkable, except for hair fibers encircling the right fourth toe at the proximal phalanx, causing distal strangulation; the phalanx was edematous with impaired circulation. The fibers were carefully cut, relieving the strangulation. Laboratory investigations showed no significant abnormalities. The patient underwent surgical decompression under the Hand Surgery service and was discharged without digit loss.

Conclusion:
Hair tourniquet syndrome is a rare but potentially limb-threatening condition that should not be overlooked in preverbal infants presenting with irritability. Therefore, a thorough head-to-toe examination, including the genital region, should be performed in all infants with unexplained irritability. Early recognition and prompt intervention can prevent permanent tissue damage and limb loss; accordingly, detailed physical examination should be a standard component of the initial assessment.

Keywords: hair tourniquet syndrome, irritable infant, pediatric emergency

Introduction

Crying and irritability are among the most common presenting complaints in infancy, yet they also have one of the broadest differential diagnoses. Because patients in this age group cannot verbally communicate the source of their distress, the underlying cause must be considered across a wide spectrum, ranging from benign etiologies such as hunger, gas, or colic to pathological causes such as infection, trauma, or foreign body aspiration or insertion. This is an important warning sign that should prompt the clinician to perform a careful and systematic physical examination, as the underlying cause may occasionally be subtle enough to be missed on routine assessment (Öztelcan Gündüz and Ceylan).

One rare but important cause of irritability is hair tourniquet syndrome. First described in 1832, this condition most commonly occurs in infants between 4 months and 2 years of age (Barton et al.; Martonovich et al.). Its pathophysiology involves a thin, elastic strand of maternal hair or a clothing fiber becoming inadvertently wrapped around an appendage and gradually embedding into deep tissue as edema develops, leading to strangulation. The most commonly affected sites are the toes, fingers, penis, clitoris, and, rarely, the uvula (Sivathasan and Vijayarajan). The clinical picture is typically dominated by irritability and crying; erythema, edema, and cyanosis may be observed at the affected site, although the fiber is often too deeply embedded to be readily visible to the naked eye. If diagnosis is delayed, ischemia, necrosis, autoamputation, or permanent functional loss may occur (Öztelcan Gündüz and Ceylan).

In this report, we present an infant who was brought to the emergency department with irritability and was found, on detailed physical examination, to have hair tourniquet syndrome of the toe, which resolved without digit loss following timely intervention. This case is presented to emphasize the importance of clinical awareness of this condition.

Case

A five-month-old female infant was brought to the emergency department by her parents with a complaint of irritability. Vital signs at admission were normal for age and remained stable throughout follow-up. Her history revealed a full-term, normal vaginal delivery with no known comorbidities.

On physical examination, systemic findings were unremarkable; the infant was undressed in a warm environment and underwent a detailed head-to-toe examination. At the level of the proximal phalanx of the right fourth toe, hair fibers were found encircling the digit and causing distal strangulation; the affected phalanx was edematous with impaired circulation. History obtained from the mother revealed that the infant’s socks had been changed approximately two days earlier, at which time no abnormality had been noted. No necrotic area was observed, and the fibers were carefully cut, relieving the strangulation (Figure 1).

Following removal of the fibers, partial improvement was noted; however, circulatory impairment persisted, and disruption of soft-tissue continuity beneath the cut fibers raised suspicion of possible injury to the medial and lateral digital neurovascular bundles. The patient was therefore referred to Orthopedics and Traumatology and subsequently transferred to a center with hand surgery facilities. Laboratory investigations showed no clinically significant abnormalities. The patient was admitted to the Hand Surgery department, underwent surgical decompression, and was discharged without digit loss.

Discussion

Hair tourniquet syndrome should always be considered in the differential diagnosis of unexplained irritability and crying, particularly in preverbal infants. Our understanding of its epidemiology and natural history is largely based on isolated case reports and small case series (Bean et al.). In the meta-analysis by Mat Saad et al. including 210 cases, approximately 44% of cases involved the penis, 40% the toes, 9% the fingers, and the remainder other sites such as the external genitalia (Mat Saad et al.). However, in the single-center pediatric series by Bean et al., the distribution differed markedly, with 85% of cases involving the toes (Bean et al.). This discrepancy likely reflects differences in study populations and the overrepresentation of penile tourniquet cases in earlier series. In our case, the affected site was also the toe, in line with pediatric reports in the literature.

Regarding treatment, the literature generally describes surgical release of the constricting fiber under magnification as the standard approach (Serour and Gorenstein). Bean et al. also reported chemical depilatory agents as an alternative, with painless, anesthesia-free resolution in approximately two-thirds of their cases. These agents act by breaking disulfide bonds in the hair shaft; however, they are contraindicated near mucous membranes and may cause chemical irritation with prolonged contact. The authors recommended trying the chemical agent twice in digital tourniquets without ischemia or necrosis, with mechanical release reserved for failures, whereas cases with ischemic or necrotic findings should undergo direct mechanical decompression (Bean et al.).

In our case, because pronounced strangulation, edema, and circulatory impairment were present, direct mechanical release was performed, followed by surgical exploration with hand surgery to ensure complete decompression and assess tissue viability. This approach is consistent with the literature recommending immediate mechanical release when ischemic signs are present (Bean et al.).

Conclusion

Although hair tourniquet syndrome is rare, it is an emergent condition that, if diagnosed late, can lead to irreversible tissue damage and limb loss. In preverbal infants presenting with unexplained irritability or crying, a detailed examination of the digits and extremities enables early diagnosis and timely intervention, resulting in a favorable clinical outcome. Increasing awareness of this condition among both physicians and parents will help maintain a low threshold of suspicion for hair tourniquet syndrome in irritable infants and prevent potential complications.

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Fıgure 1.

M4553-Tam Metin

AİLE HEKİMLERİNİN SPOR YAPABİLİR RAPORU HAKKINDA BİLGİ DÜZEYLERİ VE KARDİYOLOJİYE SEVK KRİTERLERİNE YAKLAŞIMLARININ İNCELENMESİ

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AMAÇ

Spor sırasında görülen ani kardiyak ölüm, çocuk ve ergenlerde çoğunlukla klinik olarak sessiz seyreden kalp hastalıkları tarafından tetiklenmektedir. Yoğun egzersiz ,tanı konulmamış kalp hastalığı taşıyan çocuklarda ölümcül aritmileri tetikleyebilir; bu hastalıklar sessiz seyrettiğinden spora katılım öncesi değerlendirme riskli çocuğu belirlemek için tek fırsattır [1]. Ülkemizde spora katılım belgeleri, okul çağındaki çocuk ve ergenler dahil olmak üzere ağırlıklı olarak aile sağlığı merkezlerinde (ASM) düzenlenmektedir. Ulusal rehberin 2018'den beri mevcut olmasına [2] ve 2026 tarihli Sporcu Sağlık Raporları Yönetmeliği'nin aile hekimliği birimlerini yetkili saymasına karşın [3], bu araçların sahada kullanım düzeyi bilinmemektedir. Çalışmada aile hekimlerinin bilgi düzeyleri, sevk davranışları, kendilerini yeterli görme durumları ve rehber aşinalıkları araştırılmıştır.

YÖNTEM

Tanımlayıcı, kesitsel, çevrim içi anket çalışmasına birinci basamakta çalışan 45 hekim gönüllü ve anonim olarak katılmıştır. Veri toplama aracı, ulusal rehber ile uluslararası sporcu elektrokardiyografi (EKG) ölçütleri [4] ve spor kardiyolojisi metinleri temel alınarak hazırlanmış 22 maddelik özgün formdur; tek doğru yanıtı bulunan üç maddeden 0-3 aralığında bilgi puanı türetilmiştir. Veriler sayı-yüzde ve ortalama ± standart sapma (SS) olarak sunulmuş; Fisher kesin testi ve Spearman korelasyonu uygulanmıştır. Tek değişkenli analizle yetinilmemiş; üç çıktı için ikili lojistik regresyon kurulmuş, düzeltilmiş odds oranları (OR) ve Bonferroni düzeltmesi bildirilmiştir ($p<0,05$).

BULGULAR

Katılımcıların %77,8'i 15 yıldan fazla deneyimli, %60,0'ı asistandı; %95,6'sı ASM'de çalışıyordu. Tablo 1'de görüldüğü gibi hekimlerin tamamının EKG cihazı vardı. Buna karşın yılda bir 12 derivasyonlu EKG yapan %51,1 standart form kullanan %33,3 görüldü..Katılımcıların bilgi puanı iyi denilebilir;sporcularda ani kardiyak ölüm (AKÖ) mekanizmasını %95,6'sı,karditte kısıtlamayı %73,3'ü doğru yanıtlarken sadece %28,9'u müsabaka dışı faaliyetler için yazılı beyanın yeterliliğini bilmiyordu (bilgi puanı 2,40 ± 0,72).Katılımcıların %42,2'si rehberi hiç duymamıştı. Sevklerin tanısal verimi düşüktü: %91,1'i nadiren ya da az sayıda patoloji saptandığını bildirdi. En sık sevk gerekçesi AKÖ'yü dışlamaktı (%62,2); gerekçelerin üçte biri nonspesifikti ve %60,0'ı kardiyak ilaç öyküsü olan her başvuruyu sevk ediyordu.

Tablo 1. Bulgularımız: uygulama örüntüleri ve bilgi düzeyi (n=45)

Değişken	n	%
Çalıştığı yerde EKG cihazının bulunması	45	100,0
Yılda bir 12 derivasyonlu EKG yapma	23	51,1
Standart öykü ve muayene formu kullanma	15	33,3
Bilgi puanı 3/3	23	51,1
Sevklerde patoloji nadiren ya da az sayıda	41	91,1
Ulusal rehberi hiç duymamış olma	19	42,2

Tablo 2'de görüldüğü gibi en güçlü ilişki yapılandırılmış uygulamanın iki göstergesi arasındaydı: yıllık EKG yapanlarda standart form kullanımı belirgin yüksekti (OR 32,7; %95 güven aralığı 3,7-287,2); ilişki düzeltme sonrası korundu (düzeltilmiş OR 31,2; p=0,003). Kendini yetersiz görenlerin tamamı protokolleri yetersiz buldu ve ilaç öyküsünde savunmacı sevk eğilimi gösterdi; asistanların hiçbiri kendini tamamen yeterli görmedi. Otomatik EKG yorumuna güvenenler daha sık sevk yaptı. Bilgi puanı, dikkate alınan sevk ölçütü sayısıyla pozitif ilişkiliydi (rho=0,348 n=45 p=0,019). İlk üç ilişki Bonferroni düzeltmesi sonrasında da anlamlılığını korudu.

Tablo 2. Bulgularımız: istatistiksel olarak anlamlı ilişkiler (n=45)

İlişki	Özelliği taşıyanlar, n (%)	Karşılaştırma grubu, n (%)	p
Yıllık EKG → standart form	EKG yapan: 14/23 (60,9)	Yapmayan: 1/22 (4,5)	<0,001*
Yetersizlik algısı → protokolü yetersiz bulma	Yetersiz gören: 16/16 (100)	Diğerleri: 13/29 (44,8)	<0,001*
Unvan → kendini tamamen yeterli görme	Asistan: 0/27 (0)	Pratisyen/uzman: 6/18 (33,3)	0,002*
Yetersizlik algısı → ilaç öyküsünde daima sevk	Yetersiz gören: 14/16 (87,5)	Diğerleri: 13/29 (44,8)	0,010
Otomatik yoruma güven → sık sevk	Güvenen: 4/6 (66,7)	Güvenmeyen: 6/39 (15,4)	0,016

Fisher kesin testi ve ikili lojistik regresyon kullanılmıştır.

SONUÇ

Verilerimiz, tarama için geçerli araçlar mevcutken yapılandırılmış uygulamanın azınlık bir grupta kümelendiğini göstermiştir; bu tablo yedi yıl önce farklı bir örneklemde bildirilenle uyumludur [5]. Bu veriler öykü, muayene ve EKG'yi tek iş akışında birleştiren ulusal rehber yaygınlaştırılmasını ve sporcu EKG yorumlamasına yönelik kısa eğitimleri desteklemektedir. Düşük öz-yeterlilik algısının savunmacı sevkle ilişkili olması, hekimlerin karar desteğine açık olduğunu gösterir. Çalışmanın güçlü yanları, aracın ulusal ve uluslararası ölçütler temelinde kurulması, analizin çok değişkenli modellerle desteklenmesi ve bulguların yeni yönetmelik döneminde uygulanabilir politika çıktısı sunmasıdır.

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M4554-Tam Metin

ACİL SERVİSE BAŞVURAN ÇOCUKLUK ÇAĞI FİZİKSEL ŞİDDET OLGULARININ ANALİZİ

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Amaç

Fiziksel şiddete maruz kalma nedeniyle acil servise başvuran çocukların demografik ve epidemiyolojik özelliklerini, başvuru zamanlarını, yaralanma bölgelerini, tanılarını, konsültasyon gereksinimlerini ve yaralanma şiddetlerini değerlendirmek amaçlandı. Tedavi maliyetleri ile klinik özellikler arasındaki ilişkiler de incelendi.

Çocukluk çağındaki adli olgular, anatomik, fizyolojik ve psikolojik özellikleri nedeniyle erişkinlerden farklı değerlendirilmelidir. Acil servislerde bu olguların özelliklerinin tanımlanması, klinik değerlendirme ve koruyucu uygulamalara yönelik bilgi sağlar. Türkiye'de pediatrik adli olguları ele alan çalışmalar, acil servis kayıtlarının bu amaçla kullanılabileceğini göstermektedir (Taplak et al.; Korkmaz et al.).

Yöntem

Çalışma tasarımı ve örneklem

Bu retrospektif çalışmada, üçüncü basamak bir üniversite hastanesinin Acil Tıp Kliniğine 01.01.2015–31.12.2019 tarihleri arasında fiziksel şiddete maruz kalma yakınmasıyla başvuran çocukluk çağı olgularının hastane bilgi sistemi ve arşiv kayıtları incelendi. Çalışmaya alınan 120 hastanın kayıtlı yaş aralığı 4–18 yıl idi. Belirtilen çalışma dönemi dışında başvuran veya verileri yetersiz olan hastalar çalışma dışı bırakıldı.

Yaş, cinsiyet, Glasgow Koma Skalası (GKS), Yaralanma Şiddet Skoru (Injury Severity Score; ISS), başvuru zamanı, olay nedeni, yaralanma bölgesi, tanı, konsültasyon durumu ve tedavi maliyeti değerlendirilen değişkenlerdi. Fiziksel şiddetle ilişkili ölüm durumu değerlendirildi. Ölüm görülmediği için mortaliteyle ilişki veya mortaliteyi öngörme gücü hakkında çıkarım yapılmadı.

Yaralanma şiddeti, kaynak çalışmadaki sınıflandırma korunarak ISS ≤3 için minör, ISS 4–8 için orta dereceli olarak belirtildi. Başvuru saatleri 00.00–07.59, 08.00–15.59 ve 16.00–23.59 aralıklarında gruplandı. Genel vücut travması (GVT) ile yumuşak doku travması (YDT) kısaltmaları metin ve tablolarda aynı anlamda kullanıldı.

Etik onay ve istatistiksel analiz

Kaynak çalışmada Düzce Üniversitesi Etik Kurulunun 19.10.2020 tarihli, 2020/223 sayılı onayı bildirilmiştir. Çalışma retrospektif kayıt incelemesi niteliğindedir (Akpınar).

Sürekli değişkenlerin normal dağılıma uygunluğu Shapiro–Wilk testiyle değerlendirildi. İki grup karşılaştırmalarında Mann–Whitney U, üç veya daha fazla grup karşılaştırmalarında Kruskal–Wallis testi kullanıldı. Kategorik değişkenler Pearson ki-kare veya Fisher kesin testiyle karşılaştırıldı. Sürekli değişkenler ortanca, çeyrekler arası aralık (ÇAA) ve minimum–

maksimum; kategorik değişkenler sayı ve yüzde ile sunuldu. Analizler IBM SPSS Statistics 23 kullanılarak gerçekleştirildi; p<0,05 anlamlılık sınırı olarak kabul edildi. Bu uyarlamada yeni bir istatistiksel analiz yapılmadı; kaynak çalışmanın test sonuçları korundu.

Bulgular

Demografik özellikler ve başvuru zamanı

Toplam 120 hastanın ortanca yaşı 15 yıl, ÇAA 4 yıl ve yaş aralığı 4–18 yıl idi. Hastaların 85'i (%70,8) erkek, 35'i (%29,2) kızdı. Başvuruların 19'u (%15,8) 00.00–07.59, 32'si (%26,7) 08.00–15.59 ve 69'u (%57,5) 16.00–23.59 saatleri arasında gerçekleşti (Tablo 1).

En fazla başvuru yaz mevsiminde (n=39; %32,5), en az başvuru kış mevsiminde (n=13; %10,8) görüldü. Aylık dağılımda temmuz 16 olgu (%13,3) ile ilk sırada, nisan 14 olgu (%11,7) ile ikinci sıradaydı. Çarşamba günü 12 başvuru bildirilirken, diğer günlerdeki başvuru sayıları 17–19 arasında değişiyordu.

Yaralanma bölgesi ve tanılar

GVT 52 hastada (%43,3) saptandı. Tek anatomik bölge kategorileri arasında baş yaralanmaları 39 olgu (%32,5) ile en sık, ekstremite yaralanmaları 21 olgu (%17,5) ile ikinci sıradaydı. Göğüs yaralanması 5 (%4,2), karın yaralanması 3 (%2,5) hastada görüldü. En sık tanı YDT idi (n=93; %77,5). Ekimoz veya hematom 13 (%10,8), kırık 9 (%7,5), kesi 4 (%3,3) hastada; ekimoz ve kesinin birlikte bulunduğu çoklu travma 1 (%0,8) hastada bildirildi (Tablo 2).

Yaralanma bölgesi dağılımı cinsiyetler arasında anlamlı farklılık gösterdi (p=0,013). Baş yaralanması olan 39 hastanın 34'ü (%87,2) erkek, 5'i (%12,8) kızdı; kaynak çalışmadaki ileri karşılaştırmalar farkın baş yaralanmalarından kaynaklandığını gösterdi. Tanı, konsültasyon durumu ve ISS grubu bakımından cinsiyetler arasında anlamlı fark bulunmadı (sırasıyla p=0,126; p=0,132; p=0,226). Yaralanma bölgesi, tanı, konsültasyon durumu ve ISS grubuna göre yaş dağılımları da anlamlı farklılık göstermedi (sırasıyla p=0,600; p=0,247; p=0,674; p=0,346).

Yaralanma şiddeti ve konsültasyonlar

Hastaların 105'i (%87,5) ISS ≤3, 15'i (%12,5) ISS 4–8 grubundaydı. ISS ≥9 olan hasta ve fiziksel şiddetle ilişkili ölüm bildirilmedi. Yaralanma bölgesi ile ISS grubu arasında anlamlı ilişki vardı (p<0,001). GVT bulunan 52 hastanın tamamı minör yaralanma grubundaydı. Tanı grupları arasında da ISS bakımından anlamlı fark saptandı (p<0,001): kırığı bulunan 9 hastanın tamamı orta dereceli, YDT bulunan 93 hastanın tamamı minör yaralanma grubundaydı (Tablo 2).

Toplam 24 hastada (%20,0) konsültasyon istendi. Bu hastaların 20'si erkek, 4'ü kızdı. Konsültasyonların 10'u (%41,7) kulak burun boğaz, 5'i (%20,8) ortopedi, 3'ü (%12,5) göz hastalıkları, 3'ü (%12,5) beyin ve sinir cerrahisi, 2'si (%8,3) çocuk cerrahisi ve 1'i (%4,2) plastik cerrahi bölümündendi. Bu yüzdelerin paydası konsültasyon istenen 24 hastadır.

Orta dereceli yaralanması olan 15 hastanın 14'ünde (%93,3) konsültasyon istendi. Konsültasyon istenen 24 hastanın 14'ü (%58,3), konsültasyon istenmeyen 96 hastanın ise 1'i (%1,0) orta dereceli yaralanma grubundaydı. Konsültasyon durumu ile ISS grubu arasında anlamlı ilişki vardı (p<0,001).S

Tedavi maliyetleri

Tedavi maliyeti 15,50–743,62 TL arasında değişiyordu. Yaralanma bölgesine göre en yüksek ortanca maliyet karın (369,79 TL) ve göğüs (283,88 TL; ÇAA 357,10 TL) yaralanmalarında görüldü. Tanı gruplarında kesi için ortanca maliyet 251,34 TL (ÇAA 57,40 TL), YDT için 189,45 TL (ÇAA 304,50 TL) idi. Konsültasyon istenen hastalarda ortanca maliyet 230,65 TL (ÇAA 303,60 TL), istenmeyenlerde 164,74 TL (ÇAA 254,90 TL) olarak bildirildi.

Konsültasyon branşları arasında çocuk cerrahisi için ortanca maliyet 422,82 TL, beyin ve sinir cerrahisi için 350,00 TL, göz hastalıkları için 320,96 TL idi. Kaynak tablodaki göz hastalıkları için 575,37 TL ve kulak burun boğaz için 516,59 TL değerleri en yüksek maliyetleri ifade eder; ortanca değildir. ISS ≤3 grubunda ortanca maliyet 189,45 TL (ÇAA 299,00 TL), ISS 4–8 grubunda 116,20 TL (ÇAA 220,60 TL) idi. Yaralanma bölgesi, tanı, konsültasyon durumu ve ISS grupları arasında maliyet açısından anlamlı fark saptanmadı (sırasıyla p=0,321; p=0,170; p=0,297; p=0,255). Maliyetler çalışma dönemindeki nominal TL değerleridir.

Sonuç

Bulguların değerlendirilmesi

Fiziksel şiddet nedeniyle başvuran bu hasta grubunda erkekler ve adölesanlar ağırlıktaydı. Türkiye'deki pediatrik adli olgu çalışmalarıyla karşılaştırma yapılırken, tüm adli olguları kapsayan seriler ile yalnız fiziksel şiddet olgularını içeren bu serinin farklı örneklemler olduğu dikkate alınmalıdır (Taplak et al.; Korkmaz et al.). Kalkan ve arkadaşlarının çalışmasında da yaz döneminde daha fazla başvuru bildirilmiştir (Kalkan et al.).

Başvuruların akşam saatleri ve yaz mevsiminde yoğunlaşması, çocukların okul dışında geçirdiği zaman ve sosyal etkileşimleriyle ilişkili olabilir. Ancak bu etkenler doğrudan ölçülmediği için nedensel ilişki kurulamaz. GVT tüm kategoriler içinde en sık görülürken, tek anatomik bölge yaralanmalarında baş öne çıkmıştır. YDT en sık tanıdır. Kırık saptanan olguların tümünün ISS 4–8 grubunda bulunması ve bu grupta konsültasyon gereksiniminin yüksek olması, yaralanma tipi ve anatomik şiddetin birlikte değerlendirilmesinin önemini göstermektedir.

Kısıtlılıklar

Retrospektif tasarım, tek merkezli yapı ve 120 hastalık örneklem sonuçların genellenebilirliğini sınırlar. Bulgular hastane kayıtlarının kapsamı ve doğruluğuna bağlıdır. Şiddeti uygulayan kişilere ilişkin veriler yetersizdir. Ölüm görülmemesi mortaliteyi etkileyen faktörlerin değerlendirilmesine olanak vermez. Bazı alt grupların küçük olması karşılaştırmaların yorumunu sınırlar. GKS dağılımına ilişkin sayısal sonuçlar kaynak metinde sunulmadığından bu uyarlamada da eklenmemiştir.

Klinik ve koruyucu yaklaşım

Bu seride fiziksel şiddete maruz kalan hastaların çoğunu erkek adölesanlar oluşturmuş ve yaralanmaların büyük bölümü minör düzeyde kalmıştır. Bulgular, acil servislerde çocukların yaralanma özelliklerinin ve başvuru zamanlarının düzenli kaydedilmesinin önemini desteklemektedir. Çocuklar için güvenli çevre oluşturulması, koruyucu eğitimler ve ebeveynlerle çocukların etkin katıldığı farkındalık çalışmaları desteklenmelidir. Önleme programları, yerel epidemiyolojik veriler ve çocukların korunma gereksinimleri birlikte değerlendirilerek planlanmalıdır.

Anahtar kelimeler: Acil servis; fiziksel şiddet; çocuk; yaralanma şiddeti; adli olgu.

Tablolar

Tablo 1. Demografik özellikler ve başvuru zamanı (N=120)

Özellik	Değer
Yaş, ortanca (ÇAA), yıl	15 (4)
Yaş aralığı, yıl	4–18
Kız, n (%)	35 (29,2)
Erkek, n (%)	85 (70,8)
00.00–07.59, n (%)	19 (15,8)
08.00–15.59, n (%)	32 (26,7)
16.00–23.59, n (%)	69 (57,5)
Yaz mevsimi, n (%)	39 (32,5)
Kış mevsimi, n (%)	13 (10,8)
Temmuz, n (%)	16 (13,3)
Nisan, n (%)	14 (11,7)
ISS ≤3, n (%)	105 (87,5)
ISS 4–8, n (%)	15 (12,5)
ISS ≥9, n (%)	0 (0,0)
Konsültasyon istenen, n (%)	24 (20,0)
Fiziksel şiddetle ilişkili ölüm, n (%)	0 (0,0)

ÇAA: çeyrekler arası aralık; ISS: Yaralanma Şiddet Skoru. Yüzdelerin paydası 120’dir. Mevsim ve ay satırları seçilmiş başvuru dönemlerini gösterir; tüm mevsim veya ayların dağılımını oluşturmaz. Kaynak: Akpınar, tablo 1–3 ve bulgular bölümü.

Tablo 2. Yaralanma özellikleri ve konsültasyon durumuna göre ISS dağılımı

Değişken	**Toplam n (%)**	**ISS ≤3 n (%)**	**ISS 4–8 n (%)**
Yaralanma bölgesi			
Baş	39 (32,5)	27 (69,2)	12 (30,8)
Göğüs	5 (4,2)	5 (100,0)	0 (0,0)
Karın[a]	3 (2,5)	3 (100,0)	0 (0,0)
Ekstremite	21 (17,5)	18 (85,7)	3 (14,3)
Genel vücut travması	52 (43,3)	52 (100,0)	0 (0,0)
Tanı			
Ekimoz veya hematom	13 (10,8)	8 (61,5)	5 (38,5)
Kırık	9 (7,5)	0 (0,0)	9 (100,0)
Kesi	4 (3,3)	3 (75,0)	1 (25,0)
Yumuşak doku travması	93 (77,5)	93 (100,0)	0 (0,0)
Çoklu travma[a]	1 (0,8)	1 (100,0)	0 (0,0)
Konsültasyon			
İstenmedi	96 (80,0)	95 (99,0)	1 (1,0)
İstendi	24 (20,0)	10 (41,7)	14 (58,3)
Toplam	120 (100,0)	105 (87,5)	15 (12,5)

Toplam sütunundaki yüzdeler N=120 üzerinden, ISS sütunlarındaki yüzdeler ilgili satır toplamı üzerinden hesaplanmıştır. Yuvarlama nedeniyle toplamlar %100'den küçük farklılık gösterebilir. Kaynak çalışmada yaralanma bölgesi, tanı ve konsültasyon karşılaştırmalarının her biri için $p<0,001$ bildirilmiştir. [a] Karın ve çoklu travma kategorileri, kaynak çalışmada örneklem yetersizliği nedeniyle ilgili istatistiksel karşılaştırmalara alınmamıştır. Kaynak: Akpınar, tablo 3. Hücre sayıları korunmuş, yüzdeler ortak bir payda tanımına göre düzenlenmiştir.

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M4555-Tam Metin

APPROACH TO ATRIAL SEPTAL DEFECT IN THE PEDIATRIC EMERGENCY DEPARTMENT: PRINCIPLES OF DIAGNOSIS, EVALUATION, AND MANAGEMENT

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Abstract

Introduction: Atrial septal defect (ASD) is a congenital anomaly characterized by an opening between the right and left atria. It represents one of the most prevalent acyanotic congenital heart diseases in the pediatric population. While minor defects are predominantly asymptomatic, larger defects may precipitate volume overload in the right side of the heart.

Development: Beyond the most frequently encountered secundum ASD, other variants include primum, sinus venosus, and coronary sinus types. The definitive diagnosis is established via echocardiography. In the pediatric emergency setting, ASD typically does not necessitate immediate emergency intervention; however, the presence of respiratory distress, hypoxemia, arrhythmias, or heart failure warrants an investigation for potential comorbidities. Small secundum defects may undergo spontaneous closure. Hemodynamically significant defects are managed through transcatheter or surgical closure.

Conclusion: Precise anatomical classification, assessment of the impact on the right heart, and consistent follow-up by a pediatric cardiologist are essential for the prevention of complications.

Keywords: Atrial septal defect, child, echocardiography, left-to-right shunt, transcatheter closure

Introduction

Atrial septal defect (ASD) is defined as a persistent communication between the two atria resulting from developmental anomalies of the interatrial septum. ASD may present as an isolated finding or coexist with anomalous pulmonary venous return, valvular heart disease, or more complex congenital cardiac malformations. It is reported to have a higher prevalence in female children (1,2).

Patent foramen ovale must be distinguished from a true ASD. The foramen ovale is a normal component of fetal circulation and typically closes functionally following birth. While a patent foramen ovale is characterized by a valve-like transition between septal tissues, a secundum ASD involves an actual deficiency of tissue within the fossa ovalis region (2).

CLASSIFICATION AND PATHOPHYSIOLOGY

Secundum ASD is located in the region of the fossa ovalis and represents the most common variant. Primum ASD is situated in the inferior portion of the atrial septum and may be

associated with atrioventricular valve anomalies. Sinus venosus ASD is typically adjacent to the superior vena cava and may be complicated by partial anomalous pulmonary venous return. Coronary sinus defects are rare. Anatomical classification is of fundamental importance in determining the appropriate closure strategy (1,2).

Following birth, the reduction in pulmonary vascular resistance typically leads to a left-to-right shunt. The magnitude of the shunt is dependent upon the size of the defect, ventricular compliance, and pulmonary vascular resistance. A significant shunt may result in volume overload of the right atrium and right ventricle, increased pulmonary blood flow, and progressive dilatation of the pulmonary artery. Although severe pulmonary hypertension is rare during childhood, the risk may increase in cases of large and long-standing defects (1,3).

CLINICAL MANIFESTATIONS AND DIAGNOSIS

The majority of pediatric patients are asymptomatic, with the diagnosis established during routine physical examinations. Infants with significant shunts may present with tachypnea, fatigue during feeding, diaphoresis, recurrent respiratory tract infections, and failure to thrive. Older children may develop easy fatigability, reduced exercise capacity, dyspnea, or palpitations. As chest pain and syncope are not typical for isolated ASD, alternative cardiac etiologies should be investigated (1,3).

Physical examination typically reveals a systolic ejection murmur at the left upper sternal border and a wide, fixed splitting of the second heart sound. Electrocardiography may demonstrate right axis deviation, incomplete right bundle branch block, or evidence of right ventricular volume overload. While chest radiography may reveal cardiomegaly and increased pulmonary vascular markings in the presence of a significant shunt, normal findings do not exclude an ASD (1,3).

Transthoracic echocardiography serves as the primary diagnostic modality. The type and diameter of the defect, the direction of the shunt, the dimensions of the right heart chambers, ventricular functions, pulmonary arterial pressure, and associated anomalies are comprehensively evaluated. The septal rims surrounding the defect are meticulously examined to determine the feasibility of transcatheter closure for secundum ASD (2,4).

Reporting merely the diameter of the defect on echocardiography is insufficient. Right ventricular dilatation, paradoxical interventricular septal motion, and increased pulmonary flow help demonstrate the hemodynamic significance of the shunt. If image quality is suboptimal or a sinus venosus defect is suspected, transesophageal echocardiography, cardiac magnetic resonance imaging, or computed tomography may be required. Cardiac catheterization is not utilized for routine diagnosis; it is indicated when uncertainty regarding pulmonary vascular resistance exists or when transcatheter closure is planned (2-4).

APPROACH IN THE PEDIATRIC EMERGENCY DEPARTMENT

Initial evaluation must be conducted in accordance with the ABCDE systematic approach. Heart rate, respiratory rate, blood pressure, oxygen saturation, peripheral perfusion, respiratory effort, and hepatomegaly should be systematically assessed. The type of known ASD, previous

echocardiographic findings, pulmonary pressure, concurrent medications, and planned interventions must be thoroughly reviewed.

Isolated and small ASDs typically do not require emergency treatment. The presence of resting hypoxemia, newly developed cyanosis, marked respiratory distress, poor perfusion, heart failure, persistent tachycardia, or syncope necessitates further evaluation. A simple ASD is an acyanotic lesion; if cyanosis is detected, pulmonary hypertension, right-to-left shunting, or concomitant complex heart disease should be suspected. In such patients, cardiac monitoring, echocardiography, and pediatric cardiology consultation are warranted (1,5).

Acute treatment focuses on correcting the physiological derangement that precipitated the presentation. Oxygen therapy is administered in the presence of hypoxemia; shock, severe respiratory failure, or unstable arrhythmias are managed according to pediatric advanced life support protocols. Fluid therapy in patients with heart failure must be carefully planned to avoid volume overload. Diuretic or antiarrhythmic therapy should be tailored to the clinical status and the recommendations of pediatric cardiology (5).

TREATMENT AND FOLLOW-UP

A significant proportion of small, central secundum ASDs may decrease in size or undergo spontaneous closure during infancy and early childhood. Spontaneous closure is not anticipated in primum, sinus venosus, and coronary sinus defects. The frequency of follow-up is determined by age, defect size, symptoms, and the impact on the right heart (3,6).

The decision for closure is not based solely on the diameter of the defect. Right atrial and right ventricular volume overload, shunt magnitude, symptoms, pulmonary pressure, and cardiac anatomy are evaluated comprehensively. ASDs leading to significant right heart volume overload are typically closed electively during the preschool period. The procedure may be planned earlier in symptomatic young children (3,7).

Transcatheter closure using a device is preferred for secundum ASDs with appropriate rim anatomy. Primum, sinus venosus, and coronary sinus defects, as well as very large secundum defects or anatomies unsuitable for device closure, are managed surgically. In experienced centers, the outcomes of both approaches are generally excellent. Following uncomplicated repair, the majority of children can maintain a normal physical activity level (1,7).

Following transcatheter closure, device position, residual shunts, pericardial effusion, and arrhythmias are monitored via clinical and echocardiographic evaluations. The duration of antiplatelet therapy is determined by the performing center. Routine infective endocarditis prophylaxis is not recommended for isolated, unrepaired ASD; however, it may be warranted during the early post-closure period following device implantation or in the presence of a residual shunt around the prosthetic material. Families should be provided with written instructions regarding medication administration, physical activity, and follow-up schedules (1,3).

CONCLUSION

Although atrial septum defects predominantly follow an asymptomatic course in children, large shunts can induce right heart volume overload. When respiratory distress, hypoxemia, heart

failure, or arrhythmias are identified in the pediatric emergency department, concurrent lesions and complications should be thoroughly investigated. Echocardiography serves as the cornerstone of diagnosis and treatment planning. While small secundum defects may be monitored, hemodynamically significant defects are closed via catheter-based or surgical methods at the appropriate time. With regular pediatric cardiology follow-up, the long-term prognosis is generally excellent.

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M4556-Tam Metin

THORACOABDOMINAL PENETRATING INJURY CAUSED BY A CROCHET HOOK AFTER A HOME ACCIDENT: A RARE PEDIATRIC CASE REPORT

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Abstract

Introduction/Aim: Penetrating thoracoabdominal injuries are rare in children, and this anatomically high-risk region carries an increased likelihood of concomitant thoracic and intra-abdominal organ injury due to diaphragmatic movement during respiration. We aimed to describe the emergency department management of a child with a penetrating thoracoabdominal injury from a crochet hook, and to highlight the clinical and ethical challenges when the family declined recommended inpatient observation.

Methods: We present a single pediatric case managed in a tertiary emergency department, summarizing the history, physical examination, imaging findings, observation course, and outcome.

Results: A 10-year-old boy fell onto an armchair while playing ball at home and was penetrated in the left seventh intercostal space by a crochet hook hidden in a bag on the chair. He was hemodynamically stable, and the foreign body was removed under local anesthesia without incision. Contrast-enhanced abdominal and non-contrast thoracic computed tomography showed no acute pathology beyond a subcutaneous soft-tissue defect. Four hours of observation with serial examinations, control radiographs, and a repeat blood count showed no deterioration. Although thoracic surgery recommended one day of inpatient observation given the 17-47% reported incidence of occult diaphragmatic injury after left-sided thoracoabdominal trauma, the family declined admission and left against medical advice after the risks were explained.

Conclusion: Low-velocity thoracoabdominal penetrating injuries in children carry a meaningful risk of occult diaphragmatic injury despite unremarkable imaging. When families decline observation, physicians should clearly document the risk discussion and alternative follow-up plans, both for patient safety and medicolegal protection.

Keywords: Pediatric trauma, Thoracoabdominal injury, Emergency department, Discharge against medical advice



Figure 1.

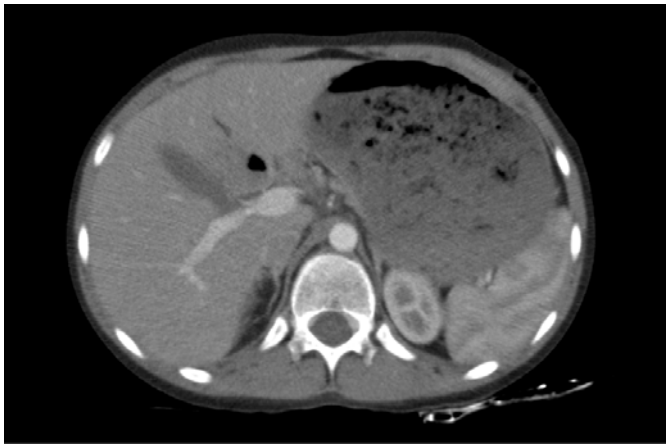


Figure 2.

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M4557-Özet Metin

ELECTROCARDIOGRAPHIC FINDINGS IN ADULTS PRESENTING TO THE EMERGENCY DEPARTMENT WITH ABDOMINAL PAIN: A DESCRIPTIVE PROFILE

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Introduction:
Abdominal pain is a common reason for emergency department admission and may occasionally be associated with cardiac conditions presenting without typical chest pain. This study aimed to describe 12-lead electrocardiographic findings in adults presenting to the emergency department with abdominal pain.

Methods:
This single-center retrospective observational study included 200 adult patients who presented to the triage area of a tertiary-care emergency department between March 1 and March 31, 2025, with abdominal pain and underwent at least one interpretable 12-lead electrocardiogram during the index visit. Demographic characteristics, clinical variables, troponin status, HEART score, and electrocardiographic findings were evaluated descriptively.

Results:
The mean age was 50.23 ± 17.33 years, and 92 patients (46.0%) were male. Intra-abdominal pathology was identified in 45 patients (22.5%), acute cardiac pathology in 3 (1.5%), and known coronary artery disease in 13 (6.5%). Troponin testing was positive in 10 patients (5.0%), negative in 108 (54.0%), and not obtained in 82 (41.0%). Sinus rhythm was the most common rhythm, observed in 162 patients (81.0%). ST-segment depression was the most frequent electrocardiographic abnormality, detected in 29 patients (14.5%), followed by bundle branch block in 8 (4.0%), atrial fibrillation in 6 (3.0%), and T-wave inversion in 5 (2.5%). No ST-segment elevation or pathological Q waves were observed.

Conclusion:
In adults presenting with abdominal pain who underwent emergency department electrocardiography, most tracings showed sinus rhythm, while ST-segment depression was the most frequent abnormality. Electrocardiographic findings should be interpreted together with clinical risk factors, symptoms, and biomarker results.

Keywords: Abdominal Pain; Electrocardiography; Emergency Department; Myocardial Ischemia; Triage

M4558-Tam Metin

LUMBAR PUNCTURE IN FEBRILE PEDIATRIC PATIENTS: WHO REALLY NEEDS IT, WHEN, AND UNDER WHAT CONDITIONS? AN UPDATED REVIEW

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ABSTRACT

Objective: Lumbar puncture (LP) is an important diagnostic tool for bacterial meningitis but is not routinely required in every febrile child. This review aimed to evaluate current LP indications and provide a practical approach to reduce unnecessary procedures without missing bacterial meningitis.

Methods: LP indications in febrile pediatric patients were evaluated based on current guidelines and clinical studies, considering age, clinical findings, bacterial infection risk, inflammatory markers, febrile seizures, neuroimaging, and cerebrospinal fluid analysis.

Results: LP thresholds are lower in early infancy, while risk stratification using inflammatory markers and urinalysis allows a more selective approach in well-appearing infants. PECARN and Step-by-Step may help identify low-risk patients but do not replace clinical assessment. In older children, LP should be guided by findings suggestive of meningitis or encephalitis rather than fever alone and is not routinely recommended for simple febrile seizures. LP should be deferred in unstable patients or when herniation is a concern, without delaying empirical antimicrobial therapy. Routine neuroimaging before LP is not required.

Conclusion: The decision to perform LP in a febrile pediatric patient should not be based solely on fever or age. Age-specific risk stratification, clinical and neurological assessment, inflammatory markers, and the availability of reliable follow-up should be considered together. In appropriately selected low-risk patients, this approach may reduce unnecessary LPs, while in patients with suspected meningitis, diagnostic procedures should not delay treatment.

Keywords: Febrile child, lumbar puncture, bacterial meningitis, febrile infant, PECARN, pediatric emergency care

INTRODUCTION

The decision to perform lumbar puncture (LP) in a febrile child is one of the most important diagnostic dilemmas in pediatric emergency practice. Bacterial meningitis may present with nonspecific findings in the early period, and a delay in diagnosis may result in death or

permanent neurological sequelae. Conversely, performing LP in every febrile child may cause harms such as pain, failed or traumatic sampling, the need for sedation, prolonged observation and hospitalization, false-positive results, and unnecessary antimicrobial treatment. Therefore, the current approach has shifted from the age-based reflex of "LP if fever is present" toward a selective decision-making process in which age, clinical appearance, neurological findings, risk of invasive bacterial infection, inflammatory markers, and the feasibility of safe follow-up are evaluated together (1,2).

LP is the principal diagnostic procedure that can directly confirm bacterial meningitis. However, whether LP is necessary and whether it is safe to perform the procedure immediately are two separate questions. In a child with suspected meningitis who has shock, respiratory failure, uncontrolled seizures, or a risk of brain herniation, the priority is stabilization and prompt empirical treatment; LP should be performed later when safe conditions have been established. Conversely, in a stable patient without contraindications, obtaining cerebrospinal fluid (CSF) before antibiotic administration increases the diagnostic yield (1,2).

Age is a strong determinant of the likelihood of invasive bacterial infection, particularly during the first three months of life. However, recent guidelines do not recommend completely identical approaches even within the same age groups. The American Academy of Pediatrics (AAP) strongly recommends routine CSF evaluation in febrile infants aged 8–21 days, while adopting a more selective approach based on inflammatory markers in infants aged 22–60 days. The Canadian Paediatric Society (CPS), in its statement updated in May 2026, considers withholding LP as an option even in some infants aged 0–28 days who meet validated low-risk criteria, provided that close in-hospital observation is available (3,4). This difference demonstrates that the decision to perform LP depends not only on age but also on the risk-stratification method used, the laboratory capabilities of the center, the capacity for clinical follow-up, and the family's ability to reliably return for reassessment.

The aim of this review is to evaluate the indications for LP in febrile pediatric patients according to age groups, explain the role of clinical and laboratory risk stratification, address controversial situations such as febrile seizures and viral infections, define the need for neuroimaging before the procedure, and provide a practical approach to the current interpretation of CSF findings.

Inıtıal Evaluatıon Of The Febrıle Chıld: Clınıcal Rısk Before The Lp Decısıon

The first step in the evaluation of a febrile child is the rapid assessment of the airway, breathing, circulation, and level of consciousness. If shock, respiratory failure, prolonged seizure, or severe impairment of consciousness is identified, resuscitation should be initiated before diagnostic procedures. If the likelihood of bacterial meningitis is high, blood cultures should be obtained as soon as possible; however, preparation for blood culture collection or LP should not delay empirical antibiotic therapy (1,2).

In older children, the combination of fever, headache, neck stiffness, and altered consciousness or cognitive status is a strong warning combination for bacterial meningitis. However, the absence of all four findings does not exclude meningitis. In infants, neck stiffness and headache may not be assessable or may be entirely absent; irritability, lethargy, decreased feeding, weak or high-pitched crying, apnea, hypothermia, bulging fontanelle, and unexplained circulatory impairment may be more prominent. Focal neurological findings, prolonged alteration of

consciousness, status epilepticus, petechial or purpuric rash, and a clinician's impression of significant illness should lower the threshold for LP (2,5).

In children older than three months, the degree of fever alone is not an indicator of meningitis. In an older child with an identifiable focus of infection, good general condition, a normal neurological examination, and no signs of meningeal irritation, routine LP is not recommended solely because of high fever or leukocytosis. In contrast, clinical appearance alone is not sufficiently reliable in young infants; invasive bacterial infection may also be present in an infant who appears well at the initial evaluation. Therefore, age-specific algorithms should be used during the first months of life, whereas in older children, the decision should be based predominantly on clinical findings that increase the likelihood of meningitis or encephalitis (3–5).

Lumbar Puncture Decısıon Accordıng To Age Groups

Recommendations according to age are summarized in Table 1. This table is intended for children who are clinically stable and have no contraindications to LP. In the presence of prematurity, chronic disease, immunodeficiency, recent antibiotic use, prolonged hospitalization, technology dependence, or focal bacterial infection, standard low-risk algorithms may not be applicable; a more cautious and individualized approach is required in these patients (3,4).

Table 1. Age-Based Approach to LP in Febrile Pediatric Patients

Age group	Predominant current approach	Situations in which LP is particularly indicated	Situations in which LP may not be performed
0–7 days	Fever or hypothermia is considered neonatal sepsis, and a comprehensive evaluation is performed.	After clinical stabilization, CSF is generally obtained as part of the sepsis/meningitis evaluation. HSV risk is assessed separately.	LP is deferred only when there is a temporary safety concern; treatment should not be delayed.
8–21 days	The AAP recommends routine CSF analysis and culture in addition to urine and blood cultures.	Documented fever ≥38°C; particularly in the presence of clinical deterioration, neurological findings, or HSV risk.	Routine omission of LP is not consistent with the AAP approach.
22–28 days	According to the AAP, risk stratification is performed using blood and urine testing and inflammatory markers; the threshold for LP is low. The CPS considers management without LP to be an option in infants meeting validated low-risk criteria, provided that close in-hospital observation is available.	Multiple abnormal inflammatory markers, clinical concern, neurological findings, positive blood culture, or lack of reliable follow-up.	In selected patients with all markers within normal limits who are clinically stable and can be safely observed in the hospital, omission of LP may be considered through shared decision-making.
29–60 days	Rather than routine LP, a selective approach based on urinalysis, blood culture, and inflammatory markers is recommended.	Abnormal inflammatory markers, signs of meningitis/encephalitis, clinical deterioration, or lack of reliable follow-up.	LP is not required in infants who are clinically low risk and have normal inflammatory markers. A positive urinalysis alone does not automatically constitute an indication for LP when inflammatory markers are normal.

61–90 days	At minimum, urine testing is performed; when necessary, risk stratification similar to that used for infants aged 29–60 days is applied.	Ill appearance, abnormal neurological examination, elevated inflammatory markers, or suspicion of meningitis.	Routine LP is not indicated in low-risk infants without neurological findings when close follow-up is feasible.
>90 days–18 years	Age alone is not an indication for LP; the decision is based on the likelihood of central nervous system infection.	Neck stiffness, altered consciousness, focal neurological findings, status epilepticus, unexplained prolonged postictal period, bulging fontanelle, or suspicion of meningoencephalitis or meningococcal disease.	Routine LP is not indicated in the presence of a simple febrile seizure, an identifiable alternative source of fever, and a normal neurological examination.

The difference between the AAP and CPS approaches is particularly important during the first 28 days of life. The AAP favors routine LP in infants aged 8–21 days; in the 22–28-day age group, it considers LP a reasonable option even when all markers are normal and recommends obtaining CSF when more than one inflammatory marker is abnormal. The more recent CPS approach accepts in-hospital observation without LP in some infants aged 0–28 days who are classified as low risk using validated methods such as PECARN or Step-by-Step. This approach does not mean that "LP is unnecessary in neonates"; it requires complete low-risk stratification and in-hospital observation by experienced personnel (3,4).

Bıomarkers And Clınıcal Decısıon Rules

The key requirement for reducing the use of LP in young febrile infants is reliable stratification of the risk of invasive bacterial infection. In the PECARN rule, a negative urinalysis, an absolute neutrophil count (ANC) ≤4000/μL, and procalcitonin (PCT) ≤0.5 ng/mL are used as low-risk criteria. The Step-by-Step approach includes, in addition to clinical appearance and age, negative urine leukocytes, PCT <0.5 ng/mL, C-reactive protein (CRP) ≤20 mg/L, and ANC ≤10,000/μL. Although these rules have high negative predictive values, no test or algorithm can replace clinical assessment; they should be used with particular caution in the youngest infants and in high-risk patients who fall outside the scope of these algorithms (6,7).

PCT appears to have better discriminatory ability for invasive bacterial infection than CRP, ANC, and total leukocyte count. However, it may remain normal during the very early hours of infection and should not determine the decision to perform LP on its own. In a 2025 study including 2,032 febrile infants, the PCT+CRP, PCT+ANC, and PCT+ANC+urinalysis strategies demonstrated 100% sensitivity and negative predictive value for invasive bacterial infection in the 22–60-day age group, while the PCT+CRP combination provided higher specificity. However, the results of this single-center study, which included only 29 cases of invasive bacterial infection, are not sufficient to exclude the need for LP based solely on a laboratory marker combination, particularly in neonates (8).

Selective algorithms reduce LP use in real-world practice. In a 2025 study evaluating 33,736 encounters before and after the AAP guideline, the rate of LP decreased from 31.7% to 21.8%, hospitalization from 42.6% to 34.7%, and antimicrobial use from 41.9% to 33.1%. However, the slight increase in delayed diagnoses of bacteremia and sepsis among infants younger than 28 days indicates that the goal of "fewer procedures" should not be implemented in the youngest age group without an appropriate safety net (9).

A positive respiratory viral test alone is also not a reason to omit LP. Viral positivity may reduce the likelihood of invasive bacterial infection in infants older than 28 days; however, particularly

during the first 28 days of life, the risk of concomitant bacteremia or meningitis remains clinically significant. Viral test results may modify risk estimation when considered together with age and inflammatory markers, but they should not replace the initial clinical assessment (3,4).

Is Lp Necessary In Febrıle Seızures?

A simple febrile seizure alone is not an indication for LP. In a neurologically healthy child aged 6–60 months who has experienced a brief, generalized seizure that does not recur within 24 hours and has returned to baseline mental status, routine LP is not recommended in the absence of meningeal irritation or other findings suggestive of central nervous system infection. LP should be performed to investigate suspected meningitis or encephalitis, rather than to determine the cause of the seizure (10,11).

LP should be performed in a patient with a febrile seizure who has neck stiffness, bulging fontanelle, persistent alteration of consciousness, focal neurological deficit, petechial/purpuric rash, status epilepticus, or clinical suspicion of meningitis. LP may be considered at a lower threshold in children aged 6–12 months with incomplete Hib or pneumococcal immunization or unknown immunization status, and in patients who have previously received antibiotics. Antibiotics may mask meningeal signs and may also reduce the sensitivity of CSF culture (10).

In complex febrile seizures, focal, prolonged, or recurrent seizures do not automatically indicate LP. The decision should be based on postictal recovery, the duration of altered consciousness, focal deficits, age, immunization status, antibiotic use, and the clinical source of infection. Particularly in patients with prolonged postictal impairment of consciousness, the possibility of meningoencephalitis should be considered rather than attributing the altered mental status solely to the seizure (11).

When Should Lp Be Deferred And When Should Antıbıotıcs Be Started?

In a stable patient with suspected meningitis and no contraindications, LP should preferably be performed before antibiotic administration. However, if preparation for the procedure or neuroimaging would cause a clinically significant delay in starting antibiotics, treatment should take priority. Current WHO and NICE guidelines emphasize that, in suspected bacterial meningitis, empirical intravenous treatment should be initiated as soon as possible after presentation to an appropriate healthcare facility, with a target of within the first hour, and that diagnostic procedures should not delay treatment (1,2).

The main conditions that should be corrected or stabilized before LP are as follows:

1. An unprotected airway or significant respiratory failure.
2. Hemodynamic instability or shock.
3. Ongoing or uncontrolled seizure.
4. Clinically significant bleeding risk or severe coagulation disorder.
5. Rapidly progressive, extensive purpura.
6. Skin or soft tissue infection at the puncture site.
7. Neurological findings suggestive of a mass effect or risk of brain herniation.

Under these conditions, blood cultures should be obtained, empirical treatment should be initiated, and LP should be reassessed as soon as possible once it can be performed safely. The initiation of antibiotics does not make LP entirely uninformative. Although culture sensitivity may decrease, CSF cell count, protein, glucose, Gram staining, and particularly appropriate molecular tests may still contribute to the diagnosis. Therefore, the approach that "antibiotics have been administered, so LP can no longer be performed" is not appropriate (1,2).

Who Requıres Cranıal Ct Or Mrı Before Lp?

Routine cranial imaging is not recommended in suspected meningitis. Unnecessary CT may delay LP and antibiotic treatment in addition to causing radiation exposure. Neuroimaging should be performed before LP in patients who have risk factors for a space-occupying lesion or findings suggestive of mass effect or significantly increased intracranial pressure, including new focal neurological findings, abnormal pupillary responses, a GCS ≤9, or a rapid, sustained, or progressive decline in the level of consciousness. In these patients, blood samples should first be obtained, antibiotics should be initiated, and the patient should be stabilized (1,2).

Fever, headache, neck stiffness, or an isolated simple febrile seizure alone is not an indication for CT. The WHO guideline states that, in the absence of other risk findings, a new-onset isolated seizure in a child also does not require mandatory neuroimaging before LP. In contrast, focal seizures, abnormal posturing, persistent focal deficits, or unresolved impairment of consciousness should be evaluated differently (1). A bulging fontanelle alone does not always indicate herniation; however, when accompanied by impaired consciousness, pupillary changes, or focal findings, specialist evaluation and neuroimaging are required before LP.

DISCUSSION

Current discussions regarding the use of LP in febrile pediatric patients focus less on its diagnostic value and more on identifying the patients in whom the expected benefit of LP outweighs the potential harms of the procedure and unnecessary treatment. Particularly in young infants, the nonspecific presentation of invasive bacterial infections makes it difficult to omit LP, whereas the development of validated risk-stratification methods has enabled a more selective approach in low-risk patients. However, differences between the AAP and CPS recommendations indicate that there is no single universally accepted approach to LP, particularly during the first 28 days of life. While the AAP maintains a more cautious approach, the CPS considers omission of LP under close in-hospital observation to be an acceptable option in selected infants who meet appropriate low-risk criteria (3,4). These differences demonstrate that the decision to perform LP cannot be based solely on age or a single laboratory result and that clinical appearance, inflammatory markers, neurological findings, procedural safety, and follow-up capabilities should be evaluated together.

An important advantage of approaches aimed at reducing LP use is their potential to decrease unnecessary invasive procedures, traumatic sampling, hospitalization, and unnecessary antimicrobial treatment. However, because missed meningitis may have serious consequences, particularly in neonates and young infants, a reduction in LP use alone should not be considered a measure of clinical success. Therefore, low-risk algorithms should be used as tools to support clinical decision-making rather than as substitutes for clinical assessment. A more cautious approach is required in conditions that may limit the applicability of these algorithms, such as

prematurity, comorbidities, recent antibiotic use, neurological findings, or the absence of reliable follow-up. Similarly, when the patient is clinically unstable or has findings requiring neuroimaging before LP, deferring the procedure should not result in a delay in antimicrobial treatment.

Another important area of discussion is the role of shared decision-making in the LP process. Particularly in low-risk infants aged 22–28 days, family preferences may be incorporated into the decision-making process when the available evidence allows more than one acceptable approach. However, shared decision-making should not mean leaving the determination of the indication for LP entirely to the family. Families should be clearly informed that the risk of meningitis is low but not zero, of the diagnostic contribution of LP, of the potential complications of the procedure, and of the close observation and follow-up required when LP is not performed. In conclusion, although the current approach is increasingly moving away from routine LP in febrile children, the goal should not simply be to perform "fewer LPs." The primary objective is to reduce unnecessary invasive procedures without missing serious central nervous system infections and to individualize the decision to perform LP within a framework that integrates age-sensitive risk stratification, clinical assessment, procedural safety, and the availability of reliable follow-up (3,4).

CONCLUSION

The decision to perform LP in a febrile pediatric patient should not be based solely on fever or a single age cutoff. During the first weeks of life, and particularly in the AAP-defined 8–21-day age group, routine CSF evaluation remains the predominant approach, whereas in selected infants aged 22–90 days, risk stratification based on clinical appearance, urinalysis, blood culture, and PCT/CRP/ANC may reduce unnecessary LPs. However, low-risk algorithms should be used with caution in the presence of prematurity, comorbidities, antibiotic use, neurological findings, or lack of reliable follow-up.

In older children, the primary indication for LP is not fever itself, but suspicion of meningitis or encephalitis. Routine LP is not required in simple febrile seizures; clinical decision-making should be based on meningeal signs, level of consciousness, seizure characteristics, immunization status, and history of antibiotic use. If shock, respiratory failure, uncontrolled seizures, significant bleeding risk, or signs of herniation are present, LP should be deferred; however, blood culture collection and empirical antimicrobial treatment should not be delayed. Routine CT before LP is not recommended.

CSF cell count, protein, glucose, Gram staining, and culture are the basic investigations; PCR panels are complementary, particularly in patients from whom a sample could not be obtained before antibiotic administration or when rapid identification of the causative pathogen would alter treatment. No biomarker, negative viral test result, or single CSF parameter can reliably exclude clinically suspected meningitis. The safest approach is to integrate age-sensitive risk stratification, clinical assessment, procedural safety, and follow-up capabilities within the same decision-making framework.

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M4559-Tam Metin

DEMOGRAPHIC, CLINICAL, AND SEASONAL CHARACTERISTICS OF PEDIATRIC BURN CASES PRESENTING TO THE PEDIATRIC EMERGENCY DEPARTMENT: A ONE-YEAR RETROSPECTIVE ANALYSIS

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ABSTRACT

Objective: Pediatric burns are traumatic injuries that are frequently encountered—particularly in younger age groups—and are largely preventable. This study aimed to evaluate the demographic, clinical, and seasonal characteristics of pediatric burn cases presenting to the pediatric emergency department.

Method: Data from patients who presented to the Pediatric Emergency Department of Malatya Training and Research Hospital between January 1 and December 31, 2025, and were recorded under the ICD-10 diagnosis code T31, were retrospectively analyzed. Patients with incomplete data were excluded, and a total of 503 patients were included in the evaluation.

Results: The median age of the patients was 4 years (IQR: 1–9), and 267 (53.1%) were male. Children in the 0–5 age group accounted for 310 (61.6%) of the cases. Burns were classified as mild in 493 (98.0%) patients, moderate in 7 (1.4%), and severe in 3 (0.6%); 10 (2.0%) patients were hospitalized. The highest number of admissions occurred in July (13.1%), with 36.8% of all admissions taking place during the summer season. No significant association was found between burn severity and either gender or nationality ($p=0.885$ and $p=0.637$, respectively).

Conclusion: Pediatric burns were found to be concentrated in the 0–5 age group; the vast majority were mild, and admissions increased during the summer season. Strengthening preventive measures for young children and raising parental awareness are important.

Keywords: Pediatric burn; Pediatric emergency department; Epidemiology; Seasonal distribution

INTRODUCTION

Burn injuries are significant traumatic injuries frequently encountered in childhood; they can lead to pain and loss of function during the acute phase, as well as physical and psychosocial sequelae in the long term. For burns—a common reason for visits to pediatric emergency departments—an accurate early assessment of severity is crucial for planning appropriate treatment and determining the need for hospitalization [1]. A recent systematic review and meta-analysis outlining the epidemiological characteristics of pediatric burns reported that the male gender and the 0–4 age group were notably predominant, scalds accounted for the majority of burns, and the hospitalization rate was approximately 2.5% [2].

The epidemiological characteristics of pediatric burns can vary based on age, gender, socioeconomic conditions, and geographic region. Data from the World Health Organization

Global Burn Registry indicate that children account for 42% of recorded burn cases; among these pediatric cases, 60% are male, and 62% fall within the 1–5 age group [3]. In a study from Turkey evaluating 1,442 pediatric cases, it was reported that 89.2% of burns occurred in indoor settings and that scalds caused by hot water and tea were the most common etiological factor across all age groups [4].

The incidence and characteristics of burns can also exhibit temporal and seasonal variations. Current data regarding seasonal changes indicate that the type of burn and the frequency of hospital admissions vary by season, and that understanding this variability is crucial for planning targeted prevention programs [5].

In this context, elucidating the regional epidemiological characteristics of pediatric burns, identifying risk groups, and developing preventive strategies are of importance. This study aimed to evaluate the demographic and clinical characteristics, as well as the temporal distribution, of pediatric burn cases presenting to the pediatric emergency department over a one-year period.

MATERIALS AND METHODS

Selection of Participants

Data from patients who presented to the Malatya Training and Research Hospital Pediatric Emergency Department between January 1 and December 31, 2025, were retrospectively analyzed. Data were obtained for a total of 550 patients registered in the hospital information system under the ICD-10 diagnostic code T31 (burns classified according to the extent of body surface area involvement). Discharge summaries in the hospital information system were examined in detail. Forty-seven patients with incomplete data were excluded from the study. The study was conducted with 503 patients who met the inclusion criteria.

Statistical Analysis

IBM SPSS Statistics for Windows, version 27.0 (IBM Corp.; Armonk, New York, USA) was used for statistical analyses. The conformity of parameters to a normal distribution was assessed using the Kolmogorov-Smirnov test. Descriptive statistics were presented as mean, median, standard deviation, percentage [25th–75th percentiles (Interquartile Range – IQR)], and frequency. The Chi-square test (χ^2) was performed to determine the relationship between categorical (qualitative) variables. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 503 pediatric burn patients were included in the study. The median age of the patients was 4 years (IQR: 1–9 years); 267 (53.1%) were male and 236 (46.9%) were female. While 216 (42.9%) patients were in the 0–2 age group, patients in the 0–5 age group accounted for 61.6% (n=310) of all cases. Of the patients, 455 (90.5%) were Turkish nationals, and 48 (9.5%) were foreign nationals.

Regarding burn severity, 493 (98.0%) patients had mild burns, 7 (1.4%) had moderate burns, and 3 (0.6%) had severe burns. A total of 10 (2.0%) patients were hospitalized for follow-up.

An analysis of the monthly distribution of admissions revealed that the highest number of admissions occurred in July (n=66, 13.1%) and the lowest in October (n=5, 1.0%). The number of admissions for the other months was recorded as follows: January 60 (11.9%), February 57

(11.3%), March 38 (7.6%), April 42 (8.3%), May 49 (9.7%), June 65 (12.9%), August 54 (10.7%), September 26 (5.2%), November 10 (2.0%), and December 31 (6.2%).

Regarding seasonal distribution, 158 admissions (31.4%) occurred in winter, 129 (25.6%) in spring, 185 (36.8%) in summer, and 31 (6.2%) in autumn. Pediatric burn admissions were found to be most frequent in summer and least frequent in autumn.

No statistically significant difference was found in the distribution of burn severity by gender (Fisher-Freeman-Halton Exact Test, p=0.885). Among cases with minor burns, 231 (46.9%) were female and 262 (53.1%) were male; among moderate burns, 3 (42.9%) were female and 4 (57.1%) were male; and among severe burns, 2 (66.7%) were female and 1 (33.3%) was male. No statistically significant relationship was found between burn severity and nationality (Fisher-Freeman-Halton Exact Test, p=0.637).

DISCUSSION

The epidemiological characteristics of pediatric burns can vary depending on age, gender, geographical region, and the specific features of the healthcare facility. In our study, the median age of the patients was 4 years, and children in the 0–5 age group accounted for 61.6% of the cases. This finding is consistent with recent studies reporting that young children constitute the highest-risk group for burn injuries. A study evaluating 12,661 pediatric burn cases reported that 81.1% of the patients were under three years of age [6]. Another study in Iran, covering 2,951 pediatric burn cases, showed that 59.7% of the cases fell within the 0–4 age group [7]. In this age group, the combination of increased motor mobility and a lack of fully developed danger perception and protective behaviors may contribute to the heightened risk of burns.

In our study, male patients outnumbered female patients, accounting for 53.1% of the total. Similarly, a multicenter study in China evaluating 6,741 cases from 23 children's hospitals reported that 63.2% of the patients were male, with a notable concentration in the 1–2 age group [8]. A study conducted in Saudi Arabia also found that 61% of the cases were male and approximately 47% were two years of age or younger [9]. However, the absence of a significant association between burn severity and gender in our study (p=0.885) suggests that the slight predominance of males in the number of admissions is not linked to the development of more severe burns.

In our study, 98.0% of the cases fell into the mild burn category, and only 10 patients (2.0%) required hospitalization, indicating that the study population consisted predominantly of burns with low clinical severity. A study evaluating national hospital data in the USA reported that pediatric burn-related hospitalization rates decreased over the years and that there was a 48.1% reduction in burn-related mortality [10]. However, it should be noted that hospitalization and complication rates may be higher in studies conducted at burn centers, as these facilities treat more severely injured patient populations. Indeed, a multicenter study involving 11,092 cases reported that post-burn complications—such as respiratory tract infections, shock, and hypoproteinemia—varied according to burn etiology and age groups [11].

The temporal distribution of admissions is one of the notable findings of our study. The highest number of admissions occurred in July, with 36.8% of the cases presenting during the summer season. However, the seasonal distribution of pediatric burns is known to vary across different geographical regions. A study evaluating 1,527 pediatric patients in Northern China reported

that burns occurred most frequently during the winter season [12]. These differences may be attributed to factors such as climatic conditions, indoor lifestyles, heating methods, school terms, and variations in children's seasonal activities.

Finally, no significant association was found between burn severity and nationality in our study (p=0.637). This result suggests that factors related to age and environmental exposures—rather than demographic characteristics—may play a primary role in the population evaluated. Recent studies on pediatric burn epidemiology emphasize the importance of preventive measures and first-aid training for caregivers, particularly regarding young children [13]. Key limitations of the study include its single-center, retrospective design and the inability to evaluate variables such as the burn mechanism, total burn surface area, and the setting where the injury occurred. Nevertheless, the study is significant for revealing current regional characteristics of burn cases presenting to the pediatric emergency department.

CONCLUSION

Our study determined that pediatric burns were concentrated in the 0–5 age group and occurred slightly more frequently in male children. While the vast majority of cases involved minor burns, the hospital admission rate was found to be low. Burn severity showed no significant association with gender or nationality, and presentations were observed to peak during the summer months. These findings highlight the importance of strengthening preventive measures—especially for young children—and raising parental awareness regarding burn prevention.

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M4560-Tam Metin

PATHOPHYSIOLOGICAL FOUNDATIONS OF ACUTE CARDIOPULMONARY EMERGENCIES IN NEONATAL TRISOMY 21: A PHYSIOLOGIST'S PERSPECTIVE

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Abstract

Trisomy 21 is characterized by a complex gene dosage imbalance rather than just a simple structural defect. Therefore, pediatric emergency physicians must understand the underlying cellular mechanisms to effectively manage neonatal cardiopulmonary crises. This review aims to bridge basic physiology and clinical practice by elucidating the exact pathophysiological pathways that trigger acute cardiopulmonary emergencies in Trisomy 21 neonates. The extra copy of chromosome 21 induces massive overexpression of the Superoxide Dismutase-1 (SOD1) enzyme. Physiologically, this causes severe intracellular oxidative stress and chronic mitochondrial dysfunction. This oxidative burden disrupts embryonic endocardial cushion migration. It also impairs extracellular matrix regulation. As a result, the incidence of Atrioventricular Septal Defect (AVSD) increases. Furthermore, systemic oxidative stress suppresses endothelial nitric oxide (NO) synthase activity. Additionally, the overexpression of interferon receptors creates a pathological state in the pulmonary vascular bed. The resulting decrease in NO bioavailability and the increase in anti-angiogenic factors disrupt the physiological transition to neonatal circulation. This frequently manifests in the emergency department as persistent pulmonary hypertension and severe hypoxic crises. Cardiopulmonary emergencies in Trisomy 21 are driven by cellular stress and altered vasoactive signaling. Recognizing these roots reveals the vital importance of targeted cellular vasodilator therapies.

Keywords: Trisomy 21, Oxidative Stress, Pulmonary Hypertension, AVSD, SOD1, Nitric Oxide, Endothelial Dysfunction.

1. Introduction and Aim

Down syndrome (Trisomy 21) is the most common genomic anomaly in live-born infants, **presenting as** a complex condition that affects multiple organ systems [1]. Its devastating effects on the cardiovascular system are particularly important **since they** primarily determine the morbidity and mortality rates of these patients [6]. A significant portion of Trisomy 21 cases present to the emergency department during the neonatal period. They typically show signs of acute respiratory failure, deep cyanosis, and heart failure. Recent statements from the American Heart Association (AHA) highlight a critical point. Cardiovascular complications in Trisomy 21 are not limited to anatomical defects. They also involve cellular adaptation problems starting from the first days of life [7].

In clinical settings, these emergencies are usually explained by congenital heart diseases or structural lung anomalies. However, a much more complex cellular pathophysiology lies at the

core of the disease. This is driven by a "gene dosage imbalance." This review adopts a physiologist's perspective. It aims to comprehensively explain the mechanisms behind cardiopulmonary emergencies in Trisomy 21 neonates based on current literature. These mechanisms include cellular stress, impaired vasoactive signaling, extracellular matrix disorders, and embryological adaptation problems.

2. Gene Dosage Imbalance and Cellular Oxidative Stress Mechanisms

The pathophysiological basis of Trisomy 21 involves the overexpression of specific genes on chromosome 21. These genes are expressed at 1.5 times (50% more) their normal levels. Their excessive transcription exceeds the cell's normal homeostatic limits. This causes severe metabolic stress starting from the early fetal period. Redox proteomic analyses of amniotic fluid have proven this phenomenon. They demonstrate that oxidative stress begins and accumulates early in pregnancy [3].

Gene (Chromosome 21)	Normal Physiological Function	Pathophysiological Result of Overexpression (Trisomy 21)
SOD1 (Superoxide Dismutase-1)	Conversion of intracellular superoxide radicals to hydrogen peroxide (H2O2).	Excessive H2O2 accumulation, glutathione depletion, mitochondrial damage, and lipid peroxidation [12].
RCAN1	Inhibition of the calcineurin pathway.	Impaired angiogenesis, inadequate vascular development, and endothelial dysfunction [4].
DSCAM	Cell adhesion and cardiac tissue development.	Migration defect of endocardial cushion cells and septal defect pathogenesis [8].
COL6A1 / COL6A2	Extracellular matrix integrity and structural support.	Cardiac septation anomalies, decreased tissue elasticity, and structural dysfunction [8].
IFNAR1 / IFNAR2	Immune and inflammatory response mediated by interferon receptors.	Exaggerated hypoxia-induced platelet activation and increased pulmonary vascular resistance [10].

The overactivity of the SOD1 enzyme creates a dangerous paradox at the cellular level. It clears superoxide radicals efficiently. However, the resulting H2O2 cannot be detoxified fast enough. This happens because Catalase and Glutathione Peroxidase enzymes remain at normal levels, as they are encoded outside chromosome 21 [12]. This imbalance leads to permanent oxidative damage and protein denaturation. It also causes chronic mitochondrial dysfunction in myocardial and pulmonary endothelial cells.

From an experimental physiology perspective, it is crucial to note that much of the foundational evidence for these gene dosage effects—particularly SOD1 overexpression and the ensuing endothelial damage—has been robustly demonstrated in transgenic murine models. These in vivo studies are essential for translating molecular oxidative stress findings into clinical cardiopulmonary pathophysiology.

3. Molecular and Developmental Physiology of Congenital Heart Diseases (AVSD)

The prevalence of congenital heart disease in Trisomy 21 patients is reported as 40-50% in the literature. Atrioventricular Septal Defect (AVSD) is the most common anomaly. It presents in the emergency department with early-stage heart failure and pulmonary edema crises [9].

During embryological development, the heart separates into four chambers. This requires endocardial cushion cells to undergo an epithelial-mesenchymal transition (EMT) at the right time. They must then migrate to the septum region. Mollo et al. (2023) highlighted a critical issue in this process for Trisomy 21. The process is disrupted due to dysregulation in the extracellular matrix (ECM). This dysregulation is caused by the increased gene dosage [8]. The overexpression of the COL6 gene family and cell adhesion molecules (DSCAM) alters cell dynamics. It impairs the cells' ability to adhere to each other and the matrix. Consequently, the septum cannot close completely. This results in a postnatal left-to-right shunt. It also causes volume overload in the pulmonary vascular bed and acute hemodynamic deterioration [9].

4. Persistent Pulmonary Hypertension (PPHN) and Endothelial Dysfunction

Persistent Pulmonary Hypertension (PPHN) is one of the most fatal neonatal emergencies in Trisomy 21 patients. The prevalence of PPHN in neonates with DS is significantly higher than in the healthy population [5]. During the transition from fetal to neonatal circulation, the baby takes its first breath. Oxygen fills the lungs and should cause strong vasodilation in the pulmonary vessels. However, this physiological adaptation mechanism often fails in Trisomy 21 [13]. Several basic mechanisms underlie this failure:

Profound Decrease in NO Bioavailability: Nitric Oxide (NO) is produced in healthy endothelium. It is the main mediator that relaxes vascular smooth muscles. However, Trisomy 21 creates a massive oxidative stress environment. Free radicals immediately bind the NO molecule and convert it to peroxynitrite (ONOO-). This "NO quenching" directly prevents vasodilation [13].

Anti-Angiogenic Imbalance and Pulmonary Hypoplasia: Anti-angiogenic factors (e.g., endostatin precursors) are located on chromosome 21. Their overexpression prevents the full development of the pulmonary vascular bed. This causes pulmonary vascular hypoplasia. The low number of vessels and suppression of alveolar growth exponentially increase the risk of pulmonary hypertension [4].

Interferon Receptors and Platelet Activation: Recent studies show the critical role of interferon receptors (IFNAR). Their increased gene dosage is vital in pulmonary hypertension pathogenesis. This increase leads to exaggerated platelet activation in the hypoxic pulmonary bed. It also causes microthrombus formation and further increases vascular resistance [10].

The Role of Portosystemic Shunts: Recent case reports highlight hidden congenital portosystemic shunts. These shunts may underlie unexplained and fatal pulmonary hypertension crises in Trisomy 21 neonates. These anatomical variations allow vasoconstrictor substances released from the liver to pass directly into the pulmonary circulation. This deepens the hemodynamic crisis [11].

Together, these mechanisms lay the foundation for pulmonary hypertension in the neonatal period. This condition often becomes chronic in individuals with Down syndrome at older ages [2].

5. Translational and Physiological Perspective on Emergency Clinical Management

Pediatric emergency specialists must grasp this cellular pathophysiology. This understanding is mandatory for developing life-saving therapeutic strategies. Clinicians should not focus

solely on the cardiac structural defect. Applying standard oxygen protocols can also be insufficient. These patients have a severe "vasoactive crisis" (endothelial dysfunction) at the cellular level. For instance, consider a Trisomy 21 neonate presenting with PPHN or severe cyanosis. Giving high concentrations of oxygen (hyperoxia) can be harmful. It can further trigger reactive oxygen species (ROS), which are already elevated due to SOD1 excess. This exacerbates myocardial and endothelial "oxidative damage." Therefore, the clinician's focus should be on breaking the pulmonary vascular resistance through cellular pathways. Clinicians can use Inhaled Nitric Oxide (iNO) therapy to replace the NO deficiency. They can also use agents that force vasodilation by increasing intracellular cGMP [13]. These are specific and rational interventions directed at the underlying mechanisms.

Looking ahead, recognizing the profound impact of redox imbalance suggests a future therapeutic frontier. Beyond conventional vasodilators, developing targeted, mitochondria-specific antioxidant therapies that directly neutralize H2O2 accumulation could theoretically prevent the initial endothelial damage in Trisomy 21 neonates before the vasoactive crisis fully manifests.

6. Conclusion

Managing emergency cardiopulmonary conditions in neonatal Trisomy 21 cases requires a deep cellular perspective. It goes beyond anatomical and symptomatic interventions. The acute crises are rooted in several factors. These include cellular oxidative stress due to increased gene dosage and extracellular matrix disorders. Endothelial NO depletion and exaggerated immune-platelet activation also play key roles. Emergency clinicians and physiologists must speak the same translational language. This is the most critical step to increase the survival rates of these vulnerable neonates during crisis moments.

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M4561-Tam Metin

AŞILAMA SONRASI ACİL BAŞVURULAR: CİDDİ ADVERS OLAYLARIN TANINMASI VE AYIRICI TANI YAKLAŞIMI

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Özet

Aşılar, aşı ile önlenebilir hastalıkların görülme sıklığını azaltan en etkili koruyucu sağlık uygulamalarından biridir. Bununla birlikte aşılama sonrasında ortaya çıkan bazı olaylar acil değerlendirme gerektirebilir. Bu olayların önemli bir bölümü hafif ve geçicidir; ancak anafilaksi, senkop, immünizasyon stres ilişkili yanıtlar (ISRR), febril konvülziyon ve bazı ciddi AEFI (aşılama sonrası istenmeyen olaylar) hızlı değerlendirme gerektirir. Aşılama sonrasında gelişen her tıbbi olayın doğrudan aşıya bağlanamayacağı; nedensellik değerlendirmesinde olayın klinik özellikleri, aşılamayla arasındaki zaman ilişkisi, olası alternatif nedenler ve literatürde tanımlanmış aşı-olay ilişkilerinin birlikte değerlendirilmesi gerektiği vurgulanmaktadır. [1,2]. Bu derlemede birinci basamakta karşılaşılabilecek aşı sonrası acil başvurular; klinik özellikleri, ayırıcı tanıları, ilk yaklaşım ve bildirim süreçleri açısından ele alınmıştır.

Anahtar Kelimeler: Aşı, advers olay, AEFI, anafilaksi, senkop, immünizasyon stres ilişkili yanıt, febril konvülziyon, aşı güvenliliği, birinci basamak

1. Giriş

Aşı güvenliliğinin değerlendirilmesi, bağışıklama programlarının sürdürülebilirliği ve toplumdaki güvenin korunması açısından önemlidir. Aşılama sonrasında ortaya çıkan olayların doğru sınıflandırılması ve aşılarla ilişkisinin uygun biçimde değerlendirilmesi, hem ciddi reaksiyonların erken tanınmasını hem de tesadüfi olaylar nedeniyle gereksiz aşı ertelemelerinin önlenmesini sağlar [1,2].

AEFI, aşılama sonrasında meydana gelen ve aşı ile ilişkisi bulunması zorunlu olmayan herhangi bir tıbbi olayı ifade eder. Dolayısıyla yalnızca zaman ilişkisi, olayın aşıdan kaynaklandığını kanıtlamaz. WHO yaklaşımı; olayın tanısının doğrulanması, uygun zaman penceresinin incelenmesi, alternatif nedenlerin araştırılması ve bilinen aşı-olay ilişkilerinin gözden geçirilmesini içerir [2].

2. Aşı Sonrası Acil Başvuruda İlk Değerlendirme

Aşı sonrası acil başvuruda ilk adım, olayın aşıyla ilişkisini tartışmadan önce hastanın klinik olarak stabil olup olmadığını belirlemektir. Solunum sıkıntısı, dolaşım bozukluğu, bilinç değişikliği, uzamış nöbet veya ciddi travma gibi yaşamı tehdit eden bulgular varsa acil yaklaşım önceliklidir. Enjeksiyon yerinde ağrı, kısa süreli ateş veya geçici baş dönmesi gibi beklenen ve hafif reaksiyonlar ise çoğunlukla destekleyici yaklaşım ve uygun izlem ile yönetilebilir. Bu

yaklaşımın temel amacı, beklenen reaksiyonlarla ciddi tabloları erken dönemde ayırt ederek gerekli müdahaleyi geciktirmemektir [1,4].

3. Anafilaksi: Hızlı Tanı ve Adrenalin

Anafilaksi, aşılama sonrasında ortaya çıkabilen nadir ancak yaşamı tehdit eden bir reaksiyondur. 2025 tarihli bir sistematik derleme ve meta-analizde, yetişkinlerde 37 çalışma ve toplam 206.855.261 katılımcı değerlendirilmiş; meta-analize dahil edilen 22 çalışmada aşı sonrası anafilaksi insidansı 100.000 kişi başına 2,91 olarak hesaplanmıştır [3].

Yaygın ürtiker veya anjiyoödem, bronkospazm, wheezing, stridor, solunum sıkıntısı ve hipotansiyon önemli klinik bulgulardır. Şüpheli anafilakside IM adrenalin geciktirilmemeli; havayolu, solunum ve dolaşım değerlendirilerek gerekli destek tedavisi sağlanmalıdır. CDC, aşı uygulayan birimlerde adrenalinin ve havayolu yönetimi için gerekli ekipmanın hemen kullanılabilir durumda olmasını önermektedir [4].

Vazovagal senkop ile ayırım özellikle önemlidir. Solukluk, terleme, baş dönmesi ve kısa süreli bilinç kaybı senkop lehineyken; ürtiker, bronkospazm, üst havayolu bulguları veya dolaşım bozukluğu anafilaksiyi düşündürür [4,5].

4. Senkop ve İmmünizasyon Stres İlişkili Yanıtlar (ISRR)

Senkop özellikle adölesanlarda aşılama sırasında veya hemen sonrasında görülebilir. CDC verilerine göre bildirilen senkopların yaklaşık %80'i aşı uygulamasından sonraki ilk 15 dakika içinde gerçekleşmektedir. Düşmeye bağlı yaralanmaları önlemek amacıyla hastanın oturarak veya yatarak aşılanması ve çoğu aşı sonrasında 15 dakika gözlenmesi önerilmektedir [4,5].

Baş dönmesi, halsizlik, bulantı, terleme ve solukluk senkop öncesinde görülebilir; bilinç kaybı genellikle kısa sürer. Güvenli pozisyon sağlanması, vital bulguların değerlendirilmesi ve travmanın önlenmesi temel yaklaşımdır. Bilinç kaybının beklenenden uzun sürmesi, ciddi travma, göğüs ağrısı veya fokal nörolojik bulgu bulunması halinde senkop dışındaki nedenler araştırılmalıdır [5].

ISRR, aşılama öncesinde, sırasında veya sonrasında ortaya çıkabilen stres yanıtlarını kapsar. Baş dönmesi, hiperventilasyon, parestezi ve vazovagal yanıt bu kapsamda değerlendirilebilir. Özellikle korku, kaygı ve stresin eşlik ettiği durumlarda görülebilen bu yanıtlar, klinik değerlendirmede ciddi reaksiyonlardan ayırt edilmelidir [6,7]

5. Ateş ve Febril Konvülziyon

Febril konvülziyonlar bazı aşılar sonrasında görülme riskinde kısa süreli artış bildirilen, ancak mutlak riskin düşük olduğu olaylardır. MMRV (Kızamık, Kabakulak, Kızamıkçık, Suçiçeği) aşısını değerlendiren 39 çalışmanın yer aldığı sistematik derleme ve meta-analizde, 10–24 aylık çocuklarda belirli risk dönemlerinde nöbet veya febril konvülziyon riskinde yaklaşık iki kat artış bildirilmiş; buna karşın en yüksek insidans %0,295'in altında kalmıştır [8].

Aşılamaya yakın dönemde gelişen bir nöbetin değerlendirilmesinde nöbetin süresi, fokal özellikleri ve çocuğun genel durumu önemlidir [9]. 2026 tarihli bir çalışmada da 2–5 yaş çocuklarda monovalan COVID-19 mRNA aşısı sonrasında belirli kısa risk dönemlerinde febril nöbet riskinde artış bildirilmiş; bu bulgunun mutlak risk açısından değerlendirilmesi gerektiği vurgulanmıştır [10].

6. Pratik Yaklaşım

Aşı sonrası acil başvuruda pratik yaklaşım; önce yaşamı tehdit eden bulguların dışlanması, ardından anafilaksi, senkop/ISRR ve febril konvülziyon gibi tabloların klinik özelliklerine göre ayrılması şeklinde yapılabilir.

Tablo 1. Aşı sonrası acil başvurularda sık karşılaşılan klinik tablolar ve ilk yaklaşım

Klinik tablo	Öne çıkan bulgular	İlk yaklaşım
Anafilaksi	Ürtiker/anjiyoödem; wheezing/stridor; solunum veya dolaşım bozukluğu	IM adrenalin; ABC yaklaşımı; destek tedavisi; uygun gözlem ve gerektiğinde transfer
Vazovagal senkop	Solukluk, terleme, baş dönmesi; kısa süreli bilinç kaybı	Güvenli pozisyon; vital bulgular; travmayı önleme; düzelmiyorsa alternatif nedenleri araştırma
ISRR	Baş dönmesi, hiperventilasyon, parestezi, yoğun kaygı	Sakin iletişim; güvenli ortam; vital bulgular; ciddi nedenleri dışlama
Febril konvülziyon	Ateşle birlikte nöbet; süre ve fokal özellikler önemli	ABC; nöbet süresini belirleme; uzamış nöbeti tedavi etme; ciddi nedenleri değerlendirme
Ciddi/beklenmeyen AEFI	Yaşamı tehdit eden olay, hastaneye yatış veya kalıcı sekelle ilişkili tablo	Stabilizasyon; ayrıntılı kayıt; uygun ASİE (Aşı Sonrası İstenmeyen Etkiler) bildirimi ve nedensellik değerlendirmesi

7. Nedensellik, Bildirim ve Yeniden Aşılama

Özellikle nöbet veya ciddi alerjik reaksiyon öyküsü bulunan hastalarda sonraki dozlar, olayın gerçek klinik tanısı ve ilgili aşının özellikleri dikkate alınarak planlanmalıdır. Aşıya yakın dönemde gelişen nöbetleri inceleyen derlemede de yeniden aşılama kararının nöbetin tipi, süresi ve ilgili aşı dikkate alınarak verilmesi gerektiği belirtilmiştir [9].

Ciddi veya beklenmeyen olaylarda aşının adı, uygulama tarihi ve saati, mümkünse seri/lot bilgisi, olayın başlangıç zamanı, klinik bulgular, uygulanan tedavi ve sonuç kaydedilmelidir. Bu bilgiler nedensellik değerlendirmesi ve olayın izlenmesi açısından önemlidir [2,4]. Türkiye'de 03.02.2023 tarihli ve 2023/03 sayılı ASİE Genelgesi yürürlüktedir; ASİE izlem ve bildirim süreçleri bu çerçevede yürütülmektedir [11].

8. Sonuç

Aşı sonrası acil başvurularda temel amaç, nadir ancak ciddi reaksiyonları beklenen ve çoğunlukla hafif reaksiyonlardan hızlı biçimde ayırt etmektir. Anafilaksi, senkop/immünizasyon stres ilişkili yanıtlar ve febril konvülziyon gibi tabloların klinik özelliklerinin bilinmesi, gereksiz müdahalelerin önlenmesi ve ciddi durumlarda tedavinin gecikmemesi açısından önemlidir.

Birinci basamakta aşı güvenliği yalnızca acil durumların yönetimini değil; uygun kayıt ve bildirim yapılmasını, olay ile aşı arasındaki ilişkinin dikkatle değerlendirilmesini ve sonraki aşılamaların klinik duruma göre planlanmasını da kapsar. Bu yaklaşım, hem ciddi advers olayların erken tanınmasına hem de aşı güvenine katkı sağlar.

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M4565-Tam Metin

Aile Hekimliğinde Hasta Çocuk: Pediatrik Acile Sevk İçin Kırmızı Bayraklar

The Sick Child in Primary Care: Red Flags for Referral to the Pediatric Emergency Department

Nur Kaplan Demir

Battalgazi ilçe sağlık müdürlüğü

Abstract

Objective: Fever, respiratory symptoms, vomiting, diarrhea, abdominal pain, headache, and rash are common presentations in children evaluated in primary care. Although most are associated with self-limiting conditions, similar initial manifestations may occur in serious infections, respiratory or circulatory failure, acute neurological disorders, and surgical emergencies. This review aims to identify red flags suggestive of serious or time-sensitive illness in children presenting to primary care and to provide a systematic approach to guide referral to the pediatric emergency department.

Content: Pediatric assessment should begin with observation of the child's general appearance, behavior, work of breathing, and peripheral circulation, followed by a systematic evaluation using the Pediatric Assessment Triangle and the ABCDE approach. Vital signs should be interpreted according to age. Important warning signs include young age, toxic appearance, and physiological deterioration in febrile children; increased work of breathing, cyanosis, hypoxemia, and exhaustion in children with respiratory symptoms; and severe dehydration, bilious vomiting, gastrointestinal bleeding, and peritoneal signs in those with gastrointestinal complaints. Altered mental status, prolonged or focal seizures, focal neurological deficits, and features suggestive of secondary headache require urgent evaluation. Non-blanching rashes, severe cutaneous reactions, high-risk trauma findings, suspected child abuse, and toxic ingestions should also prompt consideration of emergency referral. Serious illness may present with nonspecific manifestations in neonates and young infants, and caregiver observations may provide valuable information during clinical assessment.

Conclusion: The primary goal of pediatric assessment in primary care is not necessarily to establish a definitive diagnosis in every child, but to promptly identify those who are physiologically unstable or at risk of serious and time-sensitive illness. Systematic assessment of general appearance, breathing, circulation, level of consciousness, and age-appropriate vital signs may facilitate early recognition of red flags. When safe outpatient observation cannot be assured, referral to a pediatric emergency department should be considered after appropriate initial stabilization.

Keywords: pediatric emergency; primary care; red flags; pediatric assessment; referral; serious illness

Giriş

Çocukluk çağında ateş, öksürük, kusma, ishal, karın ağrısı, döküntü ve baş ağrısı gibi yakınmalar hem birinci basamak sağlık kuruluşlarında hem de acil servislerde en sık karşılaşılan başvuru nedenleri arasındadır (1). Bu yakınmaların büyük bölümü kendini sınırlayan ve ayaktan izlenebilen hastalıklardan kaynaklanmaktadır. Bununla birlikte, başlangıç döneminde benzer semptomlarla ortaya çıkan ciddi enfeksiyonlar, solunum veya dolaşım yetmezliği, akut nörolojik hastalıklar ve cerrahi aciller de görülebilmektedir. Bu nedenle birinci basamakta çocuk hastanın değerlendirilmesindeki temel hedeflerden biri, kesin tanının konulmasından önce ciddi hastalık olasılığının belirlenmesi ve acil değerlendirme gerektiren çocukların erken dönemde tanınmasıdır.

Çocuklarda fizyolojik rezervin erişkinlerden farklı olması ve klinik kötüleşmenin bazı durumlarda hızlı gelişebilmesi, erken uyarı bulgularının tanınmasını önemli hale getirmektedir. Özellikle küçük çocuklarda yakınmaların ifade edilememesi, semptomların özgül olmaması ve yaşa göre normal vital bulgu sınırlarının değişmesi değerlendirmeyi güçleştirebilir. Bu nedenle çocuğun genel görünümü, davranışı, solunum paterni ve periferik dolaşımı ile başlayan sistematik bir değerlendirme yapılmalıdır (2).

İlk Değerlendirme:

Hasta Çocuğa İlk Bakış

Çocuk hastanın değerlendirilmesi ayrıntılı öykü ve fizik muayeneden önce, çocuk muayene odasına girdiği anda başlamalıdır. Çocuğun çevreyle ilişkisi, ebeveyniyle etkileşimi, ağlamasının niteliği, hareketleri, cilt rengi ve solunum eforu önemli bilgiler sağlayabilir.

Bu amaçla kullanılabilecek sistematik yaklaşımlardan biri Pediatric Assessment Triangle'dır (PAT). PAT; görünüm (appearance), solunum işi (work of breathing) ve cilde yansıyan dolaşımın (circulation to skin) birlikte değerlendirilmesine dayanır (3).

PAT:

Görünüm (Appearance): Bilinç düzeyi, göz kontağı, tonus, tepki verme ve ağlama şekli.

Solunum Çabası (Work of Breathing): Hırıltı, çekilmeler, burun kanadı solunumu veya anormal sesler.

Dolaşım (Circulation to Skin): Cilt rengi (solukluk, morarma veya alacalı görünüm).

Bilinç düzeyinde azalma, çevreyle etkileşimin bozulması, zayıf veya anormal ağlama, belirgin solunum eforu, siyanoz, solukluk veya benekli görünüm ciddi hastalık açısından uyarıcı kabul edilmelidir.

İlk gözlemsel değerlendirmenin ardından hava yolu, solunum, dolaşım, nörolojik durum ve ekspojuru içeren ABCDE yaklaşımı uygulanmalıdır. Vital bulgular mutlaka çocuğun yaşına göre değerlendirilmelidir. Taşikardi, bradikardi, takipne, hipotansiyon, hipoksemi, uzamış kapiller dolum süresi ve bilinç değişikliği acil değerlendirme gerektiren fizyolojik bozulmanın göstergeleri olabilir (4).

Ateşli Çocukta Kırmızı Bayraklar

Ateş çocukluk çağında en sık sağlık kuruluşuna başvuru nedenlerinden biridir (5). Ateşin derecesi tek başına ciddi hastalığın varlığını veya yokluğunu belirlemek için yeterli değildir. Çocuğun yaşı, genel görünümü, vital bulguları ve eşlik eden semptomları birlikte değerlendirilmelidir.

Özellikle üç aydan küçük bebeklerde ateş ciddi bakteriyel enfeksiyon açısından daha yüksek risk taşımaktadır ve bu yaş grubunda değerlendirme eşiği düşük tutulmalıdır. Yaştan bağımsız olarak toksik görünüm, letarji, uyandırmada güçlük, belirgin irritabilite, solunum sıkıntısı, siyanoz, dolaşım bozukluğu, peteşi veya purpura, ense sertliği, nöbet, belirgin dehidratasyon ve immünsüpresyon varlığı ciddi hastalık açısından kırmızı bayrak olarak değerlendirilmelidir (6).

Ateşli bir çocukta antipiretik tedavi sonrası ateşin düşmesi veya çocuğun geçici olarak rahatlaması ciddi hastalığı tek başına dışlamaz. Klinik karar genel durum ve fizyolojik bulgular temelinde verilmelidir.

Solunum Sistemi ile İlişkili Kırmızı Bayraklar

Öksürük, burun akıntısı ve hırıltı çocuklarda oldukça sık görülmesine rağmen solunum sıkıntısının erken tanınması önemlidir. Çocuğun solunum sayısı yaşa göre değerlendirilirken yalnızca takipnenin varlığına değil, solunum işinin artıp artmadığına da dikkat edilmelidir.

İnterkostal, subkostal veya suprasternal retraksiyon, burun kanadı solunumu, inleme, stridor, belirgin yardımcı solunum kası kullanımı, siyanoz ve hipoksemi ciddi solunum problemi açısından uyarıcıdır. Bebeğin solunum sıkıntısı nedeniyle beslenememesi veya büyük çocuğun konuşmakta güçlük çekmesi de hastalığın şiddetini gösterebilir (7).

Solunum seslerinin belirgin azalması veya ağır solunum sıkıntısına rağmen wheezing şiddetinin azalması klinik düzelme olarak değerlendirilmemelidir. Özellikle astım atağında "sessiz akciğer" ağır hava yolu obstrüksiyonunun göstergesi olabilir. Apne, bilinç değişikliği, siyanoz veya tükenme bulguları bulunan çocuklarda acil stabilizasyon ve uygun koşullarda nakil gereklidir (8).

Kusma, İshal ve Dehidratasyonda Kırmızı Bayraklar

Akut gastroenterit çocuklarda sık görülmekle birlikte kusma ve ishal değerlendirilirken ciddi dehidratasyon ve gastroenterit dışındaki hastalıklar gözden kaçırılmamalıdır.

Oral sıvı alamama, sürekli kusma, belirgin aktivite azalması, ağız mukozasında kuruluk, idrar miktarında azalma, uzamış kapiller dolum ve dolaşım bozukluğu ciddi dehidratasyon açısından uyarıcıdır (9).

Kusmanın özelliği ayrıca önemlidir. Özellikle safra içeren yeşil kusma gastrointestinal obstrüksiyon açısından acil değerlendirme gerektirir. Hematemez, hematokezya, belirgin abdominal distansiyon, peritoneal irritasyon bulguları veya şiddetli lokalize karın ağrısının eşlik etmesi basit gastroenterit dışında alternatif ve cerrahi nedenlerin değerlendirilmesini gerektirir (10).

Karın Ağrısında Kırmızı Bayraklar

Çocuklarda karın ağrısı çoğunlukla benign nedenlerle ortaya çıkmakla birlikte apandisit, invajinasyon, intestinal obstrüksiyon, volvulus, inkarsere herni ve gonadal torsiyon gibi zaman

duyarlı hastalıkların ilk belirtisi olabilir. Şiddetli veya giderek artan ağrı, lokalize hassasiyet, defans veya rebound, safra içerikli kusma, abdominal distansiyon, gastrointestinal kanama ve genel durum bozukluğu cerrahi patoloji açısından değerlendirilmelidir (11).

Karın ağrısıyla başvuran erkek çocuklarda testis torsiyonunun yalnızca skrotal ağrıyla ortaya çıkmayabileceği unutulmamalıdır. Alt abdominal ağrı, bulantı veya kusmayla başvuran erkek çocuklarda genital muayene değerlendirmeye dahil edilmelidir (12). Benzer şekilde adölesan kızlarda akut alt abdominal ağrı değerlendirilirken over torsiyonu gibi jinekolojik aciller göz önünde bulundurulmalıdır (11).

Nörolojik Kırmızı Bayraklar

Bilinç değişikliği çocuklarda her zaman önemli bir uyarı bulgusudur. Çevreyle etkileşimin azalması, uyandırmada güçlük, konfüzyon, yaşa uygun olmayan davranış veya belirgin letarji hipoglisemi, ciddi enfeksiyon, intoksikasyon, kafa içi patoloji veya metabolik hastalıkların belirtisi olabilir. Uzamış nöbet, tekrarlayan nöbetler, fokal nöbet, nöbet sonrasında beklenenden uzun süren bilinç bozukluğu ve fokal nörolojik defisit acil değerlendirme gerektirir (13).

Baş ağrısında ani başlayan çok şiddetli ağrı, progresif seyir, fokal nörolojik bulgu, bilinç değişikliği, ense sertliği, papilödem bulguları veya özellikle sabah belirginleşen ve tekrarlayan kusmayla birliktelik sekonder nedenler açısından uyarıcıdır (14).

Döküntülü Çocukta Kırmızı Bayraklar

Döküntüler çocukluk çağında sık görülmekte ve çoğunlukla benign nedenlerle ilişkili olmakla birlikte, ateşle birlikte peteşi veya purpura bulunması ciddi enfeksiyonlar açısından uyarıcı olabilir. Basmakla solmayan döküntüye toksik görünüm, dolaşım bozukluğu, bilinç değişikliği veya hızlı progresyonun eşlik etmesi acil değerlendirme gerektirir. Deri bulgularına solunum veya dolaşım bozukluğunun eşlik etmesi sistemik ve yaşamı tehdit edebilen reaksiyonları düşündürmelidir. Yaygın bül oluşumu, epidermal ayrışma veya belirgin mukozal tutulum ise Stevens-Johnson sendromu ve toksik epidermal nekroliz gibi ciddi kutanöz reaksiyonlar açısından değerlendirilmelidir (15).

Travmalı Çocukta Kırmızı Bayraklar

Çocukluk çağında minör travmalar oldukça sık görülmektedir. Bununla birlikte travmanın mekanizması, çocuğun yaşı ve klinik bulgular birlikte değerlendirilmelidir. Kafa travması sonrasında bilinç düzeyinde bozulma, tekrarlayan kusma, nöbet, fokal nörolojik defisit, kafa tabanı kırığı bulguları veya klinik durumun progresif kötüleşmesi ileri değerlendirme gerektirir. Travmanın öyküsü ile saptanan yaralanmanın uyumsuz olması, çocuğun gelişim düzeyiyle açıklanamayan travma mekanizması, farklı iyileşme dönemlerinde yaralanmalar veya sağlık kuruluşuna başvuruda açıklanamayan gecikme çocuk istismarı açısından uyarıcı olmalıdır (16).

Zehirlenmelerde Kırmızı Bayraklar

Çocuklarda kazara ilaç ve kimyasal madde alımları özellikle küçük yaş grubunda önemli bir başvuru nedenidir. Alınan maddenin bilinmemesi, miktarın belirlenememesi veya toksik potansiyeli yüksek bir maddeyle temas acil değerlendirme gerektirebilir. Bilinç değişikliği, nöbet, solunum depresyonu, ritim bozukluğu, hipotansiyon veya diğer sistemik toksisite bulguları

bulunan çocuklar acil olarak sevk edilmelidir. Düğme pil, korozif madde ve bazı yüksek toksisite potansiyeline sahip ilaçların alımında çocuk başlangıçta asemptomatik olsa dahi acil değerlendirme gerekebilir (16).

Yenidoğan ve Küçük Bebekte Özel Durumlar

Yenidoğan ve küçük bebeklerde ciddi hastalıklar özgül olmayan bulgularla ortaya çıkabilir. Bu nedenle bu yaş grubunda acil değerlendirme eşiği daha düşük tutulmalıdır. Beslenmenin azalması veya tamamen kesilmesi, aktivitede azalma, zayıf ağlama, hipotermi veya ateş, apne, siyanoz, tekrarlayan kusma, solunum güçlüğü ve belirgin sarılık ciddi hastalığın ilk belirtileri olabilir. Ebeveynin "bebeğim her zamanki gibi değil" şeklindeki ifadesi de göz ardı edilmemelidir. Bebeği sürekli gözlemleyen bakım verenlerin davranış ve aktivitedeki değişiklikleri fark etmesi klinik değerlendirmeye değerli bilgi sağlayabilir (17).

Tanıdan Önce Fizyolojik Durum

Birinci basamakta pediatrik hastanın değerlendirilmesinde önemli noktalardan biri, sevk kararının yalnızca düşünülen tanıya göre verilmemesidir. Aynı hastalığa sahip iki çocuk tamamen farklı klinik şiddette olabilir.

Örneğin üst solunum yolu enfeksiyonu düşünülen, çevreyle ilişkisi iyi, solunum sıkıntısı bulunmayan ve oral alımı normal olan bir çocuk ayaktan izlenebilirken; benzer semptomları bulunan ancak letarjik, takipneik veya dolaşımı bozulmuş bir çocukta ciddi hastalık araştırılmalıdır.

Bu nedenle temel soru yalnızca "Bu çocuğun tanısı nedir?" olmamalıdır. Bunun yanında **"Bu çocuk fizyolojik olarak stabil mi?"** ve **"Bu çocuğu mevcut koşullarda güvenle izleyebilir miyim?"** soruları yanıtlanmalıdır.

Acil Sevk Kararı Sonrasında Yaklaşım

Sevk kararı verilmesi değerlendirme sürecinin sonu değildir. Çocuğun nakil öncesinde mümkün olduğunca stabilize edilmesi gerekir. Hava yolu açıklığı, solunum ve dolaşım yeniden değerlendirilmeli; gerekli durumlarda oksijen desteği sağlanmalı ve hipoglisemi gibi hızla düzeltilebilir durumlar tedavi edilmelidir.

Anafilaksi, aktif nöbet, hipoglisemi veya ağır bronkospazm gibi zaman duyarlı durumlarda yalnızca naklin beklenmesi yerine mevcut olanaklarla uygun acil tedavi başlanmalıdır.

Nakil yöntemi çocuğun klinik durumuna göre belirlenmelidir. Fizyolojik olarak instabil veya nakil sırasında kötüleşme riski bulunan çocukların uygun sağlık ekibi eşliğinde transferi tercih edilmelidir. Sevk edilen merkeze çocuğun klinik durumu, vital bulguları, düşünülen ön tanı ve uygulanan tedaviler açık şekilde aktarılmalıdır.

Safety-Netting ve Güvenli Ayaktan İzlem

Her çocuk acil servise sevk edilmek zorunda değildir. Ancak ayaktan izlem kararı verilen çocuklarda güvenli taburculuk sürecinin önemli bir parçası aileye hangi durumlarda yeniden sağlık kuruluşuna başvurması gerektiğinin açıklanmasıdır.

Aileye çocuğun solunumunda güçlük gelişmesi, bilinç veya davranışında değişiklik olması, oral alımının belirgin azalması, idrar miktarında azalma, sürekli kusma, yeni döküntü gelişmesi veya genel durumunun kötüleşmesi halinde yeniden değerlendirme gerektiği açıkça anlatılmalıdır.

Kontrol zamanı ve yeri mümkün olduğunca belirlenmeli, aileye belirsiz ifadeler yerine gözleyebileceği somut bulgular verilmelidir. Böylece düşük riskli çocukların gereksiz acil servis başvuruları azaltılırken ciddi hastalığın geç tanınma riskinin de azaltılması amaçlanır.

Sonuç

Birinci basamakta çocuk hastanın değerlendirilmesinde temel amaç her hastaya kesin tanı koymaktan çok, ciddi hastalık riski bulunan çocuğu erken dönemde tanımaktır. Çocuğun genel görünümü, solunum işi, dolaşımı, bilinç düzeyi ve yaşa göre vital bulguları değerlendirme sürecinin temelini oluşturmalıdır.

Ateş, solunum sıkıntısı, kusma, ishal, karın ağrısı, nörolojik yakınmalar, döküntü, travma ve zehirlenme gibi sık karşılaşılan durumlarda kırmızı bayrakların bilinmesi, acil sevk gerektiren çocukların erken tanınmasına yardımcı olur. Özellikle yenidoğan ve küçük bebeklerde ciddi hastalıkların özgül olmayan belirtilerle ortaya çıkabileceği ve değerlendirme eşiğinin daha düşük tutulması gerektiği unutulmamalıdır.

Sonuç olarak birinci basamakta pediatrik değerlendirmede üç temel soru yol gösterici olabilir:

Çocuk fizyolojik olarak stabil mi?

Ciddi veya zaman duyarlı bir hastalığa işaret eden kırmızı bayrak var mı?

Bu çocuk mevcut koşullarda güvenle izlenebilir mi?

Bu sorulardan herhangi birine güvenli bir yanıt verilemiyorsa ileri değerlendirme ve gerektiğinde pediatrik acil servise sevk düşünülmelidir.

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Evaluation of Demographic and Laboratory Characteristics of Patients with Acute Cholecystitis in the Emergency Department

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ABSTRACT

Objective: Acute cholecystitis is one of the common biliary diseases encountered in emergency departments. This study aimed to evaluate the demographic and laboratory characteristics of adult patients presenting to the emergency department with acute cholecystitis and to investigate the associations of laboratory parameters with age and sex.

Materials and Methods: This retrospective, descriptive study included patients aged ≥18 years who presented to the Emergency Department of Istanbul Prof. Dr. Cemil Taşcıoğlu City Hospital between January 2024 and January 2025 and had an ICD diagnostic code of K81. For patients with recurrent presentations, only the first visit was included. A total of 126 patients were analyzed. Comparisons between sexes were performed using the independent-samples t-test or Mann–Whitney U test. Associations between age and laboratory parameters were evaluated using Spearman correlation analysis.

Results: The mean age of the patients was 56.37±16.46 years, and 54.0% were male. HGB, HCT, MCV, PDW, monocyte count, monocyte percentage, and CK levels were significantly higher in male than in female patients ($p<0.05$). Age showed moderate negative correlations with albumin and lymphocyte count. In contrast, moderate positive correlations were observed between age and D-dimer and procalcitonin levels ($p\leq0.001$). In addition, lymphocyte percentage decreased and neutrophil percentage increased with advancing age.

Conclusion: Some routine laboratory parameters in patients with acute cholecystitis may vary according to age and sex. These findings suggest that demographic characteristics should also be considered when interpreting laboratory results in patients with acute cholecystitis in the emergency department.

Keywords: Acute cholecystitis, emergency department, laboratory findings, age, sex

INTRODUCTION

Acute cholecystitis is an acute inflammatory disease of the gallbladder and is one of the common biliary conditions encountered in emergency departments. In most cases, obstruction of the cystic duct by gallstones plays a major role in its development. The clinical presentation may range from localized inflammation to severe disease accompanied by systemic manifestations [1]. Diagnosis is based on the combined assessment of clinical, laboratory, and imaging findings [2]. Right upper quadrant pain and local inflammatory findings are important in clinical evaluation, while ultrasonography is one of the primary imaging modalities used in the emergency department [2,3].

Laboratory findings play an important role in the evaluation of acute cholecystitis. Hematological parameters such as leukocyte, neutrophil, and lymphocyte counts may provide information about the inflammatory response [4], while liver function tests and other routine biochemical parameters are also used in clinical assessment [5]. In recent years, the associations of these readily available laboratory parameters with disease severity and clinical course have also received increasing attention [4–6].

Age and sex are important demographic characteristics in the evaluation of patients with acute cholecystitis. The occurrence of acute cholecystitis may vary according to age and sex [7], while advanced age has been associated with greater disease severity and adverse clinical outcomes [8]. Therefore, evaluating demographic characteristics together with laboratory findings may contribute to a better characterization of the patient population.

This study aimed to evaluate the demographic and laboratory characteristics of adult patients presenting to the emergency department with acute cholecystitis and to investigate the associations of laboratory parameters with age and sex.

MATERIALS AND METHODS

Study Design and Patient Selection

This retrospective, descriptive study was conducted to evaluate the demographic and laboratory characteristics of adult patients presenting to the Emergency Department of Istanbul Prof. Dr. Cemil Taşcıoğlu City Hospital with acute cholecystitis. The medical records of patients aged ≥18 years who presented to the emergency department between January 2024 and January 2025 were retrospectively reviewed through the hospital information management system.

Patients aged ≥18 years who presented to the emergency department during the study period and had a K81 diagnostic code according to the International Classification of Diseases (ICD) were included. For patients with multiple emergency department visits during the study period, only the first visit was included. Patients with missing data for the main study variables were excluded. After applying the inclusion and exclusion criteria, a total of 126 patients were included in the study.

Data Collection

Demographic characteristics, emergency department presentation data, admitting department, hospital discharge status, and laboratory results obtained at presentation were retrieved from the hospital information management system. Laboratory parameters included complete blood count parameters, coagulation tests, blood gas parameters, and biochemical measurements. When multiple laboratory results were available for the same patient, the first results obtained during the emergency department visit were included in the analysis.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 27.0 (IBM Corp., Armonk, NY, USA). The normality of continuous variables was assessed using the Kolmogorov–Smirnov test. Normally distributed continuous variables were presented as mean ± standard deviation (SD), whereas non-normally distributed variables were presented as median and interquartile range (25th–75th percentiles). Categorical variables were expressed as number (n) and percentage (%).

For comparisons between sexes, the independent-samples t-test was used for normally distributed variables and the Mann–Whitney U test for non-normally distributed variables. Associations between age and laboratory parameters were evaluated using Spearman's rank correlation analysis. The absolute correlation coefficient was interpreted as very weak (0.00–0.19), weak (0.20–0.39), moderate (0.40–0.59), strong (0.60–0.79), or very strong (0.80–1.00). A p-value <0.05 was considered statistically significant.

RESULTS

A total of 126 patients were included in the study. The mean age was 56.37 ± 16.46 years; 68 (54.0%) patients were male and 58 (46.0%) were female. Of the patients, 107 (84.9%) presented to the Emergency Examination Unit and 19 (15.1%) to the Emergency Surgery Unit. A total of 120 (95.2%) patients were admitted to the General Surgery Department and 6 (4.8%) to the Internal Medicine Department. Regarding hospital outcomes, 62 (49.2%) patients were discharged as recovered, 54 (42.9%) were discharged after inpatient treatment, and 8 (6.3%) were discharged with clinical improvement. Mortality occurred in 2 (1.6%) patients. The demographic and clinical characteristics of the patients are presented in Table 1.

Table 1. Demographic and clinical characteristics of the patients

Variable	**n (%) / Mean ± SD**
Age, years	56.37 ± 16.46
Sex	
Male	68 (54.0)
Female	58 (46.0)
Initial admission unit	
Emergency Examination Unit	107 (84.9)
Emergency Surgery Unit	19 (15.1)
Initial admitting department	
General Surgery Department	120 (95.2)
Internal Medicine Department	6 (4.8)
Hospital discharge status	
Discharged as recovered	62 (49.2)
Discharged after inpatient treatment	54 (42.9)
Discharged with clinical improvement	8 (6.3)
Death	2 (1.6)

When the laboratory parameters at admission were evaluated, the mean hemoglobin level was 134.93 ± 18.39, hematocrit was 39.78 ± 5.04, and albumin was 40.72 ± 5.08. The median WBC count was 12.98 (10.07–15.77), absolute neutrophil count was 10.40 (6.62–13.96), absolute lymphocyte count was 1.57 (1.05–2.43), and platelet count was 260.50 (204.00–315.25). The median RDW-CV was 13.80 (13.10–14.90), lactate level was 1.76 (1.34–2.28), and LDH level was 291.50 (222.00–408.25).

Regarding blood gas parameters, the median pH was 7.39 (7.34–7.43), actual bicarbonate was 24.40 (20.60–26.90), standard bicarbonate was 23.40 (21.10–24.80), pO_2 was 47.10 (32.40–

67.70), and pCO_2 was 40.00 (35.20–46.70). Among the biochemical parameters, the median glucose level was 122.00 (99.25–149.50), ALT was 25.50 (16.00–65.75), AST was 30.00 (21.25–62.25), and potassium was 4.30 (4.00–4.78). The mean sodium and calcium levels were 136.74 ± 3.72 and 9.38 ± 0.59, respectively. D-dimer and procalcitonin were not measured in all patients. Among patients with available measurements, the median D-dimer level was 1.58 (0.85–3.88), and the median procalcitonin level was 0.42 (0.10–1.52). The laboratory findings of the patients are presented in Table 2.

Table 2. Laboratory findings of the patients

Variable	**n**	**Value**
Normally distributed variables		**Mean ± SD**
HGB	126	134.93 ± 18.39
Monocyte (%)	126	5.95 ± 2.19
APTT	126	29.08 ± 5.64
HCT	126	39.78 ± 5.04
PDW	126	16.16 ± 0.45
MPV	126	10.14 ± 1.18
MCV	126	85.20 ± 6.37
Sodium	126	136.74 ± 3.72
Calcium	126	9.38 ± 0.59
Albumin	126	40.72 ± 5.08
Non-normally distributed variables		**Median (IQR)**
Neutrophil (NEU#)	126	10.40 (6.62–13.96)
Neutrophil (%)	126	80.40 (69.35–87.15)
Lymphocyte (LYM#)	126	1.57 (1.05–2.43)
Lymphocyte (%)	126	13.00 (7.83–21.73)
Platelet (PLT)	126	260.50 (204.00–315.25)
Monocyte (MONO#)	126	0.66 (0.51–1.01)
D-dimer	51	1.58 (0.85–3.88)
Procalcitonin	57	0.42 (0.10–1.52)
PT-INR	126	1.12 (1.02–1.24)
pH	126	7.39 (7.34–7.43)
Actual HCO_3	126	24.40 (20.60–26.90)
Standard HCO_3	126	23.40 (21.10–24.80)
Lactate	126	1.76 (1.34–2.28)
pO_2	126	47.10 (32.40–67.70)
pCO_2	126	40.00 (35.20–46.70)
WBC	126	12.98 (10.07–15.77)
RDW-CV	126	13.80 (13.10–14.90)
RDW-SD	126	41.40 (40.10–43.85)
LDH	126	291.50 (222.00–408.25)
Glucose	126	122.00 (99.25–149.50)
Creatine kinase (CK)	126	81.50 (52.00–133.00)

Variable	n	Value
ALT	126	25.50 (16.00–65.75)
AST	126	30.00 (21.25–62.25)
Potassium	126	4.30 (4.00–4.78)

When the demographic and laboratory characteristics of the patients were compared according to sex, no statistically significant difference in age was observed between female and male patients (p=0.450). HGB (143.10 ± 17.57 vs. 125.34 ± 14.36; p<0.001), HCT (41.85 ± 4.94 vs. 37.36 ± 4.01; p<0.001), monocyte percentage (6.34 ± 2.01 vs. 5.50 ± 2.31; p=0.034), PDW (16.27 ± 0.48 vs. 16.02 ± 0.37; p=0.002), MCV (86.96 ± 6.61 vs. 83.15 ± 5.44; p<0.001), absolute monocyte count [0.81 (0.57–1.11) vs. 0.60 (0.47–0.91); p=0.005], and CK levels [109.50 (59.75–172.50) vs. 61.00 (46.00–105.25); p=0.001] were significantly higher in male patients than in female patients. No statistically significant differences were observed between sexes for the other laboratory parameters evaluated (p>0.05). The comparison of demographic and laboratory characteristics according to sex is presented in Table 3.

Table 3. Comparison of demographic and laboratory characteristics according to sex

Variable	Female (n=58)	Male (n=68)	p
HGB	125.34 ± 14.36	143.10 ± 17.57	<0.001
HCT	37.36 ± 4.01	41.85 ± 4.94	<0.001
MCV	83.15 ± 5.44	86.96 ± 6.61	<0.001
Creatine kinase (CK)	61.00 (46.00–105.25)	109.50 (59.75–172.50)	0.001
PDW	16.02 ± 0.37	16.27 ± 0.48	0.002
Monocyte (MONO#)	0.60 (0.47–0.91)	0.81 (0.57–1.11)	0.005
Monocyte (%)	5.50 ± 2.31	6.34 ± 2.01	0.034
RDW-SD	41.10 (39.95–42.85)	42.55 (40.10–44.55)	0.086
D-dimer†	2.92 (1.33–3.98)	1.10 (0.67–3.02)	0.087
pH	7.40 (7.37–7.45)	7.38 (7.34–7.42)	0.118
WBC	12.18 (9.26–15.47)	13.57 (10.79–15.92)	0.143
Neutrophil (NEU#)	9.42 (6.15–13.14)	10.61 (7.44–13.60)	0.149
ALT	20.50 (14.00–65.50)	28.00 (17.00–68.75)	0.254
pCO_2	38.10 (35.20–44.90)	41.70 (35.20–51.90)	0.277
RDW-CV	13.95 (13.12–15.40)	13.75 (13.10–14.33)	0.285
Lymphocyte (%)	14.05 (8.22–22.25)	12.05 (7.72–20.70)	0.316
PT-INR	1.09 (1.01–1.22)	1.13 (1.03–1.24)	0.345
AST	28.00 (20.00–128.25)	33.50 (24.00–58.50)	0.357
Actual HCO_3	24.20 (20.60–26.80)	24.80 (20.60–26.95)	0.388
Platelet (PLT)	267.00 (214.75–314.25)	254.50 (202.75–299.50)	0.418
Age, years	57.10 ± 17.38	55.75 ± 15.73	0.450
pO_2	47.10 (32.40–70.22)	44.95 (30.53–56.65)	0.462
Glucose	125.50 (102.25–155.50)	120.50 (95.50–145.75)	0.475
LDH	283.00 (215.75–391.00)	300.00 (224.25–432.75)	0.485

Variable	Female (n=58)	Male (n=68)	p
APTT	28.72 ± 6.68	29.38 ± 4.60	0.524
Procalcitonin‡	0.28 (0.05–1.52)	0.56 (0.12–1.44)	0.536
Standard HCO_3	23.40 (21.10–25.10)	23.40 (21.10–24.57)	0.576
Albumin	40.48 ± 4.85	40.93 ± 5.29	0.627
Lactate	1.60 (1.32–2.28)	1.84 (1.37–2.31)	0.655
Neutrophil (%)	80.45 (67.70–86.73)	80.10 (70.78–87.55)	0.695
Calcium	9.34 ± 0.54	9.41 ± 0.63	0.701
MPV	10.11 ± 1.07	10.17 ± 1.27	0.778
Sodium	136.66 ± 4.38	136.81 ± 3.08	0.823
Potassium	4.30 (3.92–4.60)	4.30 (4.00–4.80)	0.866
Lymphocyte (LYM#)	1.67 (1.15–2.33)	1.79 (1.16–2.12)	0.940

The relationships between age and laboratory parameters were evaluated using Spearman correlation analysis. Moderate negative correlations were observed between age and albumin (r_s=−0.468; p<0.001) and absolute lymphocyte count (r_s=−0.428; p<0.001). Significant weak correlations were found between age and lymphocyte percentage (r_s=−0.397; p<0.001), neutrophil percentage (r_s=0.376; p<0.001), RDW-SD (r_s=0.368; p<0.001), and RDW-CV (r_s=0.322; p<0.001).

Among patients with available D-dimer measurements, a moderate positive correlation was observed between age and D-dimer (r_s=0.471; p<0.001). Similarly, among patients with available procalcitonin measurements, a moderate positive correlation was found between age and procalcitonin (r_s=0.414; p=0.001). In addition, significant weak correlations were observed between age and PT-INR (r_s=0.292; p=0.001), calcium (r_s=−0.290; p=0.001), HGB (r_s=−0.275; p=0.002), HCT (r_s=−0.251; p=0.005), glucose (r_s=0.246; p=0.006), and sodium (r_s=−0.218; p=0.014).

Statistically significant but very weak correlations were found between age and CK, platelet count, and absolute neutrophil count (r_s=−0.198, p=0.026; r_s=−0.197, p=0.027; and r_s=0.191, p=0.032, respectively). No statistically significant correlations were observed between age and the other laboratory parameters (p>0.05). The correlation analysis between age and laboratory parameters is presented in Table 4.

Table 4. Correlations between age and laboratory parameters

Variable	n	r_s	p
Albumin	125	−0.468	<0.001
Lymphocyte (LYM#)	126	−0.428	<0.001
Lymphocyte (%)	126	−0.397	<0.001
Neutrophil (%)	126	0.376	<0.001
RDW-SD	126	0.368	<0.001
RDW-CV	126	0.322	<0.001
D-dimer	51	0.471	<0.001
PT-INR	122	0.292	0.001
Calcium	124	−0.290	0.001

Variable	n	r_s	p
Procalcitonin	57	0.414	0.001
HGB	126	−0.275	0.002
HCT	126	−0.251	0.005
Glucose	126	0.246	0.006
Sodium	126	−0.218	0.014
Creatine kinase (CK)	126	−0.198	0.026
Platelet (PLT)	126	−0.197	0.027
Neutrophil (NEU#)	126	0.191	0.032
ALT	126	−0.115	0.199
LDH	126	0.105	0.244
Lactate	126	0.100	0.265
WBC	126	0.091	0.308
Standard HCO_3	125	0.084	0.354
pH	126	0.083	0.356
APTT	126	−0.058	0.515
AST	126	0.052	0.563
Monocyte (MONO#)	126	0.052	0.564
Actual HCO_3	125	0.050	0.583
pO_2	126	0.044	0.621
Potassium	126	0.035	0.693
pCO_2	125	0.019	0.831
MPV	126	−0.017	0.848
PDW	126	0.011	0.902
Monocyte (%)	126	−0.009	0.917
MCV	126	0.003	0.971

DISCUSSION

Acute cholecystitis is one of the common biliary diseases encountered in emergency departments and is characterized by acute inflammation of the gallbladder [1]. Early recognition of the disease in the emergency department is important for identifying patients at risk of developing complications and planning an appropriate treatment strategy [1].

In our study, the mean age of patients diagnosed with acute cholecystitis was approximately 56 years, and male patients constituted the majority. A recent study evaluating patients with acute cholecystitis reported a mean age of 62 years, with males accounting for 54.5% of the patients [7]. The sex distribution in our study was similar to that reported in the literature, whereas the difference in mean age may be attributable to differences in the characteristics of the study populations.

In our study, HGB and HCT levels were higher in male patients than in female patients. Although recent studies on acute cholecystitis have reported that sex may be associated with the occurrence

and clinical characteristics of the disease, sex-related differences in HGB and HCT levels have been evaluated only to a limited extent [7]. We consider that the differences in HGB and HCT observed in our study may be related to physiological hematological differences between females and males rather than being specific to acute cholecystitis.

In our study, monocyte count and monocyte percentage were higher in male patients than in female patients. A previous study reported that monocyte counts were significantly higher in patients with acute cholecystitis than in the control group [4]. Similarly, another recent study showed that monocyte levels increased in the presence of acute inflammation [9]. These findings suggest that monocytes may play a role in the inflammatory response associated with acute cholecystitis. The higher levels observed in male patients in our study may be related to sex-related differences in the inflammatory response.

In our study, PDW levels were higher in male patients than in female patients. A study evaluating patients with acute cholecystitis reported that PDW differed significantly from the control group and was independently associated with acute cholecystitis [10]. In contrast, another study found no significant difference in PDW between patients with complicated and uncomplicated acute cholecystitis [11]. These findings suggest that PDW may be affected by the acute inflammatory process, although its role in reflecting disease severity may be limited. The higher PDW levels observed in male patients in our study may also have been influenced by sex-related hematological characteristics in addition to differences in the inflammatory response.

In our study, CK levels were higher in male patients than in female patients. A study of patients with acute calculous cholecystitis reported that CK levels were higher than those in the control group and increased with greater destruction of the gallbladder wall [12]. CK levels are known to be influenced by factors such as sex, muscle mass, body composition, and physical activity [13]. Therefore, the higher CK levels observed in male patients in our study may not be attributable solely to acute cholecystitis; individual characteristics such as sex-related differences in muscle mass and physical activity may also have contributed to this finding.

In our study, albumin levels decreased with increasing age, with a moderate negative correlation between the two variables. A study evaluating patients with acute cholecystitis according to age groups reported that albumin levels were significantly lower in older age groups [8]. The same study also showed that low albumin levels were associated with severe complications in older patients [8]. Our finding appears to be consistent with the literature. Age-related changes in nutritional status, an increased burden of comorbidities, and the acute inflammatory process may have contributed to the decrease in albumin levels.

In our study, lymphocyte count and percentage decreased with increasing age, whereas neutrophil percentage increased. Studies on acute cholecystitis have reported that elevated neutrophil levels may be associated with the diagnosis of the disease and a more severe clinical course [4,14]. However, the relationship between age and lymphocyte and neutrophil levels in patients with acute cholecystitis has not been fully clarified. We consider that the decrease in lymphocytes and increase in neutrophils observed with advancing age in our study may be related to age-related changes in the inflammatory response.

In our study, a moderate positive correlation was observed between age and D-dimer levels. Previous studies have reported that D-dimer levels increase with age and that age-adjusted D-dimer cutoffs may therefore be used in older patients [15]. Our finding is consistent with these data. In addition to the inflammatory process associated with acute cholecystitis, age-related

changes in the coagulation and fibrinolytic systems may have contributed to the higher D-dimer levels observed in older patients.

In our study, procalcitonin levels increased with advancing age, with a moderate positive correlation between the two variables. Studies in patients with acute cholecystitis have reported that procalcitonin levels increase with disease severity and may be useful in identifying severe cases [16,17]. We consider that the positive relationship between age and procalcitonin observed in our study may be related to differences in the inflammatory response and disease severity in older patients.

In our study, HGB and HCT levels decreased with increasing age. The prevalence of anemia is known to increase with advancing age, with chronic diseases, inflammation, and nutritional disorders potentially contributing to this process [18]. We consider that the decreases in HGB and HCT observed in our study may be related to the increasing burden of chronic disease and the accompanying tendency toward anemia with advancing age, rather than being specific to acute cholecystitis.

In our study, a weak negative correlation was observed between age and serum calcium levels. It is difficult to attribute this relationship directly to acute cholecystitis. Age-related changes in nutritional status, vitamin D and calcium metabolism, and decreases in albumin levels may affect total serum calcium levels. Therefore, we consider that the decrease in calcium observed in our study may have been influenced more by age-related individual and metabolic factors than by the disease itself.

This study has several limitations. Its single-center and retrospective design limits the generalizability of the findings. The relatively small sample size is another limitation. In addition, some laboratory tests, including D-dimer and procalcitonin, were not performed in all patients, limiting the evaluation of these parameters. Because of the retrospective design, factors that may affect laboratory values, such as comorbidities, medication use, nutritional status, and physical activity, could not be evaluated in detail.

CONCLUSION

Routine laboratory parameters in patients with acute cholecystitis may vary according to age and sex. In our study, sex-related differences were observed particularly in hematological parameters and CK levels, while increasing age was associated with several laboratory parameters, particularly albumin, lymphocyte, D-dimer, and procalcitonin levels. These findings suggest that patients' demographic characteristics should also be considered when interpreting laboratory results in acute cholecystitis. Further studies with larger, multicenter populations are needed to support these findings.

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M4570-Özet Metin

KÜNT DALAK VE KARACİĞER YARALANMALARINDA NON-OPERATİF YÖNETİM

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Epidemiyoloji

- Künt abdominal travmaya bağlı intraabdominal yaralanma (İAY), tüm çocukların yaklaşık %5-10'unda görülür.
- Mortalite nadirdir (<%1); ancak yaralanan organ sayısına bağlı olarak risk artar (%8,5).
- Künt travmaların en sık nedenleri motorlu taşıt kazaları ve yüksekten düşmelerdir.
- Abdominal bölgenin ön-arka çapının dar olması, kasların görece zayıflığı ve yağ dokusunun daha az olması nedeniyle çocuklar, yetişkinlere kıyasla künt İAY'ye daha duyarlıdır.
- Karın içinde en sık yaralanan organlar sırasıyla dalak, karaciğer ve böbreklerdir.

İlk değerlendirme

- X, A, B, C, D, E stabilizasyonu ilk basamaktır.
- Taşikardi, mental durumda bozulma ve soğuk-soluk cilt erken; hipotansiyon ise geç bulgu olabilir.
- Hemodinamik olarak instabil çocuklarda izotonik sıvı tedavisi başlanabilir; ancak mümkün olan en kısa sürede kan transfüzyonu yapılmalıdır.
- Hemodinamik stabilizasyon sağlandıktan sonra gerekli görülen tetkik veya müdahale planlanmalıdır.

İkinci değerlendirme

- Sekonder değerlendirme sırasında yaralanma mekanizması, öykü ve fizik muayene dikkatlice ele alınmalıdır.
- Bisiklet gidonuna düşme, motorlu araç kazası, emniyet kemeri kullanımı ve 3 metreden yüksekten düşme gibi yüksek enerjili travmalar İAY ile ilişkilidir.

Üçüncü değerlendirme

- Yirmi dört saat sonra yapılarak gözden kaçan yaralanmalar ortaya çıkarılabilir.
- Bilinci kapalı hastalarda karın hassasiyetini değerlendirmek mümkün değildir.
- Bilinci açık olsa da çocuğun travmaya psikolojik cevabı değerlendirmeyi zorlaştırabilir.
- Bu nedenle tekrarlayan muayeneler, geç ortaya çıkan bulgular açısından önemlidir.

Fizik muayene

Oskültasyon

- Barsak seslerinde azalma, intraabdominal kanama veya perforasyonu düşündürebilir.

İnspeksiyon

- Emniyet kemeri izi (seat-belt sign)
- Bisiklet gidonu izi (handlebar mark)
- Künt cismin ciltteki izi (imprinting)
- Ekimoz ve abrazyonlar

Palpasyon

- Batında yaygın hassasiyet veya defans ileri inceleme gerektirir.
- Alt kostalarda hassasiyet karaciğer veya dalak yaralanmasını düşündürebilir.

Laboratuvar

- Standart bir "travma paneli" bulunmamakla birlikte bazı temel testler yapılmalıdır.
- Erken dönemde hemoglobin ve hematokritte belirgin düşüş olmayabilir; 4-6 saatlik aralıklarla izlenmelidir.
- İlk başvurudaki hematokritin <%30 olması ciddi kan kaybını düşündürür.
- Mikroskopik veya masif hematüri üriner sistem yaralanmasını düşündürür.
- Karaciğer fonksiyon testlerindeki yükselme karaciğer yaralanmasını düşündürür.
- Amilaz/lipaz yüksekliği pankreas yaralanmasını düşündürür; sensitivite ve spesifitesi düşüktür.

Görüntüleme

- Klinik olarak instabil hastalarda laparotomiyi geciktireceği düşünülüyorsa tetkik yapılmamalıdır.
- İAY tespiti için e-FAST ile dört boşluk—subksifoid bölge/perikard, Morrison poşu, Douglas boşluğu ve flank bölge—hızla değerlendirilebilir.
- İnstabil çocuklarda laparotomi gerekliliğini belirlemede FAST'in sensitivitesi %100'e yakındır.
- Stabil çocuklarda USG'nin duyarlılığı bilgisayarlı tomografiye (BT) kıyasla daha düşüktür.
- Stabil hastalarda negatif e-FAST, İAY'yi dışlamak için yeterli duyarlılığa veya negatif prediktif değere sahip değildir.
- Stabil hastalarda kontrastlı abdomen ve pelvis BT, İAY tanısında en değerli yöntemdir.
- Solid organ yaralanmalarında duyarlılığı yüksekken içi boş organ ve pankreas yaralanmalarında daha düşüktür.
- Travmalı çocuklarda BT çekim kararının Çocuk Acil Bakım Araştırma Grubu (PECARN) risk kriterlerine göre verilmesi önerilmektedir.

PECARN kriterleri

- Glasgow Koma Skoru <14
- Karın duvarı travmasına ait kanıt veya emniyet kemeri işareti (seat-belt sign)

- Karında hassasiyet
- Karın ağrısı
- Kusma
- Toraks travması öyküsü
- Solunum seslerinde azalma veya kaybolma

Bu kriterlerin yokluğunda ciddi İAY riski %0,1'dir; sensitivite %99'dur.

Tedavi yaklaşımları

1. Non-operatif tedavi (NOM)

- Hemodinamik olarak stabil karaciğer ve dalak yaralanmaları, yaralanmanın derecesinden bağımsız olarak konservatif şekilde yönetilebilir.
- Mevcut veriler, NOM'un %95'e varan başarı oranına sahip olduğunu göstermektedir.
- NOM'un cerrahi tedaviye kıyasla hastanede kalış süresi, kaynak kullanımı ve morbiditede önemli azalma sağladığı gösterilmiştir.
- NOM'un temel prensipleri spontan hemostazı teşvik etmek, pıhtı oluşumunu sürdürmek, iyileşmeyi hızlandırmak ve organ fonksiyonlarını korumaktır.
- NOM genellikle klinik gözlemden oluşur; ancak kan transfüzyonu ihtiyacının >40 mL/kg olması durumunda arteriyel embolizasyon (AE) uygulanabilir.
- AE'nin NOM başarısızlığını ve splenektomi insidansını azalttığı görülmüştür.
- NOM, 24 saat açık ameliyathanesi bulunan ve deneyimli bir kurumda uygulanmalıdır.
- Yüksek dereceli yaralanma, çoklu organ yaralanması, ileri yaş ve komorbidite varlığında yoğun bakım izlemi gerekebilir.

NOM başarısını etkileyen faktörler

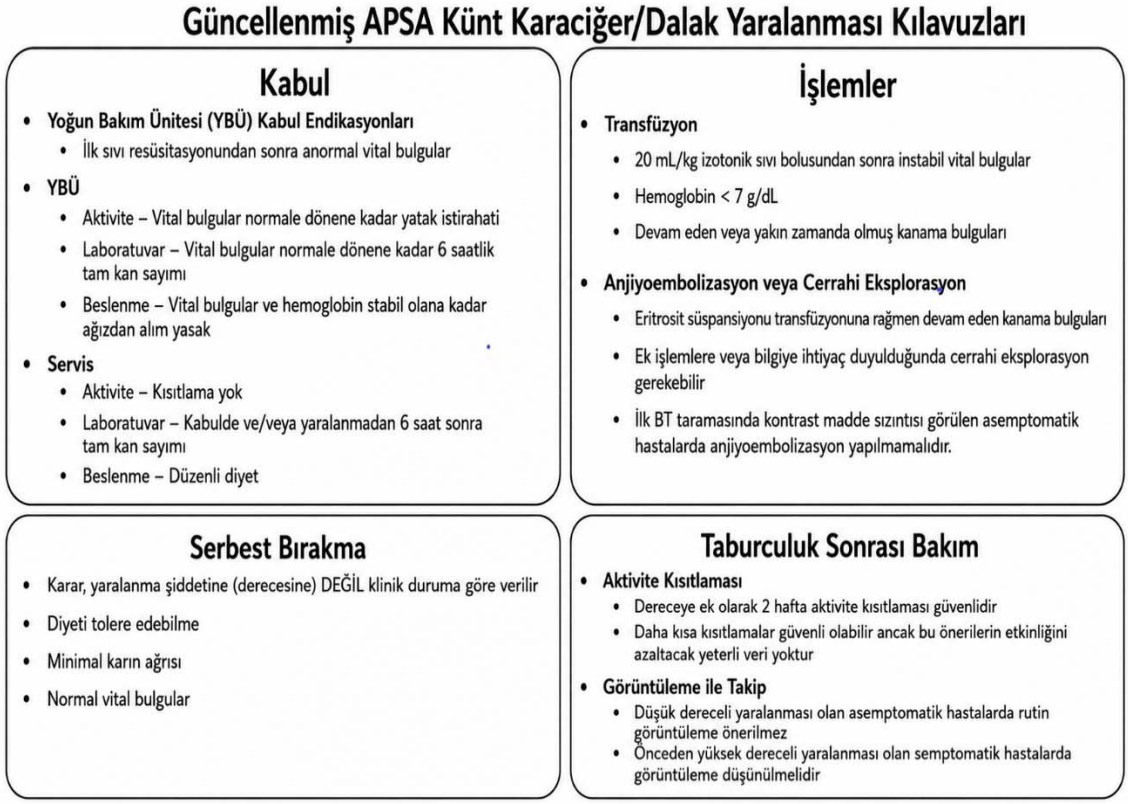
Hastaya ait faktörler	Radyolojik/Klinik faktörler
Kombine organ yaralanması	Kontrast ekstravazasyonu
Hipotansiyon	Yüksek dereceli yaralanma
Taşikardi	Transfüzyon gereksinimi
Yüksek sıvı ihtiyacı	Eşlik eden pankreas/böbrek yaralanması

2. Laparotomi endikasyonları

- Persistan hemodinamik instabilite
- Kontrol edilemeyen kanama
- Pnömoperitoneum
- Penetran abdominal yaralanmalarda uygun endikasyon varlığı

Dalak ve karaciğer yaralanmalarının tedavisi

- Künt dalak ve karaciğer yaralanmalarında güncel standart tedavi NOM'dur.
- Hemodinamik olarak stabil, peritonit bulgusu olmayan veya cerrahi gerektirmeyen hastalarda uygulanır.
- Genellikle yatak istirahati ile laboratuvar, klinik ve vital bulguların yakın izleminden oluşur.
- Çocuklarda abdominal travma yönetiminde sıvı tedavisi önemli bir yer tutar.
- Tüm hastalarda en az iki damar yolu açılarak kristaloid infüzyonuna başlanmalıdır.
- Yeterli resüsitasyona rağmen vital bulguları düzelmeyen olgularda cerrahi tedavi gerekebilir.
- Dalak ve karaciğer yaralanmalı çocukların yönetimi için American Pediatric Surgical Association (APSA) kılavuzu geliştirilmiştir.



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M4571-Tam Metin

ACİL SERVİSTE YENİDOĞAN VE SÜT ÇOCUĞUNDA DİRENÇLİ HİPOGLİSEMİ YÖNETİMİ

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Giriş

Pediatrik ve yenidoğan dönemde hipoglisemi, özellikle persistan veya dirençli olduğunda, hızlı tanı ve tedavi gerektiren yaşamı tehdit eden bir acil durumdur. Doğumla birlikte maternal glukoz desteğinin kesilmesiyle yenidoğan glikojenoliz ve glukoneogenezi aktive ederek endojen glukoz üretimine geçer. Bu dönemde geçici glukoz düşüşleri fizyolojik olabilir; ancak hipogliseminin uzaması veya yüksek glukoz infüzyon hızlarına rağmen tekrarlaması patolojiyi düşündürür. Yenidoğan ve süt çocuklarında erken tanı, nörolojik hasarın önlenmesi ve uygun tedavi açısından önemlidir. [1,2]

Amaç Yenidoğan ve süt çocuklarında dirençli hipogliseminin tanı, etiyoloji ve acil tedavi yaklaşımını güncel literatür eşliğinde değerlendirmektir.

Yöntem

Bu derlemede, yenidoğan ve süt çocuklarında dirençli hipogliseminin tanı, etiyoloji ve acil tedavisine ilişkin güncel literatür, ulusal ve uluslararası kılavuzlar incelenmiştir. Elde edilen bilgiler klinik yaklaşım, tanısal değerlendirme ve tedavi seçenekleri açısından değerlendirilerek anlatısal derleme yöntemiyle sunulmuştur.

Bulgular

Literatür değerlendirmesinde, yenidoğan ve süt çocuklarında dirençli hipogliseminin başlıca nedenlerinin hiperinsülinizm, endokrin ve metabolik hastalıklar ile perinatal stres ve sistemik hastalıklar olduğu; uzamış veya tekrarlayan hipogliseminin ise ciddi nörolojik hasara yol açabileceği görülmüştür. Acil yaklaşımda hızlı glukoz replasmanı, uygun glukoz infüzyon hızının belirlenmesi, hipoglisemi sırasında kritik örneklerin alınması ve altta yatan etiyolojiye yönelik tedavinin erken başlanmasının temel yönetim basamakları olduğu belirlenmiştir.

Tanım ve Etiyoloji

Dirençli hipoglisemi, uygun glukoz tedavisine rağmen kan glukozunun hedef düzeyde sürdürülememesi veya yüksek glukoz infüzyon hızlarına rağmen tekrarlaması olarak tanımlanabilir. Yenidoğanda ilk 48 saatte yaklaşık 50 mg/dL, sonrasında 60 mg/dL altındaki değerler; 29 gün üzerindeki çocuklarda 70 mg/dL altındaki değerler hipoglisemi açısından önem taşır. Tedavi hedefleri yenidoğanda 60–70 mg/dL, çocuklarda 70 mg/dL üzerindedir. Yenidoğanda başlıca nedenler hiperinsülinizm, prematürite, düşük doğum ağırlığı, perinatal stres, endokrin ve metabolik hastalıklardır. Çocuklarda uzamış açlık, ketotik hipoglisemi, adrenal yetmezlik, büyüme hormonu eksikliği, hipopitüitarizm, metabolik hastalıklar ve ilaç/toksin maruziyetleri araştırılmalıdır. Sepsis, şok ve ağır karaciğer hastalıkları her yaş grubunda önemli nedenlerdir. [1-3,5]

Beyin Enerji Metabolizması ve Hipoglisemik Hasar

Beyin enerji metabolizmasında temel substrat glukozdur. Glukoz, kan-beyin bariyerinden GLUT1, nöronlara GLUT3 üzerinden alınır. Uzamış açlıkta β-hidroksibütirat ve asetoasetat alternatif enerji substratlarıdır. Hipoglisemide ATP azalması, Na^+/K^+-ATPaz işlevini bozarak nöronal hasara yol açabilir. Parieto-oksipital korteks ve hipokampus etkilenebilir. Uzamış veya tekrarlayan hipoglisemi epilepsi, motor bozukluklar, bilişsel gelişim geriliği ve kalıcı nörolojik sekellere yol açabilir. [3,4]

Acil Yaklaşım ve Tedavi

Yönetimin ilk basamağı ABCDE yaklaşımıyla hastanın stabilize edilmesidir. Havayolu ve solunum güvenliği sağlanmalı, dolaşım değerlendirilmeli ve intravenöz veya gerektiğinde intraosseöz damar yolu açılmalıdır. Bilinç değişikliği veya nöbet bulunan hastalarda kan glukozu derhal ölçülmeli; semptomatik hipoglisemide laboratuvar sonucu beklenmeden tedavi başlanmalıdır. [1,5,6]

Kritik veya semptomatik hipoglisemide intravenöz %10 dekstroz (D10W) 2–4 mL/kg dozunda uygulanabilir. Bolus sonrasında hipogliseminin yeniden gelişmesini önlemek amacıyla sürekli glukoz infüzyonu başlanmalı ve kan glukozu sık aralıklarla izlenmelidir. Glukoz infüzyon hızı (GİR), hastaya kilogram başına dakikada verilen glukoz miktarını ifade eder: [2,6]

GİR (mg/kg/dk) = [Dekstroz konsantrasyonu (%) × infüzyon hızı (mL/saat)] / [6 × vücut ağırlığı (kg)]

Yenidoğanda 8–10 mg/kg/dk'nın, çocuklarda yaklaşık 10–12 mg/kg/dk'nın üzerindeki gereksinim, özellikle tekrarlayan hipoglisemi ile birlikte olduğunda hiperinsülinizm veya metabolik/endokrin hastalık açısından ileri değerlendirme gerektirir. Ancak yüksek GİR tek başına tanı koydurmaz. [2,6,7]

Mümkünse tedavi öncesinde kritik kan örneği alınmalıdır. Plazma glukozu, insülin, C-peptid, kortizol, büyüme hormonu, β-hidroksibütirat, serbest yağ asitleri, laktat, amonyak, karaciğer fonksiyon testleri, açil-karnitin profili ve idrar organik asitleri etiyolojik değerlendirmede önemlidir. [1,5,7]

Dirençli hiperinsülinizmde glukoz gereksinimi artırılabilir; yüksek konsantrasyonlu dekstrozlarda santral venöz erişim değerlendirilebilir. Uygun olgularda glukagon, konjenital hiperinsülinizmde diazoksit ve dirençli olgularda oktreotid kullanılabilir. Adrenal yetmezlik şüphesinde stres dozunda hidrokortizon başlanmalı; metabolik hastalıklarda açlıktan kaçınma ve hastalığa özgü tedavi uygulanmalıdır. [1,5-7]

Sonuç

Pediatrik dirençli hipoglisemi, nörolojik hasar ve çoklu organ disfonksiyonuna yol açabilen kritik bir tablodur. Başarılı yönetim; hızlı ABCDE stabilizasyonu, glukoz replasmanı, uygun GİR hesaplanması ve kritik örneklerin alınmasına dayanır. Altta yatan hiperinsülinemik, endokrin, metabolik veya sistemik nedenin erken belirlenmesi ve gerekli durumlarda ilgili uzman ekiplerin sürece dahil edilmesi önemlidir.

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M4572-Tam Metin

ÇOCUK YANIKLARINDA SIVI RESÜSİTASYONU: FORMÜLDEN DİNAMİK HEDEFLERE

Birsen Harma

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Özet
Geniş yanıklar kapiller kaçak, intravasküler hacim kaybı ve yanık şokuna yol açabilir. Çocuklarda dolaşan kan hacmi, vücut yüzey alanı/ağırlık oranı ve sınırlı glikojen depoları sıvı tedavisini farklılaştırır. Yaşa uyarlanmış Lund-Browder şemasıyla hesaplanan toplam vücut yanık yüzdesi (TVYY), resüsitasyon kararının temelidir. Çoğu protokol yaklaşık yüzde 10-15 TVYY ve üzerindeki yanıklarda dengeli izotonik kristalloid başlatır. Yanık sıvısı, idame ve dekstroz ayrı değerlendirilir; saatlik idrar çıkışı ve perfüzyon göstergeleriyle titre edilir.

Anahtar kelimeler: çocuk yanığı; sıvı resüsitasyonu; toplam vücut yanık yüzdesi; idrar çıkışı; sıvı yüklenmesi

Abstract
Major burns may cause capillary leak, intravascular volume loss, and burn shock. Management differs because of smaller circulating volume, body-surface-area-to-mass ratio, and limited glycogen stores. Total body surface area (TBSA) should be estimated with an age-adjusted Lund-Browder chart. Most protocols begin balanced isotonic crystalloid at approximately 10-15% TBSA. Burn-related fluid, maintenance fluid, and dextrose are considered separately; hourly urine output and perfusion indicators guide titration.

Keywords: pediatric burn; fluid resuscitation; total body surface area; urine output; fluid overload

Giriş
Yanık sonrası inflamasyon kapiller kaçak, ödem ve dolaşım hacminde azalmaya neden olur. Çocuklarda hesaplama hataları hipotansiyon, hipoglisemi, hipotermi veya sıvı yüklenmesiyle sonuçlanabilir. Bu nedenle resüsitasyon fizyolojik yanıta göre yönetilen dinamik bir süreçtir [1-3].

Resüsitasyon Kararının Temeli
Yalnız parsiyel ve tam kat yanıklar TVYY hesabına katılmalı, yüzeyel eritem dışlanmalıdır. Vücut oranları yaşla değiştiği için dokuzlar kuralı yerine Lund-Browder şeması kullanılmalıdır. Resüsitasyon eşiği yaklaşık yüzde 10-15 TVYY'dir. İnfant, gecikmiş başvuru, inhalasyon veya elektrik yaralanması, travma ve yetersiz oral alım daha erken damar içi tedavi gerektirebilir [1-3].

Başlangıç Sıvısı ve Hesaplama
Başlangıçta laktatlı Ringer veya Hartmann solüsyonu gibi dengeli izotonik kristalloidler kullanılır. Formüllerde mililitre (mL) ve kilogram (kg) kullanılır. İlk 24 saatlik yanık hacminin yarısı yaralanmadan sonraki ilk 8 saatte, kalanı sonraki 16 saatte verilir; hastane öncesi sıvı ilk paydan düşülür. Küçük çocuklarda idame 4-2-1 kuralıyla ayrıca hesaplanır; hipoglisemi riski varsa dekstroz eklenir [1,2,4].

Tablo 1. Pediatrik Yanık Resüsitasyonunda Başlangıç Yaklaşımları

Yaklaşım	Başlangıç hesabı	Not
Ağırlık temelli	3 mL x kg x yüzde TVYY + idame	Sık kullanılır; yerel protokol önceliklidir.
Parkland	4 mL x kg x yüzde TVYY	Geleneksel referanstır; mutlak hedef değildir.
Galveston	5000 mL/metrekare yanık + 2000 mL/metrekare vücut yüzeyi	İdameyi içerir.

İzlem ve Titrasyon

Amaç yeterli organ perfüzyonunu en düşük etkili hacimle sağlamaktır. Saatlik idrar çıkışı 30 kg altındaki çocuklarda yaklaşık 1 mL/kg/saat, 30 kg ve üzerindeki ergenlerde 0,5 mL/kg/saat olmalıdır. Miyoglobinüride hedef geçici olarak 1-2 mL/kg/saat olabilir. Hedef dışı değerlerde sonda, TVYY, hipotermi, kanama, kalp işlevi ve intraabdominal basınç gözden geçirilir. Büyük boluslar yerine yalnız yanık sıvısı hızı genellikle yüzde 10-20 değiştirilir. Nabız, kapiller dolum, mental durum, laktat, baz açığı, elektrolitler, glukoz, kreatinin ve kümülatif denge birlikte değerlendirilir [1,2,4].

Tablo 2. Yatak Başı İzlem Hedefleri

İzlem	Hedef	Yanıt
İdrar çıkışı	30 kg altı: 1 mL/kg/saat; 30 kg ve üzeri: 0,5 mL/kg/saat	Sondayı kontrol et; yanık sıvısını yüzde 10-20 değiştir.
Perfüzyon	Uygun nabız ve basınç, sıcak ekstremite, düzelmiş kapiller dolum	Yanık dışı şok, kanama ve kalp işlevini araştır.
Metabolik denge	Azalan laktat ve baz açığı; dengeli elektrolit, glukoz ve kreatinin	Hesabı ve kompartman bulgularını yeniden değerlendir.

Aşırı Sıvı Yüklenmesi

Hesaplananın üzerinde kristalloid verilmesi aşırı sıvı yüklenmesi (fluid creep) olarak adlandırılır. Fazla TVYY hesabı, tekrarlayan boluslar ve hızın zamanında azaltılmaması başlıca nedenlerdir. Akciğer ödemi ve kompartman sendromları gelişebilir; artan gereksinimde hesap ve tanı yeniden değerlendirilmelidir [2,5].

Klinik Örnek

> Üç yaşında, 15 kg ve yüzde 20 TVYY sıcak sıvı yanığı bulunan çocuk, yaralanmadan 2 saat sonra 100 mL laktatlı Ringer verilerek başvursun. 3 mL x kg x yüzde TVYY yaklaşımıyla yanık hacmi 900 mL/24 saattir. İlk 8 saatlik 450 mL'den 100 mL çıkarılır; kalan 350 mL, 6 saatte yaklaşık 58 mL/saat verilir. İdame 50 mL/saat, başlangıç toplamı 108 mL/saattir. İdrar hedefi 15 mL/saattir; yalnız yanık sıvısı yanıta göre titre edilir.

Sonuç

Güvenli pediatrik resüsitasyon; doğru TVYY hesabı, yanık sıvısı ile idamenin ayrılması, glukoz gereksiniminin gözetilmesi ve saatlik hedeflere göre küçük hız değişikliklerine dayanır. Formül başlangıç haritasıdır; yönü çocuğun yanıtı belirler.

Kaynaklar

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M4573-Tam Metin

FİZİKSEL İSTİSMAR DÜŞÜNDÜREN BULGULAR; ÖZGÜL KEMİK KIRIKLARI

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Giriş

İlk kez 1860 yılında Ambroise Tardieu tarafından tariflenmiş olan "çocuk istismarı" tüm toplumların önemli bir sorunudur. (1). 1946 yılında radyolog olan Dr Caffey tarafından ise beş yaş altı çocuklarda kemik kırıkları ve subdural hematom birlikteliğini ortaya konulmuştur (2). Dünya Sağlık Örgütüne (WHO) göre "Çocuk istismarı, 18 yaşın altındaki çocuklara yönelik istismar ve ihmaldir. Bu, sorumluluk, güven veya güç ilişkisi bağlamında çocuğun sağlığına, hayatta kalmasına, gelişimine veya onuruna gerçek veya potansiyel zarar veren her türlü fiziksel ve/veya duygusal kötü muameleyi, cinsel istismarı, ihmali, dikkatsizliği ve ticari veya diğer sömürüyü" içerir(3) Çocukla ilgili istismar çeşitli sınıflandırmalar mevcut olup, Genel olarak istismar; fiziksel, cinsel, duygusal ve ekonomik olmak üzere dörde ayrılmaktadır (4).

Fiziksel İstismar Epidemiyolojisi

Fiziksel istismar, çocuğun kaza dışı fiziksel zarar görmesi veya yaralanmasına neden olan durumları (örneğin vurma, tekmeleme, yakma, sarsma) içermektedir. Duygusal (psikolojik) istismar, çocuğun benlik saygısını ve duygusal gelişimini olumsuz etkileyen sürekli aşağılama, reddetme, tehdit etme, korkutma veya sevgi ve ilgiden mahrum bırakılması gibi durumları karşılar. Rıza gösterme yetisi olmayan çocukların herhangi bir cinsel etkinliğe katılımının sağlandığı durumlar Cinsel istismar olarak tanımlanmaktadır. İhmal ise çocuğun ihtiyaçlarını karşılamakla yükümlü olan veli veya vasisinin çocuğun temel gereksinimlerini karşılayabilecekken karşılamamasıdır. (3). WHO ve UNICEF verilerine göre, dünya genelinde aile içinde veya bakmakla yükümlü kişilerce 5 yaş altı yaklaşık 400 milyon çocuk (%60) tekrarlayan fiziksel ve/veya psikolojik şiddete maruz bırakılmaktadır. Söz konusu çocukların yaklaşık 330 milyonu fiziksel cezalandırmaya maruz kalmaktadır(3).

Ülkeler ve bölgeler bazında incelendiğinde de belirgin farklılıklar bulunmaktadır. WHO'nun 49 düşük ve orta gelirli ülkeyi kapsayan değerlendirmesine göre, son bir ay içinde ebeveyn veya bakım veren tarafından uygulanan fiziksel ceza oranı Kazakistan'da yaklaşık %30, Ukrayna'da %32, Sırbistan'da %63, Sierra Leone'de %64 ve Togo'da %77 olarak bildirilmiştir. Bölgesel karşılaştırmalarda şiddetin türü ve maruz kalma yeri açısından önemli farklılıklar da sunulmaktadır. Afrika ve Orta Amerika'da okul ortamında 18 yaşına kadar fiziksel şiddet sıklığı %70'in üzerindeyken, Doğu Akdeniz ve Güneydoğu Asya bölgelerinde son bir yıldaki okul ortamında fiziksel şiddete maruz kalma %60'ın üzerindedir. Buna karşılık Batı Pasifik Bölgesi'nde bu oran yaklaşık %25 civarlarında olduğu görülmüştür. Avrupa ve Orta Asya bölgelerinde ise

fiziksel şiddet nispeten düşük olup yaklaşık her üç çocuktan biri (%30'dan fazla) aile içi fiziksel şiddete maruz kalmaktadır. Çocukların üçte ikisinin psikolojik şiddet yaşadığı bildirilmiştir (3).

Fiziksel İstismarı Düşündüren Klinik Bulgular

Fiziksel şiddetin en yaygın belirtisi olarak karşımıza çıkan gözlemlenebilir en sık bulgu ekimoz (morarma) kabul edilmektedir. Yürümeyen bebeklerde morluk görülmesi fiziksel şiddet açısından şüphelenebilir bir durum olup dikkatle değerlendirilmelidir. Fiziksel şiddet sonucu oluşan morluklar genellikle baş-boyun bölgesi, yanaklar, kulaklar, boyun, gövde, kalça ve uyluk gibi yumuşak dokularda konumlanmaktadır; nispeten büyük, fazla sayıda ve birleşme eğiliminde olabilir veya kullanılan cismin şekline has morluklarla karşılaşılabilmektedir. Kaza sonucu meydana gelen morluklar ise daha çok Buna diz, dirsek ve alın gibi ekstremitelerin veya dokuların altındaki kemik yapıların çıkıntılı kısımlarında izlenebilmektedir (5). Diğer bulgular:

- Yanıklar (özellikle sigara, sıcak su veya ütü yanıkları)
- Isırık izleri
- Kesiler ve sıyrıklar
- Kırıklar (özellikle kaburga, metafiz, humerus ve femur kırıkları)
- Kafa travması, subdural hematom ve retinal kanama
- Ağız içi yaralanmaları (özellikle frenulum yırtığı)
- Farklı iyileşme evrelerinde birden fazla yaralanmanın bulunması (6).

Son yıllarda yapılan sistematik derlemelerde; özellikle kalça ve boyun bölgelerinde morluklar, şekilli (patterned) morluklar, ağız içi travmatik yaralanmalar, subkonjonktival kanama, subdural hematom ve retinal kanamalar fiziksel şiddet tanısını destekleyen klinik bulgular olduğunu belirtmişlerdir. Tabii ki hiçbir bulgu tek başına tanı koydurucu olarak değerlendirilemez ve öykünün derinleştirilmesi, detaylı ve tam fizik muayene ye ek olarak (gerekliyse) radyolojik tetkik sonuçlarıyla beraber değerlendirilmesi gerekir (6). Meta-analiz çalışmalarında çocukların 18 yaşına kadar fiziksel şiddete uğrama sıklığı yaklaşık %17–18 (her altı çocuktan birinin) olarak bildirilmektedir (7). Ayrıca fiziksel şiddetin erken evrede tanınmasını sağlayabilecek "sentinel (öncü) yaralanmalar" kendini ifade edemeyecek yaşlardaki çocuklarda önemlidir. Araştırmalar, ağır fiziksel şiddete maruz kalan veya ölümle sonuçlanmış vakaların birçoğunda daha önceden de var olan küçük morluklar veya ağız içi yaralanmalar gibi öncü bulguların bulunduğunu bildirilmiştir. Bu nedenle özellikle yürümeyen bebeklerde sebebi açıklanamayan morluk veya ağız içi yaralanmaların değerlendirilmesi fiziksel şiddet açısından önemlidir (8). Fiziksel istismar tanısı konulan hastaların üçte birinde tanı anında eski bir yaralanmaya dair kanıt bulunmakta olup, en muhtemel fail ise ebeveyndir (9).

İstismar Açısından Özgül Kemik Kırıkları

Kemik kırıkları çocuğun fiziksel istismarının gözlemlenebilir önemli bulgularındandır. Özellikle iki yaş altındaki çocuklarda görülen sebebi bakıcılarıyla açıklanamayan kırıklar fiziksel istismar açısından önem arz eder. İstismar sonucu meydana gelen kırıkların %80–90'ı üç yaşın altındaki çocuklarda, daha büyük bir kısmı ise 18 ayın altındaki bebeklerde karşımıza çıkmaktadır (10). İstismarda görülen kırıklar tek bir kemiği etkileyebileceği gibi, farklı iyileşme evrelerinde birden fazla kırığın bulunması tanısal açıdan oldukça önemlidir. Çocuğun gelişim düzeyiyle uyumsuz mekanizma öyküsü veya açıklanamayan çoklu kırıklar fiziksel istismar olasılığını artırmaktadır (6). Çocuğun göğüs bölgesinin kuvvetle sıkılması sonucu meydana gelen ve özellikle posterior kısımlarda lokalize olan kot kırıkları çocuğun fiziksel istismarının en özgül bulgularından biridir (10). Bükme ve şiddetli sarsmalara bağlı ortaya çıkan metafiz kırıkları, "bucket handle" (kova sapı) ve "corner fracture" (köşe kırığı) olarak adlandırılan lezyonlar, özellikle süt çocuklarında fiziksel istismar ile en güçlü ilişkilendirilen kırıklardandır (10). Özellikle yürümeyen bebeklerde femur kırıkları ile spiral humerus kırıkları, açıklanamayan durumlarda fiziksel istismar açısından araştırılmalıdır (11). Kafatasında görülebilen çoklu kırıklar, genişleyen kırık hatları, çökme kırıkları, karmaşık ve birden fazla sütüre geçebilen kırıklar, istismara bağlı olgularda kazaya bağlı olgulara göre daha sık görülmektedir (6). Skapula, sternum ve omurga kırıkları

çocuklarda oldukça nadirdir. Bu kemiklerin kırılması için yüksek enerjili travma gerektiğinden, İstismar olgularında aynı çocukta farklı zamanlarda oluşmuş kırıkların birlikte bulunması oldukça karakteristiktir (12-14).

Kırık tipi	İstismar açısından önemi
Posterior kaburga kırıkları	Çok yüksek özgüllük
Metafiz (bucket handle/corner) kırıkları	Çok yüksek özgüllük
Femur kırıkları (özellikle yürümeyen bebekte)	Yüksek şüphe
Humerus kırıkları	Yüksek şüphe
Tibia kırıkları	Klinik öykü ile değerlendirilmeli
Skapula kırıkları	Nadir, yüksek şüphe
Sternum kırıkları	Nadir, yüksek şüphe
Vertebra kırıkları	Nadir, yüksek şüphe
Farklı iyileşme evresindeki çoklu kırıklar	Tekrarlayan istismarı düşündürür

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M4574-Tam Metin
PEDİATRİK ACİLLERDE DENTAL TRAVMALARIN YÖNETİMİ

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Giriş

Dental travmalar, çocukluk çağında acil değerlendirme gerektiren önemli orofasiyal yaralanmalardandır. Diş hekimine doğrudan ulaşmanın mümkün olmadığı durumlarda çocuklar sıklıkla acil servise getirildiği için, ilk değerlendirmeyi yapan acil tıp hekimi veya diğer sağlık profesyonellerinin yaklaşımı prognozu doğrudan etkileyebilir. Bu nedenle dental travmanın tanınması, doğru ilk müdahalenin yapılması ve uygun zamanda diş hekimine yönlendirilmesi yalnızca dental bir konu değil, pediatrik acil yaklaşımının da bir parçasıdır. [1,2]

Dental Travmalarda Adli ve İatrojenik Boyut

Dental travma, günlük yaşam aktiviteleri sırasında dişlerde ve çevre oral dokularda oluşan yaralanmaları kapsar. Çocuklarda özellikle üst ön kesici dişler sık etkilenir. Orofasiyal bölgenin vücut yüzeyindeki görece küçük payına karşın travmalarda belirgin şekilde etkilenmesi, bu yaralanmaların klinik önemini artırmaktadır. [3–5]

Okul öncesi dönemde çocukların yürümeyi yeni öğrenmesi, motor koordinasyon ve dengenin henüz tam gelişmemiş olması nedeniyle düşme ve çarpma en sık nedenler arasındadır. Okul çağında ise düşme ve çarpmalara bisiklet kazaları, trafik kazaları ve spor yaralanmaları eklenir. Dolayısıyla travmanın mekanizması çocuğun yaşına ve gelişim düzeyine göre değerlendirilmelidir. [3,6]

Her dental yaralanmanın kazaya bağlı olmadığı unutulmamalıdır. Ağız ve diş yaralanmaları fiziksel çocuk istismarının bir bulgusu olabilir. Bunun yanında acil hava yolu yönetimi sırasında laringoskopi ve endotrakeal entübasyona bağlı iyatrojenik dental yaralanmalar da gelişebilir. Bu nedenle travmanın ne zaman, nerede ve hangi mekanizmayla meydana geldiğini belirlemek; ilk muayenedeki dental bulguları işlem öncesinde kaydetmek hem klinik hem de adli açıdan önemlidir. [7]

Hava yolu yönetiminde dişler, özellikle laringoskopi sırasında mekanik kuvvetlere maruz kalabilir. Kırık, mobilite, lüksasyon veya avülsiyon gibi bir bulgunun işlemden önce mi bulunduğunun, yoksa işlem sırasında mı geliştiğinin bilinmemesi daha sonra medikolegal tartışmaya yol açabilir. Özellikle multiple travmalı hastalarda başlangıçtaki dental durumun kaydedilmemesi bu ayrımı güçleştirir. [8–10]

Klinik koşullar izin verdiği ölçüde entübasyon öncesinde kırık, eksik, mobil veya yer değiştirmiş dişler; ağız içi kanama ve yumuşak doku yaralanmaları kaydedilmelidir. Kurum politikaları uygunsa fotoğrafla kayıt yararlı olabilir. Hava yolu girişiminin kendisi de ayrıntılı biçimde belgelenmeli ve işlem sonrasında tekrar ağız-diş muayenesi yapılmalıdır. Böylece hem hasta güvenliği hem de sağlık çalışanının hukuki korunması açısından daha güçlü bir kayıt zinciri oluşturulur. [11]

Çocuklarda ağız ve diş yaralanmaları fiziksel istismarın bulgularından biri olabilir. Açıklanan mekanizmayla uyumsuz oral yaralanmalar, çocuğun gelişim düzeyiyle açıklanamayan travmalar, tekrarlayan yaralanmalar veya farklı iyileşme evrelerindeki lezyonlar istismar açısından dikkatle değerlendirilmelidir. Oral bulgular bazen istismarın ilk fark edilen işareti olabilir; bu

nedenle ağız muayenesinin genel travma değerlendirmesinin dışında bırakılmaması gerekir. [7] Türkiye'de sağlık mesleği mensupları açısından suç belirtisiyle karşılaşıldığında bildirim yükümlülüğü ayrıca hukuki önem taşır. Türk Ceza Kanunu'nun 280. Maddesi, görev sırasında bir suçun işlendiğine ilişkin belirtiyle karşılaşılmasına rağmen yetkili makamlara bildirim yapılmaması veya geciktirilmesini düzenlemektedir. İstismar şüphesinde klinik bulguların ayrıntılı ve tarafsız biçimde belgelenmesi, ilgili çocuk koruma ve adli bildirim süreçlerinin kurum prosedürlerine uygun şekilde işletilmesi gerekir. [12]

Öncelik her zaman çocuğun hayati fonksiyonlarının güvence altına alınmasıdır. Yaşamı tehdit eden durumlar değerlendirildikten sonra dental travma göz ardı edilmemelidir. Doğal dişin korunması fonksiyon, estetik, konuşma ve psikososyal iyilik hali açısından önemlidir. Özellikle çocuk ve genç hastalarda erken diş kaybı, büyüme ve gelişim boyunca uzun süreli tedavi gereksinimine yol açabilir. [13–15]

Avülsiyon ve Acil Müdahale

Avülsiyon, travma sonucunda dişin alveoler soketinden tamamen çıkmasıdır. Daimi diş avülsiyonu ciddi bir dental yaralanmadır ve prognoz büyük ölçüde olay yerinde ve hemen sonrasında yapılan işlemlere bağlıdır. Bu nedenle ilk kritik soru avülse olan dişin süt dişi mi yoksa daimi diş mi olduğudur. [14]

Avülse süt dişi replante edilmemelidir. Bunun önemli nedenleri arasında gelişmekte olan daimi diş germine ek zarar verme olasılığı, küçük çocuk için tedavi yükü ve aspirasyon gibi tıbbi riskler bulunur. Buna karşılık avülse daimi dişte, uygun olgularda mümkün olan en kısa sürede replantasyon tercih edilen yaklaşımdır. [15]

Kaza yerinde daimi diş bulunmuşsa diş kökünden değil kronundan tutulmalıdır. Kirliyse yüzeyine zarar vermeden kısa süre nazikçe yıkanmalı ve koşullar uygunsa gecikmeden soketine yerleştirilmelidir. Yerleştirilen diş, çocuğun güvenliği gözetilerek geçici olarak stabilize edilmeli ve hasta acilen diş hekimine yönlendirilmelidir. Replantasyon olay yerinde yapılamıyorsa dişin kuru bırakılmaması ve uygun bir saklama ortamında en kısa sürede diş hekimine ulaştırılması kritik önemdedir. [14]

Ekstraoral kuru kalma süresi prognoz açısından belirleyicidir. IADT yaklaşımında periodontal ligament hücrelerinin canlılığı, dişin hemen replante edilip edilmediği, uygun bir saklama ortamında tutulup tutulmadığı ve kuru kalma süresi dikkate alınarak değerlendirilir. Klinik replantasyon sonrasında lokal anestezi, soketin değerlendirilmesi, dişin replante edilmesi, uygun esnek splintleme ve gerekli takip işlemleri diş hekimi tarafından planlanır. [14]

Adli Tıp Açısından Dental Yaralanmalar

Travmatik diş yaralanmalarının adli boyutu da göz ardı edilmemelidir. Yaralanmanın oluş mekanizması, zamanı, mevcut diş durumu ve yapılan işlemler mümkün olduğunca açık biçimde kaydedilmelidir. Türk Ceza Kanunu çerçevesinde düzenlenen adli raporlarda diş yaralanmaları; yaralanmanın niteliği, basit tıbbi müdahaleyle giderilebilirliği ve çiğneme-konuşma fonksiyonları üzerindeki etkisi gibi ölçütlerle değerlendirilebilir. [16]

Diş veya implant kayıpları, subluksasyonlar ve belirgin diş kırıkları adli değerlendirmede önem taşıyabilir. Bu nedenle çocuk hastada dental travmanın yalnızca tedavi edilmesi yeterli değildir; yaralanmanın ne zaman ve hangi mekanizmayla oluştuğunun ortaya konması, mevcut bulguların doğru belgelenmesi ve gerektiğinde adli süreç için uygun raporlamanın yapılması gerekir.

Diş yaralanmaları ceza hukuku yanında tazminat ve maluliyet değerlendirmelerine de konu olabilir. Bu nedenle özellikle kalıcı fonksiyon kaybı veya estetik sonuç doğurabilecek olgularda eksiksiz klinik kayıt, görüntüleme, konsültasyon ve takip belgeleri büyük önem taşır. [16]

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M4424-Tam Metin

ACIL SERVISE BAŞVURAN VE OPERE EDILEN SUBDURAL HEMATOMLU HASTALARDA KAN VE INFLAMATUAR PARAMETRELERIN MORTALITE ILE ILIŞKISI

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Amaç

Subdural hematom, özellikle ileri yaş ve eşlik eden sistemik bozuklukların varlığında yüksek mortalite ve morbidite ile seyredebilir (1). Erken dönemde elde edilen laboratuvar göstergelerinin prognozla ilişkisini belirlemek, klinik risk sınıflamasına katkı sağlayabilir; albümin, kreatinin ve elektrolit bozukluklarının farklı kritik hasta gruplarında mortalite ve prognozla ilişkili olduğu bildirilmiştir (2-5). Hemoglobin-albümin-lenfosit-trombosit (HALP) skoru da çeşitli klinik durumlarda prognostik bir gösterge olarak değerlendirilmiştir (6,7). Bu çalışmada, cerrahi uygulanan subdural hematomlu hastalarda başvuru anındaki hematolojik, biyokimyasal ve kan gazı parametreleri ile hemoglobin-albümin-lenfosit-trombosit (HALP) skorunun 30 günlük mortalite ve hastanede/yoğun bakımda kalış süreleriyle ilişkisinin değerlendirilmesi; ayrıca mortalite açısından anlamlı bulunan parametrelerin ayırt edici performanslarının belirlenmesi amaçlandı.

Yöntem

Bu retrospektif gözlemsel çalışmada, yerel etik kurul onayı alındıktan sonra Mart 2022-Mart 2025 tarihleri arasında Malatya Eğitim ve Araştırma Hastanesi acil servisine başvuran, subdural hematom tanısıyla yatırılan, yoğun bakımda izlenen ve opere edilen 18 yaş üzerindeki hastalar değerlendirildi. Toplam 58 hastanın verisine ulaşıldı; dahil etme ve dışlama ölçütlerini karşılayan 46 hasta analize alındı. Eksik verisi bulunanlar, 18 yaş altındakiler, antikoagülan/koagülan tedavi kullananlar, başka merkeze sevk edilenler, yatışı kabul etmeyenler ve önceden subdural hematom öyküsü bulunanlar dışlandı. Başvuru sırasındaki hemogram, biyokimya ve kan gazı parametreleri, oksijen parsiyel basıncı (pO2) ve HALP skoru kaydedildi. Birincil sonlanım noktası 30 günlük mortaliteydi. Normal dağılım Shapiro-Wilk testiyle değerlendirildi; iki grup karşılaştırmalarında Student t testi veya Mann-Whitney U testi kullanıldı. Hastane ve yoğun bakım kalış süreleriyle ilişkiler korelasyon analiziyle, mortaliteyi ayırt etme performansı alıcı işletim karakteristiği (ROC) analiziyle değerlendirildi. Hemoglobin ile albümin arasındaki ilişki basit doğrusal regresyonla incelendi. $p<0,05$ istatistiksel olarak anlamlı kabul edildi.

Bulgular

Analize alınan 46 hastanın 36'sı (%78,3) erkek, 10'u (%21,7) kadındı. Otuz sekiz hasta (%82,6) sağ kalırken sekiz hasta (%17,4) 30 gün içinde kaybedildi. Ortanca yaş 77,5 (çeyrekler arası aralık: 72,5-84,2) yıldı. Mortalite grubunda sodyum, klor, üre, kreatinin ve pO2 düzeyleri daha yüksek; trombosit ve albümin düzeyleri daha düşüktü. Gruplar arasındaki fark sodyum (p=0,001), klor (p=0,001), trombosit (p=0,040), üre (p=0,001), kreatinin (p=0,006), albümin (p=0,036) ve pO2 (p=0,032) için anlamlıydı. ROC analizinde en yüksek eğri altında kalan alan (AUC) üre için 0,870, klor için 0,829, sodyum için 0,817 ve kreatinin için 0,809 bulundu. Üre için 52,75 mg/dL kesim değerinde duyarlılık %89,5 ve özgüllük %87,5; klor için 110,5 mmol/L kesim değerinde duyarlılık %81,6 ve özgüllük %87,5 idi. Kreatinin hem hastane kalış süresi (r=0,474; p=0,001) hem de yoğun bakım kalış süresi (r=0,475; p=0,001) ile en güçlü pozitif korelasyonu gösterdi. HALP skoru hastane kalış süresiyle negatif korelasyon gösterirken (r=-0,299; p=0,043), yoğun bakım kalış süresiyle anlamlı ilişkili değildi (r=-0,138; p=0,361). Hemoglobin ile albümin arasında pozitif doğrusal ilişki saptandı (B=2,419; %95 güven aralığı: 1,64-3,20; p=0,001; R^2=0,470).

Tablo 1. Mortalite ile anlamlı ilişkili parametrelerin ROC analizi

Parametre	AUC	%95 GA	Duyarlılık	Özgüllük	Kesim değeri	p
Trombosit	0,757	0,610-0,903	%63,2	%87,5	$206\times10^3/\mu L$	0,024
Albümin	0,737	0,534-0,940	%92,1	%50,0	2,8 g/dL	0,037
Sodyum	0,817	0,638-0,997	%68,4	%87,5	138,5 mmol/L	0,005

Klor	0,829	0,631-1,000	%81,6	%87,5	110,5 mmol/L	0,004
Üre	0,870	0,678-1,000	%89,5	%87,5	52,75 mg/dL	0,001
Kreatinin	0,809	0,674-0,945	%76,3	%75,0	0,995 mg/dL	0,006
pO2	0,743	0,569-0,917	%73,7	%62,5	44,5 mmHg	0,032

AUC: eğri altında kalan alan; GA: güven aralığı.

Sonuç

Cerrahi uygulanan subdural hematomlu hastalarda başvuru anındaki sodyum, klor, üre, kreatinin, albümin, trombosit ve pO2 değerleri 30 günlük mortaliteyle anlamlı ilişki göstermiştir. Özellikle üre, klor, sodyum ve kreatinin mortaliteyi ayırt etmede görece yüksek performans sergilemiştir. Kreatininin hastane ve yoğun bakım kalış süreleriyle ilişkisi, erken prognoz değerlendirmesinde böbrek fonksiyon göstergelerinin önemini desteklemektedir. Bulguların küçük örneklem büyüklüğü ve retrospektif tasarım nedeniyle daha geniş, prospektif çalışmalarla doğrulanması gereklidir.

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M4407-Tam Metin

RED EYE IS NOT ALWAYS CONJUNCTİVİTİS: EVALUATİON OF PEDİATRİC UVEİTİS CASES İN THE EMERGENCY DEPARTMENT

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Introduction

Red eye is a common clinical presentation in pediatric emergency departments and primary care settings. Although conjunctivitis is among the most frequent causes, potentially vision-threatening

conditions such as keratitis, corneal abrasion or foreign body, episcleritis/scleritis, ocular trauma, and uveitis may also present with ocular redness. Therefore, a detailed ophthalmologic evaluation is particularly important in children with decreased visual acuity, photophobia, ocular pain, or persistent redness despite treatment (1–3).

Although uveitis is less common in children than in adults, pediatric cases account for approximately 5–10% of all uveitis cases. Pediatric uveitis represents a particularly challenging group in terms of diagnosis, follow-up, and treatment. Young children may have difficulty describing visual symptoms, cooperation during ophthalmic examination may be limited, prolonged therapies may have adverse effects on growth and development, and complications involving the visual axis may result in amblyopia (4).

In a multicenter pediatric uveitis registry study conducted in Türkiye, anterior uveitis was the most common anatomic form, accounting for 39% of cases, followed by intermediate uveitis in 29%. The most frequent specific diagnoses were pars planitis (22%), juvenile idiopathic arthritis (JIA)-associated uveitis (12%), and Behçet disease (9%), whereas infectious uveitis accounted for 15.6% of cases. These findings highlight the broad anatomic and etiologic spectrum of pediatric uveitis (5).

Although the clinical characteristics of pediatric uveitis have been well described in the literature, data specifically addressing children who present to emergency departments with red eye and are subsequently diagnosed with uveitis remain limited. Cases initially diagnosed as conjunctivitis, particularly those with persistent symptoms despite treatment, are clinically important because of the potential for diagnostic delay.

The present study aimed to evaluate the clinical characteristics, etiologies, treatment requirements, and visual outcomes of pediatric patients who presented to the pediatric emergency department with red eye and were subsequently diagnosed with uveitis. We also aimed to highlight clinical features that may raise suspicion of uveitis and contribute to delayed or incorrect initial diagnosis.

Materials and Methods

This single-center, retrospective observational study included patients younger than 18 years who presented to the pediatric emergency department with ocular redness between January 2023 and June 2026 and were subsequently diagnosed with uveitis following ophthalmologic evaluation.

Electronic medical records were retrospectively reviewed. Data collected included age, sex, presenting symptoms, initial diagnosis, anatomic classification and etiology of uveitis, laterality, best-corrected visual acuity (BCVA) at presentation and at the final follow-up visit, topical and systemic treatments, and clinical outcomes.

Uveitis was anatomically classified as anterior, intermediate, or panuveitis. Etiologic classification was based on clinical findings, systemic disease history, and, when indicated, laboratory and imaging investigations. Visual acuity was recorded using decimal Snellen values.

Patients who had initially been diagnosed with conjunctivitis either at another healthcare facility or during their first emergency department visit and who were subsequently reevaluated because of persistent or worsening symptoms were analyzed separately.

Results

Results

A total of 49 pediatric patients were included in the study. The mean age was 11.1 ± 3.5 years; 23 patients (46.9%) were female and 26 (53.1%) were male. Bilateral involvement was present in 29 patients (59.2%). Mean best-corrected visual acuity (BCVA), expressed as decimal Snellen values, was 0.65 at presentation and 0.92 at the final follow-up visit. The demographic and main clinical characteristics of the study population are summarized in Table 1.

Table 1. Demographic and main clinical characteristics of the patients

Variable	Value
Number of patients	49
Age, years	11.1 ± 3.5

Female	23 (46.9%)
Male	26 (53.1%)
Bilateral involvement	29 (59.2%)
Unilateral involvement	20 (40.8%)
Baseline BCVA, decimal Snellen	0.65
Final BCVA, decimal Snellen	0.92
Initially diagnosed with conjunctivitis	4 (8.2%)
Initially diagnosed with bacterial conjunctivitis	2
Initially diagnosed with allergic conjunctivitis	2

According to the anatomic classification, anterior uveitis was the most common form, accounting for 79.6% of cases, followed by intermediate uveitis (12.2%) and panuveitis (8.2%). With regard to etiology, idiopathic uveitis was the most frequent category (36.7%), whereas traumatic and juvenile idiopathic arthritis (JIA)-associated uveitis each accounted for 24.5% of cases. The anatomic distribution, etiologic characteristics, and treatment patterns are presented in Table 2.
All patients with traumatic anterior uveitis achieved complete recovery with topical therapy alone. Overall, topical treatment alone was sufficient in 19 patients (38.8%), while methotrexate was used in 29 patients (59.2%) and adalimumab in 21 patients (42.9%) during follow-up. These systemic treatment categories were not mutually exclusive, as some patients received these therapies sequentially or in combination.
Four patients (8.2%) had initially been treated for bacterial conjunctivitis (n=2) or allergic conjunctivitis (n=2). These patients re-presented because of persistent or worsening symptoms accompanied by decreased visual acuity. Subsequent detailed ophthalmologic examination established the diagnosis of uveitis.

Table 2. Anatomic distribution, etiology, and treatment characteristics of uveitis

Variable	**n (%)**
Anatomic classification	
Anterior uveitis	39 (79.6%)
Intermediate uveitis / pars planitis	6 (12.2%)
Panuveitis	4 (8.2%)
Etiology	
Idiopathic	18 (36.7%)
Traumatic	12 (24.5%)
JIA-associated	12 (24.5%)
Infectious	3 (6.1%)
Vogt–Koyanagi–Harada disease	2 (4.1%)
Behçet disease	1 (2.0%)
TINU syndrome	1 (2.0%)
Treatment	
Topical therapy alone	19 (38.8%)
Methotrexate use	29 (59.2%)
Adalimumab use	21 (42.9%)
Complete recovery with topical therapy alone in traumatic anterior uveitis	12/12 (100%)

Footnote: Methotrexate and adalimumab treatment categories were not mutually exclusive; some patients received these agents sequentially or in combination.

Discussion

In this study, we evaluated 49 pediatric patients who presented to the pediatric emergency department with red eye and were subsequently diagnosed with uveitis. Approximately four-fifths of the patients had anterior uveitis, and more than half had bilateral involvement. Idiopathic uveitis was the most common etiologic category, although traumatic and JIA-associated uveitis also represented substantial proportions of cases. All cases of traumatic anterior uveitis resolved with topical treatment alone, whereas a considerable proportion of non-traumatic cases required systemic immunomodulatory or biologic therapy. Importantly, four patients had initially been diagnosed with conjunctivitis, underscoring the need to consider uveitis in the differential diagnosis of pediatric red eye.

Pediatric uveitis is an important inflammatory ocular disorder that may lead to significant visual impairment. Previous studies have reported that a substantial proportion of children with uveitis develop at least one ocular complication during follow-up, and some patients experience permanent visual loss or require surgical intervention. Common complications include posterior synechiae, cataract, secondary glaucoma, hypotony, and macular involvement. In younger children, inflammation or complications affecting the visual axis also pose an additional risk of amblyopia (6).

One of the major challenges in diagnosing pediatric uveitis is that young children may be unable to adequately describe symptoms such as reduced vision, photophobia, or blurred vision. Furthermore, some forms of pediatric uveitis may be mildly symptomatic or have an insidious onset. JIA-associated anterior uveitis is a well-known example, as it may remain entirely asymptomatic. Therefore, the absence of ocular pain or marked redness does not exclude uveitis.

Several clinical findings may help distinguish uveitis from conjunctivitis and other common causes of pediatric red eye. Photophobia, decreased visual acuity, and ocular pain should raise suspicion of intraocular inflammation. In anterior uveitis, redness is often most prominent in the perilimbal region, while the tarsal conjunctiva may remain relatively spared. In contrast, conjunctivitis is more commonly associated with tarsal conjunctival hyperemia and ocular discharge. The presence of anterior chamber cells and flare is a key ophthalmologic finding supporting the diagnosis of anterior uveitis. Accordingly, children with red eye accompanied by photophobia or decreased visual acuity, particularly in the absence of prominent discharge or when symptoms persist despite standard conjunctivitis treatment, should undergo ophthalmologic assessment for possible uveitis (7,8).

The finding that four patients in our cohort were initially diagnosed with bacterial or allergic conjunctivitis is clinically noteworthy. Although conjunctivitis is a common cause of red eye in children, persistent redness despite treatment, reduced visual acuity, photophobia, or significant ocular pain should prompt consideration of alternative diagnoses. Early ophthalmology consultation in such cases may reduce diagnostic delay.

Another notable finding was the differing treatment requirements between traumatic and non-traumatic uveitis. All patients with traumatic anterior uveitis achieved complete recovery with topical therapy alone, whereas methotrexate was used in 59.2% of the overall cohort and adalimumab in 42.9%. These findings indicate that chronic, bilateral, or systemic disease-associated pediatric uveitis may frequently require prolonged systemic therapy.

Corticosteroids remain a cornerstone of treatment for active intraocular inflammation. Depending on the anatomic location, laterality, and severity of inflammation, corticosteroids may be administered topically, periocularly, intravitreally, systemically, or in combination. However, prolonged systemic corticosteroid therapy in children may result in significant adverse effects, including weight gain, growth impairment, adverse effects on bone metabolism, and adrenal suppression. Therefore, corticosteroid-sparing immunomodulatory therapy plays an important role in the long-term management of chronic pediatric uveitis (9).

Among conventional disease-modifying antirheumatic drugs, methotrexate is one of the most commonly used agents in pediatric non-infectious uveitis because of the substantial long-term

experience regarding its efficacy and safety (4). In children with persistent active inflammation despite methotrexate therapy, particularly those with JIA-associated uveitis, anti-tumor necrosis factor-α agents constitute an important treatment option. Randomized controlled trials have demonstrated the efficacy of adalimumab in controlling ocular inflammation in children with active JIA-associated uveitis despite methotrexate treatment (10,11). In our cohort, adalimumab was used in 42.9% of patients during follow-up, further illustrating the substantial requirement for advanced systemic therapy in this patient population.

This study has several limitations. First, its retrospective, single-center design and relatively small sample size may limit the generalizability of the findings. Because only children who presented to the pediatric emergency department with red eye and were ultimately diagnosed with uveitis were included, the results cannot be generalized to all pediatric patients with uveitis. In addition, the absence of a control group consisting of children with conjunctivitis, keratitis, or other causes of red eye precluded a comparative analysis of clinical features independently associated with uveitis. Finally, because of the retrospective design, detailed presenting symptoms and the exact interval between symptom onset and definitive diagnosis may not have been documented uniformly in all patients.

Conclusion

Uveitis is a relatively uncommon but clinically important cause of pediatric red eye, and delayed diagnosis may result in significant visual morbidity. Uveitis should be considered in the differential diagnosis of children presenting with decreased visual acuity, photophobia, ocular pain, or persistent ocular redness despite standard treatment for conjunctivitis.

Although topical therapy may be sufficient in most cases of traumatic anterior uveitis, a substantial proportion of children with non-traumatic uveitis may require systemic immunomodulatory or biologic treatment. Increasing awareness of uveitis among clinicians evaluating pediatric red eye and ensuring prompt ophthalmologic assessment in suspicious cases may help reduce diagnostic delay and subsequent visual morbidity.

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M4577-Tam Metin

PEDİATRİK BEYİN BT'DE KRİTİK NOKTALAR: ACİL SERVİSTE SİSTEMATİK GÖRÜNTÜLEME YAKLAŞIMI

Serkan Ünlü

Malatya Eğitim ve Araştırma Hastanesi, Radyoloji Kliniği, Yeşilyurt-Malatya

Amaç:

Acil serviste pediatrik hastayla karşılaşan her radyolog, aslında biraz da zamana karşı çalışır. Kafa travması, bilinç değişikliği ya da ani başlayan nörolojik bulgu tarifleyen bir çocukta beyin BT çoğu zaman elimizdeki en hızlı ve en erişilebilir araçtır. Ne var ki büyüklerde alıştığımız değerlendirme reflekslerini doğrudan çocuğa uygulamak bizi yanıltabilir; radyasyona duyarlılık daha fazladır, yaşa göre değişen normal görünümler vardır, hareket artefaktı istenmeyen bir durumdur (1-3).

Günlük pratikte pediatrik beyin BT'yi okurken gerçekten fark yaratan noktaları -kimde çekim gerekir, doz nasıl düşük tutulur, görüntüye nereden başlanır, hangi bulgu bekletmeden aranmalı- tek bir çerçevede, sahada işe yarayacak şekilde sunmaktır.

Yöntem:

Ortaya çıkan derleme; ACR (Appropriateness Criteria) başta olmak üzere güncel kılavuzlar (1), PECARN gibi yerleşik klinik karar kuralları (4) ve konuyla ilgili yakın tarihli yayınlar (2,5) taranarak hazırlandı. Amaç yeni bir sınıflama önermek değil, var olan bilgiyi acil şartlarına, yani zamana karşı okuma pratiğine uyarlamaktı. Bu doğrultuda önce hasta seçimi ve BT kararının nasıl verildiğine, ardından ALARA çerçevesinde doz optimizasyonuna bakıldı (1,3). Sonrasında teknik kalite ve yumuşak doku/kemik pencerelerinde sistematik değerlendirme ele alındı; klinik bilgiden başlayıp kanama, parankim, ventrikül-sistern, kafatası ve şant değerlendirmesiyle biten yedi basamaklı bir okuma sırası oluşturuldu. Buna yaşa özgü normal görünümler ve sık düşülen yorumlama tuzakları eklendi. Son olarak hem travmatik (epidural/subdural/subaraknoid kanama, kafatası kırığı, ödem, herniasyon) hem de non-travmatik (iskemi, venöz tromboz, enfeksiyon, hipoksik-iskemik hasar, hidrosefali, şant sorunları) acil tablolar ve şüpheli fiziksel istismar olguları ayrı başlıklar altında derlendi (6-9).

Bulgular:

Hasta seçimi konusunda literatür oldukça nettir. Pediatrik kafa travmalarının büyük kısmı hafiftir ve her çocuğa BT çekmek gerekmez. PECARN, klinik olarak önemli beyin yaralanması riski çok düşük olan çocukları ayıklamada hâlâ en sağlam dayanak noktasıdır (4). İki yaş altı ile üstü için bakılan kriterler biraz farklılaşıyor; küçük çocukta mental durum değişikliği, ele gelen kafatası kırığı, geniş skalp hematomu ya da ebeveynin "bugün hiç kendinde değil" demesi önemli bir uyarı olabilir, büyük çocukta ise buna kusma ve şiddetli baş ağrısı eklenir (1,4).Doz tarafında ALARA'yı sadece "miliamper(mA)'i düşür" olarak okumamak gerekiyor -asıl mesele zaten gereksiz olan tetkiki hiç yapmamaktır (1,3). Tarama alanını soruya göre sınırlamak, gereksiz fazlardan kaçınmak, eldeki eski tetkike bakıp tekrarı önlemek pratikte en çok işe yarayan adımlardır. Kurumlar arasında doz farklılıkları olabileceği de unutulmamalıdır (3).Görüntü kalitesi açısından hem yumuşak doku hem kemik penceresine bakmak şart; biri diğerinin yerini tutmaz (1). Kompleks kırıklarda ya da kafa tabanında multiplanar rekonstrüksiyon önemli olup şüpheli istismar olgularında ince kırıkların ortaya konmasında oldukça etkilidir (6). Hareket artefaktı ise küçük çocukta neredeyse kural; şüpheli bir yoğunluk artışı gördüğünüzde önce komşu kesitlerde, mümkünse başka bir düzlemde teyit etmek gereklidir. Okuma sırası için önerilen yedi adım aslında zihinde bir kontrol listesi oluşturmaktır. Bu liste önce klinik hikâye ve travma mekanizması, sonra epidural/subdural gibi ekstraaksiyel koleksiyonlar, ardından kontüzyon ve intraparenkimal kanama, gri-beyaz cevher ayrımı, ventriküller ve bazal sisternler, kafatası-sütürler ve varsa şant/kateter değerlendirilir. Bu sıra atlanınca küçük ama önemli bulgular gözden kaçabilir. Yaşa bağlı normal görünüm konusu belki de en çok yanılgıya açık alan: yenidoğanda ve küçük bebekte beyin su içeriği ve miyelinizasyon erişkinden çok farklı, dolayısıyla gri-beyaz cevher kontrastını erişkin gözüyle değerlendirmek yanlış olabilir. Açık sütür ve fontaneller de sık sık kırıkla karıştırılan normal yapılar. Travmatik tabloya gelince: epidural hematom klasik bikonveks görünümüyle, subdural hematom ise konveksite boyunca uzanan yarımay şekliyle tanınıyor; ikisi de hızla büyüyebildiği için klinik kötüleşme olduğunda görüntü bulguları acil yönetim bağlamında değerlendirilmelidir (1). Subaraknoid kanama sulkus ve sisternlerde ince hiperdansite olarak seçilir. Kırıklarda lineer mi depresse mi ayrımını yapmak, ardından epidural/subdural hematom, pnömosefali ya da venöz sinüs yaralanması eşlik ediyor mu diye bakmak önemli; özellikle subdural koleksiyonların dağılımı şüpheli istismar olgularında ayrıca dikkat gerektirir (6,7).Diffüz

ödemde gri-beyaz cevher ayrımının silikleşmesi, sulkusların kapanması ve ventriküllerin sıkışması dikkat çekiyor; ileri olgularda orta hat kayması ve herniasyon gelişebiliyor ki bu, görüldüğü an klinik ekibi aramayı gerektiren bulgulardan biridir. Hidrosefali ve şant değerlendirmesinde de aynı acillik geçerli olup ventrikül boyutu önceki tetkikle karşılaştırılmalı, kateter ucunun yeri kontrol edilmeli, çevresinde koleksiyon olup olmadığına bakılmalıdır. Travma dışı acillerde tablo biraz daha gizli olabilir. Erken iskemide bulgular çoğu zaman silik, venöz sinüs trombozunda hiperdens sinüs ipucu verebilir. Enfeksiyonda BT esas olarak kitle etkisi ve hidrosefaliyi göstermede işe yarar, hipoksik-iskemik hasarda ise diffüz gri-beyaz cevher kaybı erken dönemde gözden kaçabilir eğer klinik şüphe yüksekse MR'ı devreye sokmak gererekir. Şüpheli fiziksel istismarda tek bir görüntü asla yeterli kanıt değil; birden fazla ya da farklı yaşta (farklı dansitelerde) ekstraaksiyel koleksiyon, interhemisferik ya da tentoryal yayılım ve eşlik eden parankimal yaralanma bir arada görüldüğünde iş mutlaka multidisipliner bir değerlendirme ile yapılmalıdır (6-9).

Sonuç:

Sonuçta pediatrik beyin BT, elimizdeki en hızlı ve en güvenilir araçlardan biri olmaya devam ediyor; ama bunu iyi kullanmak sadece görüntüyü doğru yorumlamaktan geçmiyor. Doğru hastayı seçmek, dozu makul tutmak ve her seferinde aynı sistematik sırayla bakmak, işin en az yorumlama kadar belirleyicisidir.

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M4578-Tam Metin

GEREKSİZ PEDİATRİK ACİL BAŞVURULARININ ÖNLENMESİ: KANITA DAYALI YAKLAŞIM

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1. GİRİŞ

Acil servislerdeki aşırı kalabalık, dünya genelinde sağlık sistemlerinin çözüm bekleyen sorunlarından biridir ve çocuk acilleri bu yükten payına düşeni fazlasıyla almaktadır. Uluslararası veriler, pediatrik acil başvurularının %40-80'inin acil olmayan; yani birinci basamakta ya da evde öz bakımla yönetilebilecek yakınmalardan kaynaklandığını göstermektedir [1,2]. Bu başvurular masum bir fazlalık değildir: bekleme sürelerini uzatır, bakım kalitesini düşürür, hastaların muayene olmadan ayrılmasına ve hastane enfeksiyonlarına maruziyete zemin hazırlar, sağlık çalışanlarında tükenmişliği ve toplam sağlık harcamalarını artırır [1].

Türkiye, acil servis kullanımının nüfusa oranla en yüksek olduğu ülkelerden biridir. Sağlık Bakanlığı verilerine göre 2023 yılında acil servislere yaklaşık 150 milyon başvuru yapılmış; bu sayı ülke nüfusunu belirgin biçimde aşmıştır [3]. Böyle bir tablo, acil servislerin yalnızca gerçek acil durumlara değil, sistemin başka bir noktasında karşılanamayan geniş bir talebe de yanıt verdiğini düşündürmektedir. Çocuk yaş grubuna bakıldığında bu örüntü daha da nettir: Gaziantep'te bir üniversite hastanesinin çocuk acilinde beş düzeyli triyaja göre acil olmayan (düzey 5) kategorisinde değerlendirilen 457 hastanın ebeveyniyle yürütülen kesitsel çalışmada, ailelerin üçte biri (%33,7) çocuğunun durumunu 'çok acil' olarak algılamıştır [4]. Bir ilçe devlet hastanesinde 974 hastayı kapsayan başka bir kesitsel çalışmada başvuruların %68'i acil olmayan bulunmuş, bu başvuruların yarısından fazlası da ebeveynlerce acil ya da çok acil olarak algılanmıştır [5]. Mardin ve Midyat'ta ebeveynler, acil çalışanları ve aile hekimleriyle yürütülen

nitel bir çalışma ise ailelerin kararlarında sağlık sisteminin yapısal sınırlılıklarına ilişkin algıların belirleyici olduğunu ortaya koymuştur [6].
Bu bildirinin amacı; gereksiz pediatrik acil başvurularının tanımını, sıklığını ve belirleyicilerini güncel literatür ışığında özetlemek ve önleme girişimlerine ilişkin kanıtları ülkemiz koşullarına uyarlanabilirlik açısından değerlendirmektir.

2. YÖNTEM

Çalışma geleneksel (anlatısal) derleme olarak tasarlanmıştır. PubMed, Web of Science, Scopus ve Google Akademik'te 'non-urgent', 'low-acuity', 'inappropriate', 'pediatric/paediatric emergency department', 'intervention', 'health literacy', 'telemedicine/telephone triage' ve 'primary care' anahtar sözcükleri ile bunların kombinasyonları taranmış; ulusal literatür için TR Dizin ve DergiPark'ta 'çocuk acil', 'uygunsuz başvuru' ve 'acil olmayan başvuru' terimleri kullanılmıştır. Ocak 2000-Aralık 2025 arasında yayımlanmış İngilizce ve Türkçe makaleler değerlendirilmiş; sistematik derlemeler, randomize kontrollü çalışmalar ve yarı deneysel/girişimsel çalışmalar öncelikli olarak seçilmiştir.

3. GEREKSİZ BAŞVURU: TANIM, SIKLIK VE SONUÇLARI

Literatürde 'gereksiz', 'acil olmayan' (non-urgent), 'düşük aciliyetli' (low-acuity) ve 'uygunsuz' (inappropriate) başvuru terimleri çoğu zaman birbirinin yerine kullanılır; üzerinde uzlaşılmış tek bir tanım yoktur [1]. En işlevsel tanım, triyajda düşük aciliyet düzeyine (beş düzeyli sistemlerde tipik olarak düzey 4-5) atanan ve birinci basamakta güvenle yönetilebilecek ya da öz bakım önerileriyle izlenebilecek başvurulardır [1]. Bu tablo çoğunlukla ateş, hafif solunum yolu ve gastrointestinal yakınmalar ile minör yaralanmalardan oluşur [1]. Tanımlardaki bu belirsizlik, bildirilen sıklıkların neden %40-80 gibi geniş bir aralıkta değiştiğini de büyük ölçüde açıklamaktadır [1,2].
Burada kavramsal bir uyarı gereklidir: 'gereksiz' nitelemesi geriye dönük ve sistem gözünden yapılan bir değerlendirmedir; ebeveynin başvuru anındaki algısını yansıtmaz. Nitekim triyajda acil olmayan kategoriye alınan çocukların ebeveynlerinin üçte ikiye varan bölümü, çocuğunun durumunu acil ya da çok acil görmektedir [4,5]. Dolayısıyla önleme stratejileri, aileleri suçlayan bir dilden özenle kaçınmalı; ailelerin gerçek bir kaygıyla hareket ettiğini kabul ederek sistemi bu kaygıyı doğru yanıtlayacak biçimde yeniden düzenlemelidir.

4. GEREKSİZ BAŞVURULARIN BELİRLEYİCİLERİ

Ebeveynlerin minör hastalıklarda çocuk aciline başvurma nedenlerini inceleyen karma yöntemli bir sistematik derleme; algılanan aciliyet, birinci basamağa erişim güçlükleri, acil servisin sunduğu kolaylık ve kapsamlı olanaklar ile birinci basamaktan memnuniyetsizlik gibi birbiriyle bağlantılı etmenleri öne çıkarmıştır [2]. Bu etmenlerin ortak yanı, çoğu zaman ebeveynin algısı ile bilgi düzeyinin iç içe geçmesidir: aileler çocuklarının durumunu gerçekten acil gördüklerinde, yaygın çocukluk hastalıklarının evde nasıl izleneceğine ilişkin bilgi eksikliği başvuru kararını kolaylaştırmaktadır.
Sosyodemografik olarak genç ebeveyn yaşı, düşük eğitim ve gelir düzeyi ile sosyoekonomik dezavantaj, farklı sağlık sistemlerinde acil olmayan başvurularla ilişkilendirilmiştir [5]. Bakım verenin düşük sağlık okuryazarlığı ise hem toplam çocuk acil kullanımını hem de acil olmayan başvuruları artıran bağımsız bir etmen olarak öne çıkmaktadır [7].

5. KANITA DAYALI ÖNLEME STRATEJİLERİ

5.1. Ebeveyn Eğitimi ve Sağlık Okuryazarlığının Güçlendirilmesi

Minör sağlık sorunlarında birinci basamak ve acil kullanımını azaltmayı amaçlayan sağlık okuryazarlığı girişimlerini inceleyen kapsamlı bir sistematik derlemede, acil kullanımına etkiyi bildiren 30 çalışmanın 19'unda (%63) başvurularda azalma saptanmış; çalışmaların büyük çoğunluğunda kullanıcı memnuniyeti yüksek bulunmuştur [8]. Bu alandaki en güçlü kanıtlardan biri Danimarka'dan gelmektedir: 4.686 çağrının randomize edildiği bir klinik çalışmada, hasta çocukların bakım verenlerine yaygın semptomların evde yönetimine ilişkin kısa video eğitimleri sunulması, standart telefon triyajına kıyasla hastane değerlendirmesiyle sonuçlanan başvuruları anlamlı biçimde azaltmış (%27'ye karşı %35; olasılıklar oranı 0,67; %95 GA 0,55-0,82) ve bakım verenlerin öz yeterlilik algısını yükseltmiştir [9]. Tekrarlayan acil olmayan başvuruları ele alan bir sistematik derlemede ise taburculukta verilen bilgilendirme kitapçığının kısa bir yüz yüze eğitimle birleştirilmesinin, çocuk başına yıllık başvurularda küçük ama anlamlı bir azalma sağladığı bildirilmiştir [10].

5.2. Tele-Sağlık, Telefon ve Video Triyajı

Tele-tıp temelli girişimler, güncel derlemede en çok çalışmayla temsil edilen ve tutarlı biçimde olumlu sonuç bildirilen gruptur [1]. Amerika Birleşik Devletleri'nde, muayenehanelerin mesai dışında da telefonla ulaşılabildiği 'önce telefon et' modellerinin Medicaid kapsamındaki çocuklarda acil servis ve acil bakım merkezi kullanımını azalttığı ve maliyet tasarrufu sağladığı gösterilmiştir [11].

5.3. Birinci Basamağın Güçlendirilmesi ve Bakımın Sürekliliği

Birinci basamağa erişimin artırılması, uygunsuz acil başvurularını azaltmada merkezi bir role sahiptir. Bunun en somut örneklerinden biri, ABD'de bir klinikte poliklinik erişiminin genişletilmesi (aynı gün randevu ve uzatılmış saatler) ile ebeveyn eğitiminin birleştirildiği girişimdir: uygulama sonrası düşük aciliyetli çocuk acil başvuruları 12 ayda %29,8 azalmış ve Medicaid için yaklaşık 300.000 ABD doları tasarruf sağlanmıştır [12]. Türkiye bağlamında ise aile sağlığı merkezlerinin çocuk acil kullanımını önlemedeki rolünü inceleyen güncel bir çalışma, birinci basamağın kapasite ve erişilebilirliğine ilişkin algıların iyileştirilmesinin kritik olduğunu vurgulamakta [13]; Gaziantep çalışmasının yazarları da aile hekimliğinin ilk başvuru noktası olarak konumlandırılmasını ve ebeveynlerin çocuk sağlığı konusunda eğitilmesini önermektedir [4].

7. SONUÇ VE ÖNERİLER

Gereksiz pediatrik acil başvuruları; ailelerin bilgi gereksinimi, algılanan aciliyet ve sağlık sisteminin erişilebilirlik özelliklerinin kesiştiği, çok etmenli bir sistem sorunudur. Kanıta dayalı çözüm de tek bir müdahale değil, birbirini tamamlayan bileşenlerden oluşan bütüncül bir stratejidir. Son olarak, tüm bu girişimlerin başvuru sayıları, hasta güvenliği, aile memnuniyeti ve maliyet çıktılarıyla birlikte ileriye dönük değerlendirildiği ulusal araştırmalar planlanmalıdır. Aileleri suçlamayan, kaygılarını meşru kabul eden ve sistemi bu kaygıyı doğru kanala yönlendirecek biçimde tasarlayan bir yaklaşım; hem çocuk acillerinin gerçek acil hastalara

odaklanmasını hem de her çocuğun doğru zamanda doğru basamakta bakım almasını sağlayacaktır.

Destek: Çalışmanın hazırlanma sürecinde herhangi bir proje desteği veya başka bir araştırma desteği alınmamıştır.

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M4412-Tam Metin

THE IMPORTANCE OF SECONDARY DİAGNOSES İN PEDİATRİC PATİENTS PRESENTİNG WİTH TRAUMA: A CASE REPORT

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ABSTRACT

INTRODUCTION

Pediatric trauma cases are among the most common presentations to emergency departments, and during the assessment process clinicians typically direct their attention toward injuries that may be attributable to the trauma itself. However, it should be kept in mind that imaging performed for trauma evaluation may also reveal secondary or incidental diagnoses that are not directly related to the trauma. When the trauma-focused assessment is applied too narrowly, this may result in delayed diagnosis and possible complications. In this report, a pediatric case presenting to the emergency department after a fall from a tree, in whom appendicitis was diagnosed on imaging independently of the trauma, is discussed in light of the relevant literature.

CASE PRESENTATION

A 15-year-old male patient presented to the pediatric trauma unit of the Gaziantep University Emergency Department following a fall onto his back from a tree. The patient reported abdominal pain. On physical examination, no evident lesion was noted on inspection; tenderness was detected on palpation of the right lower quadrant. Vital signs at presentation were stable. Abdominal computed tomography obtained as part of the trauma protocol demonstrated an appendix with a maximal anteroposterior diameter of 7.7 mm, and the findings were considered consistent with appendicitis. Based on these findings, the pediatric surgery department was consulted with a diagnosis of appendicitis, and the patient was admitted with surgical treatment planned.

CONCLUSION

This case underscores that the evaluation of pediatric patients presenting with trauma should not be limited solely to traumatic injuries, and that secondary pathologies unrelated to the trauma should also be kept in mind. Systematic and comprehensive evaluation of post-traumatic imaging can help prevent surgical emergencies such as appendicitis from being overlooked, thereby contributing to the prevention of serious complications.

Keywords: pediatric trauma, appendicitis, secondary diagnosis

INTRODUCTION

Childhood trauma is among the most frequent reasons for emergency department presentation, and during the evaluation process the physician's attention is generally directed toward pathologies potentially related to the trauma. However, it should be borne in mind that secondary or incidental pathologies unrelated to the trauma may also be identified during trauma-related evaluations and imaging. This represents an important warning sign, as an overly narrow, trauma-focused assessment may result in the underlying primary pathology being overlooked and the diagnosis being delayed.

Among children undergoing CT for trauma, incidental (non-traumatic) findings are reported in approximately 20–27% of all CT scans, and in nearly 40% of abdominal/pelvic CT scans; however, only 3.5–5.5% of these findings require emergency management or close follow-up, with the majority being benign or amenable to routine surveillance Acute appendicitis, which may be among these findings, can pose a diagnostic dilemma for the clinician when identified concurrently with trauma; distinguishing whether the finding represents an incidental pathology independent of the trauma or a trauma-related (post-traumatic) entity can be difficult (Habachi et al.). In either scenario, right lower quadrant pain in a trauma patient should not be attributed solely to soft-tissue or organ injury, and surgical emergencies such as appendicitis must be kept in the differential diagnosis.

In this article, we present a pediatric case who presented to the emergency department with abdominal pain following a fall from a tree, in whom acute appendicitis independent of the trauma was identified on computed tomography obtained as part of the trauma protocol, with the aim of drawing attention to the importance of secondary diagnoses in trauma patients.

CASE PRESENTATION

A 15-year-old male patient presented to the Pediatric Trauma Unit of the Department of Emergency Medicine at Gaziantep University after falling onto his back from a height of approximately 3 meters from a tree. The patient reported no complaints other than abdominal pain that developed after the trauma. Vital signs and level of consciousness were normal, and the patient was evaluated in accordance with standard trauma protocols. On standard trauma assessment, guarding was present in the right lower quadrant. No other significant traumatic lesion or finding, such as ecchymosis, hematoma, or skin integrity disruption, was identified.

Contrast-enhanced abdominal computed tomography obtained as part of the trauma protocol demonstrated an appendix with a maximal anteroposterior diameter of 7.7 mm, surrounded by several lymph nodes reaching a size of a few centimeters, along with mesenteric fat stranding. **(Figure 1)** When these imaging findings were evaluated together with the accompanying clinical tenderness, they were considered consistent with acute appendicitis. As the patient had no other traumatic findings, the pediatric surgery department was consulted with a preliminary diagnosis of appendicitis; the patient was admitted, and surgical treatment was planned.

DISCUSSION

The frequency of incidental findings in pediatric trauma patients has increased with the expansion of imaging protocols. Among pediatric trauma cases undergoing whole-body CT, the prevalence of incidental findings has been reported to range between 20% and 27%, whereas this proportion can reach 40–47% in the abdominal CT subgroup. However, the large majority

of these findings represent benign changes requiring only routine follow-up; those requiring emergency management or close follow-up account for only 3.5–5.5%. (Alansari et al.; Hassankhani et al.; Ugalde et al.) This indicates that imaging in trauma patients should be evaluated systematically not only for traumatic injuries but also for the detection of concurrent surgical emergencies.

The co-occurrence of trauma and appendicitis has rarely been reported in the literature, and a causal relationship between the two entities has not been clearly established in most cases. It has been proposed that post-traumatic appendicitis may develop through mechanisms such as lymphoid hyperplasia, fecalith formation, or luminal obstruction of the appendix following blunt abdominal trauma. In many cases, however, imaging performed after trauma actually reveals appendicitis that has developed independently of, and coincidentally with, the trauma. (Ugalde et al.; Trout et al.) This distinction is important both for clinical management and from a forensic standpoint, underscoring that abdominal pain in patients with a history of trauma should not be attributed solely to traumatic injury.

In the pediatric age group, appendiceal diameter alone is not a sufficient diagnostic criterion. In the 2014 study by Trout et al. characterizing the normal pediatric appendix, the mean appendiceal diameter was found to be 5.6–5.7 mm; however, the normal range (95% confidence interval) extended up to 2.7–8.7 mm, and 34–39% of normal appendices were larger than 6 mm. These findings suggest that reliance on the conventional 6 mm cutoff alone in pediatric patients may lead to a considerable number of false-positive diagnoses. More recent studies indicate that diameters exceeding 7–8 mm on CT are more specific for appendicitis, but emphasize that the diagnosis should be established by considering additional radiologic findings—such as wall thickening, increased contrast enhancement, periappendiceal fat stranding, and the presence of a fecalith or free fluid—together with clinical examination findings. (Sams et al.; Trout et al.) In our case, an appendiceal diameter of 7.7 mm, together with periappendiceal inflammatory changes and right lower quadrant guarding, supported the diagnosis of acute appendicitis

CONCLUSION

This case highlights that the evaluation of pediatric patients presenting with trauma should not be limited solely to traumatic injuries, and that secondary pathologies—whether independent of or concurrent with the trauma—should also be considered. Systematic and comprehensive evaluation of post-traumatic imaging can help prevent surgical emergencies such as appendicitis from being overlooked, thereby contributing to the prevention of serious complications. Furthermore, this case once again demonstrates the importance of establishing the diagnosis in conjunction with clinical findings in situations where radiologic parameters such as appendiceal diameter yield borderline values

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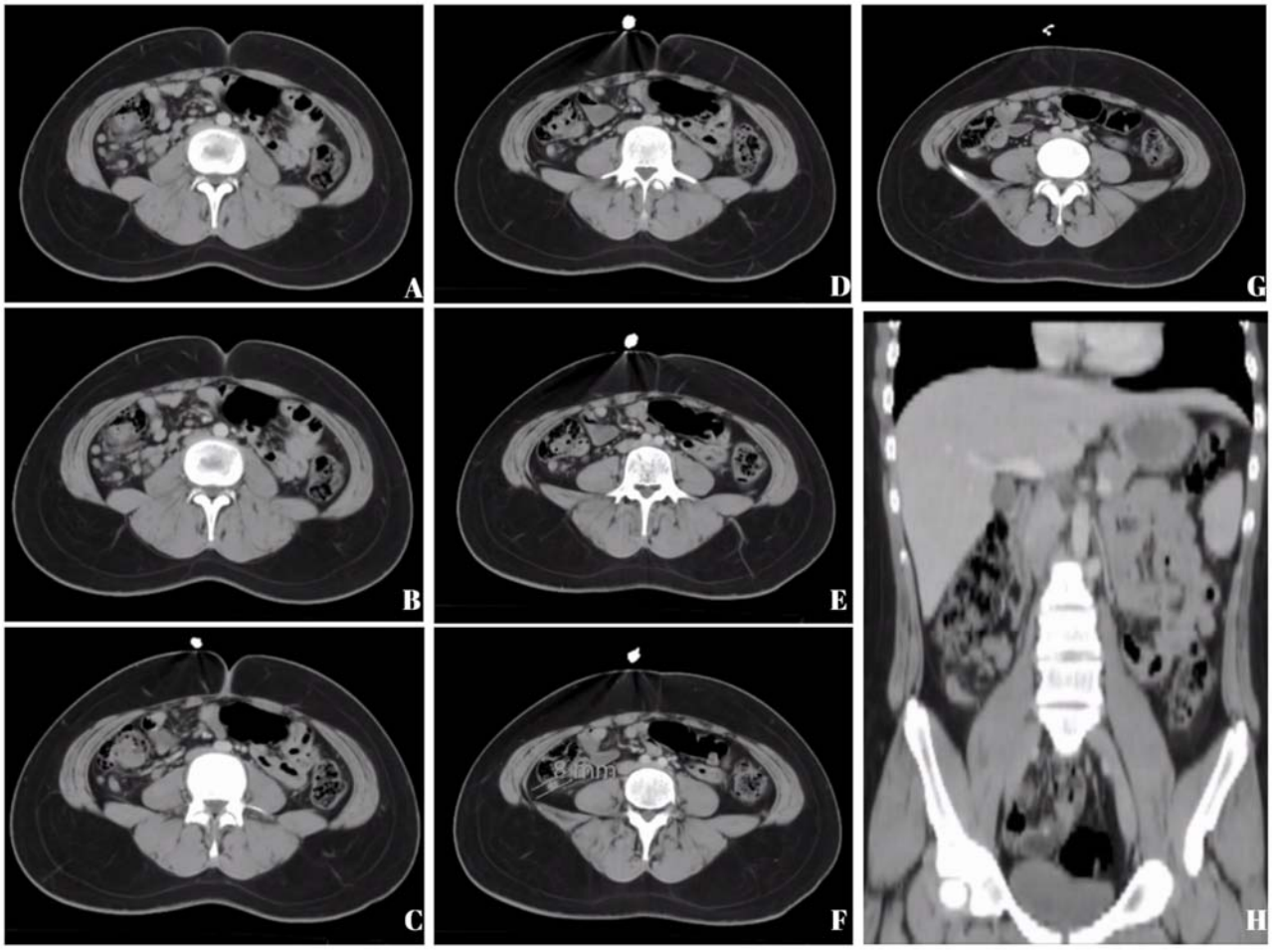
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FIGURES

Figure 1. CT Findings of acute appendicitis following blunt abdominal trauma / after a fall



M4579-Özet Metin

AKUT KARACİĞER YETMEZLİĞİNE YAKLAŞIM

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Akut Karaciğer Yetmezliği Çalışma Grubu (AKYÇG) tarafından, daha önce bilinen kronik karaciğer hastalığı olmayan bir kişide, hastalık belirtileri çıktıktan sonra ensefalopati olsun yada olmasınAkut karaciğer yetmezliğini gösteren biyokimyasal değerlerin olması (miyopati ile açıklanmadığı sürece Aspartat aminotransferaz (AST) veya alanin aminotransferaz (ALT) >100 IU/L, total bilirubin >5 mg/dL, direkt veya konjuge bilirubin >2 mg/dL ve/veya gama-glutamil transpeptidaz >100 IU/L.) ve düzeltilemeyen koagülopati ensefalopatisi olan hastalarda INR >1,5 veya PT >15sn, ensefalopatisi olmayanlarda INR > 2 veya PT >20sn olması olarak tanımlanmıştır. Akut karaciğer yetmezliğinin prognozunu daha iyi öngörebilmek için 1993 yılında O'Grady ve arkadaşları sarılığın başlamasından ensefalopatinin geliştiği süreye göre 1 hafta ise hiperakut,1-4 hafta ise akut, 5-12 hafta ise subakut karaciğer yetmezliği olarak sınıflamışlardır. Hiperakut tip yüksek serebral ödem sıklığına rağmen, tıbbi tedavi ile hayatta kalabilecek grubu oluştururken akut tip yüksek oranda beyin ödemi sıklığı olup karaciğer nakli olmadan kötü prognoza sahip grubu oluşturmakta ve subakut tip ise düşük beyin ödemi sıklığına rağmen karaciğer nakli olmadan kötü prognoza sahiptir.

Akut karaciğer yetmezliğinin sıklığı Amerika Birleşik Devletleri'ndeki tüm yaş gruplarında akut karaciğer yetnezliğinin tahmini sıklığı yılda 100.000 nüfus başına yaklaşık 17 vakadır, ancak çocuklardaki sıklık bilinmemektedir. Akut karaciğer yetmezliği Amerika Birleşik Devletleri'nde her yıl gerçekleştirilen pediatrik karaciğer nakillerinin yaklaşık %10'unu oluşturmaktadır Etiyoloji ülkeden ülkeye değişmekle beraber başta enfeksiyon hastalıları olmak üzere ilaçlar, toksinler, metabolik hastalıklar, vasküler nedenle, karaciğeri infiltre eden tümörler sorumlu olmasına rağmen halen vakaların %50'inde neden saptanamamaktadır.

Acil polikliniğe başvuran bu hastalarda çoğunlukla, halsizlik, sarılık, şuur bulanıklığı, enfeksiyöz hepatitin prodromal belirtileri (iştahsızlık, kusma, ishal, ateş…) gibi tipik bir anamnez söz konusudur. İyi bir öykü alınmalı;sarılık, mental durum değişikliği, kolay morarma, kusma ve ateş gibi semptomların başlama zamanı, benzer yakınmaların çevresindeki başka insanlarda da olup olmadığı, enfeksiyöz hepatitle temas öyküsü, kan transfüzyon öyküsü, intravenöz madde kullanımı, gençlerde depresyon ve suisit girişim öyküsü, evdeki ilaçların listesi, mantar yeme öyküsü, aile öyküsü (wilson, otoimmün hepatit, kardeş ölümü..), gelişimsel gecikme, nöbet öyküsü (metabolik hastalık açısından) sorgulanmalıdır. Fizik muayenede ilk olarak bilinç durumu değerlendirilmeli, mutlaka hepatik koma evrelemesi yapılmalı, büyüme, gelişme ve nutrisyonel durumun değerlendirilmeli, koagülopati bulgusu, karaciğer fonksiyonu ve kan akımı ile ilgili bulgular (sarılık, hepatomegali ve /veya splenomegali, asit, periferik ödem) aranmalı, fetor hepatikus açısından dikkatli olunmalı ve flepping tremora bakılmalıdır.

Akut karaciğer yetmezliğinden şüphelenildiği zaman kapsamlı laboratuvar incelemeleri ve görüntüleme yapılmalıdır. Bir yandan karaciğer hasarını (AST, ALT, LDH) ve kolestaz (GGT, ALP, Blirubinler) diğer yandan karaciğerin sentez (glikoz, albümin, PT/INR) ve detoksifikasyon fonksiyonu (Amonyak) bakılmalıdır. Öte yandan diğer organlarda eşlik eden komplikasyonları belirlemek için; kan gazı, laktat, üre, kreatin ve tam kan sayımı yapılmalıdır. Akut karaciğer yetmezliğinin tedavi edilebilir nedenlerini tespit etmek için serum asetoaminofen düzeyi, idrarda toksikolojik tarama, viral panel (HAV, HBV, HCV, HEV, HIV, HSV, CMV, EBV, VZV), seruloplazmin, 24 saatlik idrar bakırı, ANA, ASMA, LKM, IgG bakılmalıdır. Akut karaciğer yetmezliğinde metabolik tetkikler metabolik hastalıkları ayrıcı tanısını yapmak için mutlaka gönderilmelidir.

Önceden var olan herhangi bir karaciğer hastalığını veya vasküler bir etiyolojiyi tespit etmek için portal ve hepatik ven doppler US yapılmalıdır.

Hastada K vitaminine yanıtsız koagülopati, hipoglisemi, metabolik asidoz, ensefalopati varsa nakil merkezine yönlendirilmelidir. Nakil merkezine kan grubu uygun vericisi ile birlikte hastaya santral vevöz kateter takılarak, hipo/hipervolemiden, hipoglisemiden, elektrolit inbalansından kaçınarak, ensefalopati evre 3-4 de ise hasta ise entübe edilerek yönlendirilmelidir. Parasetamol intoksikasyonunda N-asetilsisteinin (NAC) etkinliği kanıtlanmış olup, AKYÇG tarafından ABD'de yapılan son prospectif çok merkezli bir çalışmada non-asetaminofen ile ilişkili AKY'de N-asetilsistein kullanımı mantıklı olarak gözükmektedir olarak rapor edilmiştir. Ensefalopati evre 1-2 olan hastalarda NAC karaciğer nakilsiz sağ kalım hızını arttırdığı görülmüştür. Transfer esnasında NAC infüzyonu başlanmalıdır.

Nakil merkezinde hastanın yönetimi multidisipliner olmalıdır. Bir taraftan çocuk yoğun bakım uzmanı ve çocuk hepatoloğu gelişebilecek komplikasyonlara karşı önlem alıp, karaciğerin fizyolojik fonksiyonlarını düzeltmeye ve karaciğerin iyileşmesi için zaman kazandırmaya çalışırken diğer taraftan nakil cerrahı olası karaciğer nakil gereksinimi için hastanın ulusal acil kadaverik karaciğer duyurusunu yapmalı ve hastanın canlı vericisini hazırlamalıdır.

Akut karaciğer yetmezliğinde metabolik, sıvı-elektrolit ve asit baz bozuklukları sıklıkla meydana gelir. Karaciğerin hayati metabolik fonksiyonlarının idame edebilmesi ve karaciğer rejenerasyonunun sağlana bilmesi için hastanın kan şekeri 90-110 mg/dl arasında tutulmalıdır. Hiponatremi, hipokalemi, hipokalsemi, hipofosfatemi ve hipomagnezemi sıklıkla gözlenir. Serum elektrolitleri sık monitörize edilmeli ve anormallikler hızlı bir şekilde düzeltilmelidir. Israrlı hiponatremi, hipoglisemi ve hiperfosfatemi kötü prognastik parametredir.

Katabolik süreçten kaçınmak için beslenme desteği sağlanmalıdır. Protein 1g/kg/gün ile sınırlandırılmalıdır. Eğer serum amonyak düzeyi yükseliyorsa 0.5g/kg/gün'e düşülmelidir. Bilinç açık olduğu sürece enteral beslenme önerilmektedir.

Koagülopati K vitamini ile düzelmiyorsa karaciğer yetmezliğini düşündürür. Günlük K vitamini yapılması gerekmez.

Hepatik ensefalopatili hastaların erken saptanması ve uygun tedavisi, beyin ödemi ve intrakranial basınç artışı ile ilişkili mortalite ve morbitideyi azaltmak için önemlidir.

Mortalite karaciğer transplantasyonunun keşfinden önceki dönemde %80'nin üzerinde iken, günümüzde posttransplant dönemde sürvinin %90'in üzerinde olduğu bilinmektedir. Transplantasyon kararı hastanın spontan hepatik iyileşme olasılığı göz önünde bulundurularak verilmelidir.

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M4580-Özet Metin

ALTIN SAAT İÇİNDE HEMORAJİK ŞOK YÖNETİMİ VE PERMİSİF HİPOTANSİYON

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Travmatik yaralanmalar çocuklarda önde gelen ölüm nedenlerindendir; günde 1.600'den fazla çocuk travma nedeniyle yaşamını kaybetmekte ve düşük gelirli ülkelerde risk sekiz kat artmaktadır.[1] Başlıca neden trafik yaralanmaları olup ölümlerin dörtte üçünden fazlası erkeklerde gerçekleşmektedir.[2]

Çocuklarda normal kalp hızı ve kan basıncı yaşla değişir. Toplam kan hacmi düşük olduğundan, küçük bir kayıp dolaşan hacmin önemli bir bölümünü oluşturabilir. [3–5] Hemorajiye karşı taşikardi ve periferik vazokonstriksiyonla santral organ perfüzyonu korunur. Bu sırada periferik nabızlarda zayıflama, soğuk ve soluk ekstremiteler, uzamış kapiller dolum, daralmış nabız basıncı, takipne, huzursuzluk ve bilinç değişikliği görülebilir; hipotansiyon ise ileri dolaşım yetersizliğini gösterir.[6] Hipotansiyon gelişmesini beklemek kanama kontrolünü geciktirerek mortaliteyi artırabilir.[4,5,7,8]

Yaşa bağlı fizyolojik değişkenlik nedeniyle pediatrik travmada yaşa göre uyarlanmış şok indeksi kullanılır:

SIPA (Shock Index, Pediatric Age-Adjusted) = Kalp hızı / Sistolik kan basıncı

SIPA, sonucun yaşa özgü eşiklerle yorumlanması bakımından klasik şok indeksinden ayrılır. Yüksek eşikler 4–6 yaşta 1,22, 7–12 yaşta 1 ve 13–16 yaşta 0,9'dur. Yüksek SIPA tanı koydurmaz; ancak ağır yaralanma, transfüzyon, acil cerrahi veya girişim, yoğun bakım yatışı ve mortalite riskinde artışla ilişkilidir.[9,10]

Yüksek enerjili travmalarda gizli hemoraji açısından kaviter alanlar ve uzun kemikler araştırılmalıdır.[3] Küçük çocuklarda açıklanamayan huzursuzluk, ebeveynle etkileşimin azalması,

uykuya eğilim veya çevreye yanıtın bozulması serebral hipoperfüzyonun erken bulguları olabilir. Klinik bulgular hemorajiye özgü değildir; birden fazla bulgunun birlikte bulunması ve zamanla kötüleşmesi uyarıcıdır.[3,8]

Pediatrik travmada altın saat kavramı, yaralanmadan definitif hemostaza kadar önlenebilir gecikmelerin ortadan kaldırılmasıdır.[11,12] Prehospital sürenin değerlendirildiği çalışmalarda en düşük mortalite 45–60 dakika aralığında ve hazırlığı yüksek travma merkezlerine başvurularda bildirilmiştir.[11,12] Prehospital kan ürünü uygulaması daha düşük 24 saatlik mortaliteyle ilişkilendirilmiştir.[13] Olay yerinde hava yolu, solunum ve dolaşımı doğrudan etkileyen dış kanama kontrolü, turnike, pelvik stabilizasyon, ısı kaybının önlenmesi ve gerektiğinde kan temelli resüsitasyon uygulanmalıdır.[3,12] Travma ekibi önceden aktive edilmeli; yaşa uygun ekipman, kan ürünleri ve cerrahi veya girişimsel ekipler hazırlanmalıdır. Definitif tedavi kararını değiştirmeyecek uygulamalardan kaçınılmalıdır. [3]

Kanama kaynağı belirlenirken yaralanma mekanizması, fizik muayene ve yatak başı görüntüleme birlikte değerlendirilmelidir. E-FAST değerlendirmeyle pnömotoraks, intraperitoneal, perikardiyal veya plevral serbest sıvı araştırılır. [3] Hemodinamik olarak instabil çocukta pozitif FAST, kaviter kanama olasılığını güçlendirerek erken cerrahi veya girişimsel tedavi kararını destekler; negatif sonuç ise aktif kanamayı dışlamaz.[14] Hemoperitoneumda duyarlılık %35–80 arasında değiştiğinden sonuç klinik bulgularla birlikte yorumlanmalıdır.[15] Kanama şüphesi devam eden hastada seri FAST artan serbest sıvıyı gösterebilir; ancak definitif hemostazı geciktirmemelidir. [16] Kontrastlı bilgisayarlı tomografi, hemodinamisi stabil çocuklarda intraabdominal ve retroperitoneal yaralanmaların temel görüntüleme yöntemidir. [15,17] İnstabil çocukta ise tomografi definitif hemostazı geciktirmemeli; kararın temelini hastanın fizyolojisi oluşturmalıdır. [17]

Pelvik yaralanma şüphesinde pıhtıyı bozma riskinden tekrarlayan sıkıştırma veya “springing” manevraları yapılmamalıdır. Pelvik kemer veya uygun şekilde katlanmış çarşaf büyük trokanterler seviyesine yerleştirilmeli ve gizli kanama alanlarının araştırılmasına devam edilmelidir. [18]

Damage-control resüsitasyon; erken kanama kontrolü, kan temelli resüsitasyon ve hemodilüsyon, hipotermi ile asidozun önlenmesini kapsayan bir yaklaşımdır.[19] Açık yara kanamasında doğrudan bası ve basınçlı pansuman uygulanmalı; basıyla kontrol edilemiyorsa yaralanmanın proksimaline ve eklem dışına turnike yerleştirilmeli; kanama sürüyorsa sıkılmalı veya ikinci turnike eklenmelidir. Uygulama zamanı kaydedilmeli ve turnike yalnızca definitif kontrol planı olduğunda gevşetilmelidir.[3] Değerlendirme, resüsitasyon ve kanama kontrolü ardışık değil, paralel yürütülmelidir. [3,19]

İki periferik intravenöz girişim başarısızsa intraosseöz erişim geciktirilmemelidir. Tekrarlayan kristalloid bolusları hemodilüsyon, doku ödemi ve hipotermiyi artırabileceğinden kan ürünleri öncelenmelidir. [3] Çocuklar yüksek vücut yüzey alanı/kütle oranı nedeniyle hızla ısı kaybeder; hipotermi pıhtılaşmayı bozarak kanamayı ağırlaştırır.[3,6] Hasta yalnızca gerekli muayene süresince açılmalı; ortam, battaniye, intravenöz sıvılar ve kan ürünleri ısıtılmalı, vücut sıcaklığı seri izlenmelidir. Masif kanama protokolü devam eden kanama, kötüleşen fizyoloji ve beklenen transfüzyon gereksinimine göre erken aktive edilmeli; kan bankası, kilo temelli ürünler, ısıtıcılar

ve infüzyon ekipmanı hazırlanmalıdır. [3,19] İlk müdahalelerden sonra kanama, santral ve periferik nabızlar, kapiller dolum, mental durum, cilt sıcaklığı ve yaşa uygun vital bulgular yeniden değerlendirilmelidir. Damage-control resüsitasyonun definitif hemostazın alternatifi olmadığı unutulmamalıdır. [19]

Permisif hipotansiyon, aktif kanama kontrol edilene kadar agresif sıvı uygulamasından kaçınarak kanama artışını, koagülasyon faktörlerinin seyrelmesini ve hipotermiyi önlemeyi; organ perfüzyonunu sürdürebilecek en düşük yeterli dolaşım düzeyini korumayı amaçlar.[19,20] Çocuklarda yaşla değişen normaller ve kan kaybının uzun süre kompanse edilebilmesi nedeniyle erişkinlere ait sabit hedefler doğrudan uygulanamaz bu nedenle pediatrik hemorajik şokta permisif hipotansiyon önerilmemektedir. [3] Çocuklarda en düşük yeterli dolaşım düzeyi sağlanırken resüsitasyon yaşa uygun kan basıncı ve klinik perfüzyona göre titre edilmeli; yeterli oksijen sunumu ile uç organ perfüzyonu sağlanmalıdır.[3,20]

Travmatik beyin hasarı dışlanamayan çocukta hipotansiyon, serebral perfüzyonu azaltarak sekonder iskemi ve kötü nörolojik sonuç riskini artırır. [21,22] Sedasyon, hipoksi, şok ve gelişimsel özellikler nörolojik değerlendirmeyi güçleştirebilir. Bu nedenle düşük arter basıncı hızla düzeltilmesi gereken bir sekonder hasar kaynağı kabul edilmelidir.[3,22] Serebral perfüzyon basıncı intrakraniyal basınç ölçülen hastalarda en az 40 mmHg tutulmalıdır.[22] Hava yolu ve oksijenasyon erken güvence altına alınmalı; hipoksi ve serebral kan akımını azaltabilecek aşırı hipokapniden kaçınılmalıdır.[21,22] Pediatrik yaşam desteği önerileri, genel şok yönetiminde 5. persentilin minimum eşik kabul edilmesini vurgular.[23]

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M4581-Özet Metin
ÇOCUKLARDA TRAVMATIK BEYIN HASARINDA KONTRASTSIZ BT BULGULARI

Ayla Özaydoğdu Çimen
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AMAÇ
Acil ortamda pediatrik kraniyal BT'yi sistematik okumak, cerrahi aciliyet gerektiren bulguları tanımak, yaşa bağlı tuzaklardan kaçınmak ve nöroşirürjiyi ne zaman arayacağını bilmek.

GiRiŞ

TBH(Travmatik beyin hasarı), çocukluk çağı ölüm ve engelliliğinin önde gelen önlenebilir nedenlerindendir. Küçük yaşta en sık düşme sonucu travmatik beyin hasarı meydana gelmektedir. 0-4 yaş grubunda spor ve darbeye bağlıı yaralanmalar ön planda iken, küçük çocuk (5- yaş)ve ergenlerde travmatik beyin hasarı bimodal dağılım göstermektedir.Ayrıca 2 yaş altındaki çocuklarda travmatik beyin hasarında kaza dışı travmalar akla getirilmelidir. İstismara bağlı kafa travması veya halk arasında bilinen adıyla sarsılmış bebek sendromu atlanmamalıdır.

YÖNTEM

Amerikan Nöroloji Akademisine göre bilinç kaybı, travma sonrası amnezi, Glaskow koma skalası (GKS)'de bozulma, nörolojik defisit varlığı ve/veya kafatası kırığı olgularında beyin bilgisayarlı tomografi çekmek gerekir. Bilgisayarlı tomografi (BT) çekme kararını vermede PECARN kriterlerinin (<2 yaş altı hastada GKS≤14, bilinç bulanıklığı, palpabl kafatası kırığı) göz önünde bulundurulması yardımcı olacaktır.

Çocuk beyni radyasyona daha duyarlı olduğundan bu hastalarda BT çekimi öncesinde fayda-zarar değerlendirilmesini iyi gözetmek gereklidir. Gereksiz BT çekimlerinde kümülatif doz riski mevcuttur.

BT Tekniği

İnce kesit kemik ve beyin rekonstrüksiyonlu çekim yapmak lazım. BT Aksiyel ve koronal/sagital reformat düzlemde değerlendirilmelidir. Pediatrik düşük doz protokolü ile çekim yapılmalıdır. Beyin penceresi değerlendirilmesinde (WW ≈ 80 HU(Hounsfield Unit) ve WL ≈ 40 HU) parankim, kanama ve ödem olup olmadığı taranmalıdır. Kemik penceresinde(WW ≈ 2000–4000 HU · WL ≈ 400–700 HU) kırık, suture ve dislokasyon olup olmadığı değerlendirilmelidir.

BULGULAR

Kemik penceresi olmadan kırık kaçar ve sutur ile karıştırmamak gereklidir. Kemik yapıların değerlendirilmesinde özellikle kafatası kırıklarında üç temel patern dikkate alınmalıdır. Lineer kırıklarda; keskin, dallanmayan lüsent hat görülür. Suturdan farkı ise düz seyirli olması, zigzag şeklinde olmaması ve sklerotik kenar yokluğudur. Deprese kırıklarda; içe çökmüş kemik fragmanıgörülür. Tabla kalınlığından daha derin çökmeler cerrahi gereksinimi açısında değerlendirme gerektirir. Diyastatik kırıklarda; sutur ayrışması veya genişlemesi gözlenir. Çocuklarda suturlar açık olduğundan asimetrik veya geniş sutur görünümü önemlidir ve büyüyen kırığa zemin hazırlayacağı unutulmamalıdır.

Ekstraaksiyel kanama

Epidural hematom(EDH) genellikle BT'de bikonveks (lens) şeklinde görülür. Keskin sınırlı hiperdens bir lezyondur. Sutur hatlarını sıklıkla geçmez ve büyük çoğunluğu arteriyel (a. meningea media)kanamalardır. Komşu kalvaryal kırıklar sık eşlik eden bulgulardır. Lucid intervali değerlendirildiğinde hastalar başlangıçta uyanıktır ve saatler içinde hızlı kötüleşme görülür. Bu internal klasiktir ama her zaman olmayabilir. Çocuklarda erişkin hastalardan farklı olarak venöz kaynaklı EDH'lar daha sık görülür. Daha sinsi seyirlidir. Kırık her zaman eşlik etmeyebilir ve hızlı hacim artışı erken cerrahi kritik karar vermede önem arz etmektedir.

Subdural hematom (SDH) hilal şeklinde görülen kanamalardır. Sıklıkla köprü ven yırtığı sonucu oluşur. Konkav iç kenarşeklinde görünür, geniş yayılım gösterebilir ve sıklıkla sütür hatlarını aşar. Akut evrede (<3 gün) BT' de hiperdens (Beyaz- parankimden parlak), subakut evrede (3 gün-3 hafta) BT' de izodens (parenkime yakın parlaklıkta), Kronik (>3 hafta) evrede ise hipodens (Beyin omurilik sıvısına yakın koyulukta görünür.

Subaraknoid Kanama sıklıkla travma ile ilişkilidir. Sisternde ve sulkuslarda kan görülür. BT bulguları sistern/sulkus/fissürde hiperdens çizgilenme, normal hipodens BOS boşluklarının "dolması", şeklindedir. Sylvian ve interhemisferik fissure ve bazal sisternlerde kan görülmesi tipiktir. Travmatik subaraknoid hematom genelde fokal ve yüzeyeldir. Yaygın bazal sistern dolumu anevrizmal kanamayı düşündürür.
Parankim (Kontüzyon & intraparankimal kanama) da ilk BT normal olabilir. Klinik kötüleşme durumunda (lezyonlar sıklıkla ilk 24–48 saatte büyür.) tekrar BT yapılmalıdır. BT bulguları arasında; parankim içi hiperdens (kanama) odağı, Çevresel hipodens ödem (miks dansite)görülebilir. Frontal/temporal pol yerleşimi tipiktir. Zamanla "çiçeklenme" (blossoming) büyüyebilir.
Diffüz hasar (Diffüz Aksonal Hasar-DAI) da tipik bulgu peteşiyal kanamalardır. Tipik lokalizasyon gri-beyaz cevher bileşkesi, korpus kallozum ve dorsolateral beyin sapıdır. BT' nin normal olması beyinde hasar olmadığı anlamına gelmez. Düşük GKS ve nispeten normal BT bulgusu durumunda DAI'yı düşünmek gerekir. Kesin tanı MRI(Magnetik Rezonans Görüntüleme) ile konulabilir.
Pediyatrik hasta özelinde baktığımızda büyüyen kırık sıklıkla bir leptomeningeal kist olduğunu düşündürür. BT' de genişleyen kırık defekti, kemik kenarlarında erozyon, BOS dansiteli leptomeningeal kist ve komşu ensefalomalazi görülür. Klinik olarak palpabl, büyüyen skalp kitlesi, cerrahi (dura onarımı sonrası takip görüntüleme önemli ve şarttır.
Pediatrik hastalarda bir diğer önemli husus nontravmatik (istismara bağlı) beyin hasarlarıdır. Öykü ile bulgu uyumsuzluğu, değişen anamnez, yaşa uymayan mekanizma (hareketsiz bebekte kanama), gecikmiş başvuru, eşlik eden farklı yaşta kırıklar ve retinal kanama istismara bağlı kanamayı düşündürmelidir. Bu çocuklardaki BT bulguları ise bilateral / interhemisferik SDH, Subdural higroma, diffüz beyin ödemi ve hipoksik hasardır. Pediatrik hastalarda beyin ödemi de önemli bir travma bulgudur. Çocukta yaygın, kitlesiz ödem (pure diffuse swelling) tipiktir. Diffüz ödemde sulkuslar silinmiş, slit ventriküller, gri-beyaz ayrımı kaybolmuştur.

SONUÇ

Sonuç olarak travmatik beyiin hasarında BT kararını PECARN ile vermek ve gereksiz radyasyondan kaçınmak gereklidir. Her BT hem kemik hem beyin penceresinden sistematik okunmalıdır. Kanama bulgularını net bir şekilde ayırt etmek ve gerekli durumda nöroşirürji konsültasyonu yapmak hayat kurtarıcı olmaktadır.
Destek : Herhangi bir proje desteği veya başka araştırma desteği alınmamıştır.
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M4467-Tam Metin

BLOOD–BRAİN BARRİER DİSRUPTİON AND NEURONAL APOPTOSİS İN PEDİATRİC STATUS EPİLEPTİCUS: PATHOPHYSİOLOGİCAL MECHANİSMS AND CLİNİCAL IMPLİCATİONS

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ABSTRACT

Introduction

Status epilepticus is a major pediatric neurological emergency that develops when the physiological mechanisms responsible for terminating a seizure become insufficient. Prolonged convulsive seizures may lead not only to persistent electrical activity but also to progressive metabolic and cellular injury.

Main Body

During prolonged seizures, gamma-aminobutyric acid-mediated inhibitory neurotransmission may decrease, whereas glutamate-mediated excitatory neurotransmission may increase. This alteration may enhance sodium and calcium influx into neurons. Intracellular calcium accumulation may contribute to increased energy consumption. It may also impair mitochondrial function and increase oxidative stress and neuroinflammation.

The blood–brain barrier plays a fundamental role in maintaining central nervous system homeostasis. It consists of endothelial cells, tight junction proteins, pericytes, and astrocytic end-feet. Oxidative stress and inflammatory mediators generated during status epilepticus may disrupt barrier integrity. Damage to tight junction proteins may increase blood–brain barrier permeability. Consequently, plasma proteins and inflammatory components may enter the brain parenchyma. This process may increase glial cell activation, cerebral edema, and neuronal excitability. The bidirectional interaction between barrier disruption and neuroinflammation may promote seizure persistence.

Disruption of mitochondrial membrane integrity may result in cytochrome c release. Subsequently, the intrinsic apoptotic pathway mediated by caspase-9 and caspase-3 may be activated. Caspase-8 may also contribute to the extrinsic apoptotic pathway through death receptor signaling. As seizure duration increases, these mechanisms may contribute to a higher risk of neuronal injury and permanent neurological impairment.

Conclusion

This review summarizes blood–brain barrier disruption, neuroinflammation, caspase-mediated neuronal apoptosis, and the clinical significance of these processes in pediatric status epilepticus in light of the current literature.

Keywords: Child, status epilepticus, blood–brain barrier, neuroinflammation, caspase, neuronal apoptosis.

INTRODUCTION

Status epilepticus is a neurological emergency that occurs when the physiological mechanisms responsible for seizure termination become insufficient or when mechanisms that sustain seizure activity are activated. In convulsive status epilepticus, five minutes is considered the first critical time point at which treatment should be initiated. A seizure duration of approximately thirty minutes may increase the risk of neuronal injury, cell death, and long-term alterations in neural networks (1).

Status epilepticus is a major cause of morbidity and neurological impairment in childhood (2). Its incidence is particularly high during the first years of life. Febrile status epilepticus is among the most common causes of convulsive status epilepticus in children (3). Central nervous system infections, metabolic disorders, and electrolyte disturbances are also important etiological factors

(3,4). Trauma, toxic exposures, and the discontinuation or irregular use of antiseizure medications may also contribute to the development of status epilepticus (5).
The causes and outcomes of status epilepticus may vary according to the child's age. In the developing brain, synaptic connections, ion channels, and neurotransmitter systems continue to mature. The balance between excitatory and inhibitory neurotransmission also exhibits age-dependent characteristics. These features may influence both the susceptibility of the pediatric brain to seizure generation and its response to prolonged seizures (3,6).
A prolonged seizure is not limited to persistent electrical activity. Neuronal energy demand may increase, ionic homeostasis may be disrupted, and excitotoxic processes may be activated. Oxidative stress and neuroinflammation may affect neurons, glial cells, and the cerebral vasculature. These processes may compromise the structural and functional integrity of the blood–brain barrier (7).
Blood–brain barrier disruption may adversely affect central nervous system homeostasis. Increased barrier permeability may facilitate the entry of serum proteins and inflammatory components into the brain parenchyma. These alterations may enhance neuronal excitability and contribute to the persistence of seizure activity. Therefore, blood–brain barrier dysfunction is not regarded solely as a consequence of seizures. It is also considered a potential mechanism that may sustain seizure activity (7,8).
Prolonged cellular stress may impair mitochondrial function and contribute to the activation of caspase-mediated apoptotic pathways. The integrated evaluation of blood–brain barrier disruption, neuroinflammation, and neuronal apoptosis may provide a better understanding of the pathophysiological consequences of pediatric status epilepticus. This perspective highlights that early treatment is important not only for terminating seizure activity but also for limiting progressive cellular injury (1,7).

PATHOPHYSIOLOGY AND CLINICAL IMPLICATIONS OF PROLONGED SEIZURES

Normal brain function depends on a physiological balance between excitatory and inhibitory neurotransmission. Glutamate is the principal excitatory neurotransmitter in the central nervous system, whereas gamma-aminobutyric acid (GABA) is the principal inhibitory neurotransmitter. Activation of gamma-aminobutyric acid type A (GABA-A) receptors reduces neuronal excitability. In contrast, activation of N-methyl-D-aspartate (NMDA) and alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptors promotes neuronal depolarization. Under physiological conditions, this balance is maintained through the coordinated activity of voltage-gated sodium, potassium, and calcium channels (9,10). During childhood, the incomplete maturation of inhibitory neural circuits may contribute to the increased susceptibility of the developing brain to prolonged seizures (3,6).

At the onset of status epilepticus, inhibitory mechanisms attempt to terminate seizure activity. However, as the seizure persists, a proportion of synaptic GABA-A receptors may undergo internalization. Consequently, GABA-mediated inhibition may progressively weaken. In contrast, the activity of NMDA and AMPA receptors at the synaptic membrane may increase. These alterations may contribute to the transition of seizure activity into a self-sustaining process (9–11).
In prolonged seizures, GABA-A receptor internalization and increased NMDA receptor expression are among the principal mechanisms underlying the development of pharmacodynamic resistance to benzodiazepines (10,11).
The reduction in GABA-A receptor availability may also influence the clinical response to treatment. Benzodiazepines exert their effects through GABA-A receptors. As seizure duration increases, responsiveness to benzodiazepines may decrease. Therefore, early administration of treatment is essential. Delayed treatment may make seizure control more difficult and increase the need for second-line antiseizure medications (10,12).

Excessive activation of glutamate receptors may increase sodium and calcium influx into neurons. Intracellular sodium accumulation may contribute to cellular swelling, whereas calcium accumulation may activate proteases, phospholipases, and other pathways involved in cellular injury. The process by which excessive glutamatergic stimulation becomes harmful to the cell is defined as excitotoxicity (9,13). Increased intracellular calcium may also activate calpains and endonucleases, thereby contributing to cytoskeletal degradation, membrane damage, and DNA fragmentation (9,13).

During a seizure, neuronal energy demand increases markedly. Initially, cerebral blood flow and glucose utilization increase. However, as the seizure persists, energy production may become insufficient to meet the increased metabolic demand. Reduced adenosine triphosphate (ATP) levels may impair ion pump function. Mitochondrial calcium loading may increase, and the generation of reactive oxygen species may accelerate. These processes may contribute to the progression of neuronal injury. Opening of the mitochondrial permeability transition pore may reduce ATP synthesis, impair oxidative phosphorylation, and lead to sustained neuronal depolarization (9,13).

Hypoxia, hypoglycemia, hypotension, and electrolyte disturbances may exacerbate energy failure. Therefore, the management of pediatric status epilepticus should not be limited to seizure termination alone. Maintaining adequate oxygenation, circulation, blood glucose levels, and metabolic homeostasis is also essential for limiting secondary brain injury (12,14).

BLOOD–BRAIN BARRIER DISRUPTION AND NEUROINFLAMMATION

The blood–brain barrier regulates the transport of substances between the central nervous system and the systemic circulation. The barrier consists of endothelial cells, tight junction proteins, pericytes, and astrocytic end-feet. This structure contributes to the maintenance of ionic and metabolic homeostasis within the brain tissue. In addition, the neurovascular unit, together with the basement membrane and extracellular matrix components, plays a role in preserving barrier integrity (7,8).

Oxidative stress and inflammation associated with status epilepticus may damage endothelial cells and tight junction proteins. Consequently, blood–brain barrier permeability may increase, facilitating the entry of albumin and other serum components into the brain parenchyma. This process may impair astrocytic function and contribute to the extracellular accumulation of glutamate and potassium, thereby increasing neuronal excitability. Reduced expression of tight junction proteins, including claudin-5, occludin, and zonula occludens-1 (ZO-1), may further enhance paracellular permeability (7,8).

Prolonged seizure activity may contribute to the activation of microglia and astrocytes. Cytokines released from these cells, including interleukin-1 beta, interleukin-6, and tumor necrosis factor-alpha, may amplify the inflammatory response. Consequently, a bidirectional cycle may develop

among seizure activity, neuroinflammation, and blood–brain barrier disruption (7,13).

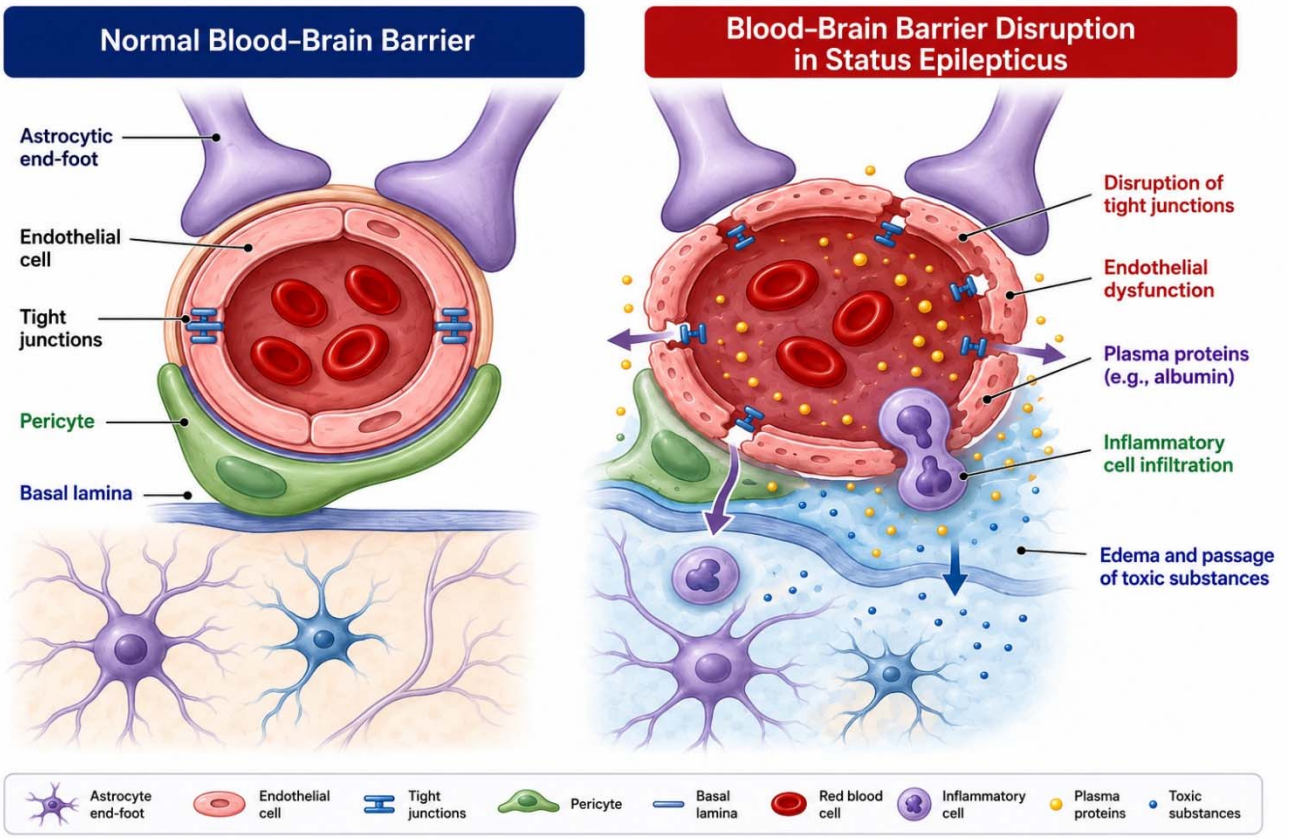


Figure 1. Comparison of the normal blood–brain barrier with blood–brain barrier disruption occurring during status epilepticus.

NEURONAL APOPTOSIS AND CASPASE ACTIVATION

Increased glutamatergic activity during status epilepticus may lead to excessive calcium influx into neurons. Mitochondria contribute to the regulation of intracellular calcium homeostasis. However, excessive calcium loading may disrupt the mitochondrial membrane potential. Consequently, adenosine triphosphate production may decrease, while the generation of reactive oxygen species may increase. These alterations may contribute to the activation of the intrinsic apoptotic pathway (9,13).

During status epilepticus, the permeability of the outer mitochondrial membrane may increase, resulting in the release of cytochrome c into the cytoplasm. Cytochrome c binds to apoptotic protease-activating factor 1 (Apaf-1) to form the apoptosome complex. The apoptosome subsequently activates the initiator caspase-9, which in turn activates the executioner caspase-3. Caspase-3 activation leads to the cleavage of cellular proteins, chromatin condensation, and DNA fragmentation (15,16).

The apoptotic process is regulated by the B-cell lymphoma 2 (Bcl-2) protein family. Proapoptotic proteins, such as Bcl-2-associated X protein (Bax), increase the permeability of the outer mitochondrial membrane. In contrast, antiapoptotic proteins, including Bcl-2, contribute to the preservation of mitochondrial membrane integrity. A shift in the Bax/Bcl-2 balance toward a proapoptotic state may facilitate neuronal apoptosis (16).

Activation of death receptors may initiate the caspase-8-mediated extrinsic apoptotic pathway. Activated caspase-8 may directly activate caspase-3. Thus, the intrinsic and extrinsic apoptotic pathways may converge on caspase-3 activation and contribute to neuronal apoptosis (Figure 2). However, cell death in status epilepticus is not limited to apoptosis. Apoptosis and necrosis may occur concurrently. The predominant mode of cell death may vary depending on seizure duration, the severity of injury, and cellular energy status (15,16).

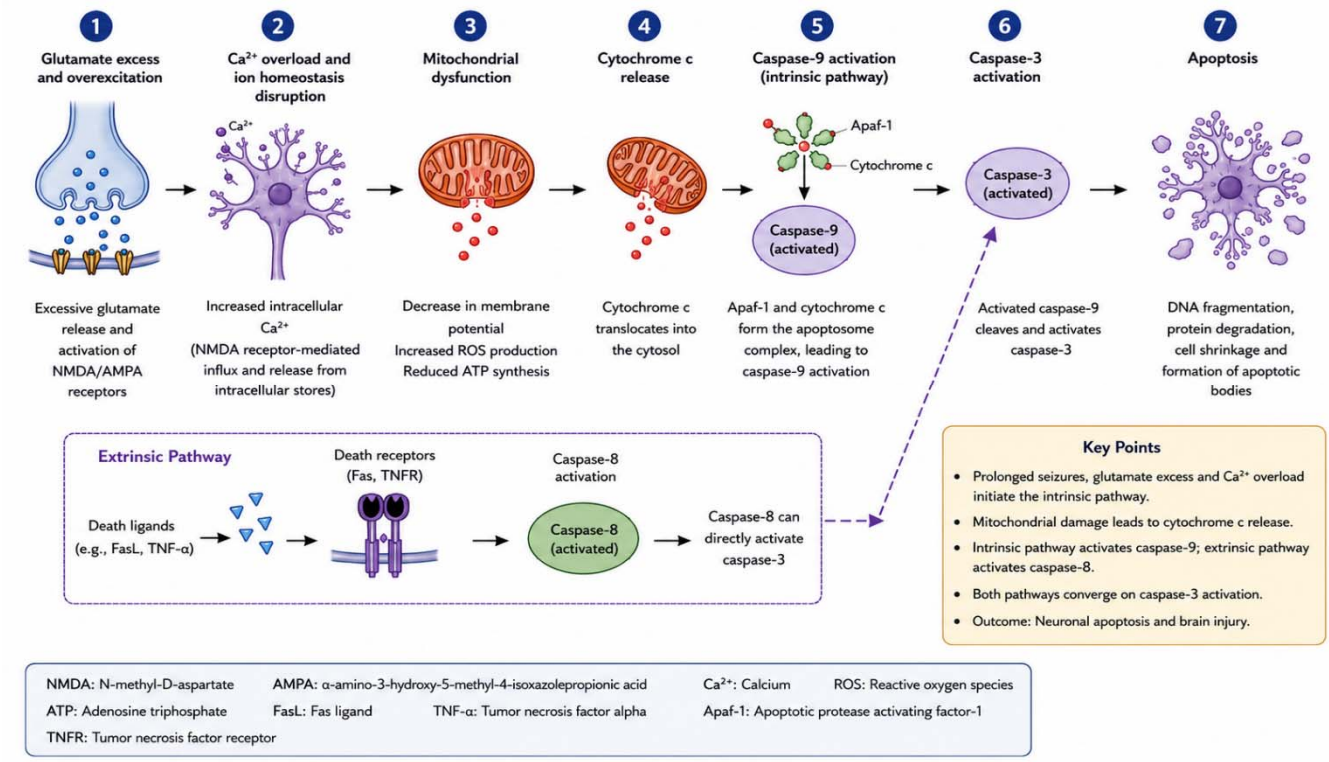


Figure 2. Intrinsic and extrinsic pathways of neuronal apoptosis during status epileptic

CLINICAL SIGNIFICANCE AND CONCLUSION

Pediatric status epilepticus should not be regarded merely as prolonged electrical activity. A prolonged seizure is a dynamic process that simultaneously affects neurotransmitter balance, cellular energy metabolism, the neurovascular unit, and cell survival. Reduced GABA-mediated inhibition and increased glutamate-mediated excitation may impair the spontaneous termination of seizure activity. These alterations may also contribute to a progressive decline in treatment responsiveness over time (9,10).

Increased intracellular calcium levels may impair mitochondrial energy production and exacerbate oxidative stress. Disruption of blood–brain barrier integrity may facilitate the passage of serum proteins and inflammatory components into the brain parenchyma. The inflammatory response associated with microglial and astrocytic activation may further increase neuronal excitability. Consequently, a self-sustaining cycle may develop among seizure activity, blood–brain barrier disruption, and neuroinflammation (7,13).

Progressive mitochondrial damage may contribute to cytochrome c release and the activation of caspase-mediated apoptotic pathways. Caspase-9 and caspase-3 are involved in the intrinsic apoptotic pathway, whereas caspase-8 contributes to the extrinsic pathway. These mechanisms may explain the cellular basis of neuronal loss that can develop following prolonged seizures.

However, cell death is not limited to apoptosis alone. Seizure duration, the severity of injury, and cellular energy status may influence the concurrent occurrence of apoptosis and necrosis (15,16).

In the developing pediatric brain, synaptic networks and inhibitory systems continue to mature. Therefore, the pathophysiological consequences of prolonged seizures may vary with age (3,6). Early management of pediatric status epilepticus should not focus solely on terminating motor seizure activity. Maintaining adequate oxygenation, circulation, blood glucose levels, and metabolic homeostasis is also essential for limiting secondary brain injury (12,14).

In conclusion, pediatric status epilepticus is a dynamic process characterized by disruption of the physiological balance between neuronal excitability and inhibitory control. Prolonged seizure activity simultaneously affects ionic homeostasis, cellular energy production, mitochondrial function, and blood–brain barrier integrity. These alterations enhance neuroinflammation and promote caspase-mediated cell death. Consequently, seizure activity that is initially electrical in nature may progressively lead to neurovascular and cellular injury. Therefore, early and effective treatment is critically important not only for terminating seizure activity but also for preserving brain homeostasis and limiting irreversible neuronal loss.

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M4479-Tam Metin

ASSOCİATİONS OF NLR, PLR, MLR, SII, SIRI, PNI, AND RAR WİTH BURN SİZE AND LENGTH OF STAY İN PEDİATRİC PATİENTS WİTH MAJOR BURNS

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AIM

Burn injuries in pediatric patients may result in prolonged hospitalization and increased healthcare requirements (1). Burns involving ≥20% total body surface area (TBSA) may induce marked systemic inflammatory and hypermetabolic responses in children (2,3). Indices derived from complete blood count and albumin measurements may provide accessible information about inflammatory and nutritional status (4-6). This study evaluated the relationships of the neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), monocyte-to-lymphocyte ratio (MLR), systemic immune-inflammation index (SII), systemic inflammation response index (SIRI), prognostic nutritional index (PNI), and red cell distribution width-to-albumin ratio (RAR) with intensive care unit length of stay and TBSA in pediatric patients with major burns.

METHODS

This single-center retrospective study included patients younger than 18 years treated in the Pediatric Burn Intensive Care Unit of İnönü University Turgut Özal Medical Center between January 1 and December 31, 2025. Ethics committee approval was obtained, and informed consent was waived. Patients with burns involving ≥20% TBSA who presented within 24 hours and had complete admission laboratory and hospitalization data were included. Patients with active infection, malignancy, hematological or chronic inflammatory disease, kidney or liver failure, immunosuppressive treatment, serious concomitant trauma, or insufficient data were excluded. Of 153 screened patients, 28 were excluded because of missing data and 22 because TBSA was <20%; 103 patients were analyzed.

Age, sex, burn etiology and depth, TBSA calculated using the Lund–Browder chart, and length of stay were recorded. Indices were calculated from the first pretreatment laboratory results: SII=platelet×neutrophil/lymphocyte; SIRI=neutrophil×monocyte/lymphocyte; PNI=albumin (g/L)+5×lymphocyte count (10^9/L); and RAR=RDW-CV (%)/albumin (g/dL). Relationships with length of stay and TBSA were assessed using Spearman correlation analysis. Burn etiologies were compared using the Kruskal–Wallis test and, when appropriate, Dunn's test with Bonferroni correction. A two-sided $p<0.05$ was considered significant.

RESULTS

Burns were caused by hot water in 68 patients (66.0%), flames in 16 (15.5%), hot milk in 11 (10.7%), electricity in five (4.9%), hot oil in two (1.9%), and syrup in one (1.0%). Median NLR

and MLR values did not differ significantly according to burn etiology (Figure 1). TBSA was strongly correlated with length of stay (ρ=0.640; $p<0.001$). Length of stay was positively correlated with SIRI and RAR and negatively correlated with PNI. TBSA was positively correlated with RAR and negatively correlated with PNI (Table 1). Other correlations were not significant.

CONCLUSION

Higher SIRI and RAR and lower PNI were associated with longer intensive care unit stays in pediatric patients with major burns. RAR showed the strongest relationships with both length of stay and TBSA and may reflect systemic inflammation, protein loss, and physiological burden. However, the weak-to-moderate correlations do not establish causality or independent prognostic value. The retrospective single-center design, single laboratory measurement, and small etiological subgroups were the main limitations. These readily calculated indices may support initial clinical assessment, but their independent prognostic performance should be evaluated in larger multicenter studies using adjusted models.

Financial support: None.

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Table 1. Correlations of inflammatory and nutritional indices with intensive care unit length of stay and TBSA burned

Index	ICU length of stay, Spearman's ρ	p-value	TBSA burned, Spearman's ρ	p-value
NLR	0,141	0,1589	0,124	0,2160
PLR	0,043	0,6629	−0,018	0,8541
MLR	0,163	0,1003	0,169	0,0888
SII	0,153	0,1235	0,062	0,5318

SIRI	0,216	**0,0286***	0,178	0,0714
PNI	−0,235	**0,0168***	−0,331	**0,0006***
RAR	0,327	**0,0007***	0,394	**<0,001***

Data were analyzed using Spearman's rank correlation analysis. ρ: Spearman's rank correlation coefficient; TBSA: total body surface area; NLR: neutrophil-to-lymphocyte ratio; PLR: platelet-to-lymphocyte ratio; MLR: monocyte-to-lymphocyte ratio; SII: systemic immune-inflammation index; SIRI: systemic inflammation response index; PNI: prognostic nutritional index; RAR: red cell distribution width-to-albumin ratio.*p<0.05 was considered statistically significant.

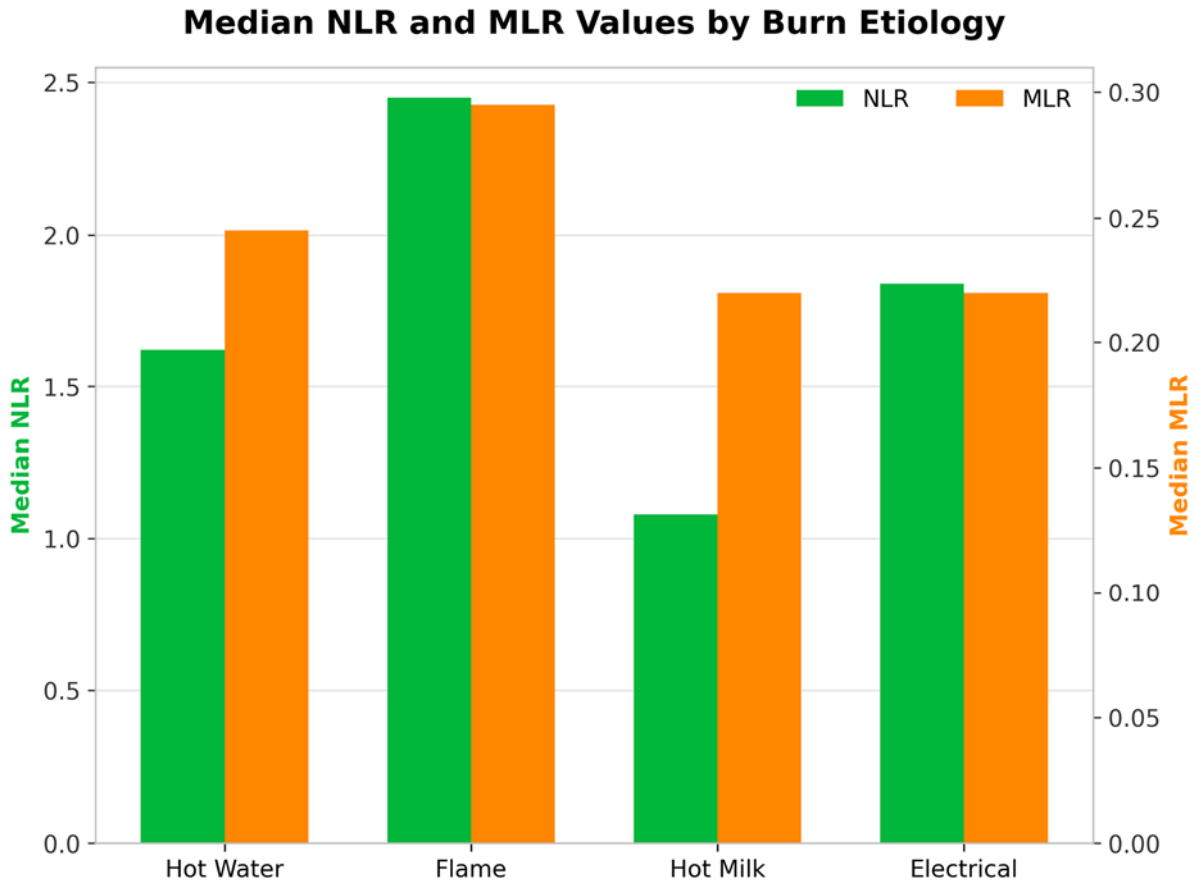


Figure 1. Distribution of median NLR and MLR values according to burn etiology. Green bars represent the median neutrophil-to-lymphocyte ratio (NLR; left axis), whereas orange bars represent the median monocyte-to-lymphocyte ratio (MLR; right axis). Hot oil and hot syrup burns were excluded from the graph because of the insufficient number of patients in these groups. The graph is descriptive and does not indicate a statistically significant difference between the groups.

M4582-Tam Metin

ÇOCUKLARDA ACİL ARİTMİLERDE HAYAT KURTARAN İPUÇLARI

Özlem Elkıran

İnönü Üniversitesi Tıp Fakültesi, Çocuk Sağlığı ve Hastalıkları ABD, Çocuk Kardiyoloji BD.

Giriş:

Çocukluk çağında acil aritmiler erişkine göre daha nadirdir ancak tanıda birkaç dakikalık gecikme ciddi hemodinamik bozulma, kardiyak arrest ve nörolojik sekellerle sonuçlanabilir. Bu nedenle güncel AHA 2025 ve ERC 2025 kılavuzlarının ortak vurgusu, pediatrik aritmi yaklaşımında ilk ayrımın hemodinamik durum olduğudur (1,2).

Çocukta aritmi yönetiminde hayat kurtaran temel basamak yalnızca EKG morfolojisini tanımak değil, hemodinamik durumu değerlendirmek ve uygun algoritmayı gecikmeden uygulamaktır. Hipotansiyon, şok, bilinç değişikliği, ciddi dispne, göğüs ağrısı, kötü perfüzyon veya senkop varlığında, ritmin ayrıntılı elektrofizyolojik sınıflaması ikinci planda kalır. İlk 30–60 saniyede mental durum, perfüzyon, nabız ve solunum hızla değerlendirilmelidir (1,2,3).

Yaşa Göre Kalp Atım Hızları : Çocuklarda kalp hızı yaşa göre değişiklik gösterir. Çocuklarda aritmilerin doğru şekilde değerlendirilebilmesi için kalp hızının yaşa göre normal değerleri bilinmelidir. Bebeklerde kalp hızı daha yüksek iken, yaş arttıkça kalp hızı azalarak, adölesanlarda yaklaşık olarak erişkindeki değerlere düşer (Tablo 1).

Tablo1. Yaşa göre normal kalp hızı değerleri

Yaş	Ortalama kalp hızı (atım/dakika)
Yenidoğan	145(90-180)
6 ay	145 (106-185)
1 yaş	132 (105-170)
2 yaş	120 (90-150)
4 yaş	108 (72-135)
6 yaş	100 (65-135)
14 yaş	85 (60-120)

Pediatrik Aritmiler :

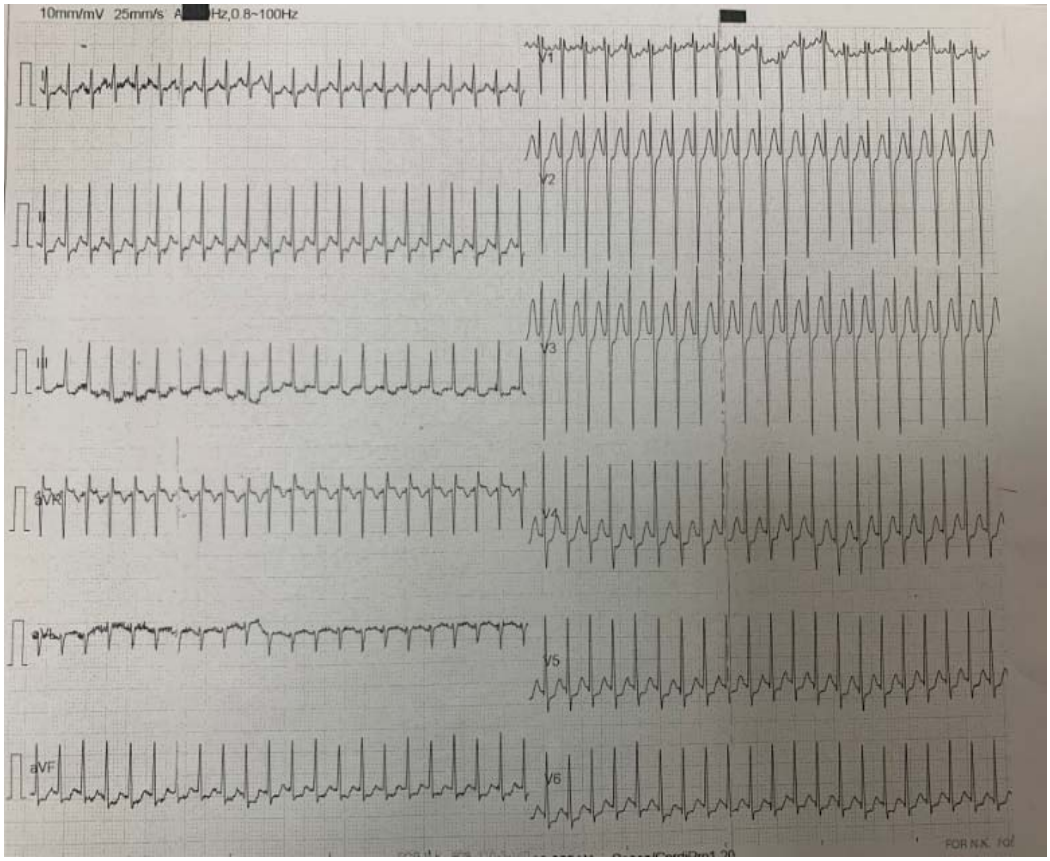
I.Taşiaritmiler
II. Bradiaritmiler ve AV blok
III. Kanalopatiler ve ani kardiyak arrest/ölüm olarak sınıflandırılabilir.

I- Taşiaritmiler

a-Dar QRS li taşikardiler (Supraventriküler)

Çocukluk çağında semptomatik taşiaritminin en sık formu supraventriküler taşikardidir (Resim1). Hemodinamik olarak stabil çocuklarda ilk yaklaşım vagal manevralardır. İnfantlarda soğuk yüz uygulamasıyla diving reflex, daha büyük çocuklarda uygun valsalva manevrası, uygulanabilir ve düşük riskli girişimlerdir. Karotis sinüs masajı çocuklarda önerilmez. Vagal manevralar etkisiz ise adenozin (200 mcg/kg, gerekirse 300 -400 mcg/kg, (santral venöz yol, SF ile yıkanarak) ilk basamak ilaç tedavisidir. 2024 tarihli çok merkezli 10 yıllık çalışma, pediatrik taşiaritmi tedavisinde adenozinin genel olarak güvenli olduğunu; ciddi advers olayların nadir kaldığını göstermiştir. Ancak tekrar eden başarısız ilaç denemeleri yerine, kötüleşen hastada senkronize kardiyoversiyona geçmek gerekir (1,3)

Akut mental durum değişikliği (konfüzyon, letarji, bilinç kaybı), şok bulguları (soğuk ekstremiteler, uzamış kapiller dolum, zayıf periferik nabızlar), kalp yetmezliği bulguları (pulmoner ödem, belirgin dispne), iskemik semptomlar, göğüs ağrısı (özellikle büyük çocuk/adölesan) hastanın hemodinamik olarak stabil olmadığını gösterir. Hemodinamik olarak stabil olmayan hastalalarda ise senkronize kardiyoversiyon yapılmalıdır. Senkronize kardiyoversiyon dozu 0.5–1 J/kg, başarısızsa 2 J/kg olmalıdır (1,2,3).



Resim 1: Supraventriküler taşikardi

b-Geniş QRS li taşikardiler

Çocuklarda geniş QRS taşikardi; ventriküler taşikardi, aberran iletili SVT, aksesuar yol üzerinden iletim ya da pace ritmi gibi farklı nedenlere bağlı olabilir (1,5) . Bununla birlikte, **Geniş kompleks taşikardi, aksi kanıtlanana kadar ventriküler taşikardi olarak kabul edilmelidir** (Şekil 2). Yapısal kalp hastalığı, miyokardit, kardiyomiyopati veya kanalopati zemininde VT olasılığı daha da önem kazanır. (Tablo 2).

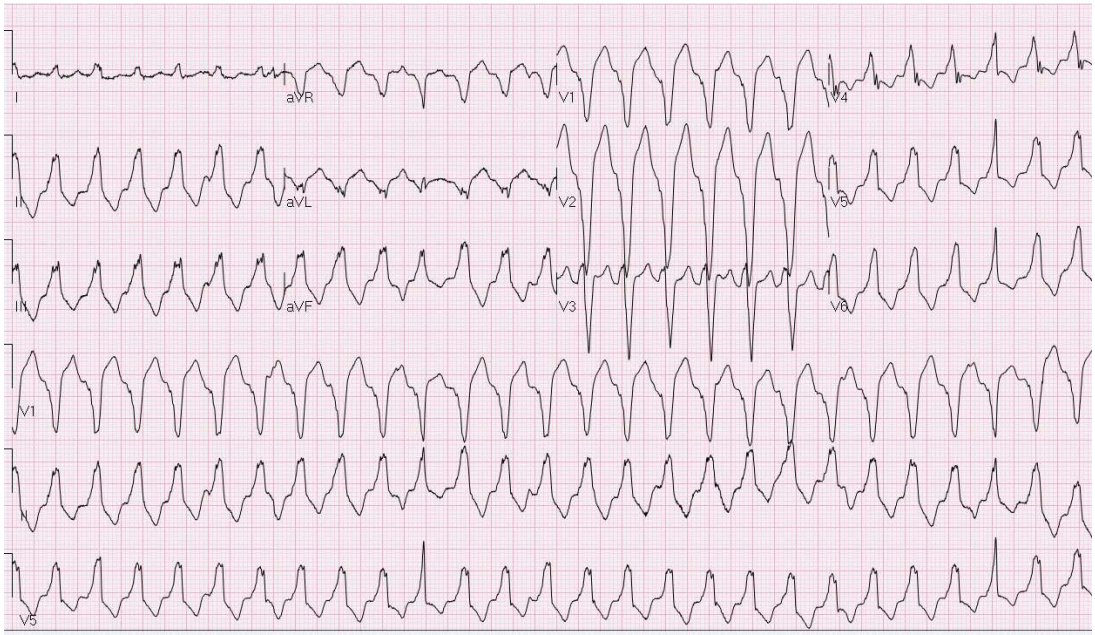
Stabil, ayırıcı tanısı yapılmamış geniş kompleks taşikardisi olan hastalarda özellikle de aberan iletimli SVT şüphesinin yüksek olduğu durumlarda vagal manevralar uygulanabilir. Adenozin, ayırıcı tanısı yapılmamış düzenli geniş kompleks taşikardi olgularında AV nod iletimini geçici olarak bloke etmek için güvenle uygulanabilir ve hem terapötik hem tanısal etkiler sağlayabilir. Uygun dozda verilmiş adenozin, AV nodal blok oluşturarak AV noda bağımlı SVT'yi ve idiyopatik çıkış yolu VT'lerini de sonlandırabilir. AV nodal blok sonrasında atriyal taşikardinin devam etmesi, aberran iletimli SVT mekanizmasının atriyal taşikardi olduğunu ortaya koyar.

Adenozin, düzensiz düzensiz geniş kompleks taşikardi olgularında **asla** uygulanmamalıdır. Özellikle geniş kompleks taşikardi olgularında varlığında, adenozin uygulanırken resüsitasyon ekipmanı ve özellikle bir defibrilatör mutlaka hazır bulundurulmalıdır. Adenozin etkisi sırasında

VA ilişkisindeki değişiklikleri belgelemek amacıyla 12 derivasyonlu ritim şeridi kaydedilmelidir (1,4,5).

Çocuklarda ayırıcı tanısı yapılmamış geniş kompleks taşikardi veya sustained VT'nin **başlangıç tedavisinde** bir antiaritmiğin diğerinden üstün olduğunu gösteren güçlü bir veri yoktur; bu nedenle tedavi seçimi olası taşikardi mekanizması, hastanın yaşı ve yapısal kalp hastalığı ile ventriküler disfonksiyonun varlığı veya yokluğu tarafından yönlendirilebilir. Başlangıç tedavisi seçenekleri arasında intravenöz amiodaron, prokainamid, lidokain ve esmolol yer alır.

Defibrilasyon, ventriküler fibrilasyon ve polimorfik ventriküler taşikardi (VF/pVT) için kesin tedavi yöntemidir. VF/pVT'nin süresi ne kadar kısa olursa, şok ile perfüzyon ritminin sağlanma ihtimali o kadar yüksektir. Defibrilasyon başlangıç dozu olarak 2-4 J/kg monofazik veya bifazik enerji kullanmak uygundur, ancak öğretme kolaylığı için 2 J/kg başlangıç dozu düşünülebilir. Refrakter VF için defibrilasyon dozunu 4 J/kg'a çıkarmak mantıklı olabilir. Sonraki enerji seviyeleri için, 4 J/kg'lık bir doz makul olabilir ve 10 J/kg'ı veya yetişkin maksimum dozunu aşmamakla birlikte daha yüksek enerji seviyeleri düşünülebilir (4,8).



Resim 2. Ventriküler taşikardi

Tablo 2: Ventriküler aritmilerde etyoloji

Akut nedenler	**Kronik nedenler**

Metabolik Hipoksi, Asidemi Hipoglisemi Hipokalemi ve hiperkalemi Hipokalsemi, Hipomagnezemi **Enfeksiyöz** Miyokardit Akut Romatizmal Ateş Kokain kullanımı **İskemik** Kawasaki Koroner Patoloji **Travmatik** Kardiyak cerrahi Travma . **Toksik** **İlaçlar:** Digoksin, Trisiklik antidepresanlar Sotalol, Flekainid, Fenotiazinler **Madde kullanımı:** Kokain	**Konjenital Kalp Hastalığı** Koroner Arter Anomalileri Fallot Tetralojisi Mitral Kapak Prolapsusu **Kardiyomiyopatiler** ARVD Hipertrofik KMP Dilate KMP Noncompaction KMP **Kanalopatiler** Uzun QT sendromu Brugada Sendromu Katekolaminerjik polimorfik VT Kısa QT Sendromu **Kardiyak Tm** **Kardiyak Cerrahi sonrası** **İdiyopatik VT**

II. Bradiaritmiler ve AV blok

Çocukta ciddi bradikardi çoğu kez primer iletim sistemi hastalığından değil; hipoksemi, ventilasyon bozukluğu, asidoz veya periarrest fizyolojiden kaynaklanır (1,2). Bu nedenle çocukta bradikardinin akut tedavisinde ilk basamak çoğu zaman atropinden önce oksijenasyonun ve ventilasyonun düzeltilmesidir. Kalp hızı 60/dk altında ve perfüzyon bozuk ise, ileri yaşam desteği algoritmasına hızlı geçiş gerekir. Klinik pratikte hata, EKG'deki yavaş hıza odaklanıp altta yatan hipoksiyi geç fark etmektir.

3. derece Atriyoventriküler (komplet AV blok) blokta atriyal uyarıların hiçbiri ventriküle geçemez ve bloğun distalinden kaynaklanan bir kaçış ritmi görülür. Atriyumlar ve ventriküller birbirinden bağımsız çalıştığından, EKG de P ve QRS dalgaları arasında bir ilişki yoktur. P ve QRS dalgaları kendi aralarında ilişkilidir. Komplet AV bloklu çocuklar ventrikül hızına bağlı olarak asemptomatik olabileceği gibi, baş dönmesi, halsizlik, efor kapasitesinde azalma, senkop ve hatta ani ölümle prezente olabilir. Tedavi altta yatan nedene ve hastanın klinik bulgularına göre planlanmalıdır (1,2,3).

III. Kanalopatiler ve ani kardiyak arrest/ölüm

I. Uzun QT sendromu (LQTs) (En sık kanalopati)

II. Katekolaminerjik polimorfik ventriküler taşikardi (CPVT)

III. Brugada sendromu (BrS)

IV. Kısa QT sendromu (SQTs)

V. Erken repolarizasyon senromu (ERs) ve idiopatik ventriküler fibrilasyon (IVF)

Kanalopatili hastalarda ilk bulgu ani kardiyak arrest olabilir. 2024'te yayımlanan kapsamlı güncelleme, çocukluk çağında kalıtsal aritmi ve kardiyomiyopati spektrumunun; LQTS, CPVT, Brugada sendromu, ARVC ve benzeri tabloları içerdiğini ve morbidite-mortalite açısından büyük önem taşıdığını göstermiştir. Bu nedenle egzersizle veya ani emosyonla gelişen aritmik durumlar ve senkop, aile öyküsüyle birlikte mutlaka kardiyak açıdan da değerlendirilmelidir (6,7,8).

Senkobun egzersiz, aşırı gürültü, korku, anksiyete ve aşırı emosyonel stres anında olması, senkop öncesi çarpıntı ve göğüs ağrısının olması, prodromal belirtilerin **olmaması** ve senkopun yaralanma ile sonlanması, **yüzerken** senkop ve kollaps olması, **senkop anında kardiyopulmoner canlandırma gereksinimi**, **senkopun nörolojik sekelle sonuçlanması**, senkop anında veya hemen sonrasındaki ritim anormalliği, patolojik üfürüm, anormal kalp sesleri gibi fizik muayene ve EKG anormalliklerinin olması, ailede < 40 yaş ani kardiyak arrest ve Pacemaker / ICD öyküsü, ailede ani bebek ölüm sendromu öyküsü varlığı kalıtsal aritmi sendromlarını düşündürür.

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M4525-Tam Metin

BİRDEN FAZLA NEODİMYUM MIKNATIS YUTULMASI SONRASI MİNİMAL KLİNİK BULGULARA RAĞMEN GÖRÜLEN CİDDİ GASTROİNTESTİNAL HASAR

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Abstract

Introduction / Aim: Multiple magnet ingestion is a life-threatening form of foreign body ingestion in children. Magnetic attraction between magnets located in different segments of the gastrointestinal tract may cause pressure necrosis, perforation, fistula formation, intestinal obstruction, and volvulus. Despite severe gastrointestinal injury, clinical findings may remain mild or nonspecific. We present a four-year-old boy with minimal symptoms who developed extensive gastrointestinal injury after ingesting multiple neodymium magnets.
Methods: Clinical presentation, radiologic and endoscopic findings, operative findings, and postoperative outcomes were retrospectively reviewed from the patient's medical records.
Results: A four-year-old boy presented with intermittent abdominal pain. Abdominal radiography demonstrated multiple radiopaque foreign bodies in a chain-like configuration. Upper gastrointestinal endoscopy revealed partial gastric wall penetration with apparent extraluminal extension of the magnet cluster. Despite an unremarkable abdominal examination and normal laboratory findings, endoscopic findings prompted emergency exploratory laparotomy. Surgical exploration revealed two gastrojejunal fistulas, gastric and jejunal perforations, and mesenteric defects caused by magnetic attraction. Thirty-four neodymium magnets were removed, and all perforations and mesenteric defects were repaired primarily. The patient recovered uneventfully and was discharged on postoperative day 7.
Conclusion: This case demonstrates that minimal clinical findings do not exclude severe gastrointestinal injury following multiple magnet ingestion. In children with suspected multiple magnet ingestion, prompt radiologic evaluation and timely endoscopic or surgical intervention are essential to prevent serious complications and reduce morbidity.
Keywords: Child; multiple magnet ingestion; neodymium magnet; gastrojejunal fistula; foreign body.

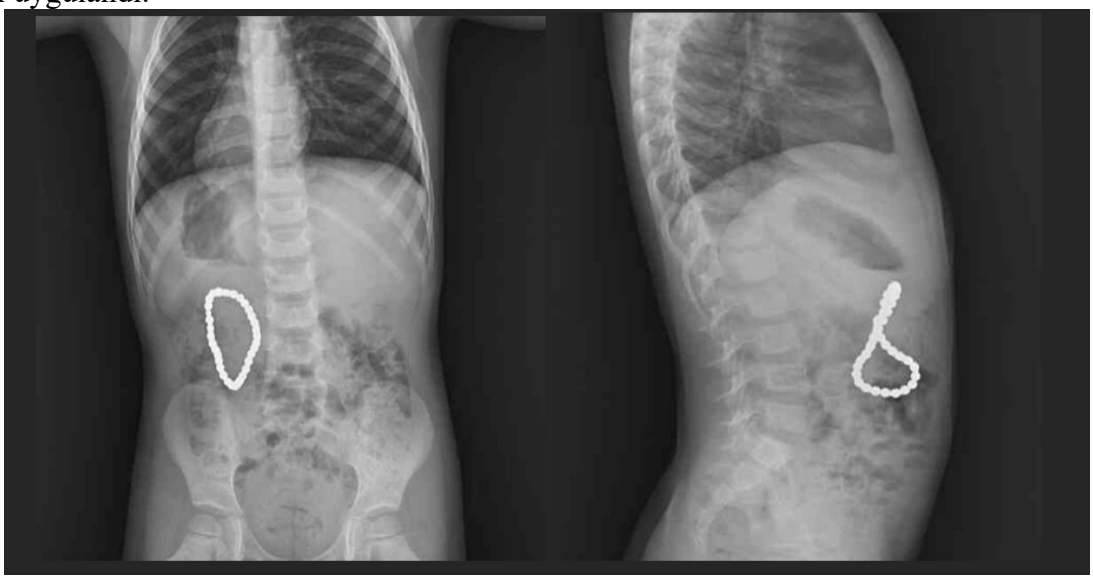
Amaç

Yabancı cisim yutulmaları çocukluk çağında sık görülür ve olguların büyük bölümü komplikasyonsuz sonuçlanabilir. Ancak yüksek çekim gücüne sahip neodimyum mıknatıslar, özellikle birden fazlasının yutulması durumunda ciddi gastrointestinal komplikasyonlara yol açabilir [1,2]. Farklı gastrointestinal segmentlerde bulunan mıknatısların birbirini çekmesi, arada kalan bağırsak duvarı ve mezenterin sıkışmasına neden olarak basınç nekrozu, perforasyon, fistül, obstrüksiyon ve volvulusla sonuçlanabilir [1]. Bununla birlikte semptomların hafif olması, abdominal muayenenin benign olması veya direkt grafide belirgin komplikasyon bulgularının bulunmaması gelişen anatomik hasarın şiddetini her zaman yansıtmayabilir. Bu bildiride, minimal klinik ve radyolojik bulgulara rağmen iki ayrı gastrojejunal fistül ve çoklu gastrointestinal yaralanma gelişen dört yaşındaki bir olgunun tanı ve tedavi sürecinin sunulması amaçlandı.

Yöntem

Dört yaşında erkek hasta, aralıklı karın ağrısı nedeniyle başvurduğu dış merkezde çekilen direkt karın grafisinde sol üst kadranda tespih biçiminde sıralanmış metalik yabancı cisimlerin görülmesi üzerine değerlendirildi. Mıknatısların yutulma zamanı ve toplam sayısı bilinmiyordu. Üst

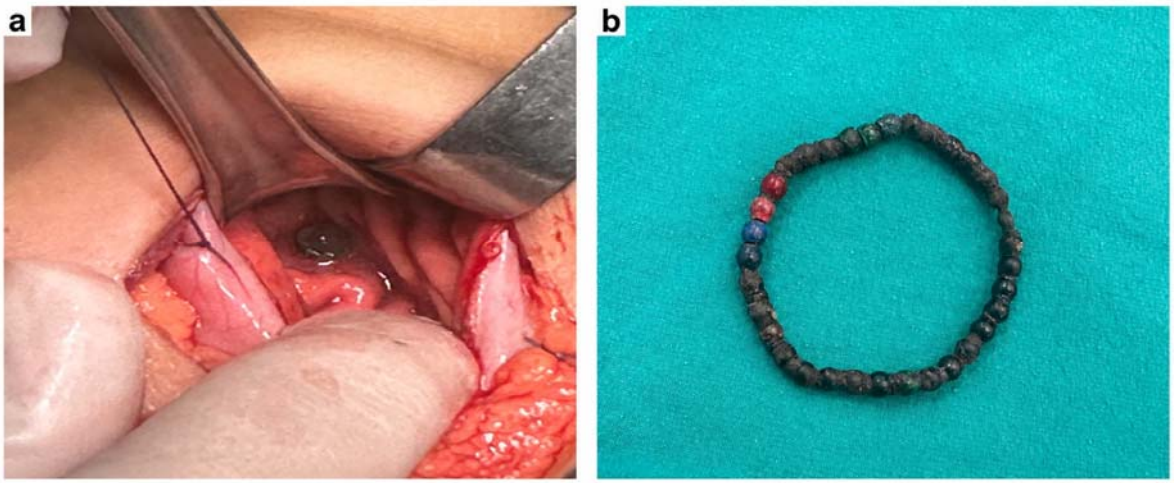
gastrointestinal sistem endoskopisinde mıknatıs zincirinin mide mukozasına gömülü olduğu görüldü. Mıknatısların çekilmesinin mevcut transmural hasarı genişletebileceği, olası fistül hatlarını bozabileceği ve intraperitoneal kontaminasyona yol açabileceği öngörülerek endoskopik çıkarma denenmedi ve hasta cerrahi tedavi amacıyla kliniğimize sevk edildi.
Kliniğimize başvurusunda aralıklı karın ağrısı dışında yakınması yoktu. Gaz ve gaita çıkışı mevcuttu; kusma ve abdominal distansiyon bulunmuyordu. Batın rahat olup defans ve rebound saptanmadı. Direkt karın grafisinde birbirine yapışık çok sayıda radyoopak yabancı cisim izlenirken diyafram altı serbest hava, hava-sıvı seviyesi veya obstrüksiyon bulgusu görülmedi (Resim 1). Mıknatısların çok sayıda ve birbirine yapışık olması, endoskopide mide duvarına gömülü izlenmesi ve transmural hasar olasılığı birlikte değerlendirilerek acil eksploratif laparotomi uygulandı.



Resim 1. Direkt karın grafisinde sol üst kadranda tespih biçiminde sıralanmış radyoopak yabancı cisimler; diyafram altı serbest hava ve hava-sıvı seviyesi izlenmemektedir.

Bulgular

Eksplorasyonda mıknatıs zincirinin posterior mide duvarı ile jejunum arasında iki ayrı gastrojejunal fistül oluşturduğu ve mide duvarına gömülü olduğu görüldü (Resim 2a). Gastrik ve jejunal perforasyonların yanı sıra kolon ve ince bağırsak mezenterinde defektler saptandı. Lokal inflamasyon ve yoğun yapışıklıklara karşın yaygın peritonit yoktu. Toplam 34 adet, yaklaşık 5 mm çapında neodimyum mıknatıs çıkarıldı (Resim 2b). İntraoperatif skopiyle batında başka metalik yabancı cisim bulunmadığı doğrulandı. Gastrik ve jejunal perforasyonlar ile mezenterik defektler primer olarak onarıldı; gastrik onarım Graham yamasıyla desteklendi ve batına dren yerleştirildi. Postoperatif beşinci gün oral beslenmeye başlanan hasta, yedinci gün komplikasyonsuz taburcu edildi.



Resim 2. (a) İntraoperatif eksplorasyonda mide duvarına gömülü neodimyum mıknatıs. (b) Cerrahi olarak çıkarılan, zincir hâlinde birbirine yapışmış toplam 34 neodimyum mıknatıs.

Preoperatif klinik ve radyolojik görünüm ile intraoperatif anatomik hasarın şiddeti arasında belirgin uyumsuzluk vardı. Aralıklı ve nonspesifik karın ağrısı, benign abdominal muayene ve direkt grafide serbest hava veya obstrüksiyon bulunmamasına rağmen ciddi transmural gastrointestinal yaralanma gelişmişti.

Avrupa Pediatrik Gastroenteroloji, Hepatoloji ve Beslenme Derneği (ESPGHAN) ile Kuzey Amerika Pediatrik Gastroenteroloji, Hepatoloji ve Beslenme Derneği (NASPGHAN) yaklaşımlarında çoklu mıknatıs yutulmalarının yönetimi; semptomlar, mıknatısların yerleşimi ve endoskopik erişilebilirliği, seri grafilerdeki ilerlemesi ve komplikasyon şüphesi birlikte değerlendirilerek belirlenmektedir [3,4]. Yakın izlem ancak hastanın tamamen asemptomatik olması, mıknatısların endoskopik erişimin ötesinde bulunması, obstrüksiyon veya perforasyon bulgusu göstermemesi ve seri grafilerde belirgin ilerlemesi durumunda düşünülebilir. Bu yaklaşım, çocuk gastroenterolojisi ve çocuk cerrahisinin birlikte yürüttüğü, tekrarlanan klinik ve radyolojik değerlendirmeleri içeren aktif bir izlem gerektirir. Semptom gelişmesi, seri grafilerde ilerleme olmaması, çıkarmanın başarısız olması veya komplikasyon şüphesi girişimsel tedavi lehinedir [3,4].

Sonuç

Çoklu neodimyum mıknatıs yutulmalarında klinik ve radyolojik görünüm gastrointestinal hasarın gerçek boyutunu yansıtmayabilir. Bu olguda benign abdominal muayene ile direkt grafide serbest hava ve obstrüksiyon bulunmamasına rağmen iki ayrı gastrojejunal fistül ve çoklu gastrointestinal yaralanma saptanması bu uyumsuzluğu göstermektedir. Yaygın peritonit ve serbest hava bulunmaması, mıknatısların komşu gastrointestinal segmentleri birbirine yaklaştırarak perforasyon ve fistül alanlarını sınırlamış olmasıyla ilişkili olabilir. Ayrıca endoskopide mıknatısların mide duvarına gömülü görünümü, direkt grafide belirlenemeyen transmural hasar açısından önemli bir uyarıcı bulgu olarak değerlendirilmiştir. Bu nedenle özellikle yutulma zamanı bilinmeyen ve mıknatısların birbirine yapışık olduğu olgularda klinik, radyolojik ve endoskopik bulgular birlikte değerlendirilmeli; transmural yaralanma veya fistül şüphesinde endoskopik çıkarma girişiminin mevcut doku bütünlüğü üzerindeki olası etkileri göz önünde bulundurulmalıdır.

Destek

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M4583-Tam Metin

ELECTROCARDİOGRAPHİC FİNDİNGS AND MANAGEMENT İN TRİCYCLİC ANTİDEPRESSANT POİSONİNG

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Aim

Tricyclic antidepressant (TCA) poisoning can cause severe neurological and cardiovascular complications, and pediatric patients may be particularly vulnerable (1). This review aims to summarize the electrocardiographic (ECG) findings of TCA cardiotoxicity and translate them into a practical pediatric emergency approach.

Method

A focused narrative synthesis of 11 clinical studies and reviews addressed mechanisms, prognostic ECG markers, pediatric findings, serial ECG evolution, sodium bicarbonate therapy, and extracorporeal treatment in acute TCA poisoning.

Results

Fast sodium-channel blockade in the myocardium and His-Purkinje system slows phase 0 depolarization, widens the QRS complex, and promotes dysrhythmia. Potassium-channel inhibition may prolong QT, alpha-1 blockade contributes to hypotension, and anticholinergic activity commonly causes sinus tachycardia (2,3).
The 12-lead ECG is central to early recognition and risk stratification. A QRS duration greater than 100 ms is associated with seizures, whereas a duration greater than 160 ms is associated with ventricular dysrhythmias (4). Delayed right ventricular activation directs the terminal 40-ms QRS vector rightward and superiorly, producing a deep terminal S wave in leads I and aVL and a prominent R wave in aVR. An R-wave amplitude greater than 3 mm or an R/S ratio greater than 0.7 in aVR indicates increased risk; aVR abnormalities may outperform total QRS duration for predicting seizures or dysrhythmias (5). Pediatric data similarly support evaluating QRS duration

and aVR parameters together and show an association between QRS widening and severe neurological or cardiovascular findings (6). PR and QT prolongation, conduction block, right bundle branch block-like patterns, and a Brugada phenocopy may also occur (3,7).
ECG abnormalities are dynamic. Serial studies demonstrate that QRS duration and the terminal 40-ms axis may remain abnormal longer in patients who develop seizures or dysrhythmias (8). In severe poisoning, QRS widening usually resolves within 12-18 hours but may persist for up to three days; no late seizure or life-threatening dysrhythmia was observed after QRS narrowed below 100 ms in one prospective series (9). Serial ECGs and continuous cardiac monitoring are therefore required.
Management begins with stabilization of airway, breathing, and circulation. Sodium bicarbonate is first-line therapy when QRS duration exceeds 100 ms or ventricular dysrhythmia or clinically significant hypotension is present. In children, an initial intravenous bolus of 1 mEq/kg may be repeated according to QRS and hemodynamic response. Blood gases, sodium, potassium, ionized calcium, and fluid balance should be monitored to avoid treatment-related complications (10). Refractory instability requires early toxicology consultation and individualized rescue therapy. Class IA and IC antiarrhythmics should be avoided. Because TCAs are highly protein-bound and have a large volume of distribution, hemodialysis and hemoperfusion are not recommended for toxin removal (11).

Conclusion

In pediatric TCA poisoning, clinicians should measure QRS duration, inspect lead aVR, start sodium bicarbonate promptly when cardiotoxicity is present, and continue serial ECG monitoring until conduction abnormalities resolve.

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M4476-Tam Metin

RELATİONSHİP BETWEEN THE HALP SCORE AND CLİNİCAL CHARACTERİSTİCS İN CHİLDREN AGED 2–6 YEARS WİTH EPİDURAL HEMATOMA: IMPLİCATİONS FOR SURGİCAL NURSİNG CARE

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Introductıon

Epidural hematoma is one of the most serious traumatic brain injuries in children. It accounts for a small proportion of pediatric head trauma but requires rapid diagnosis and appropriate management. Early treatment is associated with favorable clinical outcomes. Both surgical and conservative management may be effective in selected patients (1,2).

Clinical decision-making in pediatric epidural hematoma is based on neurological examination and radiological findings. Glasgow Coma Scale, hematoma size, midline shift, and neurological deficits are important factors in treatment selection. Careful observation is appropriate for children with stable clinical findings (3,4).

Inflammation and nutritional status may influence recovery after traumatic brain injury. The Hemoglobin–Albumin–Lymphocyte–Platelet (HALP) score combines hematological and nutritional parameters into a single index. It is inexpensive, easily calculated, and obtained from routine laboratory tests. Recent studies have demonstrated the clinical value of inflammatory indices in pediatric diseases (5,6).

Children with epidural hematoma require continuous assessment during hospitalization. Surgical nurses play an important role in neurological monitoring, vital sign assessment, pain management, nutritional evaluation, and the early recognition of clinical deterioration. Comprehensive nursing care may improve patient safety and support recovery (1,7).

Although the clinical management of pediatric epidural hematoma has been widely investigated, evidence regarding the relationship between HALP scores and clinical characteristics remains limited. Evaluating this relationship may contribute to patient assessment and support

individualized surgical nursing care. Therefore, this study aimed to investigate the relationship between the HALP score and clinical characteristics in children aged 2–6 years with epidural hematoma and to evaluate the potential implications of the findings for surgical nursing care (2,6).

Materıals And Methods

This retrospective study was conducted in children aged 2–6 years who were diagnosed with epidural hematoma between January 2018 and December 2025. The study included patients who were admitted to the emergency department of a tertiary care hospital and subsequently hospitalized for follow-up or treatment.

Patients with incomplete clinical or laboratory records, chronic hematological disorders, active infections, malignancy, immunodeficiency, or missing albumin measurements were excluded. A total of 22 children met the inclusion criteria and were included in the final analysis.

Demographic characteristics, mechanism of injury, Glasgow Coma Scale score, operation status, length of hospital stay, and routine laboratory findings were obtained from the hospital electronic medical records. Hemoglobin, albumin, lymphocyte count, and platelet count recorded at admission were used for analysis.

The Hemoglobin–Albumin–Lymphocyte–Platelet (HALP) score was calculated using the following formula:

HALP = Hemoglobin × Albumin × Lymphocyte / Platelet

The primary outcome of the study was to evaluate the relationship between the HALP score and clinical characteristics. The potential contribution of these findings to surgical nursing care was also assessed. Particular attention was given to neurological monitoring, nutritional assessment, and the planning of individualized nursing care during hospitalization.

The study was conducted in accordance with the principles of the Declaration of Helsinki. Patient confidentiality was protected throughout the study, and all data were analyzed anonymously.

Statıstıcal Analysıs

Statistical analyses were performed using IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was evaluated using the Shapiro–Wilk test. Categorical variables were presented as numbers and percentages.

Normally distributed variables were expressed as mean ± standard deviation. Non-normally distributed variables were presented as median and interquartile range (IQR). The independent samples t-test was used for parametric variables, whereas the Mann–Whitney U test was used for non-parametric variables.

Correlations between the HALP score and continuous clinical and laboratory variables were evaluated using Pearson or Spearman correlation analysis, according to data distribution. A two-sided p-value of <0.05 was considered statistically significant.

Results

A total of 22 children aged 2–6 years were included in the study. Seven (31.8%) patients were male and 15 (68.2%) were female. The mean age was 3.91 ± 1.34 years. None of the patients died during hospitalization.

The mean hemoglobin level was 11.80 ± 1.20 g/dL, the mean albumin level was 3.42 ± 0.37 g/dL, the mean lymphocyte count was 1.88 ± 0.58 $\times 10^9$/L, and the mean platelet count was 224.23 ± 40.74 $\times 10^9$/L. The mean HALP score was 0.34 ± 0.12.

According to the Shapiro–Wilk test, most continuous variables showed a normal distribution and were presented as mean ± standard deviation. No in-hospital mortality was observed in the study population.

Dıscussıon

Pediatric epidural hematoma requires early diagnosis and appropriate treatment. Most children recover well when management is timely. Both surgical and conservative treatment may provide favorable outcomes in selected patients (1,2).

The HALP score reflects both nutritional and inflammatory status. It is calculated using routine laboratory parameters. It is simple, inexpensive, and easily available. Its clinical use in pediatric epidural hematoma remains limited (5,6).

No patient died during hospitalization in our study. This finding supports previous studies reporting good outcomes after early diagnosis and treatment. Careful clinical follow-up remains essential during hospitalization (2,3).

Surgical nursing care is an important part of treatment. Nurses should perform regular neurological assessment and monitor vital signs. Pain assessment and nutritional evaluation are also essential. Early recognition of deterioration may improve patient safety (1,7).

Family education should continue throughout hospitalization. Parents should be informed about neurological symptoms and follow-up after discharge. Individualized nursing care may improve recovery and support better clinical outcomes (6,7).

This study has several limitations. It was retrospective and conducted at a single center. The sample size was small. Larger prospective studies are needed to confirm these findings (2,6).

Conclusıon

The HALP score can be calculated using routine laboratory parameters. It may support the clinical evaluation of children with epidural hematoma. However, it should be interpreted together with clinical findings.

Surgical nursing care remains essential throughout hospitalization. Regular neurological assessment, nutritional evaluation, and family education are important components of patient care. Individualized nursing care may contribute to safer follow-up and better recovery.

Further prospective multicenter studies are needed to clarify the clinical value of the HALP score in pediatric epidural hematoma.

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M4550-Tam Metin

FEVER İN WELL-APPEARİNG İNFANTS DURİNG THE FİRST 28 DAYS OF LİFE: AN AGE-STRATİFİED APPROACH TO LUMBAR PUNCTURE, EMPİRİCAL ANTİMİCROBİALS, AND DİSPOSİTİON

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Objective

To define, among well-appearing febrile infants aged 0–28 days, when lumbar puncture (LP), empirical antimicrobials and hospital admission are indicated, and when structured observation may be considered while preserving a low probability of missed invasive bacterial infection (IBI).

Methods

We performed a focused narrative synthesis organised around clinical decisions rather than individual guidelines. American Academy of Pediatrics (AAP) and Canadian Paediatric Society (CPS) guidance informed risk stratification, CSF assessment and disposition; National Institute for Health and Care Excellence (NICE) recommendations informed neonatal antimicrobial context. We also incorporated the pooled PECARN analysis by Burstein et al., the biomarker meta-analysis by Norman-Bruce et al., neonatal sepsis reviews by Strunk et al. and Fleiss and Bizzarro, and the ESPID review by Fortmann et al. Eligible infants were term, previously healthy, clinically well appearing, had rectal temperature ≥38.0°C, and lacked major comorbidity, recent antimicrobials or focal bacterial infection.

Results

Clinical deterioration overrides any low-risk pathway: stabilisation and cultures take priority, antimicrobials should not be delayed, and LP should follow when the infant can safely undergo the procedure. AAP guidance starts at 8 days. During the first week, CPS, NICE and Fortmann et al. support conservative inpatient management; presentations within 72 hours should additionally be interpreted in an early-onset sepsis context.

For 8–21 days, AAP guidance supports CSF evaluation, parenteral antimicrobials and admission (Pantell et al.). In the fourth week, risk can be further refined. Burstein et al. identified IBI in 69 of 1537 infants (4.5%) and bacterial meningitis in 11 (0.7%). Negative urinalysis (UA), procalcitonin (PCT) ≤0.5 ng/mL and absolute neutrophil count (ANC) ≤4000/mm³ classified 632 infants (41.1%) as low risk, with 94.2% sensitivity and 99.4% negative predictive value for IBI. Four bacteremias, but no meningitis cases, were missed. Because 86.1% of the cohort was hospitalised, these data more strongly support selective LP than routine outpatient management (Burstein et al., “Prediction”).

CPS permits carefully selected low-risk neonates to remain in hospital without immediate LP or empirical antibiotics; later positivity of a blood or urine culture should prompt timely CSF evaluation (Burstein et al., “Management”). AAP also permits LP deferral in hospital when inflammatory markers are reassuring, including with a positive UA, emphasising that LP, treatment and disposition are separate decisions (Pantell et al.). Fortmann et al. favour admission throughout the neonatal period and retain a low threshold for LP and treatment. Norman-Bruce et al., analysing 14 studies and 7755 infants, found PCT more discriminative for IBI than C-reactive protein. Strunk et al. and Fleiss and Bizzarro describe evolving Gram-negative epidemiology; empirical therapy should therefore reflect age, CNS/HSV risk and local susceptibility rather than a single universal regimen.

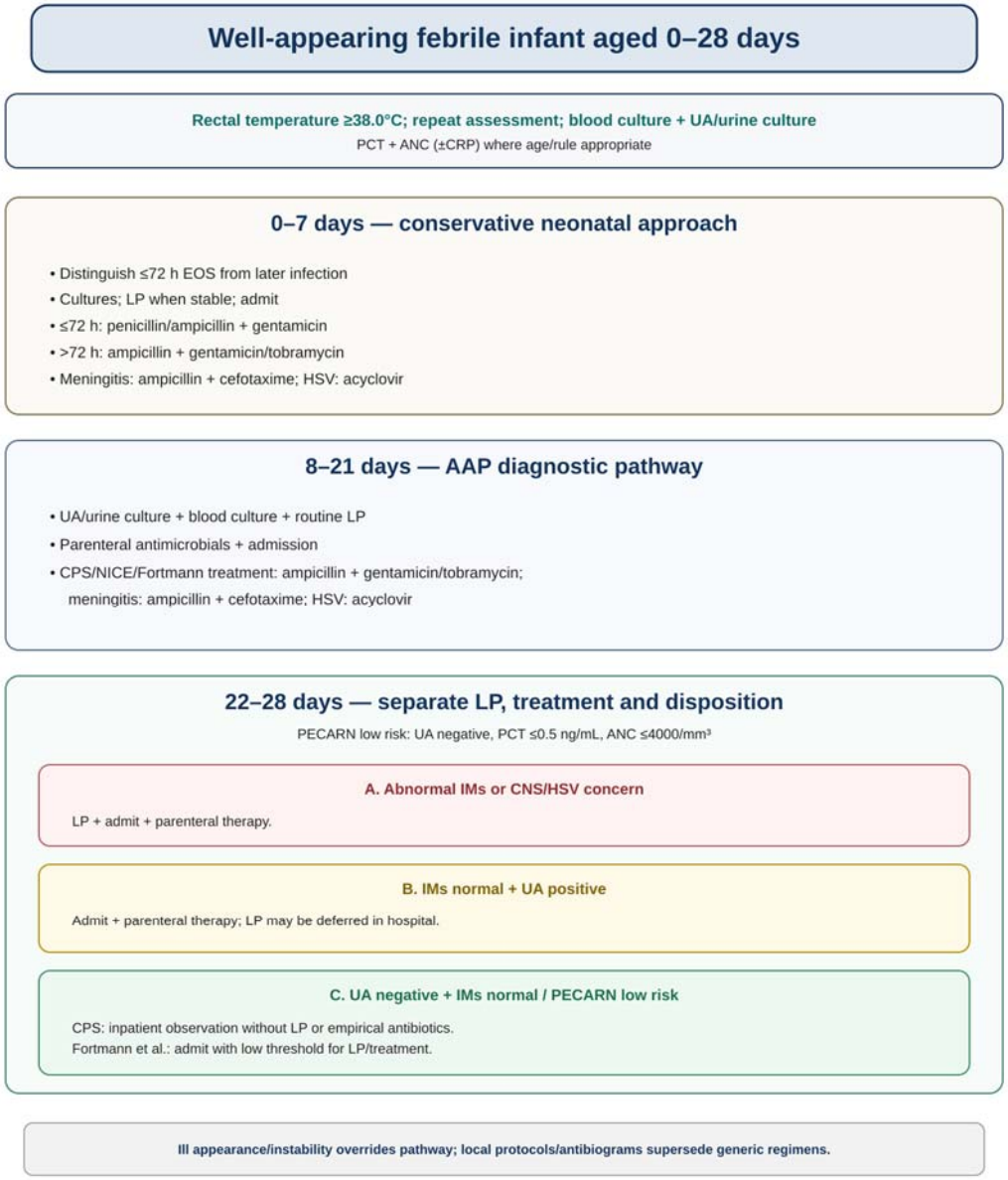


Figure 1. Evidence-integrated age-stratified pathway linking age, biomarkers, LP, antimicrobial treatment and disposition.

Conclusion

Age and risk should determine management intensity. A conservative inpatient strategy remains appropriate through 21 days. At 22–28 days, UA, PCT/ANC, serial reassessment, culture follow-up and CSF findings when obtained can identify selected infants in whom LP or empirical antibiotics may be deferred. Hospital observation provides an additional safety layer. Outpatient management should remain exceptional and requires reassuring evaluation, rapid culture follow-up, explicit return precautions and reassessment within 24 hours. This framework supports antimicrobial stewardship while avoiding the assumption that biomarker-defined low risk means no infection.

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M4584-Tam Metin

TUMOR LYSİS SYNDROME: DİAGNOSİS AND KİDNEY PROTECTİON

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Aim

Tumor lysis syndrome (TLS) is an oncologic emergency in which abrupt release of intracellular potassium, phosphate, and purine metabolites can precipitate acute kidney injury (AKI). This review presents a pediatric approach to diagnosis and kidney protection, emphasizing biochemical trajectories and timely kidney replacement therapy (KRT).

Methods

A focused narrative synthesis of recent peer-reviewed literature prioritized pediatric cohorts, the 2025 British Society for Haematology guideline, the 2024 Nature Reviews Disease Primers review, and contemporary onco-nephrology evidence.

Results

Risk assessment before anticancer therapy should integrate tumor biology, burden, treatment sensitivity, baseline kidney function, metabolic abnormalities, and hydration status (Chan et al.; Howard et al.). Cairo-Bishop criteria remain widely used; the Howard-Pui refinement requires two or more metabolic abnormalities within the same 24-h period, while clinical TLS adds AKI, arrhythmia, seizure, or sudden death (Howard et al.). Yet relative 25% biochemical changes and creatinine thresholds can misclassify patients, especially with spontaneous TLS or coexisting sepsis, nephrotoxicity, chronic kidney disease, or another AKI cause (Alhamid et al.). Formal

criteria should therefore be read alongside serial laboratory trends, urine output, and clinical evolution.

Kidney protection starts before cytoreduction. Intermediate- and high-risk patients generally require hydration of about 2-3 L/m²/day, titrated to age, cardiac and kidney status, and fluid balance, with urine output near 80-100 mL/m²/h or >2 mL/kg/h in young children (Howard et al.). Hydration solutions should contain neither potassium nor phosphate; nephrotoxic medications should be minimized, and routine urinary alkalinization avoided because it can promote calcium-phosphate crystallization. In very high-risk or established TLS, potassium, phosphate, calcium, uric acid, creatinine, and urine output should generally be reassessed every 4-6 h.

Allopurinol prevents further uric-acid generation but does not clear urate already present; during massive lysis, accumulation of poorly soluble xanthine may itself threaten the kidney (Howard et al.). Rasburicase rapidly degrades existing urate and is preferred in high-risk children or established hyperuricemia. For high-risk pediatric prophylaxis, the 2025 guideline recommends 0.2 mg/kg/day for up to five days; glucose-6-phosphate dehydrogenase status should be assessed in patients at risk (Chan et al.). Calcium replacement is reserved for symptomatic hypocalcemia because unnecessary calcium may increase calcium-phosphate precipitation.

Phosphate kinetics may provide an earlier renal warning signal. In a 31-child cohort, a daily serum phosphate rise of 0.32 mmol/L best discriminated severe TLS-associated AKI (Biró et al.). A separate 2026 cohort of 50 children found stronger discrimination for severe AKI with dynamic phosphate change than with uric-acid change (area under the curve 0.839) (Elshafey et al.). These retrospective findings do not define a treatment threshold, but support tracking phosphate trajectory rather than a single value.

KRT should respond to refractory solute, acid-base, or volume burden rather than creatinine alone. Indications include refractory hyperkalemia, severe hyperphosphatemia with symptomatic hypocalcemia, severe acidosis, and oliguria or anuria with fluid overload. Intermittent hemodialysis offers rapid solute clearance; continuous KRT may be favored when ongoing lysis, hemodynamic instability, or recurrent potassium/phosphate rebound is anticipated (Chanchlani et al.). Early pediatric nephrology and intensive-care involvement is appropriate as these complications emerge. Figure 1 summarizes this pathway.

Conclusion

TLS should be managed as a dynamic kidney-risk state rather than a static laboratory diagnosis. Kidney protection is anticipatory: individualized risk assessment, titrated hydration, rapid urate control, frequent electrolyte surveillance, avoidance of nephrotoxins and iatrogenic crystal precipitation, and timely KRT when metabolic clearance fails. Serial phosphate kinetics are promising as an early renal warning signal but require prospective validation before incorporation into formal criteria.

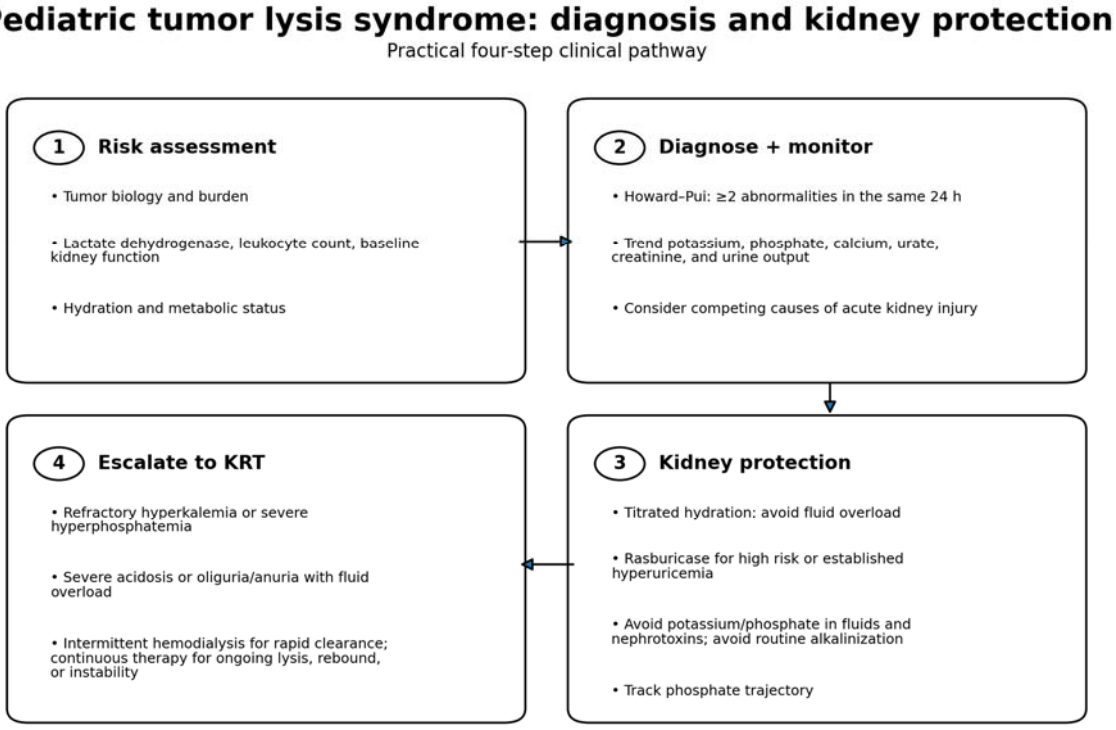


Figure 1. Practical framework for diagnosis and kidney protection in pediatric tumor lysis syndrome.

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M4585-Tam Metin

HUKUKİ KAYGILARLA İSTENEN "GEREKSİZ" TRAVMA TOMOGRAFİLERİ VE KONSÜLTASYON İSTEME

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Özet

Giriş: Ülkemizde acil servislere hasta başvuru sayısı gün geçtikçe artmaktadır. Acil servis hekimleri acil servise başvuran hastalar arasında hayati riski olan hastalara erken tanı koymayı ve tedaviye erken ulaşmalarını sağlamaya çalışmaktadırlar.

Bulgular: Hastaların hastalandıklarından ilk başvuru yeri olarak acil servisleri tercih etmeleri hasta yoğunluğunu arttırmakta ve hekimlerin hastalara ayıracağı vaktin azalmasına neden olmaktadır. Bu sebepler ile birlikte hekimler hukuki kaygılardan dolayı hastalara doğru tanı koymak için bazen yapacakları hematolojik tetkikleri, radyolojik görüntülemeleri hatta konsültasyonları genişletmek zorunda kalmaktadır. Bu durum aslında defansif tıp olarak tanımlanmaktadır. Defansif tıbba esas neden olan ise hekimlerin malpraktis korkusudur. Hekimler malpraktis durumları ile karşılaşmamak için özellikle travma hastaları ve pediatrik hastalar başta olmak üzere birçok zaman gereksiz ileri tetkikler yapmakta ve gereksiz konsültasyon istemektedirler. Bu gereksiz tetkiklerin başında ise radyolojik görüntüleme yöntemi olarak bilgisayarlı tomografi (BT) gelmektedir.

Sonuç: Sonuç olarak klinik uygulama rehberlerinin kullanımı, kanıta dayalı tıp uygulamaları, hekim mesleki sorumluluk sigortası (malpraktis sigortası), çağdaş hekim-hasta işbirliğinin geliştirilmesi ve düzenli tıbbi kayıtlar ile savunmacı tıbba karşı çözüm önerilerinin genişletilerek gereksiz tetkik ve konsültasyonların önüne geçebilmek için hekimlerin tıbbi malpraktis korkusu olmadan çalışabilmelerinin sağlanması gerekmektedir.

Anahtar Kelimeler: Acil servis, travma, defansif tıp, malpraktis

Giriş

Türkiye'de ikinci ve üçüncü basamak hastaneler arasında, hasta başvuru sayısı ve oranı en yüksek olan birimlerin başında acil servisler gelmektedir. Acil servislerde hasta yoğunluğunun arttığı zamanlarda hasta muayenesi için ayrılan sürenin kısalması nedeniyle tahlil ve görüntüleme yöntemlerine daha fazla ağırlık verilebilmektedir. Tercih edilen görüntüleme yöntemlerinin başında bilgisayarlı tomografi (BT) gelmektedir.

Bulgular

Hukuki Kaygı: Bedensel ve ruhsal varlığın tehlikede görülmesi sonucu oluşan huzursuzluk kişide korku ve kaygıya neden olur. Bir kişinin ya da kurumun eylem, karar veya sözleşmelerinin yasalar karşısında suç, ceza, tazminat veya hak kaybı gibi olumsuz sonuçlar doğurmasından duyduğu yasal endişe ve tedirginlik hali hukuki kaygıdır.

- **Korku:** Yaşamı tehdit eden gerçek tehlike karşısında hissedilen duygu
- **Kaygı (anksiyete):** Nedeni belli olmayan, ortada hiçbir somut tehlike olmamasına karşın kişinin yaşadığı huzursuzluk, tedirginlik hali

Gereksiz BT İstemleri: Hastalara yaklaşım konusunda çok sayıda ve yaygın olarak bilinen kılavuzlar olmasına rağmen, bu kılavuzların hekim davranışları üzerine etkileri sınırlıdır. Acil hekimlerinin %65,2'sinin bazen ve %19,7'sinin çoğu zaman gereksiz BT isteği görülmektedir.

Orta dereceli beyin travmalı hastalarda BT'nin aşırı kullanımı üzerinde yapılan bir çalışmada; çekilen BT'lerin %10-35'inin tıbbi kılavuzların tavsiyesi ile örtüşmediği, mevcut kılavuzların başarılı şekilde uygulanması ile beyin BT'si çekimlerinin %35 oranında azaltılabileceği görülmüştür.

Farklı bir çalışmada; ABD'de minör kafa travmalı hastalara yılda 1.000.000'dan fazla beyin BT'si çekilmekte ve bu hastaların %10'undan azında tedavinin gidişatını değiştirecek bulgulara rastlanmakta olduğu gösterilmiştir.

ABD'deki acil servislerde yapılan bir çalışmada; 1998-2007 yılları arasında yaralanmalı hastalara çekilen BT sayısında anlamlı artış saptanırken, hayatı tehdit eden durumların sayısında bu artış ile korelasyon gösteren bir yükselişe rastlanmamıştır.

Acil servis hekimlerinin %86'sı pediatrik yaş grubunda BT istemi yapma konusunda daha seçici davrandıklarını ifade etmişlerdir. BT istem nedenleri arasında; %86,5 ile tıbbi endikasyon, %79,2 ile tanı atlamaktan çekinme yer almaktadır.

Konsültasyon: Bir hastanın durumu hakkında doktorlar arasında bilgi ve tavsiye alışverişi konsültasyon olarak tanımlanır.

Gereksiz Konsültasyon: Gereksiz konsültasyon--->Savunmacı Tıp

Savunmacı tıp---defansif tıp---çekinik tıp; sorumluluk endişesi nedeniyle hekimlerin standart tıbbi uygulamaları gerçekleştirmemesi ya da gerçekleştirememesi olarak tanımlanabilir.

- **Pozitif Savunmacı Tıp:** Hekimlerin malpraktis iddialarına maruz kalmamak için gereksiz veya ek sağlık hizmeti sunumunu içeren kişisel ve mesleki güvence davranışı biçimidir.
- **Negatif Savunmacı Tıp:** Hekimlerin sağlık hizmeti sunumunun neden olabileceği yasal risk kaynaklarından korunmak için sağlık hizmeti sunumundan kaçınma davranışlarıdır.

Defansif Tıp: Defansif tıp, hekimin kendisini dava tehdidine karşı korumak amacıyla tanı ve tedaviye yönelik işlemleri gereksiz kullanması ve malpraktis davası ile sonuçlanma riski yüksek olan faaliyetlerin sorumluluğunu reddetmesidir.

- **Malpraktis:** Hekimin tedavi sırasında standart güncel uygulamayı yapmaması, beceri eksikliği veya hastaya tedavi vermemesi ile oluşan zarar
- **Komplikasyon:** Tıbbi standarda uygun bir müdahale yapılmasına rağmen ortaya çıkabileceği tıp literatüründe kabul edilen ve her türlü tedbir alınmasına rağmen kaçınılmaz olarak meydana gelen zararlar

Komplikasyon ve tıbbi malpraktis ayrımının yapılması oldukça önemlidir.

Sonuç

Olumsuz tıbbi sonuçların ve şikâyetlerin doktorların ruh hali üzerinde olumsuz bir etkiye neden olduğu görülmüştür. Şikâyetler doktorların ruh halinin yanında ayrıca hastaya olan güvenini de etkileyebilmektedir. Olumsuz tıbbi sonuçlar ve şikâyetler hekimlerde öfke, depresyon, suçluluk ve utanma gibi duygusal tepkilerin ortaya çıkmasına neden olabilmektedir. Ayrıca hekimlerin malpraktis suçlaması ile ilgili yaşadığı maddi ya da manevi kayıplar onların hastalarına yaklaşımını etkileyebilmektedir. Sonuç olarak klinik uygulama rehberlerinin kullanımı, kanıta dayalı tıp uygulamaları, hekim mesleki sorumluluk sigortası (malpraktis sigortası), çağdaş hekim-hasta işbirliğinin geliştirilmesi ve düzenli tıbbi kayıtlar ile savunmacı tıbba karşı çözüm önerilerinin genişletilerek gereksiz tetkik ve konsültasyonların önüne geçebilmek için hekimlerin tıbbi malpraktis korkusu olmadan çalışabilmelerinin sağlanması gerekmektedir.

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M4477-Tam Metin

APPROACH TO THE CHILD WITH HYPOSPADIAS IN THE PEDIATRIC EMERGENCY DEPARTMENT: FROM DIAGNOSIS TO EMERGENCY REFERRAL

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Abstract

Introduction

Hypospadias is a congenital anomaly characterized by an ectopic urethral meatus located on the ventral aspect of the penis rather than at its normal position on the tip of the glans. Its clinical presentation varies according to the location of the urethral meatus and the presence of associated anatomical abnormalities. Ventral preputial deficiency, dorsal hooded prepuce, and penile curvature (chordee) may accompany the condition. Hypospadias is most commonly diagnosed during routine physical examination in the neonatal period; however, mild forms may remain undetected until later in childhood.

Main Text

Hypospadias alone rarely constitutes a surgical emergency. Nevertheless, conditions such as acute urinary retention, significant voiding dysfunction, urinary tract infection, genital trauma, bleeding, or postoperative complications require prompt evaluation. The coexistence of proximal hypospadias with bilateral cryptorchidism, bifid scrotum, or micropenis should raise suspicion for a disorder/difference of sex development (DSD) and warrants urgent multidisciplinary assessment.

In the pediatric emergency department, the primary objective is not to plan definitive surgical correction but rather to identify emergency conditions, avoid unnecessary interventions, and ensure appropriate referral. Clinical evaluation should include assessment of the child's voiding pattern, time of the last urination, presence of fever, pain, trauma, and any history of previous urogenital surgery. A systematic genital examination should evaluate the location of the urethral meatus, the presence and severity of penile curvature, preputial anatomy, scrotal morphology, and testicular position. Forceful urethral catheterization attempts should be avoided because they may increase the risk of urethral injury.

Conclusion

This review summarizes the evaluation of children with hypospadias in the pediatric emergency department, with particular emphasis on the recognition of emergency conditions and the principles of appropriate referral.

Keywords: Hypospadias; pediatric emergency department; urethral meatus; pediatric urology; genital anomaly.

Introduction

Hypospadias is one of the most common congenital urogenital anomalies in males. It is characterized by an ectopic urethral meatus located on the ventral aspect of the penis rather than at its normal position at the tip of the glans. The urethral meatus may be located at various levels, ranging from the glans to the perineum. This anatomical abnormality is frequently associated with ventral preputial deficiency, a dorsal hooded prepuce, and penile curvature (chordee) (1,2).

The reported prevalence of hypospadias varies considerably among populations and geographic regions. A systematic review reported an average prevalence of 19.9 cases per 10,000 live births in Europe. However, substantial variation exists among epidemiological studies owing to differences in surveillance systems, diagnostic criteria, and the characteristics of the populations studied (3).

Hypospadias results from abnormal development of the external genitalia during fetal life. Its etiology is considered multifactorial, involving complex interactions among genetic, hormonal, placental, and environmental factors. Nevertheless, the underlying cause remains unidentified in the majority of cases. Reported risk factors include low birth weight, small size for gestational age, and a positive family history of hypospadias (1,4).

The diagnosis is most commonly established during routine neonatal genital examination. However, mild distal forms may remain unrecognized during the neonatal period. These children may later present with urinary stream deviation, spraying, or difficulty voiding while standing. In some cases, hypospadias is first identified during the pre-circumcision examination or at the time of circumcision (2).

Definition and Embryological Basis of Hypospadias

Hypospadias is a congenital anomaly resulting from the failure of the urethral meatus to reach its normal anatomical position at the tip of the glans penis. The urethral opening may be located anywhere along the ventral penile shaft, within the scrotum, or in the perineal region. The condition is commonly associated with ventral preputial deficiency and ventral penile curvature. In the clinical literature, penile curvature associated with hypospadias is commonly referred to as **chordee** (1,2).

Development of the male external genitalia begins early in fetal life. Initially, the genital tubercle, urethral folds, and labioscrotal swellings are morphologically identical in both sexes. Following testicular differentiation, testosterone and its biologically active metabolite, dihydrotestosterone, direct the masculinization of the external genitalia. During this process, the genital tubercle elongates to form the penis, while the urethral folds migrate toward the midline and subsequently fuse (4,5).

Fusion of the urethral folds gives rise to the penile urethra, whereas the glanular urethra develops through remodeling and canalization of the distal urethral plate. Simultaneously, the labioscrotal swellings fuse to form the scrotum. These developmental events depend on adequate androgen production, normal androgen receptor function, and an appropriate tissue response to androgenic stimulation (4,5).

Incomplete fusion of the urethral folds prevents the urethral meatus from reaching its normal distal location. The timing and anatomical level at which this developmental disruption occurs largely determine the severity of hypospadias. Developmental abnormalities arising early in embryogenesis are generally associated with proximal forms of hypospadias, whereas disturbances occurring later tend to result in distal variants (2,5).

The pathogenesis of hypospadias cannot be explained solely by hormonal abnormalities. Genetic susceptibility, placental function, fetal growth, and environmental exposures are also believed to influence external genital development. Consequently, hypospadias is currently regarded as a multifactorial congenital developmental anomaly with a complex etiology (1,4).

Classification of Hypospadias and Its Relevance in the Pediatric Emergency Department

Hypospadias is classified according to the location of the urethral meatus as **distal, midshaft (midpenile),** and **proximal** hypospadias (1,2).

In **distal hypospadias**, the urethral meatus is located at the glanular, coronal, or subcoronal level. Patients may present with a downward-deflected urinary stream, as well as urinary spraying or stream bifurcation. In the emergency department, particular attention should be paid to whether urinary outflow is adequate (1,2).

In **midshaft hypospadias**, the meatus is located on the ventral aspect of the penile shaft. Penile curvature is often more pronounced than in distal forms. The strength, continuity, and direction of the urinary stream should be carefully assessed (1,2).

In **proximal hypospadias**, the urethral meatus is located at the penoscrotal, scrotal, or perineal level. These cases are frequently associated with bifid scrotum, micropenis, or cryptorchidism. The presence of bilateral undescended testes or non-palpable testes should raise suspicion for a **disorder (difference) of sex development (DSD)** and warrants prompt specialist evaluation (1).

Presentation to the Pediatric Emergency Department and Initial Assessment

Hypospadias is most commonly diagnosed during routine neonatal examination. However, mild distal forms may remain undetected during early infancy. These children may subsequently present to the pediatric emergency department with abnormalities of the urinary stream, genital trauma, or postoperative complications following hypospadias repair (1,2).

Common Presenting Complaints

A downward-deflected urinary stream, urinary spraying, or stream bifurcation may be indicative of hypospadias. Dribbling, marked narrowing of the urinary stream, or ballooning of the urethra during voiding may suggest associated meatal stenosis (1).

Acute urinary retention accompanied by suprapubic fullness requires urgent evaluation. Urinary retention should not be attributed solely to hypospadias; alternative etiologies, including urinary tract infection, constipation, neurological disorders, and other causes of bladder outlet obstruction, should also be considered (6).

Fever, dysuria, urinary frequency, and vomiting may indicate a urinary tract infection. When clinical suspicion exists, both urinalysis and urine culture should be obtained to establish the diagnosis (7).

In children presenting after genital trauma, bleeding from the urethral meatus is a particularly important clinical finding suggestive of urethral injury. Additional findings may include inability to void, genital swelling, and perineal ecchymosis (8).

Children who have previously undergone hypospadias repair may present with postoperative bleeding, edema, surgical site infection, or catheter-related complications. Catheter obstruction or accidental dislodgement may compromise urinary drainage and requires prompt assessment (9,10).

History and Physical Examination

The initial evaluation should include documentation of a previous diagnosis of hypospadias and any prior surgical interventions. A history of circumcision should also be recorded. The direction, force, and continuity of the urinary stream should be assessed, together with the time of the patient's last voiding (1,6).

General clinical condition and vital signs should be evaluated as part of the initial assessment. The lower abdomen should be examined for suprapubic fullness suggestive of urinary retention. A systematic genital examination should document the location of the urethral meatus, the presence and severity of penile curvature, preputial anatomy, and the position of both testes (1,2).

The coexistence of proximal hypospadias with bilateral undescended or non-palpable testes should prompt further evaluation for a disorder (difference) of sex development (DSD) (1).

In children with a history of hypospadias repair, the surgical wound, dressing, and urethral catheter should be carefully inspected. Particular attention should be given to active bleeding, significant edema, and changes in penile color that may indicate vascular compromise or other postoperative complications (9).

Approach to Urethral Instrumentation

Urethral catheterization should be performed **only when clinically indicated**. In the presence of blood at the urethral meatus or when urethral injury is suspected, blind urethral catheterization should be avoided because of the risk of exacerbating the injury (8).

A urethral catheter that has become dislodged following hypospadias repair should **not** be reinserted without specialist consultation. The pediatric urology team or the surgeon who performed the procedure should be contacted before any attempt at catheter replacement (9).

Conditions Requiring Emergency Referral

Definitive surgical repair of hypospadias is typically performed electively between **6 and 18 months of age** (1). However, several clinical conditions require urgent evaluation and referral.

Acute Urinary Retention

The inability to void accompanied by suprapubic fullness is highly suggestive of acute urinary retention. In particular, cessation of urine output during the postoperative period represents an important warning sign. Prompt urological assessment should not be delayed in these patients (6,9).

Urethral Trauma and Bleeding

Bleeding from the urethral meatus following genital trauma is a key clinical finding suggestive of urethral injury. Associated manifestations may include urinary retention, perineal ecchymosis, genital swelling, and difficulty voiding. When urethral injury is suspected, blind urethral catheterization should be avoided. The patient should be referred immediately for emergency urological evaluation (8).

Signs of Systemic Infection

Fever accompanied by poor general condition, tachycardia, vomiting, or signs of circulatory instability may indicate systemic infection. In patients with suspected urinary tract infection, an appropriately collected urine specimen should be obtained for both urinalysis and urine culture. If clinical findings are suggestive of sepsis, antimicrobial therapy and supportive management should be initiated without delay (7).

Postoperative Complications

Persistent postoperative bleeding, rapidly progressive edema, and severe pain require urgent evaluation. Marked discoloration or darkening of the penile skin may indicate compromised penile perfusion and should prompt immediate urological assessment (9).

Catheter obstruction, kinking, or accidental dislodgement may impair urinary drainage. A dislodged catheter should **not** be reinserted without appropriate specialist consultation. The operating surgeon or the pediatric urology team should be contacted before any attempt at catheter replacement (9,10).

Associated Genital Anomalies

Proximal hypospadias may be associated with bilateral cryptorchidism or non-palpable testes. This constellation of findings substantially increases the likelihood of a disorder (difference) of sex development (DSD). Additional findings, including bifid scrotum, micropenis, and atypical external genitalia, also warrant comprehensive evaluation. These patients should be referred promptly to both pediatric urology and pediatric endocrinology for multidisciplinary assessment (1).

Treatment, Circumcision, and Specialist Referral

Surgical reconstruction is the standard treatment for appropriately selected patients with hypospadias. The indication for surgery is determined according to the location of the urethral meatus, the severity of penile curvature, urinary function, and associated anatomical abnormalities. Primary repair is generally planned between 6 and 18 months of age (1).

The principal objectives of surgical repair are correction of penile curvature and reconstruction of a functional urethra. Restoration of the urethral meatus to an anatomically appropriate position and establishment of a straight, controlled urinary stream are the primary goals of reconstruction (1).

Persistent postoperative bleeding, rapidly progressive edema, and severe pain may indicate complications requiring urgent evaluation. Marked darkening or discoloration of the penile skin may suggest compromised penile vascular perfusion and should prompt immediate urological assessment (9).

Catheter obstruction, kinking, or accidental dislodgement may compromise urinary drainage. A dislodged catheter should not be reinserted without specialist consultation. The operating surgeon or the pediatric urology team should be contacted before any attempt at catheter replacement (9,10).

Circumcision

Circumcision should be deferred in any child diagnosed with hypospadias. The preputial tissue may be required for subsequent urethral reconstruction and should therefore be preserved. Accordingly, children with suspected or confirmed hypospadias should be referred for specialist evaluation before circumcision is considered (1).

If hypospadias is identified during circumcision, the procedure should be discontinued. The external genital anatomy should be carefully reassessed, and a urological consultation should be obtained before any further intervention (1).

Specialist Referral

Children with distal hypospadias and adequate urinary drainage can generally be evaluated in the outpatient setting. However, patients presenting with significant penile curvature, meatal stenosis, or a proximally located urethral meatus should be referred to a pediatric urologist or another clinician experienced in the management of hypospadias (1,2).

When proximal hypospadias is associated with bilateral cryptorchidism, bifid scrotum, or micropenis, a multidisciplinary evaluation is recommended. The need for endocrine and genetic investigations should be determined according to the individual patient's clinical findings (1).

Children presenting with postoperative complications should be referred promptly to the center where the original surgery was performed whenever feasible. Emergency urological assessment is indicated in the presence of catheter-related problems, persistent bleeding, or suspected penile vascular compromise (9).

Conclusion

Hypospadias is a congenital anomaly that, in the majority of cases, is evaluated and managed electively. Nevertheless, the initial assessment performed in the pediatric emergency department plays a crucial role in ensuring appropriate clinical management. The primary objective in the emergency setting is not merely to classify the anatomical subtype of hypospadias but to recognize associated high-risk clinical findings that require urgent intervention.

Acute urinary retention, active bleeding, signs of urethral trauma, and postoperative catheter-related complications should be identified and managed without delay. In contrast, an ectopic urethral meatus or an abnormal urinary stream alone does not necessarily constitute an emergency. Distinguishing between these scenarios is essential to avoid unnecessary interventions and inappropriate referrals.

A systematic genital examination is fundamental for identifying associated anomalies, particularly undescended testes, bifid scrotum, and micropenis in children with proximal hypospadias. Recognition of these findings is critical because they may indicate an underlying disorder (difference) of sex development (DSD) and necessitate multidisciplinary evaluation.

Circumcision should be postponed until specialist assessment has been completed, and unnecessary or forceful urethral instrumentation should be avoided. In conclusion, the optimal management of children with hypospadias in the pediatric emergency department relies on the early recognition of emergency conditions, prevention of avoidable iatrogenic interventions, and timely referral to appropriate specialists.

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M4586-Tam Metin

PEDİATRİK RESÜSİTASYONDA KANITA DAYALI GÜNCEL YAKLAŞIMLAR: CPR FİZYOLOJİSİNDEN LAKTAT KLİRENSİNE

Özlem Albay

Malatya Eğitim ve Araştırma Hastanesi

Amaç

Pediatrik kardiyak arrest, erişkin kardiyak arrestten farklı epidemiyolojik ve patofizyolojik özelliklere sahiptir. Çocuklarda kardiyak arrestin önemli bir bölümünde primer kardiyak nedenlerden ziyade solunum yetmezliği ve şok ön plandadır. Bu nedenle erken tanı, etkin kardiyopulmoner resüsitasyon (CPR), uygun ventilasyon ve hızlı ritim değerlendirmesi kritik öneme sahiptir.[1] Bu konuşmada, 2025 Amerikan Kalp Derneği (AHA) Pediatrik İleri Yaşam Desteği (PALS) ve Avrupa Resüsitasyon Konseyi (ERC) Pediatrik Yaşam Desteği (PLS) kılavuzları doğrultusunda güncel pediatrik resüsitasyon yaklaşımları ve kardiyak arrest sonrası laktat klirensinin prognostik önemi ele alınmıştır.

Yöntem

Güncel öneriler, Uluslararası Resüsitasyon İrtibat Komitesi (ILCOR) tarafından değerlendirilen kanıtlar temelinde hazırlanan 2025 AHA PALS ve ERC PLS kılavuzları üzerinden gözden geçirilmiştir. Ventilasyon ve ileri hava yolu stratejileri, vasküler erişim, resüsitasyon ilaçları, defibrilasyon, CPR kalitesinin değerlendirilmesi, ekstrakorporeal CPR (ECPR) ve kardiyak arrest sonrası bakım başlıkları incelenmiştir. Ayrıca pediatrik hastalarda laktat düzeyi ve laktat klirensinin mortalite ve nörolojik prognozla ilişkisini değerlendiren çalışmalar ele alınmıştır.

Bulgular

Hastane dışı kardiyak arrestte (OHCA), ileri hava yolu girişimleri yerine balon-maske ventilasyonunun (BMV) uygulanması makul kabul edilmektedir. Klinik bir çalışmada, BMV ile ileri hava yolu uygulamalarının sağkalım ve nörolojik sonuçlar açısından benzer olduğu gösterilmiştir.[1,2] Hastane içi kardiyak arrestte (IHCA) ise BMV veya ileri hava yolu yöntemlerinden biri tercih edilebilir. İleri hava yolu yerleştirilmiş çocuklarda CPR sırasında dakikada 20–30 soluk ventilasyon hedeflenmesi önerilmektedir. Entübe pediatrik hastalarda yapılan gözlemsel bir çalışmada bir yaşından küçük çocuklarda dakikada en az 30, daha büyük çocuklarda en az 25 soluk ventilasyon uygulanması, spontan dolaşımın geri dönüşü ve taburculuğa kadar sağkalım ile ilişkili bulunmuştur.[1,3]

Vasküler erişimde intravenöz (İV) ve intraosseöz (İO) yollar arasında anlamlı fark gösterilmemiş olup seçim, zamanlama ve klinik koşullara göre yapılmalıdır. Yakın zamanda yapılan bir sistematik incelemede, pediatrik kardiyak arrestte İV ve İO damar yolları karşılaştırılmış ve iki yöntem arasında anlamlı bir fark bulunmamıştır. [1,4]

Şoklanamaz ritimlerde epinefrinin mümkün olan en kısa sürede uygulanması, şoklanabilir ritimlerde ise hızlı defibrilasyonun önceliklendirilmesi önerilmektedir. Epinefrinin CPR sırasında 3–5 dakikada bir uygulanması makul kabul edilmektedir. Şoka dirençli ventriküler fibrilasyon/nabızsız ventriküler taşikardide amiodaron veya lidokain kullanılabilir. Sodyum kanal blokeri toksisitesi veya hiperkalemi gibi özel durumlar dışında rutin sodyum bikarbonat kullanımı önerilmez. Benzer şekilde, rutin kalsiyum kullanımı da önerilmemekte; hipokalsemi, kalsiyum kanal blokeri doz aşımı veya hiperkalemi gibi özel durumlarda uygulanabilmektedir.[1]

Şoklanabilir ritimlerde erken defibrilasyon temel tedavidir. Başlangıç enerjisinin 2–4 J/kg olması makul kabul edilir. Dirençli VF/pVT'de sonraki şoklar 4 J/kg uygulanabilir; 10 J/kg veya yetişkin maksimum doz aşılmamalıdır. ERC, beş denemeden sonra 8 J/kg'a çıkılabileceğini belirtmektedir. Ardışık şoklar yerine tek defibrilasyon uygulanarak göğüs kompresyonlarına hızla yeniden başlanması önerilmektedir.[1,5]

Kaliteli CPR, sağkalım ve nörolojik sonuçlarla ilişkilidir. İnvaziv arteriyel monitörizasyon mevcutsa diyastolik kan basıncı resüsitasyonun etkinliğini değerlendirmede kullanılabilir; hedef değer 1 yaşından küçük çocuklarda ≥25 mmHg, daha büyük çocuklarda ≥30 mmHg'dir.[1] Çok merkezli bir gözlemsel çalışmada, CPR'ın ilk 10 dakikasında bu hedeflere ulaşılması daha iyi klinik sonuçlarla ilişkili bulunmuştur.[6] Ekspiryum sonu karbondioksit ($ETCO_2$) CPR kalitesinin izlenmesinde kullanılabilir; ancak tek başına belirli bir eşik değerin resüsitasyonu sonlandırmak için kullanılması önerilmez. Seçilmiş ve konvansiyonel CPR'a dirençli IHCA olgularında ECPR düşünülebilir.[1]

Kardiyak arrest sonrası dönemde normoksemi ve normokapni, hipotansiyonun önlenmesi, ateşten kaçınılması ve nöbetlerin tedavisi önemlidir. AHA, diğer prognostik göstergelerle birlikte değerlendirilmek koşuluyla, arrest sonrası ilk 12 saatte plazma laktat düzeyinin <2 mmol/L olmasının olumlu nörolojik prognozu destekleyebileceğini belirtmektedir.[1]

Laktat klirensine ilişkin çalışmalar, özellikle ilk 6 saatin prognostik önemini ortaya koymaktadır. Moustafa ve arkadaşlarının çalışmasında, 6. saatte laktat klirensinin mortaliteyi öngörmede tek bir laktat ölçümüne göre daha yüksek prognostik değere sahip olduğu ve laktat klirensi ≤0 olan hastalarda mortalitenin %86,4 olduğu bildirilmiştir.[7] Saraç ve arkadaşlarının çalışmasında ise 6. saatte laktat klirensinin %20,7'nin altında olması mortalite ile anlamlı olarak ilişkili bulunmuştur.[8]

Hastane dışı kardiyak arrest sonrası spontan dolaşımı geri dönen pediatrik hastalarda yapılan THAPCA çalışmasının ikincil analizinde ise, ROSC sonrası ilk 6 saat içinde ölçülen yüksek laktat düzeylerinin 12 aylık olumsuz nörodavranışsal sonuç veya ölüm ile ilişkili olduğu gösterilmiştir.[9]

Sonuç

Pediatrik resüsitasyonda hedef yalnızca spontan dolaşımın geri döndürülmesi değil, kaliteli CPR ile yeterli doku perfüzyonunun sağlanması ve post-arrest dönemde organ hasarının erken tanınmasıdır. Laktat klirensi, özellikle ilk 6 saatte, mortalite ve nörolojik prognozun değerlendirilmesinde yardımcı bir gösterge olarak kullanılabilir. Bununla birlikte laktat; karaciğer yetmezliği, konvülziyon ve yüksek doz adrenalin kullanımı gibi nedenlerle de yükselebileceğinden klinik tablo ile birlikte değerlendirilmelidir.

Destek

Yoktur.

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Kaynakça

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M4587-Tam Metin

THE ROLE OF İNTERVENTİONAL TREATMENT İN PEDİATRİC TRAUMA

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Aim

Rapid and effective hemorrhage control is critical for reducing morbidity and mortality in pediatric trauma patients. However, in children, the therapeutic goal is not limited to achieving hemostasis;

preservation of organ function and avoidance of unnecessary organ loss are equally important. Because the anatomical and physiological characteristics of children differ from those of adults, trauma management and endovascular procedures should be tailored specifically to the pediatric population. Interventional radiology (IR) may provide effective hemorrhage control while facilitating organ preservation and potentially avoiding surgery in appropriately selected patients [1,2]. The aim of this presentation is to discuss the role of IR in pediatric trauma, the clinical and imaging findings that should be considered in patient selection, and endovascular treatment options for different organ injuries using representative cases.

Methods

The initial approach to pediatric trauma begins with assessment of hemodynamic status according to standard trauma principles. Focused assessment with sonography for trauma may be performed when indicated, whereas contrast-enhanced computed tomography (CT) is the principal imaging modality for evaluating solid-organ and vascular injuries in hemodynamically stable patients. Findings such as active contrast extravasation, pseudoaneurysm, arteriovenous fistula, and other arterial injuries may warrant evaluation for IR treatment. However, contrast extravasation on CT alone should not be considered an absolute indication for embolization in pediatric patients. Hemodynamic status, response to resuscitation, and clinical evidence of ongoing hemorrhage should be evaluated together [2,3]. Current American Pediatric Surgical Association (APSA) recommendations reserve angioembolization in blunt liver and splenic injuries for selected patients with signs of ongoing bleeding despite resuscitation [3].

The primary objective of endovascular treatment is to achieve hemorrhage control through selective or superselective catheterization of the injured artery and administration of an appropriate embolic agent while preserving viable parenchyma and organ function. In this presentation, this approach was evaluated in splenic, hepatic, pelvic, and extremity vascular injuries.

Findings

Splenic and hepatic injuries are important areas of IR practice in pediatric blunt abdominal trauma. In appropriately selected splenic injuries, selective embolization can control hemorrhage while allowing preservation of splenic tissue. A 17-year-old male patient with a Grade IV splenic laceration following a traffic accident is presented as an example of this approach.

In hepatic trauma, ongoing arterial hemorrhage and traumatic vascular complications may be managed using endovascular techniques [4]. A 17-year-old male involved in an in-vehicle traffic accident is presented to demonstrate the interventional approach to hepatic arterial injury.

In pelvic trauma, hemorrhage originating particularly from branches of the internal iliac artery may be life-threatening. The embolization approach is demonstrated using an 18-year-old male with pelvic trauma and a 15-year-old female with pubic and sacral fractures following a traffic accident. In extremity trauma, active hemorrhage, traumatic pseudoaneurysm, and arteriovenous fistula may represent indications for interventional treatment. An 11-year-old male with a femoral fracture following a bicycle accident is presented as an example of such vascular injuries. Embolic material should be selected according to vessel diameter, anatomical location, collateral circulation, and the characteristics of the vascular injury. The use of N-butyl cyanoacrylate (NBCA) is also demonstrated in the presentation.

In a recent multicenter study of 1,462 pediatric patients with blunt liver and/or splenic injuries, 316 underwent IR. The reported IR failure rate was 3.8%, the procedure-related complication rate was 0.6%, and the splenic preservation rate was 98.4% [5].

Conclusion

Interventional radiology is a minimally invasive and organ-preserving therapeutic option that enables targeted hemorrhage control in appropriately selected pediatric trauma patients. Treatment decisions should not be based solely on injury grade or the presence of contrast extravasation on imaging. Hemodynamic status, response to resuscitation, evidence of ongoing hemorrhage, and associated injuries should be considered collectively. Appropriate patient selection, selective or superselective embolization whenever feasible, and early multidisciplinary collaboration among pediatric emergency medicine, pediatric surgery, intensive care, and interventional radiology teams are essential components of successful endovascular management in pediatric trauma [1–3].

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M4485-Tam Metin

ÇOCUKLARDA KBB YABANCI CİSİM ŞÜPHESİYLE BAŞVURULAR: ÖZELLİKLER, ANATOMİK DAĞILIM VE KLİNİK SONUÇLAR

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Amaç

Kulak burun boğaz (KBB) yabancı cisimleri çocukluk çağında sık karşılaşılan başvuru nedenlerinden biridir. Ancak yabancı cisim şüphesiyle değerlendirilen her çocukta yabancı cisim doğrulanmamakta; lokalizasyon, yaş, başvuru bulguları ve önceki girişimler klinik yönetimi

etkileyebilmektedir. Bu çalışmada KBB yabancı cisim şüphesiyle değerlendirilen çocukların demografik ve klinik özelliklerinin, yabancı cismin doğrulanma durumunun, anatomik dağılımının, başvuru anındaki travmatik bulguların ve kısa dönem klinik sonuçların değerlendirilmesi amaçlandı.

Yöntem

Eylül 2024-Temmuz 2026 tarihleri arasında tek merkezde KBB yabancı cisim şüphesiyle değerlendirilen 56 çocuk retrospektif olarak incelendi. Yaş, cinsiyet, ilk başvuru yeri, semptomlar, yabancı cismin lokalizasyonu ve kategorisi, yerleştirme olayının görülüp görülmediği, başvuru öncesi çıkarma girişimi, ilk girişimde başarı, tam çıkarma, ameliyathanede değerlendirme veya girişim, hastaneye yatış, başvuru anındaki travmatik bulgular ve işleme bağlı komplikasyonlar kaydedildi. Sürekli değişkenler ortanca ve çeyrekler arası aralık, kategorik değişkenler sayı ve yüzde ile sunuldu. Kategorik karşılaştırmalarda Fisher kesin testi kullanıldı. Yerleştirme olayının görülmesi ile yabancı cismin doğrulanması arasındaki ilişki olasılık oranı ve %95 güven aralığı ile ifade edildi. Lokalizasyona göre yaş dağılımı Kruskal-Wallis testi ile karşılaştırıldı; anlamlı genel fark sonrası ikili karşılaştırmalar keşifsel olarak Mann-Whitney U testi ile değerlendirildi. $p<0,05$ istatistiksel olarak anlamlı kabul edildi.

Bulgular: Olguların ortanca yaşı 37 ay, çeyrekler arası aralığı 24,75-52,25 ay olup 31'i (%55,4) erkekti. Hastaların 25'i (%44,6) ilk olarak acil servise başvurmuştu ve 9'unda (%16,1) başvuru öncesi çıkarma girişimi öyküsü vardı. Yabancı cisim 42 hastada (%75,0) doğrulanırken 14 hastada (%25,0) yabancı cisim saptanmadı. Doğrulanmış olguların 23'ü (%54,8) kulak, 14'ü (%33,3) burun ve 5'i (%11,9) üst aerodigestif yol yerleşimliydi. En sık yabancı cisim kategorisi boncuk veya plastik oyuncak parçalarıydı (23/42; %54,8); bunu gıda/çekirdek/tohum (8/42; %19,0), keskin cisim (7/42; %16,7), kağıt/pamuk (3/42; %7,1) ve böcek (1/42; %2,4) izledi.

Yerleştirme olayının görüldüğü 31 çocuğun 29'unda (%93,5), görülmediği 25 çocuğun ise 13'ünde (%52,0) yabancı cisim doğrulandı. Yerleştirme olayının görülmesi yabancı cismin doğrulanmasıyla güçlü biçimde ilişkiliydi (olasılık oranı=13,38; %95 güven aralığı: 2,61-68,56; $p<0,001$). Başvuru sırasında lokal kanama doğrulanmış olgularda daha sıktı (%50,0'a karşı %14,3; $p=0,027$). Yaş dağılımı lokalizasyona göre farklılık gösterdi; ortanca yaş kulak olgularında 42 ay, burun olgularında 36 ay ve üst aerodigestif yol olgularında 20 aydı ($p=0,047$). Keşifsel ikili karşılaştırmada kulak olguları burun olgularından daha büyüktü ($p=0,038$).

Doğrulanmış 42 olgunun 39'unda (%92,9) ilk girişimde çıkarma başarılı oldu ve tümünde tam çıkarma sağlandı. Dört olgu (%9,5) ameliyathanede değerlendirildi veya girişim uygulandı, yedi olgu (%16,7) hastaneye yatırıldı. Başvuru anında 23/56 hastada (%41,1) en az bir lokal travmatik bulgu mevcuttu; dış kulak yolu travması 9, epistaksis 6, mukozal laserasyon 4 ve timpan zarı hasarı 4 hastada kaydedildi. Doğrulanmış olguların 21/42'sinde (%50,0) başvuru anında travmatik bulgu vardı. Çıkarma işlemine bağlı yeni komplikasyon hiçbir hastada görülmedi.

Sonuç

KBB yabancı cisim şüphesiyle değerlendirilen çocukların dörtte birinde yabancı cisim saptanmadı. Yerleştirme olayının görülmesi yabancı cismin doğrulanmasıyla güçlü biçimde ilişkili olmakla birlikte olayın görülmemesi yabancı cismi dışlamadı. Doğrulanmış yabancı cisimler en sık kulak ve burunda yerleşimliydi ve ilk girişimde çıkarma başarısı yüksekti. Başvuru anındaki lokal travmatik bulgular sık görülmesine rağmen işleme bağlı yeni komplikasyon izlenmedi. Bulgular, dikkatli öykü, lokalizasyon ve risk değerlendirmesi ile uygun koşullarda planlanan ilk çıkarma girişiminin önemini desteklemektedir.

Tablo 1. Doğrulanmış yabancı cisim olgularının dağılımı ve klinik sonuçları (n=42)

Değişken	n (%)
Kulak yerleşimi	23 (%54,8)
Burun yerleşimi	14 (%33,3)

Üst aerodigestif yol yerleşimi	5 (%11,9)
Boncuk / plastik oyuncak	23 (%54,8)
Gıda / çekirdek / tohum	8 (%19,0)
Keskin cisim	7 (%16,7)
Kâğıt / pamuk	3 (%7,1)
Böcek	1 (%2,4)
İlk girişimde başarı	39 (%92,9)
Tam çıkarma	42 (%100)
Ameliyathanede değerlendirme / girişim	4 (%9,5)
Hastaneye yatış	7 (%16,7)
İşleme bağlı komplikasyon	0 (%0)

Anahtar kelimeler: çocuk; yabancı cisim; kulak; burun; çocuk acil
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M4588-Özet Metin
MECKEL DİVERTİKÜLÜ KANAMALARINDA ACİL CERRAHİ YAKLAŞIM

Fatma Çakmak

İstanbul Atlas Üniversitesi Acil Tıp Ana Bilim Dalı

Meckel Divertikülü Nedir?

Meckel divertikülü, embriyonik dönemde vitellin kanalının (omfalomezenterik kanal) tam olarak kaybolmaması sonucu gelişen, ileumun antimesenterik kenarında bulunan konjenital gerçek divertiküldür.

- Omfalomezenterik kanal kalıntısıdır.
- En sık görülen konjenital anomalidir.
- Genellikle ileoçekal valfe 60 cm mesafededir.
- Gerçek divertiküldür.
- Tüm bağırsak katmanlarını içerir.
- Sıklıkla ektopik doku barındırır.
- Mide mukozası en sık ektopiktir.
- Pankreas dokusu da bulunabilir.

Ağrısız alt gastrointestinal kanama: En sık başvuru şeklidir.
Tuğla kırmızısı/vişne çürüğü dışkı: Kanamanın tipik özelliğidir.
Akut karın ağrısı: Divertikülit veya perforasyon kaynaklıdır.
Bağırsak obstrüksiyonu: İnvajinasyon veya volvulus nedeniyle gelişir.
Taklitçi tablo: Akut apandisiti çok sık taklit eder.

Pediatrik Alt Gis Kanamasinda Ayirici Tani

Meckel divertikülü, tekrarlayan/masif, ağrısız rektal kanama ile başvuran her pediatrik hastada mutlaka akılda tutulmalıdır.

Süt Çocuğu (0–1 yaş)

- Anal fissür
- Alerjik proktokolit
- Malrotasyon / volvulus
- Nekrotizan enterokolit

Okul Öncesi (1–5 yaş)

- Meckel divertikülü
- İntussusepsiyon
- İnfeksiyöz kolit
- Henoch-Schönlein purpurası

Okul Çağı / Adölesan

- İnflamatuar bağırsak hastalığı
- Jüvenil polip
- İntestinal duplikasyon
- Meckel divertikülü

Neden Kanar?

Ektopik gastrik mukoza => Asit sekresyonu => Komşu ileumda peptik ülser

Pediatrik kanamanın klasik fenotipi: ağrısız, aralıklı, bazen masif hematokezya

Kanama özellikle küçük çocuklarda daha tipiktir.

Ektopik doku çoğunlukla gastrik; daha nadiren pankreatik/diğer heterotopiler bulunabilir.

Acil Serviste Tanısal Algoritma

1. Hemodinamik Değerlendirme: ABC, IV erişim, tam kan sayımı, çapraz grup, hemodinamik stabilizasyon önceliklidir.

2. Tc-99m Pertechnetate Sintigrafisi: "Meckel taraması" — ektopik gastrik mukozayı %85-90 duyarlılıkla gösterir; ilk basamak görüntülemedir.

3. İkinci Basamak Görüntüleme : Sintigrafi negatif/şüpheli ve kanama devam ediyorsa BT anjiyografi veya çift balonlu enteroskopi (DBE) düşünülür.

4. Devam Eden Masif Kanama : Görüntüleme sonucunu beklemeden, hemodinamik instabilite varlığında doğrudan cerrahi eksplorasyona geçilir.

Pozitif Tc-99m perteknetat: ektopik gastrik mukozayı gösterir; cerrahi planlamayı güçlendirir.

Yanlış negatif: küçük/az miktarda ektopik mukoza, aktif kanama olmaması, teknik/yorumlama sorunları ve anatomik varyasyonlar.

Kanayan ve hemodinamik olarak bozulan çocukta sintigrafiyi beklemek, resüsitasyon ve cerrahi hazırlığı geciktirmemelidir.

Hemodinamik İnstabilite: İlk Saatler

Cerrahi endikasyon kararı, görüntüleme sonucu beklenmeden klinik tabloya göre acilleştirilebilir.

- **Resüsitasyon**
  - İki geniş çaplı IV yol
  - İzotonik kristaloid bolus (10-20 mL/kg)
  - Eritrosit süspansiyonu: Hb <7 g/dL veya aktif masif kanamada

- **Monitörizasyon**
  - Vital bulgular / saatlik idrar çıkışı
  - Seri hemoglobin/hematokrit takibi
  - Nazogastrik dekompresyon (gerekirse)

- **Cerrahi Ekip İletişimi**
  - Pediatrik cerrahi/anestezi erken bilgilendirme
  - Ameliyathane ve kan ürünü hazırlığı
  - Aile bilgilendirme ve onam süreci

Cerrahi Karar
Hemoraji : Aktif / tekrarlayan GİS kanaması
Obstrüksiyon : İntussusepsiyon, volvulus, band obstrüksiyonu
Perforasyon: Peritonit bulguları ile
Divertikülit: Akut inflamasyon, apandisit taklidi
Umbilikoileal Fistül: Persistan vitellin kanal kalıntısı

Ameliyatın Zamanlaması: Ne Zaman Beklemiyorum?

- ❑ Devam eden hemodinamik instabilite / resüsitasyona rağmen tekrarlayan kanama.
- ❑ Transfüzyon gerektiren veya hızla kötüleşen aktif kanama.
- ❑ Meckel sintigrafisi pozitif ve klinik kanama ile uyumlu bulgular.
- ❑ Endoskopik/radyolojik değerlendirmeler tanısız kalıyor ancak klinik şüphe yüksek ve kanama sürüyor.
- ❑ Peritonit, perforasyon, invajinasyon/obstrüksiyon gibi başka cerrahi komplikasyon şüphesi.
- ❑ Karar 'sintigrafi pozitifliği'nden çok: hastanın fizyolojisi + kanamanın devamlılığı + deneyimli çocuk cerrahisi erişimi ile verilir.

İnstabil çocukta: önce resüsitasyon + cerrahi kontrol; görüntüleme ikinci plandadır.

Cerrahi Teknik
Divertikülektomi mi, Segmental Rezeksiyon mu?
Basit Divertikülektomi
Tercih Edilen Durumlar:

- Uzun boyunlu, dar tabanlı divertikül
- Basit divertikülit veya izole kanama
- Ektopik mukoza divertikül tabanıyla sınırlıysa
- İnsidental saptanan olgular

Avantaj, daha kısa operasyon süresi ve hastanede kalış; büyük seriler yeterli onkolojik/ semptomatik kür sağladığını göstermiştir.

Kama / Segmental Rezeksiyon

Tercih Edilen Durumlar:

- Geniş tabanlı, kısa divertikül (yükseklik/çap oranı <2)
- Ektopik mukoza komşu ileuma yayılmış olabilir
- Divertikül tabanına yakın aktif ülser/kanama odağı
- Perforasyon veya nekroz varlığı

Gerekçe, yetersiz sınır rezeksiyonu, kalıntı ektopik dokuya bağlı tekrarlayan kanama veya striktür riskini artırır.

Ameliyatta kritik teknik noktalar

1. Terminal ileumdan başlayarak sistematik 'run the bowel' yap.
2. Meckel'i yalnızca dış görünüşüne göre değil, taban ve komşu ileum açısından değerlendir.
3. Mezodivertiküler vasküler bant/omfalomezenterik damar kalıntılarına dikkat et; kontrol edilmeden kesme.
4. Dar tabanlı divertikülde wedge/divertikülektomi yapılacaksa lümen daralmasını önleyecek şekilde kapat.
5. Geniş taban, kısa/kalın divertikül veya tabana yakın ülserde segmenter rezeksiyon + primer anastomoz daha güvenli olabilir.
6. Rezeksiyon materyalinde ektopik mukozanın ve ülser alanının çıkarıldığından emin ol.

Postoperatif Süreç

Ameliyat Sonrası Takip ve Komplikasyonlar

Erken Dönem

Nazogastrik dekompresyon ihtiyacının değerlendirilmesi, sıvı-elektrolit takibi, erken enteral beslenmeye geçiş (ileus bulgusu yoksa).

Cerrahi Komplikasyonlar

Anastomoz kaçağı, yara yeri enfeksiyonu, postoperatif ileus, adezyona bağlı ileri dönem bağırsak obstrüksiyonu.

Kanama Rekürrensi

Rezeksiyon sınırında rezidü ektopik mukoza bırakılmışsa nüks kanama riski; patoloji raporunda sınır durumu mutlaka doğrulanmalıdır.

Patolojik İnceleme

Rezeke materyalde ektopik gastrik/pankreatik doku, ülserasyon derinliği ve nadiren neoplazi (karsinoid, GİST) araştırılır.

Cerrahi Yaklaşım

Minimal İnvaziv Ve Hibrit Teknikler

Laparoskopik / LATUM

Laparoskopi-yardımlı transumbilikal Meckel divertikülektomisi (LATUM); kozmetik avantaj ve hızlı derlenme sağlar; hemodinamik olarak stabil olgularda ilk tercih olabilir.

Çift Balonlu Enteroskopi (DBE) + Cerrahi

DBE ile divertikülün lokalizasyonu ve intraoperatif transillüminasyon rehberliği; özellikle sintigrafi negatif olgularda tanı ve lokalizasyonu birleştirir.

Açık Cerrahiye Geçiş Kriterleri

Hemodinamik instabilite, yaygın yapışıklık, ileri derece distansiyon veya laparoskopik olarak güvenli sınır elde edilememesi durumunda konversiyon gerekir.

M4589-Tam Metin

ACİL HASTALIKLARINDA RETROSPEKTİF ÇALIŞMA TASARIMI VE KLİNİK VERİ ANALİZİ

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Özet

Retrospektif çalışmalar acil tıp literatürünün önemli bir bölümünü oluşturur; acil tıp dergilerinde yayımlanan özgün araştırmaların yaklaşık dörtte biri kayıt taramasıdır. Bu çalışmalarda veri araştırma sorusu için değil, klinik bakım amacıyla üretilmiştir; bu yapısal özellik bilgi biası ve ölçülemeyen karıştırıcılık riskini beraberinde getirir. Bu derlemenin amacı, retrospektif bir acil tıp çalışmasının tasarım seçiminden raporlamaya uzanan metodolojik basamaklarını bütüncül bir çerçevede sunmaktır. Metin; tasarım seçimi, araştırma sorusunun yapılandırılması, örnekleme ve değişken tanımlama, kayıt taraması kalite standartları, yanlılık ve karıştırıcılık kontrolü, eksik veri yönetimi, örneklem büyüklüğü ile test seçimi ve STROBE/RECORD çerçevesinde raporlama başlıklarını kapsamaktadır.

Anahtar kelimeler: Retrospektif çalışmalar, acil tıp, kayıt taraması, araştırma tasarımı, yanlılık

1.Giriş

Acil tıpta hasta yoğunluğu, kısa karar süresi ve klinik tabloların heterojenliği prospektif çalışmayı güçleştirir; nadir tanılar ve ani gelişen olaylarda ise pratik olarak imkânsız kılar (1). Retrospektif tasarım bu boşluğu doldurur: nadir olaylar için uygundur, hızlı ve ekonomiktir, hipotez üretme ile fizibilite çalışmaları için zemin sunar (3). Buna karşılık kayıtların eksik ve standart dışı olması bilgi biasına, hasta seçiminin hedef popülasyonu temsil etmemesi seçilim biasına yol açar; ölçülmemiş karıştırıcılar ise kalıcı bir sınır oluşturur (2,5,6). Tasarımın küçümsenmesi değil, sınırlarının baştan kabul edilip yöntemsel titizlikle telafi edilmesi gerekir (4).

2. Analitik gözlemsel tasarım seçimi

Retrospektif kohort maruziyetten sonuca ilerler, zamansal ilişkiyi kurar ve insidans ile rölatif risk üretir. Vaka-kontrol sonuçtan maruziyete geriye bakar, nadir hastalıklarda verimlidir ve odds oranı verir; en kritik noktası kontrollerin kaynak popülasyonu temsil etmesidir. Kesitsel tasarım prevalans verir ancak zamansal öncelik kurulamadığı için nedensellik gösteremez (3,7). Tasarımı eldeki veri değil, araştırma sorusu ile olayın nadirliği belirler; tasarım protokolde kilitlenmeli, veriye bakıldıktan sonra değiştirilmemelidir (4,8).

3. Soru, örneklem ve değişkenler

Araştırma sorusu PICOT (Population-Intervention/Exposure–Comparison-Outcome-Time) ile yapılandırılır, FINER (Feasible-Interesting-Novel-Ethical-Relevant) ile sınanır; sonuç değişkeni

önceden ve tek olarak tanımlanmalıdır, çünkü sonucun veri görüldükten sonra seçilmesi doğrudan bir yanlılık kaynağıdır (7,8). Örnekleme çerçevesi sonucu doğrudan etkiler: yalnızca yatırılan hastaların alınması taburcu edilen hafif olguları sistematik olarak dışlar (5). Dahil etme ölçütleri önceden ve nesnel olmalıdır; "uygun kayıt bulunanlar" bir ölçüt değildir. Uygunluk penceresindeki tüm hastaların ardışık olarak alınması ve katılımcı akışının raporlanması esastır (1,8). Her değişken için tip, yoruma yer bırakmayan operasyonel tanım, kayıt kaynağı ve eksik veri kuralı veri toplamadan önce yazılmalıdır; örneğin "septik şok" yerine Sepsis-3 ölçütü kullanılmalıdır. Form pilot olarak test edilmelidir (2,9).

4. Veri kalitesi ve güvenilirlik

Kaliteli bir kayıt taramasının metodolojik ölçütleri Tablo 1'de özetlenmiştir (1,2,4). Literatürde en sık atlanan üç unsur abstraktör körlemesi, çift abstraksiyon ve gözlemciler arası uyumun raporlanmasıdır (2,4). Abstraktör hipotezi bilirse belirsiz kayıtları istemeden hipoteze uygun yorumlayabilir; bu bilgi biasının doğrudan kaynağıdır (2). Kayıtların %10-20'si iki bağımsız araştırmacı tarafından değerlendirilmeli, kategorik değişkenlerde Cohen kappa, sürekli değişkenlerde ICC raporlanmalıdır (1,4). Landis ve Koch eşiklerine göre 0,41-0,60 orta, 0,61-0,80 güçlü uyumu gösterir; temel değişkenlerde hedef $\kappa \geq 0{,}60$'tır (10). Değer düşükse sorun istatistikte değil operasyonel tanımın muğlaklığındadır; tanım netleştirilip ekip yeniden kalibre edilmelidir (2).

Tablo 1. Kaliteli bir retrospektif kayıt taraması için metodolojik standartlar

Kriter	Pratikte ne yapmalı
Abstraktör eğitimi	Kodlama kurallarını öğret; örnek dosyalarla kalibre et
Standart veri toplama formu	Tüm araştırmacılar aynı formu kullanmalı
Değişkenlerin açık tanımı	Her alan için nesnel, tekrarlanabilir operasyonel tanım
Çift/çoklu abstraksiyon	Kritik değişkenlerde dosyaları ikinci araştırmacı da değerlendirsin
Gözlemciler arası uyum (κ)	Kappa/ICC hesapla ve makalede raporla
Körleme	Veri toplayan kişi hipotezi veya grup bilgisini bilmesin
Anlaşmazlık çözümü	Baş araştırmacı hakemlik etsin; düzenli ekip toplantıları
İzleme ve denetim	Belirli aralıklarla veriler yeniden kontrol edilsin

Kaynak: Worster ve Haines 2004 (1); Gilbert ve ark. 1996 (2); Kaji, Schriger ve Green 2014 (4).

5. Yanlılık (bias) ve karıştırıcılık (confounding)

Seçilim biası, bilgi biası, survivorship ve saptama biası retrospektif çalışmaların başlıca tuzaklarıdır (3,5). Acil ve yoğun bakım çalışmalarında özellikle sinsi olan immortal time bias'tır: bir hastanın "antibiyotik alan" gruba girebilmesi için ilacın verildiği ana kadar hayatta kalması gerekir; maruziyet öncesindeki bu "ölümsüz süre" tedavi grubuna sayıldığında tedavi olduğundan koruyucu görünür (11). Çözüm maruziyeti zamana bağımlı değişken olarak tanımlamak veya landmark analizi kullanmaktır (11). Karıştırıcılık tasarım aşamasında kısıtlama ve eşleştirmeyle, analiz aşamasında stratifikasyon, çok değişkenli regresyon ve propensity skoruyla kontrol edilir

(6). Ancak yalnızca ölçülen karıştırıcılar kontrol edilebilir; rezidüel confounding yapısal bir sınırdır ve tartışmada dürüstçe belirtilmelidir (6).

6. Eksik veri yönetimi ve analiz

Eksik veri retrospektif çalışmanın kuralıdır. Eksiklik oranı her değişken için raporlanmalı; MAR varsayımı altında çoklu atama tercih edilmeli, varyansı yapay küçülten tek değer atamadan kaçınılmalı ve duyarlılık analizi eklenmelidir (12). "Eksik = normal" varsayımı yapılmamalıdır; belgelenmeme klinik bir sinyal olabilir (2). Örneklem mantığında sınırlayıcı olan toplam hasta değil sonuç olaylarının sayısıdır; çok değişkenli modelde değişken başına yaklaşık 10 olay pratik bir başlangıç kuralıdır, ancak kesin bir eşik değildir (13,14). Örneklem sabit olduğundan a priori güç yerine saptanabilir en küçük etki büyüklüğü raporlanmalı, post-hoc gözlenen güç hesabından kaçınılmalıdır (15). Test seçimi sonuç değişkeninin tipi, grup sayısı ve varsayımlarla belirlenir (Tablo 2). p değeri tek başına yetmez; etki büyüklüğü ve %95 güven aralığı verilmelidir (16).

Tablo 2. İstatistiksel test seçimi karar tablosu

Amaç / veri tipi	Koşul	Test	SPSS / Jamovi
2 grup, sürekli sonuç	Normal dağılım	Bağımsız t-testi	Compare Means / T-Tests
2 grup, sürekli / ordinal	Normal dağılım yok	Mann-Whitney U	Nonparametric / T-Tests
≥3 grup, sürekli sonuç	Normal dağılım	Tek yönlü ANOVA	Compare Means / ANOVA
≥3 grup, sürekli sonuç	Normal dağılım yok	Kruskal-Wallis H	Nonparametric / ANOVA
Kategorik-kategorik	Beklenen frekans yeterli	Pearson ki-kare	Crosstabs / Contingency
Kategorik-kategorik	Beklenen frekans düşük	Fisher kesin testi	Crosstabs / Contingency
İki sürekli değişken	Doğrusal / monoton ilişki	Pearson / Spearman	Correlate → Bivariate
İkili sonuç	Düzeltme gerekli	Lojistik regresyon	Regression / Regression
Sağkalım / zamana bağlı	Sansür var	Kaplan-Meier, Cox	Survival / (modül)

Önce sonuç değişkenini tanımlayın; ardından grup sayısını ve varsayımları değerlendirin.

7. Raporlama, etik ve sonuç

STROBE gözlemsel çalışmalar için 22 maddelik kontrol listesidir; RECORD ise rutin toplanan sağlık verileriyle yürütülen çalışmalar için kodlama algoritmaları, popülasyon çıkarımı ve veri bağlama maddelerini ekler (8,17). Kayıt taraması da etik kurul onayı gerektirir; onam muafiyeti kararını kurul verir, kimlik bilgileri erken aşamada ayrılmalı ve veri yönetimi KVKK'ya uygun

planlanmalıdır (3,17). Sonuç olarak retrospektif bir çalışmanın kalitesi veri toplamaya başlamadan önce, protokol aşamasında belirlenir; standart form, körleme ve uyum raporlaması güvenilir veriyi üretir, yanlılık önce tasarımla önlenir ve hiçbir istatistiksel yöntem kötü kurgulanmış bir tasarımı kurtaramaz (2,4,8).

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M4590-Tam Metin

PEDİATRİK AKUT SOLUNUM YETMEZLİĞİNDE NONİNVAZİV VENTİLASYON: BAŞARI, BAŞARISIZLIK ÖNGÖRDÜRÜCÜLERİ VE ERKEN KLİNİK YANITIN ÖNEMİ

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Giriş ve Amaç

Akut solunum yetmezliği (ARF), pediatrik yoğun bakımda sık görülen ve hızlı kötüleşebilen önemli bir durumdur. Artmış solunum iş yükü, oksijenlenme bozukluğu ve/veya alveoler ventilasyon yetersizliği, endotrakeal entübasyon ve invaziv mekanik ventilasyon (IMV) gereksinimine yol açabilir. Bu nedenle NIV, uygun hastalarda entübasyon gereksinimini azaltmak amacıyla giderek daha fazla kullanılmaktadır [1,2].

Pediatrik ARF'de **CPAP ve BiPAP** en sık kullanılan NIV yöntemleridir. CPAP oksijenlenme ve alveoler recruitment'ı desteklerken, BiPAP özellikle hiperkapnik yetmezlikte ventilasyonu artırır [1,2]. Bununla birlikte, **NIV başarısızlığının erken öngörülmesi** kritik öneme sahiptir. Başarısız NIV'nin gereğinden uzun sürdürülmesi entübasyonu geciktirebileceğinden, tedavi sonrası **erken klinik yanıtın sistematik değerlendirilmesi** gereklidir [3,4].

Yöntem

Pediatrik akut solunum yetmezliğinde NIV'nin etkinliği, başarısızlık belirleyicileri ve erken klinik yanıtı değerlendiren çalışmalar incelendi. PubMed/MEDLINE, Scopus ve Web of Science veri tabanlarında NIV, pediatrik akut solunum yetmezliği, NIV başarısızlığı, PARDS/ARDS, hipoksemik/hiperkapnik yetmezlik ve erken yanıtla ilişkili anahtar kelimeler kullanıldı. Randomize kontrollü çalışmalar, gözlemsel çalışmalar, sistematik derlemeler, meta-analizler ve güncel kılavuzlar değerlendirildi. Bulgular; NIV etkinliği, başarısızlık öngördürücüleri, erken klinik yanıt ve farklı solunum yetmezliği fenotipleri açısından sentezlendi.

Bulgular

Pediatrik ARF'de NIV'nin Etkinliği

15 RCT ve 2679 çocuk içeren meta-analizde NIV, entübasyon gereksinimini azaltmıştır (%11,5 vs %14,5; RR 0,791), ancak mortalite ve yoğun bakım/hastane yatış süresinde anlamlı fark göstermemiştir [5]. Yañez ve ark.'nın RCT'sinde entübasyon oranı NIV grubunda %28, kontrolde %60 bulunmuş; ilk saatlerde kalp hızı, solunum sayısı ve oksijenlenmede düzelme gözlenmiştir [6]. Başarısızlık riski yüksek gruplar sepsis-MODS, belirgin asidoz ve orta–şiddetli ARDS varlığı belirtilmiş ve doğru hasta seçiminin önemine dikkat çekilmiştir [7]. $PaCO_2$ ve pH değişimi erken yanıtın temel göstergeleridir [8].

NIV Başarısızlığı

114 hastalık çalışmada NIV başarısı %77, ARDS'de ise yalnızca %22 bulunmuş; yüksek PRISM II, PELOD ve ARDS başarısızlıkla ilişkili bulunmuştur [8]. Başka bir çalışmada; başarısızlığın başlıca nedenleri apne/bradikardi, ARDS, ağır hipoksemi ve artan hiperkapni olarak bildirilmiştir [4]. Özellikle PARDS, ağır hipoksemi, yüksek FiO_2, düşük S/F-P/F, yüksek hastalık şiddeti, devam eden taşipne ve düzelmeyen hiperkapni başarısızlık riski açısından yakın izlem gerektirir.

NIV sonrası ilk 1–2 saatte RR ve HR azalması, solunum eforunun gerilemesi, oksijenlenmenin düzelmesi ve FiO_2 gereksiniminin azalması olumlu yanıt göstergeleridir. $PaCO_2$ azalması ve pH düzelmesi ek olarak değerlendirilmelidir. Pons-Òdena ve ark.'nın 282 hastalık çalışmasında yaş, 2.saatteki S/F, HR ve yüksek IPAP NIV başarısızlığı ile ilişkili bulunmuştur [9]. Tek bir başlangıç değeri yerine trend değerlendirilmelidir.

PARDS ve NIV

PARDS, NIV başarısızlığı açısından yüksek riskli bir gruptur. Özellikle ciddi hipoksemi ve parankimal akciğer hasarının belirgin olduğu hastalarda NIV başarısı düşüktür. ARDS hastalarında NIV başarısı yalnızca **%22** bulunmuş ve ARDS, NIV başarısızlığının güçlü bir belirleyicisi olarak gösterilmiştir [8]. **2427 PARDS hastasının 995'inde (%41)** entübasyon öncesi NIV kullanılmıştır. Düzeltilmiş analizde NIV; daha uzun **IMV süresi, PICU yatışı ve hastane yatışı** ile ilişkili bulunmuş; 28 ve 90 günlük mortalite de daha yüksek saptanmıştır [11]. Ancak bu sonuçlar **NIV'nin PARDS'de zararlı olduğunu göstermez**. Çalışmanın gözlemsel yapısı nedeniyle nedensellik kurulamaz ve NIV uygulanan hastalar başlangıçta daha ağır olabilir [11]. A**ğır PARDS'de NIV yanıtının yakından izlenmeli ve başarısızlık durumunda entübasyonun geciktirilmemelidir**. PALICC-2 de uygun seçilmiş hastalarda NIV'yi desteklerken, yakın monitorizasyon ve erken başarısızlık değerlendirmesini vurgulamaktadır [10].

Akut Astım ve Sedasyon

NIV, özellikle **hiperkapnik ağır astımda** solunum iş yükünü azaltabilir. Status asthmaticuslu 20 çocukluk RCT'de NIV, klinik skor ve solunum parametrelerinde erken düzelme sağlamıştır [12]. Bir meta-analizde NPPV; oksijenlenmede iyileşme, $PaCO_2$ ve RR'de azalma ile ilişkili bulunmuştur [13]. SEDANIV çalışmasında sedasyon, NIV başarısızlığı ile **bağımsız olarak ilişkili bulunmamıştır**. PRISM III ve 3. saatte RR bağımsız başarısızlık belirleyicileriydi [14]. Sedasyon rutin olarak NIV başarısını artıran bir tedavi değildir; gerektiğinde **minimal ve dikkatli sedasyon** tercih edilmelidir.

Akciğer ultrasonografisi ve erken öngörü

LUS, NIV başarısızlığını erken öngörmede **gelecek vadeden bir araçtır.** Erişkin akut hipoksemik hastalardaki çalışmada**, 2. saatte LUS skorunda düzelme olmaması** NIV başarısızlığı ile bağımsız olarak ilişkili bulunmuştur [15]. NIV yanıtının **klinik bulgular + oksijenasyon + LUS değişimi** birlikte değerlendirilerek daha erken öngörülmesi mümkün olabilir.

NIV başarısızlığında "tek değer" yerine "trend" yaklaşımı

NIV başarısını değerlendirirken **tek bir başlangıç değerinden çok, ilk 1–2 saatteki değişim** önemlidir.

- **Solunum sayısı:** ↓ → olumlu; aynı/↑ → başarısızlık riski
- **$PaCO_2$/pH:** $PaCO_2$ ↓ + pH ↑ → olumlu; tersine değişim → risk
- **S/F–P/F:** ↑ ve FiO_2 ↓ → olumlu; ↓ ve FiO_2 ↑ → risk
- **Kalp hızı:** ↓ → olumlu; yüksek kalması → yetersiz yanıt göstergesi

Klinik uygulamaya yönelik yaklaşım

Uygun hasta seçimi → NIV başla → ilk 1–2 saatte yanıtı değerlendir → düzelme varsa devam et, yanıt yoksa veya kötüleşme varsa entübasyonu geciktirme.

Sonuç

Pediatrik akut solunum yetmezliğinde NIV, **uygun hastalarda entübasyon gereksinimini azaltabilen** etkili bir destek yöntemidir. Ancak PARDS, ağır hipoksemi, yüksek hastalık şiddeti ve devam eden yüksek solunum yükü **NIV başarısızlığı riskini artırır**. NIV yanıtında **ilk 1–2 saatteki trend** önemlidir. Solunum sayısı ve kalp hızında azalma, oksijenlenmede düzelme ve hiperkapninin gerilemesi olumlu yanıt göstergeleridir. **NIV'nin amacı entübasyonu her koşulda önlemek değil, uygun hastada güvenli şekilde önlemektir.** Bu nedenle NIV'nin başarısını artıran en önemli faktörlerden biri yalnızca doğru hastayı seçmek değil, aynı zamanda başarısız olacak hastayı erken tanıyabilmektir.

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M4591-Tam Metin

EMERGENCY APPROACH TO ORBİTAL FRACTURES AND TRAUMATİC OPTİC NEUROPATHY

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Aim

Eye trauma is an important cause of visual impairment. Approximately 55 million eye injuries occur worldwide each year, with an estimated 23 million people experiencing unilateral visual loss and 750,000 requiring hospitalizations. In a large series of severe eye injuries, 27% of affected eyes had visual acuity below 20/200, whereas visual improvement was reported in 61% of patients receiving early and appropriate ophthalmic treatment. This presentation aimed to summarize the emergency approach to orbital fractures and traumatic optic neuropathy, with emphasis on early recognition of sight-threatening conditions.(Négrel and Thylefors)

Method

A focused literature-based review was prepared using the clinical content presented in the oral presentation. The review addressed initial trauma stabilization, focused ocular examination, orbital fracture patterns, pediatric trap-door fractures, orbital compartment syndrome, and traumatic optic neuropathy. The selected literature included studies on the global burden of eye injuries, ocular and periocular injuries associated with orbital fractures, orbital compartment syndrome, and traumatic optic neuropathy.(Andrews et al.; Lima et al.; Négrel and Thylefors; Rossin et al.; Sun et al.; Yu-Wai-Man; Bharati and Chowdhury)

Findings

Initial management should follow trauma priorities, including control of life-threatening hemorrhage, airway, breathing, circulation, neurological assessment, and exposure. Cervical spine immobilization should be considered when appropriate. After stabilization, visual acuity should be documented separately for each eye. The focused examination should include pupillary responses and relative afferent pupillary defect, ocular motility and diplopia, proptosis, eyelid tension, chemosis, facial sensation, orbital rim tenderness, and signs of open-globe injury.
Open-globe injury, orbital compartment syndrome, traumatic optic neuropathy, retinal detachment, and significant hyphema are major sight-threatening conditions. In suspected open-

globe injury, pressure on the eye and tonometry should be avoided. A rigid protective shield and urgent ophthalmology consultation are required.
Orbital compartment syndrome should be suspected in the presence of proptosis, tense eyelids, reduced retropulsion, chemosis, restricted ocular movement, visual deterioration, or a relative afferent pupillary defect. It is a clinical emergency, and imaging should not delay lateral canthotomy and cantholysis when indicated.(Andrews et al.; Yu-Wai-Man)
Orbital floor fractures may cause periorbital swelling, ecchymosis, diplopia, painful or restricted eye movement, enophthalmos, orbital emphysema, and infraorbital sensory loss. In children, flexible bone may lead to trap-door fractures with extraocular muscle entrapment. Painful restricted gaze accompanied by nausea, vomiting, or bradycardia should raise concern for the oculocardiac reflex and requires urgent surgical assessment.(Bharati and Chowdhury)
Traumatic optic neuropathy may occur after blunt orbital trauma, orbital fracture, or optic canal injury. Acute visual loss, relative afferent pupillary defect, reduced color vision, and an initially normal fundus are important diagnostic clues. Computed tomography is useful for identifying orbital fractures and muscle entrapment, while computed tomography or magnetic resonance imaging may support assessment of optic canal injury or associated hematoma. Nevertheless, traumatic optic neuropathy remains primarily a clinical diagnosis. (Yu-Wai-Man)
In patients with suspected traumatic optic neuropathy, open-globe injury, orbital compartment syndrome, and severe orbital fractures should be excluded first. If orbital compartment syndrome is present, emergency decompression is the priority. High-dose corticosteroids and optic canal decompression should be individualized through multidisciplinary assessment because the available evidence remains limited and controversial.(Sun et al.)

Conclusion

Orbital fractures and traumatic optic neuropathy should be approached as potentially sight-threatening components of facial trauma. Early documentation of visual function, recognition of open-globe injury and orbital compartment syndrome, and prompt identification of pediatric muscle entrapment are central to emergency care. In traumatic optic neuropathy, acute visual loss with a relative afferent pupillary defect warrants urgent ophthalmic assessment; routine steroid therapy or optic canal decompression should not be automatic.

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M4592-Tam Metin

P-DEĞERLERİ VE GÜVEN ARALIKLARININ YORUMLANMASI: ACİL TIP PRATİĞİNDE YAYGIN İSTATİSTİKSEL HATALARDAN KAÇINMAK İÇİN PRATİK BİR ÇERÇEVE

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ÖZET

Acil tıp pratiğinde klinik kararlar büyük ölçüde literatürden elde edilen istatistiksel bulgulara dayanmaktadır; ancak p-değeri ve güven aralığı, tıp literatüründe en sık kullanılan ve en sık yanlış yorumlanan iki istatistiksel ifadedir. Bu konuşmada, bir klinik vaka örneği (NLR-mortalite ilişkisi) üzerinden aynı bulgunun yalnızca p-değeriyle, ardından etki büyüklüğü ve güven aralığıyla, son olarak klinik bağlamla birlikte raporlandığında yorumun nasıl değiştiği gösterilmiştir. P-değerinin kavramsal tanımı ve dört temel sınırlaması, literatürde sık karşılaşılan yanlış yorumlamalar, güven aralığının klinik zenginliği ve yaygın yanlış yorumlamaları, istatistiksel anlamlılık ile klinik anlamlılık arasındaki fark ve klinik olarak anlamlı minimum fark (MID) kavramı ele alınmıştır. Bulgular, yalnızca p-değerine odaklanmanın klinisyeni yanıltabileceğini; etki büyüklüğü, güven aralığı ve MID'in birlikte değerlendirilmesi gerektiğini göstermektedir. Sonuç olarak, acil tıp pratiğinde günlük kullanım için beş adımdan oluşan pratik bir yorumlama çerçevesi ve altı ana öneri sunulmuştur.

Anahtar Kelimeler: P-değeri, Güven aralığı, İstatistiksel anlamlılık, Klinik anlamlılık, Acil tıp

GİRİŞ

Sayın oturum başkanım, değerli meslektaşlarım; hepinizi saygıyla selamlıyorum. Acil tıp pratiğinde her gün, hastaya ait klinik bir bulguyu, bir laboratuvar değerini ya da bir tedavi yaklaşımının etkisini değerlendirirken, farkında olsak da olmasak da istatistiksel bir dille konuşuyoruz. Okuduğumuz her makale, dayandığımız her kılavuz, bize bir p-değeri ve bir güven aralığı sunuyor. Ancak bu iki kavram, tıp literatüründe en sık kullanılan ve maalesef en sık yanlış yorumlanan iki istatistiksel ifadedir.

Bir örnekle başlayalım. Diyelim ki bir çalışmada başvuru anındaki nötrofil-lenfosit oranı (NLR) ile hastane içi mortalite arasındaki ilişki incelenmiş ve mortal olan hastalarda NLR düzeyinin anlamlı olarak daha yüksek bulunduğu; bu farkın istatistiksel olarak anlamlı olduğu ($p = 0,02$) bildirilmiş olsun. Çoğumuzun ilk refleksi, 'yüksek NLR mortaliteyi öngörür' şeklinde bir sonuca varmak olur. Ancak bu bulguya etki büyüklüğünü (OR: 1,18) ve ardından güven aralığını (%95 GA: 1,02–9,36) eklediğimizde tablo tamamen değişir: alt sınır neredeyse etkisiz, üst sınır ise oldukça yüksektir. Sonuç istatistiksel olarak anlamlıdır, fakat klinik olarak nasıl kullanılacağı son derece belirsizdir. Buna bir de ayırt edici gücü (ROC eğrisi altında kalan alan: 0,58) ve çok değişkenli analizde anlamlılığını kaybetmesi eklendiğinde, başlangıçta 'anlamlı' görünen bu ilişkinin klinik karar verme açısından sınırlı bir değer taşıdığı ortaya çıkar.

Bu örnek, bu konuşmanın çıkış noktasını özetlemektedir: p-değerine tek başına odaklanmak, klinisyeni yanıltabilir. Bu konuşmanın amacı; p-değerinin gerçekte ne anlama geldiğini, literatürde en sık yapılan yanlış yorumlamaları, güven aralığının p-değerine kıyasla sunduğu klinik zenginliği, istatistiksel anlamlılık ile klinik anlamlılık arasındaki farkı ve klinik olarak anlamlı minimum farkın (MID) bu yorumlamadaki yerini gözden geçirmek; son olarak da acil tıp pratiğinde günlük olarak uygulanabilecek, beş adımdan oluşan pratik bir yorumlama çerçevesi önermektir.

YÖNTEM

Bu konuşma ampirik bir araştırma değil; istatistiksel yöntembilim alanındaki temel kaynakların (Greenland ve ark., 2016; Phillips ve ark., 2022; Fethney, 2010; Tijssen, 2021; Neugut ve Fojo,

2024) gözden geçirilmesine ve bir klinik vaka senaryosu üzerinden adım adım bir yorumlama çerçevesinin kurgulanmasına dayanmaktadır. Şimdi bu çerçeveyi, önce p-değerinin ne olduğunu netleştirerek, ardından güven aralığı ve klinik bağlamla birlikte ele alarak aktaracağım.

BULGULAR

P-Değeri Nedir? Kritik Bir Ayrım

P-değeri, sıfır hipotezinin (H0) doğru olduğu varsayımı altında, gözlenen veya ondan daha uç bir sonucun rastlantısal olarak elde edilme olasılığıdır: P = P(T ≥ gözlenen | H0 doğru). Buradaki kritik ayrım şudur: p-değeri, hipotezin kendisinin doğru olma olasılığı DEĞİLDİR. P-değeri, hipotezin doğru olduğu varsayılarak hesaplandığı için, hipotezin gerçek doğruluk olasılığı hakkında doğrudan hiçbir şey söylemez. Greenland ve arkadaşlarının vurguladığı gibi, p-değeri yalnızca veri ile model arasındaki uyumsuzluğun bir ölçüsüdür; başka bir şey değildir.

P-Değerinin Dört Temel Sınırlaması

Greenland ve arkadaşlarının 2016 tarihli çalışmasında ayrıntılı biçimde ele alındığı üzere, p-değerinin klinik yorumlamada dört temel sınırlaması bulunmaktadır: p-değeri hipotezin doğruluk olasılığını göstermez; örneklem büyüklüğünden bağımsız olarak etki büyüklüğü hakkında bilgi vermez; anlamlılık eşiği (genellikle 0,05) keyfi ve tarihsel bir kabuldür; ve tek bir çalışmadaki p-değeri, o bulgunun başka çalışmalarda tekrarlanabilirliği konusunda güvenilir bir öngörü sağlamaz.

Yaygın Yanlış Yorumlamalar

Literatürde en sık karşılaşılan yanlış yorumlamaların başında, 'p = 0,01 ise hipotez %1 olasılıkla doğrudur' ifadesi gelmektedir; oysa p-değeri hipotezin doğru olma olasılığını değil, veri ile model arasındaki uyumu ölçer. İkinci sık hata, 'p = 0,05 anlamlı, p = 0,06 anlamsız' şeklindeki yapay ikili ayrımdır; 0,049 ile 0,051 arasındaki fark binde iki mertebesindedir ve pratikte aynı kanıt düzeyini temsil eder — 0,05 eşiği keyfi, tarihsel bir kabulden ibarettir. Üçüncü hata, istatistiksel anlamlılığın otomatik olarak klinik önem taşıdığının varsayılmasıdır; oysa örneğin n = 10.000 hastalık bir çalışmada kan basıncını yalnızca 2 mmHg düşüren bir ilaç p < 0,001 düzeyinde 'anlamlı' çıkabilir, ancak 2 mmHg'lik bir fark klinik açıdan önemsizdir.

Dördüncü olarak, 'p > 0,05 ise etki yoktur' yorumu da hatalıdır; doğrusu, p > 0,05 yalnızca verinin model tahminine yakın olduğunu gösterir — bu 'etki yok' değil, 'bu veriyle bir fark tespit edemedik' anlamına gelir. Beşinci hata, 'p ≤ 0,05 ise yanlış pozitif olma şansı %5'tir' şeklindeki yorumdur; oysa hipotez gerçekten doğruysa ve buna rağmen reddedilirse hata şansı %100'dür — alfa değeri olan 0,05, tek bir sonuç için değil, çok sayıda çalışmadaki uzun dönemli hata oranını ifade eder. Benzer şekilde, 'güç %90 ve p > 0,05 ise yanlış negatif olma şansı %10'dur' yorumu da yanlıştır; hipotez gerçekten yanlışsa ve kabul edilirse hata %100'dür — güç ve p-değeri, tek bir çalışmaya değil, aynı tasarımın çok sayıda tekrarına ilişkin uzun dönemli bir orana işaret eder.

Çalışmalar Arası Karşılaştırmada Yanlış Yorumlamalar

Çalışmalar arasında karşılaştırma yapılırken de benzer hatalara sık rastlanır. 'Birden fazla çalışma anlamlı değilse, toplam kanıt hipotezi desteklemez' yorumu yanlıştır; tek başına anlamlı olmayan çalışmalar meta-analiz ile birleştirildiğinde güçlü bir kanıt ortaya çıkabilir. 'Bir çalışma $p < 0,05$, diğeri $p > 0,05$ ise sonuçlar çelişkilidir' yorumu da hatalıdır; aynı etkiyi gösteren iki çalışma bile farklı örneklem büyüklükleri nedeniyle farklı p-değerleri üretebilir. Son olarak, 'küçük bir p-değeri görülürse, sonraki çalışma da benzer bir değer üretir' beklentisi de gerçekçi değildir; $p = 0,03$ bulunan bir çalışma tekrarlandığında, yeni p-değerinin yine 0,03 veya daha küçük çıkma olasılığı yalnızca yaklaşık %3'tür.

Güven Aralıklarının Gücü

Güven aralığı, hesaplamada kullanılan tüm varsayımların doğru olması koşuluyla, aynı çalışmanın çok sayıda tekrarında elde edilecek aralıkların %95'inin gerçek etki büyüklüğünü içereceği aralık olarak tanımlanır. Bir acil hekimi olarak bizim için asıl kritik soru şudur: 'en kötü durumda ne olur?' Tijssen'in 2021 tarihli yazısında vurguladığı gibi, güven aralıkları, tek başına p-değerine kıyasla çok daha zengin klinik bilgi sunar; çünkü hem etkinin yönünü hem büyüklüğünü hem de bu büyüklüğe ilişkin belirsizliğin sınırlarını aynı anda gösterir.

Güven Aralığının Yaygın Yanlış Yorumlamaları

Güven aralığı da p-değeri kadar sık yanlış yorumlanmaktadır. 'Yüzde 95 güven aralığı, %95 olasılıkla gerçek değeri içerir' ifadesi hatalıdır; tek bir aralık için bu olasılık ya %0 ya da %100'dür — aralık gerçek değeri ya içerir ya içermez, olasılık yalnızca yöntemin uzun dönemli performansına ilişkindir. 'Güven aralığı dışındaki etki büyüklükleri reddedilmiştir' yorumu da yanlıştır; sınır değerin hemen dışındaki bir değer, hemen içindeki bir değerden yalnızca çok az farklı bir uyum gösterir — güven aralığı sert bir sınır değil, gradyan bir ölçüdür. Son olarak, 'iki güven aralığı çakışıyorsa aradaki fark anlamlı değildir' yorumu da hatalıdır; aralıklar çakışsa bile doğrudan yapılan bir fark testinde $p < 0,05$ çıkabilir; iki grup arasındaki farkın anlamlılığı, aralıkların görsel olarak çakışıp çakışmadığına değil, doğrudan fark testine bakılarak değerlendirilmelidir.

İstatistiksel Anlamlılık ile Klinik Anlamlılık: İki Farklı Dünya

İstatistiksel anlamlılık, sonuçların şansa bağlı olma olasılığını ölçen, matematiksel bir hesaplamadır; ikili bir karardır - $p < 0,05$ anlamlı, $p > 0,05$ anlamsız kabul edilir; örneklem büyüklüğüne büyük ölçüde bağımlıdır ve tek başına etki büyüklüğü ya da klinik önem hakkında bilgi vermez. Klinik anlamlılık ise sonuçların pratik değerini ve hasta için taşıdığı önemi ifade eder; sürekli bir değerlendirmedir, hasta perspektifini, uygulanabilirliği, maliyet-etkinliği ve yaşam kalitesini hesaba katar. Bu iki kavramın birbirinden bağımsız eksenler olduğunu unutmamak, klinik karar verme sürecinin belki de en kritik adımıdır.

Klinik Olarak Anlamlı Minimum Fark (MID)

Minimal klinik olarak önemli fark (MID), bir sonuç ölçümünde gruplar arasındaki, klinik olarak anlamlı kabul edilen en küçük farkı ifade eder. MID belirlenmeden güven aralığını yorumlamak büyük ölçüde anlamını yitirir; çünkü aralığın alt ve üst sınırlarının klinik açıdan ne ifade ettiğini

değerlendirebilmek için bir referans noktasına ihtiyaç vardır. MID; uzman görüşü, hasta bildirimli ölçütler ve dağılım temelli istatistiksel yöntemler olmak üzere başlıca üç yaklaşımla belirlenebilir. Örneğin, prematüre bebek ağırlık artışı ile ilgili bir çalışmada MID 500 gram olarak kabul edildiğinde, elde edilen güven aralığının alt ve üst sınırlarının bu 500 gramlık eşiğin neresinde kaldığı, sonucun klinik olarak anlamlı olup olmadığını doğrudan belirler.

Pratik Yaklaşım: Beş Adım

Phillips ve arkadaşlarının 2022 tarihli klinisyen rehberinden yola çıkarak, acil tıp pratiğinde uygulanabilecek beş adımlı bir yorumlama çerçevesi önerilmektedir. Birinci adım, yalnızca p-değerine odaklanmamak; etki büyüklüğünü ve %95 güven aralığını her zaman birlikte değerlendirmektir. İkinci adım, klinik olarak önemli minimum farkı (MID) önceden tanımlamaktır. Üçüncü adım, güven aralığının alt ve üst sınırlarında neyin gerçekleşeceğini, yani en kötü ve en iyi senaryoyu hayal ederek değerlendirmektir. Dördüncü adım, ikili düşünceden kaçınmaktır; $p < 0,05$ eşiğini kesin bir hakikat değil, sürekli bir uyum ölçüsünün üzerindeki bir nokta olarak ele almaktır. Beşinci ve son adım, sonuçları sentezlemektir; tek bir çalışmaya takılmadan, aynı soruyu ele alan meta-analizleri de gözden geçirmektir.

Acil Tıp Literatüründen Uygulamalı Bir Senaryo

Bu beş adımı somutlaştırmak amacıyla varsayımsal bir senaryo üzerinden ilerleyelim: yeni bir analjezik protokolünün, travma sonrası ağrı skorunu azalttığı hipotezi, 400 hastalık bir örneklemde test edilmiş olsun. Ortalama fark 1,2 puan, p-değeri 0,02, %95 güven aralığı 0,3–2,1 ve literatürden alınan MID değeri 2,0 puan olarak verilmiştir. Yalnızca istatistiksel açıdan bakıldığında, $p < 0,05$ olduğu için sonuç 'anlamlı' kabul edilir. Ancak güven aralığına ve MID'e bakmadan bu şekilde bir karara varmak yanıltıcı olacaktır: güven aralığı (0,3–2,1), MID değerini (2 puan) içermektedir. En kötü senaryoda, tedavi yalnızca 0,3 puanlık-klinik açıdan önemsiz- bir iyileşme sağlamaktadır; en iyi senaryoda ise 2,1 puanlık, MID eşiğini aşan, klinik açıdan anlamlı bir iyileşme söz konusudur. Dolayısıyla klinik yorum şudur: sonuç belirsizdir ve daha büyük, daha kesin bir güven aralığı sağlayacak bir çalışmaya ihtiyaç vardır.

TARTIŞMA VE SONUÇ

Buraya kadar aktardığımız bulgular, istatistiksel yöntembilim literatüründeki güncel eleştirel görüşle örtüşmektedir. Greenland ve arkadaşlarının da vurguladığı gibi, p-değerinin ikili bir 'anlamlı / anlamsız' çerçevesine sıkıştırılması, klinik araştırma bulgularının zenginliğini gözden kaçırmamıza yol açmaktadır. Tijssen'in önerdiği gibi güven aralıklarına daha fazla, p-değerlerine ise daha temkinli bir ağırlık verilmesi; Phillips ve arkadaşlarının önerdiği gibi etki büyüklüğü, güven aralığı ve klinik bağlamın birlikte değerlendirilmesi ve Neugut ile Fojo'nun da işaret ettiği üzere, 'istatistiksel anlamlılık' kavramının tek başına bir karar kriteri olarak kullanılmasından kaçınılması, güncel literatürün ortak vurgusudur.

Bu konuşmayı, acil tıp pratiğine yönelik altı ana öneriyle sonlandırmak istiyorum. Birincisi, p-değerlerini ikili değil, sürekli bir uyum ölçüsü olarak yorumlayalım. İkincisi, etki büyüklüğünü ve %95 güven aralığını hem okuduğumuz literatürde arayalım hem de kendi çalışmalarımızda her zaman raporlayalım. Üçüncüsü, belirsizliği kucaklayalım; güven aralığındaki tüm değerlerin

veriyle makul ölçüde uyumlu olduğunu kabul edelim. Dördüncüsü, klinik önem ve MID kavramını değerlendirme sürecine mutlaka dahil edelim. Beşincisi, istatistiksel anlamlılığa ulaşmamış olsa bile klinik önem taşıyabilecek sonuçları göz ardı etmeyelim. Altıncısı ve sonuncusu, tek bir çalışmanın sonucuna takılmak yerine, mevcut meta-analizleri gözden geçirerek kanıtı sentezleyelim; çünkü birden fazla çalışmanın birleşik kanıtı, her zaman tek bir sonuçtan daha güvenilirdir.

Sonuç olarak, p-değeri ve güven aralığı, acil tıp pratiğinde karar verme sürecimizin ayrılmaz bir parçasıdır; ancak bu araçların gerçek anlamını ve sınırlarını bilmeden kullanmak, bizi yanlış klinik kararlara sürükleyebilir. Umarım bu konuşma, yatak başında bir makaleyi değerlendirirken ya da kendi verilerimizi yorumlarken, p-değerinin ötesine geçip etki büyüklüğüne, güven aralığına ve klinik bağlama bakma alışkanlığını pekiştirmemize katkı sağlar. Beni dinlediğiniz için teşekkür ederim.

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M4475-Tam Metin

THE RELATİONSHİP OF THE SYSTEMİC IMMUNE-INFLAMMATİON INDEX AND SYSTEMİC INFLAMMATİON RESPONSE INDEX WİTH LABORATORY FİNDİNGS İN CHİLDREN AGED 2–6 YEARS WHO DİED FOLLOWİNG CARDİAC ARREST

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Introductıon

Cardiac arrest is one of the leading causes of mortality in critically ill children. Despite advances in cardiopulmonary resuscitation, mortality remains high. Early identification of patients with severe systemic inflammation may improve clinical assessment and prognosis. (1,2)

Cardiac arrest induces a systemic ischemia-reperfusion response. This process activates inflammatory pathways and results in widespread tissue injury. The inflammatory response may contribute to multiorgan dysfunction and poor clinical outcomes. (2,3,4)

The systemic immune-inflammation index (SII) and systemic inflammation response index (SIRI) are novel biomarkers calculated from routine complete blood count parameters. These indices reflect the balance between inflammatory and immune responses. They have been associated with disease severity and mortality in various critical illnesses. (5,6,7)

Recent studies have demonstrated the prognostic value of inflammatory biomarkers in pediatric intensive care patients. However, evidence regarding SII and SIRI in pediatric cardiac arrest remains limited. Most previous studies have focused on other inflammatory markers such as the delta neutrophil index. (1,7)

Therefore, this study aimed to evaluate SII and SIRI levels and their relationship with laboratory findings in children aged 2–6 years who died following cardiac arrest.

Materıals And Methods

This retrospective study included children aged 2–6 years who died following cardiac arrest. Patients were identified from hospital records. Clinical and laboratory data were retrospectively reviewed.

Patients younger than 2 years or older than 6 years were excluded. Patients with incomplete medical records or missing laboratory data were also excluded.

Age, sex, complete blood count, and biochemical parameters were recorded. Neutrophil, lymphocyte, monocyte, and platelet counts were obtained from the first blood sample after admission.

The systemic immune-inflammation index (SII) was calculated as platelet × neutrophil / lymphocyte. The systemic inflammation response index (SIRI) was calculated as neutrophil × monocyte / lymphocyte.

The relationship between SII, SIRI, and laboratory parameters was evaluated. All patients included in the study died during hospitalization.

Statıstıcal Analysıs

Statistical analyses were performed using IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA).

The distribution of continuous variables was evaluated using the **Shapiro–Wilk test**. Normally distributed variables were presented as mean ± standard deviation. Non-normally distributed variables were presented as median (interquartile range, IQR).

Categorical variables were expressed as numbers and percentages. Correlations between continuous variables were evaluated using **Spearman correlation analysis**. A p value of <0.05 was considered statistically significant.

Results

A total of 21 children aged 2–6 years were included in the study. All patients died during hospitalization.

The median age was 4 (IQR: 3–5) years. The median white blood cell count was 9 (IQR: 7–15) $\times 10^9$/L. The mean hemoglobin level was 9.67 ± 1.35 g/dL.

The median neutrophil count was 4.0 (IQR: 3.0–5.0) $\times 10^9$/L. The median lymphocyte count was 5.0 (IQR: 4.0–6.4) $\times 10^9$/L. The median monocyte count was 1.11 (IQR: 1.00–2.00) $\times 10^9$/L. The median platelet count was 267 (IQR: 255–287) $\times 10^9$/L.

The median creatinine level was 0.60 (IQR: 0.40–0.90) mg/dL. The median AST level was 45 (IQR: 39–57) U/L. The median ALT level was 14 (IQR: 13–20) U/L. The median albumin level was 3.0 (IQR: 3.0–3.0) g/dL.

The median SII was 187.2 (IQR: 152.6–288.0). The median SIRI was 1.40 (IQR: 0.67–2.00).

According to the Shapiro–Wilk test, hemoglobin was normally distributed. The remaining continuous variables showed a non-normal distribution. Therefore, hemoglobin was presented as mean ± standard deviation, whereas the remaining variables were presented as median (interquartile range).

Dıscussıon

Cardiac arrest is associated with severe systemic inflammation. Ischemia-reperfusion injury activates inflammatory pathways and contributes to organ damage. Early assessment of inflammation may improve clinical evaluation (2,5).

The SIRI is calculated using neutrophil, monocyte, and lymphocyte counts. It reflects both inflammatory and immune responses. Previous studies reported that higher SIRI was associated with acute kidney injury and increased in-hospital mortality in critically ill children(7).

Inflammatory biomarkers have also been investigated after pediatric cardiac arrest. Yoon et al. reported that higher delta neutrophil index values were independently associated with 30-day mortality and poor neurological outcomes. These findings suggest that routine hematological markers may provide prognostic information after cardiac arrest (1).

In the present study, SII and SIRI values were calculated using routine complete blood count parameters. These indices can be obtained rapidly without additional cost. Therefore, they may provide practical information during the evaluation of children with cardiac arrest (6,7).

This study has several limitations. It was conducted at a single center and had a retrospective design. In addition, all patients died during hospitalization. Therefore, survivor and non-survivor comparisons could not be performed. Larger prospective studies are needed to clarify the clinical value of SII and SIRI in pediatric cardiac arrest(8,9).

Conclusıon

SII and SIRI are inexpensive inflammatory indices calculated from routine laboratory parameters. They can be obtained rapidly in children with cardiac arrest. These biomarkers may support the evaluation of systemic inflammation. However, further multicenter studies are required to determine their prognostic value in pediatric cardiac arrest.

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M4593-Tam Metin

EMERGENCY APPROACH TO PEDİATRİC ACL AND MENİSCAL TEARS

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Objective

Pediatric anterior cruciate ligament (ACL) and meniscal injuries are increasingly encountered with greater youth sports participation. The pediatric knee is not a small adult knee: open physes alter injury patterns, imaging interpretation, and surgical strategy. This report summarizes a practical emergency approach, focusing on recognition of time-sensitive lesions, appropriate imaging, meniscal preservation, and physeal-respecting ACL treatment [1-3].

Methods

A focused narrative synthesis was prepared from the educational presentation “Pediatric ACL and Meniscal Tears: Emergency Approach.” Its sections on meniscal anatomy, vascular zones, epidemiology, injury mechanisms, clinical findings, tear patterns, examination, imaging, conservative and surgical treatment, ACL assessment, and physeal protection were condensed into an emergency-oriented algorithm. Selected contemporary literature was used to support the principal management messages.

Results

The pediatric meniscus distributes load, improves congruity and stability, and protects cartilage. Its vascularity extends more centrally than in adults, supporting tissue preservation. Pivoting and rotational loading are typical mechanisms, while discoid meniscus is an important predisposition. Pain, effusion, mechanical catching, locking, and giving way are common. A displaced bucket-handle tear may enter the intercondylar notch and prevent full extension; repair is preferred whenever feasible [1,2].

Emergency examination should begin with effusion, joint-line tenderness, range of motion, and neurovascular status. McMurray testing may support a meniscal diagnosis, while Lachman is the most useful clinical test for ACL insufficiency; however, painful swollen knees should not be subjected to forceful provocative testing. A truly locked knee is a red flag requiring early orthopedic consultation. Forceful extension should be avoided because an incarcerated meniscal fragment may be damaged further.

Anteroposterior and lateral radiographs are mandatory after significant pediatric knee trauma. The clinician should search for tibial eminence avulsion, Segond fracture, osteochondral fragments, and physeal injury. Normal radiographs do not exclude meniscal or ligament pathology. Magnetic resonance imaging (MRI) defines soft-tissue and associated injuries. MRI timing should be management-driven: a locked knee merits urgent MRI when it facilitates operative planning, whereas a stable unlocked knee can generally undergo elective outpatient MRI.

Acute treatment consists of analgesia, ice, elevation, activity restriction, and short-term immobilization when needed. Stable, nonlocked meniscal injuries may initially receive conservative treatment, but persistent mechanical symptoms or repairable displaced tears warrant arthroscopic assessment. Pediatric meniscal repair has favorable outcomes, and current literature supports repair over resection whenever feasible [2,4].

ACL injury may be complete, partial, or present as tibial eminence avulsion. Nonoperative treatment is reserved for selected partial tears with reliable follow-up. Persistent instability risks secondary meniscal and chondral damage; open physes alone should not mandate indefinite delay. Skeletal maturity guides reconstruction: Tanner stage 1-2 patients may undergo Micheli-Kocher iliotibial-band or all-epiphyseal techniques, whereas near-mature adolescents may be candidates for carefully performed transphyseal reconstruction [3,5].

Emergency triage should separate time-sensitive lesions from injuries suitable for protected outpatient assessment. Locked knee, concerning hemarthrosis, intra-articular fracture, knee dislocation, osteochondral injury, or neurovascular abnormality requires prompt orthopedic involvement. Four practical rules summarize the approach: hemarthrosis suggests important intra-articular injury; a locked knee is time-sensitive; do not force the painful knee; and obtain radiographs before discharge.

Table 1. Emergency decision pathway for pediatric ACL and meniscal injuries

Emergency finding	**Immediate action**	**Definitive pathway**
Locked knee / suspected displaced bucket-handle tear	Immobilize, analgesia, urgent orthopedic consultation; do not force extension	Urgent MRI when it changes operative planning; early arthroscopic reduction/repair when indicated
Hemarthrosis after trauma	Radiographs; focused ligament/meniscal examination as tolerated	Orthopedic follow-up and MRI according to stability/mechanical symptoms
Tibial eminence or osteochondral fracture	Immobilize and consult orthopedics	CT/MRI and fixation strategy according to displacement/entrapment
Stable unlocked suspected ACL/meniscal injury	Ice, elevation, analgesia, protected activity	Elective MRI and pediatric sports/orthopedic review

Conclusion

Emergency management of pediatric ACL and meniscal trauma should prioritize recognition rather than definitive reconstruction. A locked knee should trigger early orthopedic assessment and appropriate MRI planning, whereas MRI for a stable unlocked knee can usually be elective. Meniscal tissue should be preserved whenever possible, and ACL treatment must respect skeletal maturity and the physes. Examination, radiographs, protection, and referral reduce missed lesions and prevent damage to meniscus, cartilage, and growth plates. This framework supports safe, efficient emergency decision-making.

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M4649-Tam metin
PEDİATRİC BURN CLASSİFİCATİON AND TRİAGE

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Aim

Total body surface area (TBSA) is fundamental to assessing burn severity and fluid needs in children. However, the minor, moderate, and major categories in the national algorithm and current consultation and transfer criteria do not represent the same decision. A limited-area burn may require specialist consultation or higher-level care because of depth, a special anatomical site, inhalation risk, or a high-risk mechanism. Age, pediatric physiology, and safe follow-up conditions also affect triage [1,4,5]. This review aimed to integrate national and current international guidance on classification, consultation, admission, and transfer and to develop a practical emergency-department decision framework.

Methods

The 2012 Burn Injury Treatment Algorithm of the Ministry of Health of the Republic of Türkiye, the 2016 International Society for Burn Injuries (ISBI) guidelines, 2024 pediatric burn publications, the American Burn Association (ABA) referral guidelines, and the Royal Children's Hospital Melbourne guideline updated in April 2026 were narratively reviewed [1-6]. Recommendations were compared for primary assessment, TBSA, depth, special sites, mechanism, pediatric risk factors, care level, discharge, consultation, and transfer. Differences between national severity categories and current consultation or transfer thresholds were examined. Each recommendation was assessed by clinical decision point, healthcare level, and pediatric applicability; details limited to treatment technique were excluded.

Results

A burned child should first be approached as a trauma patient. Airway, breathing, circulation, disability, and exposure are assessed; Foley catheterization and hourly urine output monitoring may be added when fluid resuscitation is required. TBSA should be calculated with an age-adjusted Lund-Browder chart and include only partial- and full-thickness areas. In small or scattered burns, the palmar surface of the patient's hand, including adducted fingers, approximates 1% TBSA. Because depth may evolve within 48-72 hours, potentially deep wounds need reassessment. Superficial partial-thickness burns are usually pink, moist, blistered, and painful; deep partial-thickness burns may show reduced capillary refill and sensation, whereas full-thickness tissue may be dry, pale, and insensate. Epidermal erythema is excluded from TBSA. Wounds unlikely to close within three weeks need early burn-unit assessment because of scar and contracture risk [1-3,5,6].

The national algorithm classifies partial-thickness pediatric burns as minor up to 10% TBSA, moderate at 10-20%, and major above 20%; the corresponding full-thickness thresholds are 2% and 10%. Burns of the face, neck, eyes, ears, hands, feet, major joints, genitalia, or perineum; circumferential deep burns; and inhalation, chemical, high-voltage electrical, or lightning injuries increase triage severity despite limited TBSA. Shock should not be attributed solely to burn fluid loss; bleeding and associated trauma must be sought. Infant age, hypothermia, uncontrolled pain, comorbidity, rehabilitation needs, inadequate caregiver capacity, and suspected abuse affect consultation or admission. Enclosed-space exposure, hoarseness, stridor, oral soot, and facial or neck edema suggest inhalation injury. Chemical burns require contaminant removal and irrigation.

Electrical injuries require assessment for arrhythmia, deep tissue injury, compartment syndrome, and fall-related trauma. Ventilation and distal perfusion need serial examination in circumferential thoracic or extremity burns [1,3-6].

Outpatient care requires physiological stability, adequate oral intake, pain control with oral analgesia, feasible wound care, a reliable caregiver, and early review. Current guidelines recommend early burn-center discussion for full-thickness burns, partial-thickness burns involving at least 10% TBSA, suspected inhalation injury, deep burns of special sites, and high-risk mechanisms. Consultation does not mandate transfer; pediatric capacity and the child's needs determine the destination. Before transfer, stabilization, receiving-center acceptance, and physician-to-physician communication are required. Mechanism, area, depth, site, serial findings, consultation advice, and follow-up should be documented. If the history conflicts with the burn pattern or developmental abilities, abuse should be investigated, findings recorded, and child-protection procedures initiated. Discharge instructions should include reassessment within 48-72 hours and earlier return for wound progression, infection, increasing pain, poor intake, or inability to continue wound care [1,4-6].

Conclusion

TBSA is necessary but insufficient for pediatric burn triage. Safe decisions require joint assessment of physiology, burn depth, site, mechanism, care environment, and local capability. Early specialist consultation for burns involving special sites or high-risk mechanisms supports appropriate center selection. Documented reasoning and planned reassessment protect patient safety and demonstrate professional standards of care.

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Keywords

Child; burn; triage; classification; referral

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M4594-Konuşma Metni
SURGİCAL TİMİNG İN PEDİATRİC FRACTURES: EMERGENCY OR NOT?

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Objective

To present a practical, evidence-based framework for surgical timing in pediatric fractures and to distinguish injuries requiring immediate intervention from those that may safely undergo urgent, early, or planned surgery.

Methods

A focused narrative review was prepared using major pediatric trauma principles and selected evidence addressing supracondylar humerus fractures, the pulseless hand, acute compartment syndrome, open fractures, floating elbow, pediatric femoral neck fractures, and traumatic hip dislocation. Timing was categorized as emergency, urgent, early, or planned according to the risk of irreversible harm from delay.

Results

Surgical timing in pediatric trauma should be driven by the biological consequences of delay rather than by a rigid clock. A pale, cold, pulseless extremity represents true ischemia and requires urgent reduction; persistent poor perfusion after stabilization warrants vascular exploration. Acute compartment syndrome is likewise an immediate surgical indication, and pressure measurement should not delay fasciotomy when clinical suspicion is high [1,2].
Open fractures require prompt intravenous antibiotics and appropriate tetanus prophylaxis. Debridement should be prioritized according to contamination, vascular injury, and soft-tissue status; the traditional “six-hour rule” should not be considered an absolute threshold [3].
Supracondylar humerus fractures illustrate the timing dilemma particularly well. In a neurovascularly intact child with a closed displaced fracture, nighttime surgery is not invariably required. A meta-analysis including 1,735 fractures found no significant difference in open reduction, iatrogenic nerve injury, infection, or reoperation between early and delayed surgery in the absence of vascular compromise [4]. In contrast, a pale pulseless hand cannot wait. A pink pulseless hand requires urgent reduction and fixation followed by serial neurovascular assessment. A 2026 meta-analysis of 591 patients reported pulse restoration within 24 hours in approximately 61% after closed reduction and percutaneous pinning alone and 94% after vascular exploration, although a clear long-term functional advantage was not demonstrated [5].



Figure 1. Displaced pediatric supracondylar humerus fracture. Surgical timing should be guided by neurovascular and soft-tissue status.

Floating elbow injuries warrant close surveillance because of high-energy trauma, swelling, two-level instability, and possible neurovascular compromise, but the injury pattern alone does not mandate nighttime surgery [6].

Pediatric traumatic hip dislocation is an orthopedic emergency. Reduction should be performed promptly, ideally within six hours; classic long-term data demonstrated an approximately 20-fold increase in avascular necrosis risk when reduction was delayed beyond six hours [7].

Not all delay is harmful. In high-energy injuries with tense swelling, fracture blisters, or threatened skin, temporary stabilization and delayed definitive fixation may reduce soft-tissue complications. Similarly, displaced pediatric femoral neck fractures should undergo high-quality anatomical reduction as early as reasonably possible, but reduction quality should not be sacrificed merely to meet an arbitrary time threshold [8].

Timing should also be reassessed after every reduction. Pulse, capillary refill, limb temperature, motor and sensory function, skin tension, and evolving compartment signs should be documented again because reduction may either restore perfusion or reveal a new neurovascular problem. In polytraumatized children, physiological stability takes priority over definitive fixation; temporary stabilization may be appropriate until resuscitation is complete. Thus, the decision to operate immediately, within 24 hours, during the first suitable days, or after soft-tissue recovery should integrate fracture pattern, limb viability, contamination, swelling, associated injuries, anesthesia conditions, and the availability of an experienced surgical team. A short, controlled delay can therefore improve safety when no irreversible harm is expected, whereas delay is unacceptable when tissue viability is threatened. Careful reassessment remains essential throughout this decision-making process.

Table 1. Practical classification of surgical timing

Category	**Typical indication**	**Timing**
Emergency	Pale pulseless/ischemic limb; compartment syndrome	Immediate

Urgent	Pink pulseless supracondylar fracture; traumatic hip dislocation	Same day / prompt
Early	Stable displaced fractures requiring fixation	First safe operative window
Planned/Staged	Severe swelling, blisters, threatened soft tissues	After soft-tissue recovery

Conclusion

Pediatric fractures should be classified as emergency, urgent, early, or planned according to the risk created by delay. True ischemia and compartment syndrome require immediate intervention; the pink pulseless hand requires urgent reduction and close surveillance; traumatic hip dislocation requires prompt reduction; and neurovascularly stable supracondylar fractures may safely await the first appropriate operative window. When soft tissues are not ready, staged treatment may be safer than immediate definitive fixation. The optimal surgical time is therefore not necessarily the earliest possible time, but the time at which overall risk to the child is minimized.

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M4595-Özet Metin

HEMOLİTİK ÜREMİK SENDROM OLGULARINDA ACİL SERVİS FARKINDALIĞI

Gökay Sülü

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Hemolitik üremik sendrom (HÜS), mikroanjiyopatik hemolitik anemi, trombositopeni ve akut böbrek hasarı ile karakterize, böbrek tutulumunun ön planda olduğu bir trombotik mikroanjiyopatidir. Küçük damarlarda gelişen endotel hasarı ve mikrotrombüsler, eritrositlerin parçalanmasına, trombosit tüketimine ve organ iskemisine yol açar. Çocuklarda en sık neden Shiga toksini üreten Escherichia coli (STEC) enfeksiyonudur. Bununla birlikte kompleman aracılı HÜS ve diğer trombotik mikroanjiyopati nedenleri de değerlendirilmelidir. Acil servisin temel sorumluluğu, tabloyu erken tanımak, yaşamı tehdit eden komplikasyonları yönetmek ve uygun uzmanlık desteğini gecikmeden sağlamaktır [1,2].

HÜS çoğu zaman gastroenterit yakınmalarıyla başlayan bir süreçte ortaya çıkar. Kanlı ishal sonrasında belirginleşen solukluk, halsizlik ve idrar azalması önemli uyarı bulgularıdır.

Hipertansiyon ve periorbital ödem, klinik tablonun yalnızca dehidratasyonla açıklanamayacağını düşündürür. Sunumda kullanılan eğitim amaçlı bileşik olguda, dört yaşındaki bir çocuğun beş günlük ishal öyküsüne son iki günde kanlı dışkılama, giderek artan solukluk ve yaklaşık on saattir idrar yapamama eşlik etmektedir. Bu birliktelik, basit gastroenterit yaklaşımından HÜS araştırmasına geçilmesini gerektirir. İshal öyküsünün bulunmaması ise HÜS'ü dışlamaz [1,2].

Öyküde ishalin başlangıcı ve niteliği, kusma, oral alım ve son idrar zamanı ayrıntılı sorgulanmalıdır. Az pişmiş et, pastörize edilmemiş süt, kontamine su ve hayvan teması araştırılmalıdır. Aile veya kreşte benzer hastaların bulunması da önemlidir. Muayenede uygun manşonla kan basıncı ölçülmeli; vücut ağırlığı, perfüzyon ve sıvı durumu değerlendirilmelidir. Solukluk, sarılık, peteşi, ödem ve akciğer bulguları aranmalıdır. Bilinç değişikliği, irritabilite ve nöbet, böbrek dışı tutulum açısından uyarıcıdır. Kan basıncı, idrar çıkışı ve sıvı dengesi, ilk değerlendirmeden itibaren düzenli kaydedilmelidir [1,2].

İlk laboratuvar incelemeleri üç soruya yanıt vermelidir: Mikroanjiyopatik hemoliz var mı, organ hasarı ne kadar ağır ve olası neden nedir? Tam kan sayımı ve trombosit ölçümüne periferik yayma, retikülosit, laktat dehidrogenaz, bilirubin ve haptoglobin eklenmelidir. Hemoglobin düşüşü, şistositler, laktat dehidrogenaz yüksekliği ve düşük haptoglobin birlikte yorumlanmalıdır. Direkt antiglobulin testi çoğunlukla negatiftir; pnömokok ilişkili HÜS bu açıdan istisna oluşturabilir. Üre, kreatinin, elektrolitler, kan gazı ve idrar incelemesi organ hasarını değerlendirmeye yardımcı olur. Koagülasyon testleri de ayırıcı tanı için istenmelidir. Klasik üçlü başlangıçta tam olarak belirginleşmeyebilir. Klinik şüphe sürüyorsa seri değerlendirme yapılmalıdır [1–3].

Etiyolojik incelemeler destek tedavisiyle eş zamanlı yürütülmelidir. Dışkıda Shiga toksini veya toksin genlerinin araştırılması ve kültür, STEC-HÜS tanısını destekler. ADAMTS13 aktivitesi ve inhibitör/antikor incelemesi için örnek, mümkünse plazma tedavisinden önce alınmalıdır. C3 ve C4 ölçümleri ile klinik bağlama uygun ileri kompleman incelemeleri planlanmalıdır. İshal öyküsü tek başına STEC etiyolojisini kanıtlamaz. Normal kompleman düzeyleri de kompleman aracılı HÜS'ü dışlamaz. Test sonuçları beklenirken stabilizasyon ve konsültasyon süreci kesintiye uğramamalıdır [1,3,4].

İlk saat yönetiminde havayolu, solunum ve dolaşım değerlendirilir; monitörizasyon ve damar yolu sağlanır. Glukoz kontrol edilir, hiperkalemi olasılığında elektrokardiyografi çekilir. Sıvı tedavisi hastanın perfüzyonu, akciğer bulguları, kan basıncı ve idrar çıkışına göre bireyselleştirilmelidir. Hipovolemi veya perfüzyon bozukluğu bulunan, sıvı yüklenmesi bulgusu olmayan çocukta izotonik kristalloid 10 mL/kg'lık bir bolusla başlanabilir. Her uygulamadan sonra klinik yanıt yeniden değerlendirilmelidir. Oligüri, ödem, hipertansiyon veya pulmoner konjesyon varlığında otomatik olarak tekrarlanan boluslardan kaçınılmalıdır. Nefrotoksik ilaçlar kesilmeli, gerekli ilaçların dozları böbrek fonksiyonuna göre düzenlenmelidir [1,2].

STEC-HÜS'te tedavinin temeli destek tedavisidir. Rutin antibiyotik ve loperamid gibi antimotilite ajanları kullanılmamalıdır. Ancak sepsis veya başka bir bakteriyel enfeksiyon için bağımsız bir endikasyon varsa antibiyotik kararı bu gerekliliğe göre verilmelidir. Trombosit sayısının düşük olması tek başına transfüzyon endikasyonu değildir. Aktif ciddi kanama veya zorunlu acil girişimde uzmanlarla birlikte karar verilmelidir. Klinik olarak önemli anemide eritrosit transfüzyonu, sıvı yüklenmesi riski gözetilerek uygulanabilir. Kanıtlanmış STEC-HÜS'te plazma değişimi ve ekulizumab rutin başlangıç tedavileri değildir [1,2,5].

Böbrek replasman tedavisi kararı tek bir üre veya kreatinin eşiğine dayandırılmamalıdır. Tedaviye dirençli hiperkalemi, pulmoner ödem veya kontrolsüz sıvı yükü, ciddi dirençli metabolik asidoz

ve üremik komplikasyonlar temel endikasyonlardır. Persistan oligüri veya anüriye artan metabolik yükün eşlik etmesi de erken nefroloji değerlendirmesi gerektirir. Seri elektrolit ve kan gazı ölçümleri, saatlik idrar çıkışı ve kümülatif sıvı dengesi kararı yönlendirmelidir. Diyaliz olanağı bulunmayan kurumlarda transfer, klinik kötüleşmenin ilerlemesi beklenmeden planlanmalıdır [1,6].

Ayırıcı tanıda trombotik trombositopenik purpura (TTP) özellikle önemlidir. Mikroanjiyopatik hemolize ağır trombositopeni ve nörolojik veya kardiyak iskemi bulgularının eşlik etmesi TTP olasılığını artırır. ADAMTS13 aktivitesinin %10'un altında olması güçlü tanısal kanıttır. Yüksek klinik olasılıklı immün TTP'de, örnek alındıktan sonra sonuç beklenerek terapötik plazma değişimi ve kortikosteroid tedavisi geciktirilmemelidir. Çocuklarda konjenital TTP olasılığı ve yaşa özgü tedavi seçenekleri hematolojiyle birlikte değerlendirilmelidir. HÜS ve TTP'de koagülasyon testleri çoğunlukla normaldir; dissemine intravasküler koagülasyonda ise klinik bağlam ve seri koagülasyon parametreleri yol gösterir. Bu örüntüler tek başına kesin ayrım sağlamaz [3,4,7].

STEC enfeksiyonu ve ciddi ADAMTS13 eksikliği desteklenmiyorsa, sekonder nedenlerle birlikte kompleman aracılı HÜS araştırılmalıdır. Bu tanı yalnızca diğer testlerin negatifliğiyle konulamaz. Uygun klinik bağlamda nefroloji ve hematoloji değerlendirmesi aynı gün sağlanmalı; C5 inhibitörü tedavisi için genetik sonuç beklenmemelidir. Tedavi öncesi örnekler mümkün olduğunca alınmalıdır. Meningokok aşılaması ve gerekli antibiyotik profilaksisi, yaşa ve yerel protokole uygun biçimde uzman ekip tarafından düzenlenmelidir [1].

Güçlü HÜS şüphesi bulunan çocuklarda nefroloji ve hematoloji konsültasyonları paralel yürütülmelidir. Nöbet, ensefalopati, şok, pulmoner ödem veya ağır metabolik bozukluk varlığında çocuk yoğun bakım desteği erken sağlanmalıdır. Hekimden hekime devirde vital bulgular, laboratuvar eğilimleri, verilen sıvılar ve kan ürünleri ile bekleyen testler açıkça aktarılmalıdır. Akut dönemin düzelmesi uzun dönem böbrek izlemi gereksinimini ortadan kaldırmaz. Kan basıncı, böbrek fonksiyonları ve proteinüri yönünden takip sürdürülmelidir [1,2,8].

Sonuç olarak, kanlı ishal sonrası solukluk ve idrar azalması HÜS açısından alarm kabul edilmelidir. Başarılı acil servis yönetimi; erken klinik şüphe, uygun örnekleme, hedefli sıvı tedavisi, komplikasyonların zamanında kontrolü ve doğru merkeze erken yönlendirmeyle başlar. HÜS acilde bitmez; doğru yönetim acilde başlar.

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M4490-Özet Metin

FORENSİC MEDİCAL EVALUATİON OF FOREİGN BODY INGESTİON İN A SİX-MONTH-OLD INFANT: A CASE REPORT

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Introduction/Aim
Foreign body ingestion (e.g., batteries, magnets, sharp/pointed objects) is an important cause of morbidity and mortality in the pediatric population. Severe complications such as tissue necrosis, perforation, and sepsis caused by objects entering the gastrointestinal tract may result in life-threatening outcomes. In such cases, the clinical approach should not be limited to medical intervention; the forensic aspects of the incident should also be carefully evaluated, and the case should be reported to the judicial authorities.
Methods
A case involving a six-month-old infant who presented to the hospital with foreign body ingestion was evaluated from a forensic medical perspective, together with the medical records and radiological images.
Results
A six-month-old male infant was admitted to the emergency department after his mother noticed that the handkerchief attached to his clothing with a safety pin was missing. Given the suspicion of foreign body ingestion based on the medical history, physical examination and radiological evaluation (plain abdominal radiography) were performed, revealing a radiopaque foreign body in the abdominal region consistent with an open safety pin. Endoscopic examination revealed that the safety pin was embedded in the jejunal mucosa, and it was subsequently removed.
Conclusion
Cases of foreign body ingestion in infancy should be reported to the judicial authorities upon presentation to the hospital. The conclusions of forensic medical reports should be formulated in accordance with the “Guideline for the Forensic Medical Evaluation of Injury Offenses Defined in the Turkish Penal Code”.
Keywords: Forensic medicine, Foreign body ingestion, Infant, Mandatory reporting

M4597-Özet Metin

PEDİATRİK SEPSİSE YAKLAŞIM

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Sepsis, enfeksiyon ilişkili organ disfonksiyonudur. Pediatrik sepsis uzun yıllar SIRS temelli tanımlandı. Ancak SIRS enfeksiyon dışı durumlarda görülebilir. Ayrıca organ disfonksiyonunu yeterince yansıtmayabilir [1,2]. Uluslararası kriterler 2024 yılında yeniden tanımlandı. Phoenix Sepsis Skoru bu amaçla geliştirildi. Skor dört organ sistemini değerlendirmektedir. Bunlar solunum, kardiyovasküler, koagülasyon ve nörolojidir. Şüpheli enfeksiyonda toplam skor hesaplanmaktadır. İki veya üzerindeki puan sepsisi tanımlar. Kardiyovasküler bileşen septik şoku ayrıca belirler. Sepsiste kardiyovasküler puan şok tanısını destekler [2,3]. Phoenix erken tarama aracı olarak geliştirilmemiştir. Bu nedenle klinik şüphe önemini korumaktadır. Tedavi için skorun tamamlanması beklenmemelidir.

İlk değerlendirme sistematik ve hızlı yapılmalıdır. Havayolu ve solunum öncelikle değerlendirilmelidir. Dolaşım yalnız kan basıncıyla değerlendirilmemelidir. Kapiller dolum ve nabız kalitesi incelenmelidir. Ekstremite sıcaklığı ve bilinç değerlendirilmelidir. İdrar çıkışı perfüzyon hakkında bilgi sağlar [4]. Kan laktatı erken dönemde ölçülmelidir. Laktat sepsis için tek başına özgül değildir. Ancak Phoenix kardiyovasküler puanlamasında doğrudan kullanılır. Laktat 5–10,9 mmol/L bir puandır. Laktat ≥11 mmol/L iki puandır [2,3]. Sepsiste kardiyovasküler puan septik şoku tanımlar. Seri laktat ölçümleri resüsitasyonu değerlendirmede kullanılabilir [1,4].

Kan kültürü mümkün olduğunca erken alınmalıdır. Ancak kültür antibiyotik tedavisini geciktirmemelidir. Septik şokta antibiyotik hızla başlanmalıdır. Hedef ilk bir saat içinde uygulamadır. Şoksuz olası sepsiste hızlı değerlendirme yapılmalıdır. Antibiyotik tercihen üç saat içinde başlanmalıdır [4]. Başlangıç tedavisi olası patojenleri kapsamalıdır. Yerel direnç özellikleri mutlaka dikkate alınmalıdır. Sonuçlara göre antimikrobiyal spektrum daraltılmalıdır. Enfeksiyon kaynağı hızla araştırılmalıdır. Uygun hastalarda kaynak kontrolü geciktirilmemelidir [4].

Septik şokta sıvı tedavisi bireyselleştirilmelidir. Kristalloidler albümine tercih edilmektedir. Dengeli kristalloidler öncelikle düşünülebilir [4]. Boluslar 10–20 mL/kg şeklinde uygulanmalıdır. Her bolus sonrası hasta yeniden değerlendirilmelidir. Yoğun bakım erişiminde 40–60 mL/kg uygulanabilir. Bu miktar ilk saat için üst sınırdır [4]. Şok düzelirse sıvı bolusu durdurulmalıdır. Sıvı yüklenmesi gelişirse tedavi sonlandırılmalıdır. Hepatomegali ve rallere özellikle dikkat edilmelidir.

Vazoaktif tedavi gereksiz yere geciktirilmemelidir. Santral damar yolu mutlaka beklenmemelidir. Tedavi periferik damar yolundan başlanabilir [4]. Epinefrin veya norepinefrin kullanılabilir. Güncel kanıtlar üstün ajan göstermemektedir [4]. Tedavi yanıtı sürekli yeniden değerlendirilmelidir. Uygun merkezlerde POCUS resüsitasyonu yönlendirebilir [4].

Rutin kortikosteroid tedavisi önerilmemektedir. Stabilizasyon sağlanıyorsa hidrokortizon kullanılmamalıdır. Dirençli şokta kanıt halen yetersizdir [4]. Adrenal yetmezlikte stres dozları uygulanmalıdır.

Pediatrik sepsis dinamik bir klinik süreçtir. Başarılı yönetim erken klinik şüpheyle başlar. Seri değerlendirme tedavinin temelini oluşturur. Amaç organ perfüzyonunu hızla yeniden sağlamaktır.

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M4598-Özet Metin

PEDİATRİK AKUT BÖBREK HASARINDA TANI KRİTERLERİ

Hüseyin Yıldırım

Besni Devlet Hastanesi, Acil Tıp Servisi

Akut böbrek hasarı (AKI), çocuklarda saatler veya günler içerisinde gelişen böbrek fonksiyon kaybıyla karakterize önemli bir klinik durumdur. Bu çalışmada pediatrik AKI'nin tanımı, etiyolojisi, risk faktörleri, tanı kriterleri, evrelemesi ve güncel biyobelirteçlerin tanıdaki rolünün değerlendirilmesi amaçlanmıştır.

Pediatrik AKI'nin tanı ve değerlendirilmesine ilişkin bilimsel yayınlar ve klinik kılavuzlar incelenmiştir. Serum kreatinin düzeyi, idrar çıkışı, tahmini glomerüler filtrasyon hızı (eGFR), biyobelirteçler ve renal replasman tedavisi (RRT) endikasyonları değerlendirilmiştir.

Pediatrik AKI, serum kreatinin düzeyinde artış ve/veya idrar çıkışında azalma ile tanımlanır. Hastanede yatan çocuklarda AKI insidansını değerlendiren bir meta-analizde, herhangi bir evrede AKI insidansı %26, orta-ağır AKI insidansı ise %14 olarak bildirilmiştir [1].

Etiyolojik değerlendirmede prerenal, renal ve postrenal nedenler ayırt edilmelidir. Dehidratasyon, kanama ve böbrek perfüzyonunun azalması prerenal nedenler arasında yer alırken; tübüler, interstisyel, glomerüler ve vasküler hastalıklar renal nedenleri oluşturur. Üriner sistem obstrüksiyonları ise postrenal AKI'ye yol açabilir. Sepsis, şok, kritik hastalık, maligniteler ve nefrotoksik ilaçlara maruziyet önemli risk faktörleridir [2,3].

KDIGO kriterlerine göre AKI tanısı; serum kreatinin düzeyinin 48 saat içerisinde en az 0,3 mg/dL artması, önceki yedi gün içerisinde bazal değerin en az 1,5 katına ulaşması veya idrar çıkışının en az altı saat boyunca 0,5 mL/kg/saatin altında olmasıyla konulabilir. Evre 1'de serum kreatinini bazal değerin 1,5–1,9 katına yükselir veya en az 0,3 mg/dL artar. Evre 2'de bazal değerin 2–2,9 katına, Evre 3'te ise en az 3 katına ulaşır ya da serum kreatinini en az 4,0 mg/dL olur. RRT başlanması veya çocuklarda eGFR'nin 35 mL/dk/1,73 m²'nin altına düşmesi de Evre 3 ölçütlerindendir. İdrar çıkışına dayalı evrelemede Evre 1 için idrar çıkışının 6–12 saat, Evre 2 için en az 12 saat boyunca 0,5 mL/kg/saatin altında olması; Evre 3 için ise 0,3 mL/kg/saatin altında idrar çıkışının en az 24 saat sürmesi veya anürinin en az 12 saat devam etmesi dikkate alınır [4].

Bazal kreatinin düzeyinin bilinmemesi çocuklarda tanısal güçlük oluşturabilir. Yaş, kas kütlesi ve büyüme özellikleri kreatinin düzeyini etkilediğinden önceki laboratuvar sonuçları ve seri ölçümler değerlendirilmelidir. İdrar nötrofil jelatinaz ilişkili lipokalin (NGAL) ve serum sistatin C gibi biyobelirteçler erken tanıya katkı sağlayabilir. Pediatrik hastalarda yapılan bir sistematik derleme

ve meta-analizde idrar NGAL için 0,82 (%95 güven aralığı: 0,77–0,86), serum sistatin C için 0,80 (%95 güven aralığı: 0,76–0,85) özet ROC eğrisi altında kalan alan (AUROC) değerleri bildirilmiştir. Bununla birlikte çalışmalar arasındaki heterojenlik ve standart eşik değerlerinin bulunmaması klinik yorumlamayı sınırlandırmaktadır [5,6].
AKI yönetiminde altta yatan nedenin belirlenmesi, hemodinamik durumun değerlendirilmesi, sıvı-elektrolit dengesinin korunması ve nefrotoksik maruziyetin azaltılması esastır. Tedaviye rağmen devam eden pulmoner ödem, dirençli hiperkalemi, ağır metabolik asidoz, üremik komplikasyonlar ve diyalizle uzaklaştırılabilir toksin maruziyetleri RRT açısından değerlendirilmelidir [2,4].
Pediatrik AKI tanısında serum kreatinin düzeyi ve idrar çıkışı temel ölçütlerdir. Tek bir normal kreatinin sonucu AKI'yi dışlamaz. Risk faktörlerinin erken belirlenmesi, seri laboratuvar ölçümleri ve uygun hastalarda biyobelirteçlerden yararlanılması erken tanıyı destekleyebilir. Güncel klinik uygulamada yayımlanmış KDIGO ölçütleri esas alınmalı, taslak kılavuz önerileri ise nihai önerilerden ayrı değerlendirilmelidir.

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M4599-Tam Metin

PEDİATRİK HASTALARDA PAN BT ENDİKASYONLARI

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Giriş

Pan BT künt travma hastalarında sıklıkla çoklu sistem yaralanmalarında tercih edilmektedir. Tedavi önceliklerinin belirlenmesi için hızlı ve doğru tanı gereklidir. Vücudun birden fazla bölgesinin anında görüntülenmesini sağlar. Fizik muayenede (FM) belirgin olmayabilecek yaralanmalar BT ile tespit edilebilir. Bu nedenle, travma merkezleri, büyük travma hastalarının ilk değerlendirmesine giderek daha fazla pan BT'yi (tüm vücut BT) entegre etmektedir.

Pan BT yaygın olarak kullanılsa da, kullanım endikasyonları konusunda fikir birliği bulunmamaktadır. Hemodinamik olarak stabil bir hastada çoklu sistem yaralanmasını düşündüren FM bulguları genellikle Pan BT'ye yönlendirir. Bir diğer endikasyon ise, FM güvenilmez olduğu, çoklu bölgesel yaralanma düşünülen büyük travma sonrası, bilinç düzeyindeki değişikliktir. FM uyanık hastalarda bile güvenilmez olabilir ve önemli bir yaralanma mekanizması söz konusu olduğunda Pan BT düşünülebilir.

Pediyatrik hastalarda Pan BT erişkinlere kıyasla çok daha seçici kullanılmalıdır. Çocuklarda radyasyon duyarlılığı ve yaşam boyu kümülatif risk daha yüksek olduğundan, her travma, ateş veya malignite şüphesinde rutin Pan BT endikasyonu yoktur.

Pan BT Başlıca Endikasyonlar

Majör / Yüksek Enerjili Multitravmalarda

Şüpheli kaza dışı yaralanmalarda

Yaygın malignite / metastaz araştırılmasında, ancak hastalığa göre MR ve/veya PET temelli yöntemler veya hedefe yönelik BT daha uygun olabilir.

Primer kemik tümörü / yaygın kemik hastalığı şüphesinde, ancak çoğu durumda MR ve/veya PET temelli yöntemler daha uygun olabilir.

Yaygın enfeksiyon / inflamasyonda, ancak nötropenik çocuklarda klinik duruma göre hedefe yönelik BT veya PET tabanlı incelemeler düşünülebilir.

Pan BT Kararında Etkili Faktörler

Birkaçı birlikteyse Pan BT veya geniş kapsamlı multibölgesel BT,

Yüksek enerjili mekanizma,

GCS ≤ 8 veya açıklanamayan bilinç bozukluğu,

Güvenilir FM yapılamaması,

Hemodinamik instabilite öyküsü veya resüsitasyon gereksinimi,

Açıklanamayan hemoglobin düşüşü/kanama şüphesi,

Göğüs, abdomen/pelvis yaralanmasının birlikte düşünülmesi,

Omurga yaralanması şüphesi,

Penetran multibölgesel travma,

Sonucun acil cerrahi/girişimsel radyoloji/yoğun bakım yönetimini değiştirecek olması.

Düşük enerjili mekanizma, GKS 15 ve güvenilir fizik muayene bulguları, izole anatomik yaralanma, normal vital bulgular, klavuzlara göre negatif veya düşük riskli klinik, yaralanmanın USG/röntgen/MRG ile yeterince değerlendirilebilmesi, BT sonucunun akut yönetimi değiştirmeyecek olması durumlarında Pan BT tercih edilmez.

Pan BT Teknik

Çocuğun boyutuna/kilosuna göre doz optimizasyonu yapılmalı, gereksiz multifazik çekimlerden kaçınmalı, gereksiz olarak ekstremiteler tarama alanına alınmamalıdır. Kontrastlı inceleme uygun fazda yapılmalıdır. Pediatrik protokol kullanılmalı ve daha önceki BT'ler incelenmelidir.

Sonuç

Pan BT daha hızlı ve kapsamlı tanı sağlar. Ancak Pan BT'nin çocuklarda mortaliteyi azalttığı gösterilmemiştir. Ayrıca daha fazla radyasyon kaynağıdır. Yüksek enerjili multitravma, güvenilir FM mümkün olmaması, çoklu ciddi yaralanma şüphesi gibi durumlarda Pan BT'nin tanısal avantajı ağır basabilir.

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M4600-Özet Metin

PEDİATRİK MASİF TRANSFÜZYON PROTOKOLLERİ

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Elazığ Fethi Sekin Şehir Hastanesi Acil Tıp Kliniği

Kritik kanama
Masif transfüzyon ihtiyacı doğurabilen ve yaşamsal tehdit oluşturan aşırı kanamalardır
Masif transfüzyon
24 saat içerisinde total kan hacmi kadar (erişkinlerde vücut ağırlığının %7'si) yada toplamda yaklaşık 10 ünite eritrosit transfüzyonudur. Başka bir tanımlama olarak, 4 saat içerisinde total kan hacminin yarısının transfüzyonudur. Bir diğer tanım ise dakikada 150 ml'den fazla kan kaybı olmasıdır.
Pediatride kritik kanama
Erişkin hastalarda olduğu gibi, kritik kanama en sık kazara veya diğer sebeplerle olan travma, büyük ameliyatlar (özellikle kalp cerrahisi, spinal cerrahi ve karaciğer nakli) ve gastrointestinal kanama durumlarında meydana gelir.
Yenidoğanlarda, antepartum/intrapartum fetal kanamaya bağlı aşırı kan kaybı veya masif subgaleal kanama gibi durumlar nadir görülseler de büyük hacimli transfüzyon endikasyonları arasındadırlar.
Kanama, önlenebilir ölümün önde gelen nedenlerinden biridir.Hayatı tehdit eden kanaması olan çocuklarda mortalite oranının %36 ila %50 arasında olduğu tahmin edilmektedir; bu oran yetişkinlerdekinin 2 katıdır.
Şok indeksi
Kalp hızının sistolik kan basıncına oranıdır ve kritik kanamada hastalar için iyi bir risk değerlendirme yöntemidir. Hipovolemik şokun derecesinin değerlendirilmesinde şok indeksinin kullanımı önerilmektedir. (N: 0,5-0,7)
Pediatrik anatomi ve fizyoloji farkları

- İyi korunmayan, oransal olarak daha büyük karın içi solid organlar
- Duodenumda artmış vasküler beslenme
- Büyük kafa, gelişmemiş boyun kasları, daha küçük araknoid boşluk ve azalmış BOS
- Daha yüksek travmatik beyin hasarı olasılığı
- Daha az vücut yağı
- Hgb seviyeleri 12 haftada yetişkin seviyelerine ulaşır
- Trombosit fonksiyonu olgunlaşmamış
- Ağırlığa oranla değişken ve daha büyük kan hacimleri

Pediatrik popülasyon için benzersiz hususlar
Pediatrik hastalar, pıhtılaşma yollarının olgunlaşmasında değişkenlik gösterirler. Doğumda hemostatik sistem zayıf gelişmiştir; tüm bileşenler mevcut olsa da, 16 yaşın altındaki çocuklarda yetişkinlere kıyasla daha düşük pıhtılaşma faktörü seviyeleri bulunur. Aslında, çocuklarda yetişkinlere göre %50'ye kadar daha az faktör VII ve %26 daha az trombin oluşumu vardır
Çocuklarda kanamaya karşı mikrosirkülatuar yanıt yetişkinlerden farklıdır. Hipotansiyon, çocuklarda kalp atış hızlarını ve sistemik vasküler dirençlerini artırarak kardiyak debiyi koruma konusundaki yetenekleri nedeniyle nispeten geç bir bulgudur. Bu nedenle, klinisyenler çocuklarda

doku perfüzyonunu ve resüsitasyona verdikleri yanıtı değerlendirmek için laktat ve baz açığı gibi çeşitli serum belirteçleri önermişlerdir

Pediatrik hastalar için Masif Transfüzyon Protokolüne (MTP) neden ihtiyacımız var?

- Masif hemoraji, çocuklarda önlenebilir ölümlerin önde gelen nedenidir
- Ameliyathanede çocuklarda kardiyak arrestin önde gelen nedeni
- Literatür pediatrik masif hemoraji için o kadar kapsamlı değildir

PROPPR

- PROPPR (Pragmatik Randomize Optimal Trombosit ve Plazma Oranları) çalışması masif transfüzyon gerektiren travmatik kanamalı yetişkin hastaları inceledi ve
    - 1:1:1 (plazma/trombosit/PRBC)
    - 1:1:2 stratejisi
    - İki grup arasında anlamlı istatistiksel fark olmamasına rağmen, 1:1:1 oran grubunda mortalite ve hemostazda daha yüksek iyileşme eğilimi vardı.

Bu büyük, iyi tasarlanmış çalışma, travmatik kanamada daha erken plazma ve trombosit kullanımını ve tam kana yaklaşan oranları öneren önceki çalışmaları güçlendirdi.Ancak pediatrik popülasyon maalesef çok daha az çalışılmıştır ve potansiyel olarak yetişkin popülasyondan önemli ölçüde farklıdır.

Pediatrik hastalar genellikle yetişkinlerden nispeten daha büyük kan kaybını tolere edebilir çünkü daha büyük fizyolojik rezervleri vardır. 3 aylık bir bebek ise 15 yaşındaki bir ergeninkinden çok farklı fizyolojiye sahiptir, bu da genelleştirilmiş yönetim stratejilerini gruba bir bütün olarak uygulamada zorluğa neden olur.

Pediatrik Masif Transfüzyon

Çocuklarda masif transfüzyon, 3 saatte toplam kan hacminin %50'sinin transfüzyonla replasmanı veya 24 saatte toplam kan hacminin %100'ünün transfüzyonu olarak tanımlanmıştır.

Neff ve arkadaşları, bir ABD savaş destek hastanesine yatırılan 5000 çocuk hastayı inceledi. Verilerinde, 24 saatte 40 mL/kg kan kaybında daha kötü sonuçlar olduğunu gösteren bir dönüm noktası buldular. Bu, bir çocuktaki dolaşım hacminin yaklaşık yarısına eşittir ve yazarların bilimsel temeli nedeniyle tercih ettiği büyük kan transfüzyonu tanımıdır.

Pediatrik masif transfüzyon için tetikleyiciler

Masif transfüzyon protokolü (MTP), genellikle zamana duyarlı bir şekilde tetiklenir. Yaşamı tehdit eden kanamalara bağlı ölümlerin yaklaşık %40'ı yetişkin hasta geldikten sonraki bir saat içinde gerçekleştiğinden, MTP gerektiren bir bireyin hızlı tanınması son derece önemlidir.

Powell ve ark. transfüze edilen ilk eritrosit süspansiyonu ünitesine kadar geçen her 10 dakikalık gecikme için, yetişkin travma popülasyonunda 20 günlük mortalite olasılığının %27 arttığını buldular. Bu, yaşamı tehdit eden kanamanın hızlı tanınmasına yardımcı olmak için hem yetişkin hem de pediatrik hasta popülasyonunda birden fazla puanlama sisteminin oluşturulmasını teşvik etmiştir

Assesment of Blood Consumption (ABC)

Yetişkinlerde, yaygın bir MTP aktivasyon ölçüsü Kan Tüketimi Değerlendirmesi (ABC) puanıdır. ABC puanı, aşağıdakilerin her biri mevcut olduğunda artan puan tabanlı bir sistemdir;

- Penetran mekanizma (0=hayır, 1=evet)
- SBP ≤90 (0=hayır, 1=evet)
- Nabız ≥120 (0=hayır, 1=evet)

- Pozitif FAST (0=hayır, 1=evet)

Her biri bir puan, skor 2 veya fazla ise MTP aktive edilmelidir;

McLaughlin Skoru

- Sistolik kan basıncı < 110 mmHg
- Nabız sayısı > 105 atım/dk
- pH <7.25
- Hematokrit <%32

ABCD Skoru

- Penetran mekanizma (0=hayır, 1=evet)
- Pozitif FAST (0=hayır, 1=evet)
- SIPA (Pediatrik Ayarlanmış Şok İndeksi—maks KH/Min SBP)
- Laktat (0=<8.8, 1=>8.8)
- Baz Defisiti (0= <3.5, 1=>3.5)

FAST, araştırma ve/veya tedaviyi yönlendirmek için bir araç olarak kullanılabilir. Ancak saptanamayan küçük hacimli kan kaybı (örn. retroperiton) veya kanama ile ilgili yanlış negatif sonuç riskinden dolayı pediatride genelde kullanılmamaktadır.

Protokol oluşturmak neden önemli?

- Tedavide değişkenliğin azalması
- Kan ürünü israfının azalması
- Meslekler arası iletişimin iyileşmesi
- Standartlaştırılmış süreç değerlendirmesi
- Transfüzyona kadar geçen sürenin kısalması

Kan hacimleri

- Bebekler: 80-90 ml/kg
- Çocuk: 70 ml/kg
- Yetişkinler: 65-70 ml/kg
- 5 kg ağırlığında bir çocuk için
    - Toplam kan hacmi sadece yaklaşık **425** ml.dir ve kan hacminin %50'si sadece **212** ml eder !!!
- 70 kg bir yetişkin için
    - Toplam kan hacmi 4500 ml
    - Hacimlerinin %50'si 2250 ml

MTP başlatma tetikleyicileri:

1) Sıvılara zayıf yanıt

2) Belirgin kanama
3) Hipotansiyon

Pediatrik MTP'de hangi bileşenler bulunmaktadır?

- Geleneksel MTP'de, PRBC (Eritrosit Süspansiyonu) , plazma, trombosit ve kriyopresipitat yer alırken güncel yenilikler, Tam Kan, Traneksamik Asit ve kalsiyum ilavesi şeklindedir

M4469-Tam metin

Pediatric trauma scoring systems in the emergency department: an evaluation of current evidence from a clinical-use perspective

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Objective

Early risk stratification in pediatric trauma is essential for appropriate triage and for directing limited resources to the patients who need them most. Age-related physiological differences complicate the direct use of trauma scores developed for adults. This study compared the evidence base and emergency department applicability of the main physiological, anatomical, and combined pediatric trauma scoring systems: PTS, SIPA, BIG, GAP, MGAP, RTS, ISS, TRISS, and rSIG.

Methods

PubMed and PubMed Central were searched from inception through July 27, 2026, using "pediatric trauma score," "SIPA," "BIG score," "MGAP," "TRISS," and "rSIG," combined with "mortality," "triage," "transfusion," and "validation." Priority was given to original pediatric cohort studies, validation studies, multicenter registry analyses, and systematic reviews. Studies were compared by patient age, timing of score calculation, target outcome, laboratory requirements, and reported discrimination. Because of substantial heterogeneity across studies, quantitative pooling was not performed.

Results

PTS offers a child-specific assessment that requires no laboratory testing [1], though observer-dependent components and limited sensitivity (AUROC 0.682, sensitivity 56.2%, specificity 90.8% in one study) constrain its use [2]. SIPA, calculated from heart rate and systolic blood pressure relative to age, allows rapid hemodynamic screening [3]; a normal value, however, does not reliably exclude major trauma, with pooled sensitivity of roughly 58-61% [4]. The BIG score, combining base deficit, INR, and the Glasgow Coma Scale, predicts mortality strongly (AUC 0.97 in a multicenter cohort) [5,6], but its laboratory dependence rules it out as an initial triage tool. The ISS/NISS and TRISS family (TRISS, aTRISS, NTRISS) achieve high prognostic accuracy (AUC 0.972-0.982) [7], though their reliance on anatomical coding and more extensive data suits them better to registries, quality assessment, and research than to bedside decisions under time pressure. Adult-derived tools such as GAP, MGAP, and TRIAGES should not serve as direct decision thresholds without pediatric external validation. rSIG (reverse shock index × Glasgow Coma Scale) offers rapid stratification from few variables and shows promise, though prospective external validation is still needed [8].

Clinical purpose	Recommended tool	Timing	Caution

Rapid screening at the door	SIPA + GCS	Within the first minutes; no labs required	A normal result does not exclude severe trauma
Overall pediatric trauma severity	PTS	After the initial examination	Less reliable in isolated organ injuries
Early mortality / metabolic risk	BIG	Once initial laboratory results are available	Requires waiting for laboratory results
Prognosis, quality, research	ISS/NISS, TRISS family	Once injuries have been defined	Cannot be calculated at the point of acute decision-making

Table 1. Recommended pediatric trauma score by clinical purpose.

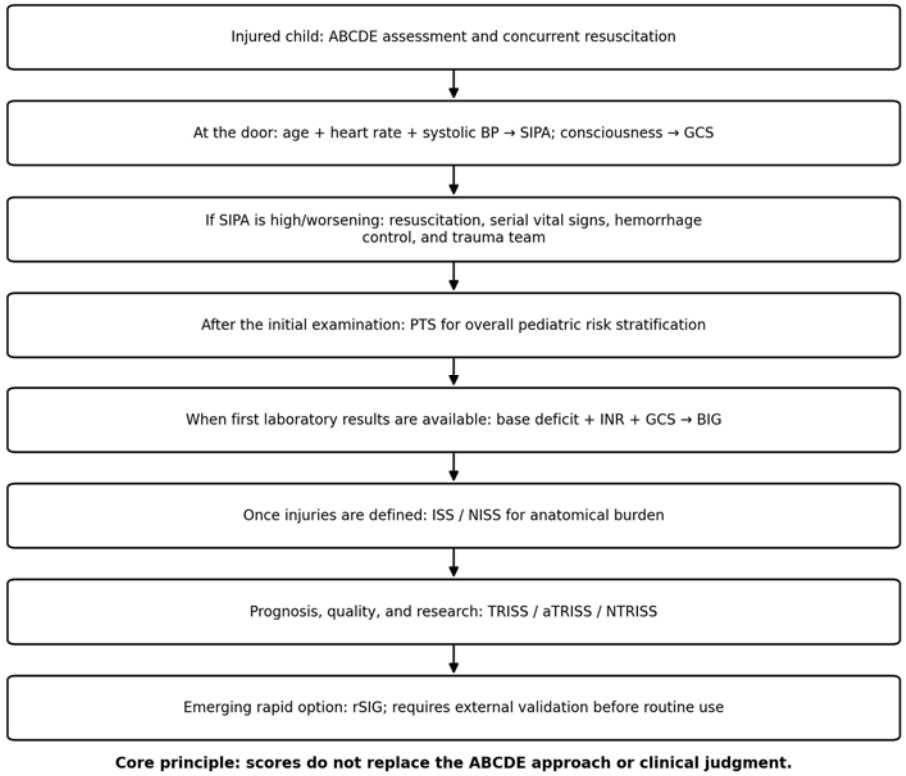


Figure 1. Algorithm for using pediatric trauma scores according to assessment timing and clinical purpose.

Conclusion

No single “best score” meets every clinical objective in pediatric trauma; selection should be guided by assessment timing and clinical goal. SIPA and GCS provide rapid initial assessment at admission, PTS supports overall risk stratification after the first examination, BIG adds value once early laboratory results are available, and TRISS derivatives are best applied once anatomical injuries are defined, for prognosis or quality assessment. None of these scores replaces the ABCDE approach, serial clinical evaluation, or the judgment of an experienced trauma team.

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M4601-Özet Metin

YABANCI CİSİM ASPİRASYONUNU TAKLİT EDEN ASTIM OLGULARI

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Giriş Ve Amaç

Pediatrik acil serviste akut solunum sıkıntısı ile başvuran olgularda ağır astım atağı ile yabancı cisim aspirasyonu (YCA) ayrımı hayati önem taşır. Astımda havayolu obstrüksiyonu düz kas spazmı, mukozal ödem ve viskoz mukus tıkaçları ile gelişirken; YCA'da bilye-valf (ball-valve) mekanizması, lokal enflamasyon ve reaktif granülasyon dokusu ön plandadır. Ancak astımda gelişen luminal mukus tıkaçları veya plastik bronşit gibi durumlar, radyolojik ve klinik olarak YCA'yı tam olarak taklit edebilmektedir. Bu sunumun amacı, atipik veya dirençli seyreden ve YCA'yı taklit eden astım olgularını incelemek ve pediatrik acil servis yönetim protokolüne dikkat çekmektir.

Olgular

- **Olgu 1 (Ventil Mekanizması ve Mukus Plağı):** 3 yaşında astım tanılı erkek hasta, evde oyun oynarken aniden başlayan şiddetli öksürük ve solunum sıkıntısı ile getirildi. Oskültasyonda sol akciğerde solunum sesleri azalmış ve ekspiryum sonu lokalize wheezing saptandı. YCA ön tanısıyla uygulanan acil bronkoskopide, yabancı cisim yerine sağ üst bronşu tıkayan viskoz astmatik mukus tıkacı tespit edilerek aspire edildi.

- **Olgu 2 (Plastik Bronşit ve Beyaz Akciğer):** 6 yaşında astım tanılı hasta, tekrarlayan bronkodilatör tedavilere yanıt vermeyen şiddetli dispne ile başvurdu. Fizik muayenede sol hemitoraksta solunum sesleri alınamadı. Grafide sol hemitoraksta homojen opasite artışı ("beyaz akciğer") ve mediastinal shift izlendi. Bronkoskopide sol ana bronştan, bronş ağacının kalıbını almış plastik bronşit tıkacı çıkarıldı.

- **Olgu 3 (Hava Kaçağı ve Pnömomediastinum):** 5 yaşında çocuk hasta, şiddetli öksürük nöbeti sonrası boyunda şişlik ve morarma öyküsüyle getirildi. Ebeveyn, çocuğun ağzında oyuncak varken öksürdüğünü ifade etti. Toraks BT'de pnömomediastinum ve cilt altı amfizemi saptandı. Yapılan bronkoskopide YCA veya bronş rüptürü görülmedi; tablonun obstrüktif astım atağına bağlı hava kaçağı olduğu doğrulandı.
- **Olgu 4 (Gezici Atelektaziler):** 1. gün akciğer grafisinde sağ üst lobda homojen opasite ve atelektazi odağı saptanarak mobil YCA şüphesi duyulan hastanın 2. gün takibinde sağ üst lob tamamen açık izlenirken, sol alt lobda yeni atelektazi odağı geliştiği saptandı. Tablonun astmatik mukus migrasyonuna ikincil olduğu gösterildi.

Tartışma

Dirençli ve atipik seyirli astım ataklarında, özellikle tanıklı aspirasyon öyküsü olmasa dahi YCA mutlaka ayırıcı tanıda yer almalıdır. Pediatrik acil serviste izlenen hastada aniden başlama ve aspirasyon şüphesi sorgulanmalı; β2-agonist ve sistemik steroid tedavisine yanıt oskültasyonla ilk saatte değerlendirilmelidir. Tek taraflı fizik muayene bulgusu veya tedaviye yanıtsızlık durumunda inspiryum/ekspiryum grafileri çekilmelidir. Tam obstrüksiyon, masif atelektazi veya yanıtsızlık varlığında bronkoskopi hem tanısal hem de terapötik bir araç olarak geciktirilmeden planlanmalıdır.

Sonuç (Eve götürülecek mesajlar)

1. Dirençli veya atipik seyreden her astım atağında yabancı cisim aspirasyonu olasılığı göz önünde bulundurulmalıdır.
2. Tanıklı bir aspirasyon öyküsünün bulunmaması YCA tanısını ekarte ettirmez.
3. Astımda görülen koyu mukus tıkaçları ve plastik bronşit, kliniği ve radyolojiyi %100 YCA şeklinde taklit edebilir.
4. Şüpheli ve medikal tedaviye yanıt alınamayan olgularda bronkoskopi geciktirilmeden uygulanmalıdır.

Anahtar Kelimeler: Pediatrik Acil, Yabancı Cisim Aspirasyonu, Astım Atağı, Plastik Bronşit, Bronkoskopi

M4602-Özet Metin

CRISIS MANAGEMENT UNDER THE RISK OF VIOLENCE IN THE EMERGENCY DEPARTMENT

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Abstract

Psychological and physical violence occurring in the workplace has become a global problem that transcends work environments and occupational groups [1]. The World Health Organization (WHO) defines violence as "the intentional use of physical force or power, threatened or actual,

against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation" [2]. As a result of increasing workload and stress leading to the deterioration of interpersonal relationships, workplace violence in the healthcare sector is rapidly rising [3]. Although regional differences exist, recent studies demonstrate that workplace violence in healthcare is universal [3]. Although healthcare workers and administrators are increasingly concerned about rising workplace violence, there is a lack of official evidence to support this concern due to low reporting rates. A study showed that only about 15% of workplace violence incidents in the healthcare sector are recorded by the relevant units [4].

Although various measures have been taken by authorities to prevent or reduce violence in healthcare—which is a global issue—violence against healthcare workers continues to escalate [5]. To manage this violence in healthcare institutions, several preventive systems have been developed. In Turkey, under the title of Service Quality Standards, Blue, Pink, and White Code applications were enacted, and the White Code system was implemented in 2013 [6]. The White Code is a crucial intervention aimed at preventing violence against all healthcare personnel [6]. In this context, to track acts of violence directed at healthcare workers, the 24/7 White Code Call Center (113) and the web portal (www.beyazkod.saglik.gov.tr) were established [7].

Although new reforms have been made in recent years to prevent violence in healthcare in Turkey, violence against medical personnel still persists. This situation significantly reduces healthcare workers' working capacity and productivity potential. In this regard, aiming to reduce violence in healthcare can be achieved by encouraging healthcare workers to use the White Code system more actively and by ensuring that the penalties imposed as a result of White Code lawsuits are more deterrent.

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M4603-Tam Metin

AKUT GASTROENTERİTTE DEHİDRATASYON DERECESİNİN BELİRLENMESİ VE TEDAVİSİ

Hasan Gökçe
Malatya Eğitim ve Araştırma Hastanesi

1. Giriş ve Tanım

Akut gastroenterit (AGE), mide ve ince bağırsak mukozasının ani başlangıçlı inflamasyonu ile karakterize, genellikle enfeksiyöz kökenli bir tablodur. Çocukluk çağında sıklıkla karşılaşılan ve ishale bağlı gelişen dehidratasyon tablosu nedeniyle küresel mortalite ve morbiditenin önde gelen nedenlerinden biri olma niteliğini korumaktadır.

Çocukların benzersiz fizyolojik ve anatomik özellikleri, onları sıvı ve elektrolit kayıplarına karşı son derece hassas ve savunmasız kılmaktadır. Ağır vakalarda hızla tablolara eklenen elektrolit dengesizlikleri, hipovolemik şok ve multi-organ yetmezliği gibi klinik sekeller, erken dönemde doğru müdahale edilmediği takdirde pediatrik yaş grubunda doğrudan hayatı tehdit eden acil durumlara zemin hazırlamaktadır.

Pediatrik hastaların klinik seyrinde rotavirüs gibi viral etkenler, tablonun şiddetini tırmandırarak dehidratasyon riskini belirgin bir şekilde artırmaktadır. Bu durum, gelişmekte olan ülkelerde yüksek mortalite oranlarına yol açarken, gelişmiş ülkelerde ise sağlık sistemleri üzerinde ağır bir hastane yatış yükünü tetiklemektedir. Dünya genelinde her yıl 5 yaş altındaki yaklaşık 1,5 ila 2 milyon çocuğun dehidratasyon kaynaklı komplikasyonlar neticesinde yaşamını yitirmesi, bu patolojinin çocuk sağlığı yönetimindeki kritik önemini gözler önüne sermektedir.

• Klinik Tanım: Karın ağrısı, bulantı, kusma ve 14 günden kısa süren ishal (24 saatte ≥3 kez gevşek veya sulu dışkı) ile kendini gösterir.

• Persistan Diyare: 14 günü aşan tablolar ise 'Persistan Diyare' olarak adlandırılır ve malabsorpsiyon/beslenme bozukluğu riski taşır.

• Temel Risk: Elektrolit dengesizlikleri, hipovolemik şok ve multi-organ yetmezliği

2. Etiyoloji

Akut gastroenteritlerin çok büyük bir kısmı mikrobiktir ve etkenler üç ana grupta incelenir:

• Viral Etkenler (%70–80): Erişkinlerde ve çocuklarda en yaygın nedendir. Norovirüs (salgınlarda ve kış aylarında) ve Rotavirüs (çocuklarda ağır ishale ve villöz atrofiye yol açan) başı çeker. Rotavirus, Norovirus, Enterik Adenovirüs ve Astrovirus başta gelir.

• Bakteriyel Etkenler (%10–20): Kontamine gıda veya suların tüketilmesiyle (besin zehirlenmesi) bulaşır. Campylobacter jejuni, Salmonella türleri, enterotoksijenik Escherichia coli (ETEC), Shigella ve Yersinia sık görülür. Doğrudan toksin üretenler (Staphylococcus aureus, Bacillus cereus) erken kusma yapar. Kanlı dışkı ve lökosit varlığı (dizanteriform tablo) invaziv bakterileri düşündürür.

• Paraziter Etkenler: Giardia duodenalis, Cryptosporidium ve Entamoeba histolytica subakut veya kronikleşen tablolar ile seyahat öyküsü olanlarda görülür.

3. Klinik Bulgular, Belirtiler ve Ayırıcı Tanı

Hastalık genellikle ani başlar ve 1-2 hafta içinde (viral olgularda çoğunlukla 3–7 günde) kendiliğinden sınırlanır.

• İshal ve Kusma: Bakteriyel etkenlerde dışkıda kan ve lökosit görülebilir; viral ve toksin kaynaklı tablolarda kusma ve bulantı ön plandadır.

• Karın Ağrısı ve Sistemik Bulgular: Artmış peristaltizme bağlı yaygın abdominal hassasiyet eşlik eder; ateş, halsizlik, miyalji ve baş ağrısı görülebilir.

• Ayırıcı Tanı: Akut kusma ve ishal tablosuyla başvuran çocuklarda, cerrahi batın acilleri olan İnvajinasyon (özellikle süt çocuklarında), Akut Apandisit veya Diyabetik Ketoasidoz (DKA) başlangıçta AGE'yi taklit edebilir. Bu tablolar mutlaka ayırıcı tanıda dışlanmalıdır.

4. Pediatrik Fizyopatolojinin Özellikleri ve Dehidratasyon Farkları

Pediatrik popülasyonda yüksek seyreden bazal metabolizma ve düşük vücut sıvı rezervleri, akut gastroenterite bağlı gelişen sıvı açığının dakikalar içerisinde derinleşerek hipovolemik şoka evrilmesine neden olabilmektedir.

Süt çocukları ve erken dönem bebeklerde total vücut su oranı ile ekstrasellüler sıvı volümünün yüksek olması, kayıpların tolerans sınırını aşma hızını katbekat artırır.

Bebeklerde hafif dehidratasyon %5, orta dehidratasyon %10, şiddetli dehidratasyon %15 civarında hacim kaybını ifade ederken, daha büyük çocuklarda bu oranlar sırasıyla %3, %6 ve %9 olarak kabul edilir.

5. Klinik Değerlendirme ve Skorlama Sistemleri

Tedavi stratejisinin belirlenmesindeki en kritik basamak, sıvı açığının doğru saptanmasıdır. Güncel kılavuzlar fizik muayene bulgularına dayanan pratik skorlamalar önerir:

• Altın Standart: Son bilinen kilo kaybı en iyi göstergedir ancak pratikte nadiren bilinir.

• Kritik Üçlü (>%5 Kayıp): Uzamış kapiller dolum zamanı, anormal deri turgoru ve gözyaşı yokluğu en güçlü klinik bulgulardır.

• Gorelick (4 Maddeli) Skalası: Genel görünüm, kapiller dolum, gözyaşı ve mukozaların nemliliğini değerlendirir. ≥2 bulgu orta, ≥3 bulgu şiddetli dehidratasyonu gösterir. Acil pratikte şiddetli dehidratasyonu hızla yakalamak için avantajlıdır.

• Klinik Dehidratasyon Skalası (CDS): Genel görünüm, gözler, mukozalar ve gözyaşını 0,1 veya 2 puan olarak değerlendirir. 0–8 puan arasında derecelendirir.

- 0 - 1 Puan: Dehidratasyon yok
- 2 - 4 Puan: Hafif / orta dehidratasyon
- 5 - 8 Puan: Şiddetli dehidratasyon

(Yaklaşık 18 saniyede uygulanabilmesiyle hızlı triyaj ve yatış gereksinimini öngörmede yüksek güce sahiptir.)

6. Laboratuvar Parametrelerinin Yorumlanması ve Hipernatremik Dehidratasyon

Rutin vakalarda laboratuvar şart değilken, şüpheli veya şiddetli olgularda şu parametreler yol göstericidir:

• BUN ve Kreatinin: Prerenal azotemi bulgusu olarak BUN ve kreatinin oranında artış görülür; önemli bir sıvı açığı ve efektif dolaşan volüm düşüklüğünü yansıtır. Biyokimya takibinde özellikle K^+ (potasyum) düşüklüğü de dikkate alınmalıdır.

• Venöz Kan Gazı (HCO_3 ve pH): İshal ile kaybedilen bazik sıvılar ve doku perfüzyonunun bozulmasına bağlı gelişen laktik asidoz, metabolik asidoza yol açar. Venöz kan gazında bikarbonat

düzeyinin 15 mEq/L altında olması dehidratasyonun derinliğini gösteren en hassas laboratuvar uyarılarından biridir.

• Hipernatremik Dehidratasyon ve Beyin Ödemi Riski: Şiddetli olgularda, immünsuprese bireylerde ve uzun süreli ishallerde elektrolit takibi şarttır. Özellikle ev yapımı yanlış tuz/şeker karışımları veya yüksek katı gıda alımıyla gelişebilen Hipernatremik Dehidratasyonda yüksek sodyum (Na > 150 mEq/L) nedeniyle şiddetli nöbet (konvülsiyon) riski vardır. Bu vakalarda sitotoksik beyin ödemi gelişmemesi için sıvı replasmanı yavaş yapılmalı, sodyum çok hızlı düşürülmemelidir (saatte 0.5 mEq/L'yi (veya günde 10–12 mEq/L'yi) geçmeyecek şekilde yavaş yapılması gerekir).

7. Tedavinin Altın Standardı: ORT ve SGLT1 Kinetiği

Hafif ve orta dereceli dehidratasyon tablosuna sahip pediatrik olgularda elektrolit dengesinin güvenli biçimde tesisi için oral rehidratasyon tedavisi (ORT) tartışmasız altın standarttır.

• Biyolojik Mekanizma: Enterosit yapısında harabiyet ve ishal tablosu mevcut olsa dahi, sodyum-glukoz ko-transporter (SGLT1) taşıyıcı mekanizması işlevini sürdürmeye devam eder; bu biyolojik gerçek enteral yolun güvenle işletilmesine olanak tanır.

• ORS Kompozisyonu: Güncel kılavuzların önerdiği düşük ozmolariteli ORS formülasyonları toplam ozmolaritesi 245 mOsm/L olacak şekildedir (Na 75 mEq/L, glukoz 75 mmol/L). Bu oran gaita çıkış hacmini, kusma sıklığını ve hastalık süresini anlamlı düzeyde baskılar.

• Evde Pratik Hazırlanış Rasyoneli: Ticari poşetlerin bulunamadığı zorunlu durumlarda 1 litre temiz, kaynatılıp soğutulmuş su içine 1 silme tatlı kaşığı tuz ve 8 silme tatlı kaşığı şeker katılarak ev yapımı solüsyon denense de, eczane menşeli farmasötik paketlerin hassas oranları her zaman ilk tercihtir.

• Hafif Dehidratasyon Protokolü: Her sulu dışkı sonrasında <2 yaş için 50–100 mL, ≥2 yaş için 100–200 mL düşük ozmolariteli ORS verilir.

• Orta Dehidratasyon: İlk 4–6 saatlik kritik pencerede hastanın vücut ağırlığı dikkate alınarak hesaplanan 40–100 mL/kg ORS dozu; gastrik distansiyona ve kusmaya yol açmamak için şırınga veya çay kaşığı yardımıyla sık aralıklarla mikro boluslar halinde verilir.

• İzlem Kriterleri: İdrar çıkışının varlığı, bilinç berraklığının korunması ve mukozalarda izlenen nemlenme artışı ORT'nin başarılı ilerlediğinin göstergesidir.

• Kaçınılması Gerekenler: Yüksek şekerli ve yüksek ozmolariteli içecekler (kola, hazır meyve suları, sporcu içecekleri) ozmotik gradienti artırarak ishali şiddetlendirir; kesinlikle verilmemelidir.

• Beslenme Devamlılığı: Emzirme asla kesilmez, aksine frekans artırılır. Formül mama kullananlarda dilüsyon yapılmaksızın tam konsantre mamaya devam edilir. Ek gıdadaki çocuklarda erken beslenme (pirinç, patates, muz, yoğurt) enterosit proliferasyonunu hızlandırır.

• Adjüvan Tedaviler: WHO protokolünce çinko desteği (6 aydan büyüklerde 20 mg/gün, <6 aylarda 10 mg/gün olmak üzere 10–14 gün) ishalin süresini ve şiddetini düşürür. Saccharomyces boulardii veya Lactobacillus rhamnosus GG (LGG) gibi probiyotik suşları mukozal bariyeri destekleyerek süreyi kısaltabilir.

8. İntravenöz Sıvı Endikasyonları ve Destek Tedaviler

Oral rehidratasyon girişimlerinin başarısız olduğu, saatte >4 dirençli kusmanın izlendiği, ileus şüphesinin doğduğu ya da hastanın sıvı kaybını tolere edemediği durumlarda gecikmeksizin parenteral yola geçilmesi şarttır.

Şiddetli dehidratasyon ve dekompanse şok tablosu sergileyen pediatrik hastalarda damar yolu (veya intraosseöz yol) derhal temin edilerek izotonik kristaloidler (%0.9 İzotonik Sodyum Klorür veya Ringer Laktat) ile 20 mL/kg'lık hızlı bolus 15–20 dakikada uygulanır; hemodinamik yanıt alınana kadar tekrarlanır. Hücresel ödem ve hiponatremi riskine karşı sodyum ve potasyum regülasyonu yakın izlenmelidir.

• Destekleyici ve Riskli İlaçlar:

- Oral toleransın bozulduğu ancak şok tablosunun bulunmadığı senaryolarda tek doz ondansetron kullanımı kusma refleksini inhibe ederek enteral yolun başarı oranını artırır ve hastane yatış endikasyonlarını azaltır.

- Akut bakteriyel/invaziv enteritlerde motiliteyi baskılayan antidiyareikler (loperamid vb.) toksik megakolon riski nedeniyle pediatrik grupta kesin kontrendikedir.

- Rutin ampirik antibiyotik kullanımı önerilmez; sadece sepsis bulguları, immünsupresyon veya kanıtlanmış bakteriyel (şiddetli şigelloz vb.) tablolarda endikedir. Ayrıca invaziv bakteriyel enteritlerde ampirik antibiyotik kullanımı Hemolitik Üremik Sendrom (HÜS) gibi ölümcül komplikasyonlara kapı aralayabilir.

9. Komplikasyonlar

• Dehidrasyon ve Hipovolemik Şok: En tehlikeli ve hızlı gelişen komplikasyondur.

• Elektrolit Dengesizlikleri: Hipokalemi, hiponatremi ve metabolik asidoz.

• Böbrek Hasarı: Prerenal azotemi ilerleyerek akut tübüler nekroza yol açabilir.

• Post-enfeksiyöz IBS: Atak sonrası aylarca süren gaz ve dışkılama bozuklukları.

10. Sonuç ve Özet

Akut gastroenterit yönetimi; doğru derecelendirme, SGLT1 kinetiğine dayanan düşük ozmolariteli ORT uygulaması ve anne sütü ile erken beslenmenin kesintisiz sürdürülmesi ilkelerinin hekim muhakemesiyle harmanlanmasına dayanmaktadır. Doğru derecelendirme, düşük ozmolariteli ORT yönetimi ve erken beslenme; mortaliteyi ve hastane yatış yükünü azaltan en güvenli yaklaşımdır.

Pediatrik gastroenterit tedavisinde marifet, komplikasyon geliştiğinde agresif yoğun bakım yönetimi uygulamak değil; ilk 4 saatte doğru dehidratasyon derecelendirmesini yapıp, fizyolojik SGLT1 kapısını kullanarak sabırlı ve doğru bir ORT yönetimi sergilemektir. Bu üç altın adım hastane yatışlarının ve ölümlerin çoğunu önler.

Dünya Sağlık Örgütü (WHO) Dehidratasyon Sınıflaması

Klinik Gösterge / Parametre	Hafif Dehidratasyon (<%5 Kayıp)	Orta Dehidratasyon (%5-9 Kayıp)	Şiddetli Dehidratasyon (≥%10 Kayıp)
Mental Durum / Sensorium	Alert, sakin, çevreye ilgili	İrritabl, huzursuz, consolable	Letarjik, stupor, koma, hipotonik
Gözler ve Fontanel (Bıngıldak)	Normal turgorda	Hafif çökük göz küreleri, çökük fontanel	Derin çökük, kurşuni gözyaşı yok, çok çökük fontanel
Deri Turgor ve Elastikiyeti	Anında eski haline döner	Yavaş düzelir (<2 sn)	Deri kıvrımı kalıcılaşır (>2 sn - tenting)

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M4604-Özet Metin

SERVİKAL BOYUNLUKLU HASTADA ENTÜBASYON TEKNİKLERİ

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Major travma hastalarında servikal omurga yaralanması insidansı %1 ile %5 arasında değişmekte olup, Glasgow Koma Skalası (GKS) puanı 8 veya altında olan ağır kafa travmalı hastaların yaklaşık %10'unda servikal omurga hasarı mevcuttur.[1,2] Gelişmiş Travma Yaşam Desteği (Advanced Trauma Life Support - ATLS) protokollerinin temeli, boyun hareketlerinin kısıtlanmasıyla birlikte havayolunun sağlanması ilkesine dayanmaktadır.[1] Tam kapalı yarı sert servikal boyunluklar boyun hareketini tamamen engellemediği gibi, entübasyon esnasında mandibular hareketi ve ağız açıklığını kısıtlayarak direkt laringoskopide glottik görüntüyü belirgin şekilde zorlaştırır.[2,3]

Bu kısıtlamayı aşmak amacıyla üçlü ekip yaklaşımı eşliğinde boyunluğun anterior (ön) parçasının çıkarılması ve Manuel İn-Line Stabilizasyon (MILS) uygulanması gerekmektedir. MILS uygulayıcısı, hastanın başını her iki yandan kavrayarak traksiyon uygulamaksızın nötral pozisyonda kısıtlar.[1,2] Yakın dönemde gerçekleştirilen randomize kontrollü bir çalışmada, videolaringoskopi (VL) sırasında boyunluğun ön parçasının çıkarılmasının (posterior-only) omurgada ek bir harekete yol açmadığı (segmental açısal değişim farkı yaklaşık 1 derece), buna karşın entübasyon süresini 33 saniyeden 23 saniyeye indirdiği gösterilmiştir. [3] Zor Havayolu Derneği (Difficult Airway Society - DAS) 2024 kılavuzları da entübasyon girişiminde rijit boyunluğun ön parçasının çıkarılarak MILS uygulanmasını tavsiye etmektedir.[2]

Pediatrik travma hastalarında ise yetişkinlerden farklı anatomik özellikler ön plana çıkar. Küçük çocuklarda ve bebeklerde başın arka kısmının (oksiput) gövdeye oranla büyük olması, düz bir

omurga tahtasında yatış sırasında servikal omurgada pasif fleksiyona neden olarak posterior farenksin öne bükülmesine ve havayolu tıkanıklığına yol açar. Bu durumu engellemek ve yüz düzlemini sedyeye paralel tutarak nötral dizilimi sağlamak amacıyla omuzlardan kalçaya kadar tüm gövde altına yaklaşık 2.5 santimetre (1 inç) kalınlığında dolgu (padding) yerleştirilmelidir. Ayrıca dar krikoid halka ve kısa trakea yapısı nedeniyle ideal Endotrakeal Tüp (ETT) derinliği "3 x ETT çapı" formülüyle hesaplanmalı, pediatrik grupta adenoid dokular ve anatomik kısıtlar nedeniyle nazotrakeal entübasyondan kaçınılmalıdır. [1]

Servikal immobilizasyon altındaki hastalar zor havayolu adayıdır; çok merkezli veriler fiziksel havayolu obstrüksiyonunun acil servisteki ilk geçiş başarısını (first-pass success) %74'ten %63'e düşürdüğünü ve advers olay sıklığını artırdığını ortaya koymaktadır.[4] Biyomekanik avantajı sayesinde havayolu akslarının hizalanmasını gerektirmeyen videolaringoskopi, DAS 2024 kılavuzlarında şüpheli servikal travmada ilk seçenek olarak önerilmektedir.[2,5] Laringoskopik görüşün kısıtlı olduğu durumlarda Elastik Buji (Gum Elastic Bougie - GEB) kullanımı entübasyon başarısını yükseltirken, başarısız havayolu durumunda Supraglottik Havayolu Araçları (Supraglottic Airway Device - SAD) geçici köprü olarak kullanılmalıdır. [2,5]Cerrahi müdahale gerektiğinde yetişkinlerde cerrahi krikotiroidotomi uygulanırken, 12 yaş altı çocuklarda krikoid kıkırdak hasarı riski sebebiyle cerrahi krikotiroidotomi kontrendike olup iğne krikotiroidotomi tercih edilmelidir.[1]

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M4605-Özet Metin

YENİDOĞAN SEPSİSİNE YAKLAŞIM

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Yenidoğan sepsisi klinik pratikte sık karşılaşılan, sinsi seyirli ve yüksek morbiditeli bir tablodur. Yenidoğanın bağışıklık sistemi henüz gelişim aşamasındadır. Bu nedenle bebek enfeksiyonlara karşı son derece hassastır. Değerlendirme ilk kritik saatlerde başlamalıdır. Amaç gereksiz antibiyotik kullanımını azaltırken gerçek sepsisi kaçırmamaktır.

Erken başlangıçlı sepsis doğumdan sonraki ilk 72 saatte gelişir. Bulaş intrapartum dönemde anneden vertikal yolla olur. Sık etkenler Grup B streptokok (GBS), Escherichia coli ve Listeria monocytogenes'tir [1]. Geç başlangıçlı sepsis 72. saat ile 28–30. gün arasında gelişir. Bulaş çevreden, hastane ortamından veya bakım verenlerden yatay yolla olur. Koagülaz negatif

stafilokoklar, S. aureus, Klebsiella ve Candida sık etkenlerdir. Prematürite, uzamış yatış, santral kateter ve parenteral beslenme başlıca risklerdir [1]. Türk Neonatoloji Derneği iki tanı grubu tanımlar. Kültürde patojen üremesi kanıtlanmış sepsistir. Üreme olmadan uyumlu klinik ve laboratuvar bulguları klinik sepsistir [1].

Erken sepsis sıklığı term bebeklerde 1000 canlı doğumda 0,5'tir [2]. Çok düşük doğum ağırlıklı bebeklerde bu oran 1000'de 11'e çıkar [1]. Doğum ağırlığı ve gestasyon haftası azaldıkça risk katlanarak artar. Erken sepsiste mortalite term bebeklerde %2–10 arasındadır. Pretermlerde mortalite 2 ila 4 kat daha yüksektir. Gram-negatif basil veya Candida kaynaklı geç sepsiste mortalite %32–36'ya ulaşır [3]. Tedavi edilen çok düşük doğum ağırlıklı pretermlerin yaklaşık %30'unda ağır nörogelişimsel sekel gelişir [4].

Annede intrapartum ateş (>38,0°C) veya koryoamniyonit önemli risk faktörüdür. Annede GBS kolonizasyonu veya bakteriürisi ve önceki bebekte invaziv GBS öyküsü riski artırır [5]. NICE kılavuzu 2026 yılında güncellendi. Güncellemede doğum eyleminin başlayıp başlamadığına bakılmaz. Membran rüptüründen doğuma kadar geçen toplam süre esas alınır. Termde 24 saat, pretermde 18 saat üzeri risk kabul edilir [5]. Prematürite, düşük Apgar skoru ve doğumda canlandırma bebek tarafındaki risklerdir. Çoğul gebelikte diğer bebekte enfeksiyon da önemli bir risktir.

Yenidoğan enfeksiyona lokalize veya özgül yanıt veremez. Bulgular silik, değişken ve sinsidir. Annenin "bugün iyi emmiyor, kucağımda gevşek" gözlemi en duyarlı uyarıdır. Yenidoğan sepsise her zaman ateşle yanıt vermez. Vücut sıcaklığının 36,0°C altına düşmesi majör bir sepsis bulgusudur [5]. Isıtmaya rağmen düzelmeyen hipotermi aksi kanıtlanana kadar sepsis kabul edilmelidir.

Solunum bulguları ilk semptomların %90'ını oluşturur. Takipne, inleme, çekilmeler, siyanoz ve apne görülebilir. Taşikardi (>160/dk) veya geç dönemde bradikardi (<100/dk) gelişebilir. Kapiller dolum süresinin 3 saniyeyi aşması ve cutis marmoratus yaklaşan şoku gösterir. Letarji, hipotoni, emme zayıflığı, irritabilite ve nöbet görülebilir. Beslenme intoleransı, kusma ve karın şişliği eşlik edebilir. Safralı kalıntılar nekrotizan enterokolit açısından uyarıcıdır [1,5].

NICE kılavuzu kırmızı bayrak sistemini kullanır [5]. NCPAP veya mekanik ventilasyon ihtiyacı kırmızı bayraktır. İnotrop gerektiren şok, ensefalopati veya nöbet de kırmızı bayraktır. Doğumda kardiyopulmoner resüsitasyon ihtiyacı da bu gruptadır. Çoğul gebelikte diğer bebekte GBS sepsisi şüphesi de kırmızı bayraktır. Tek kırmızı bayrak varsa laboratuvar sonuçları beklenmez. Hemen kan kültürü alınır. İlk bir saat içinde intravenöz ampirik antibiyotik başlanır [5].

Sarı bayraklar maternal ateş, koryoamniyonit ve uzamış membran rüptürüdür. Hafif solunum sıkıntısı, beslenme zayıflığı, letarji ve hafif ısı düzensizliği de bu gruptadır. Yetersiz intrapartum GBS profilaksisi de değerlendirilir. İki veya daha fazla sarı bayrak varsa kültür alınır ve tedavi başlanır. Tek sarı bayrak varsa ve bebek iyiyse tedavi ertelenebilir. Bebek 12–24 saat yenidoğan erken uyarı skoru ile izlenir. Kötüleşme veya ikinci bulgu varsa hemen tedavi başlanır [5].

Kaiser Permanente sepsis hesaplayıcısı 34 hafta ve üzeri bebeklerde kullanılır. Anne verileri ile klinik muayeneyi Bayes yaklaşımıyla birleştirir. Sepsis olasılığını 1000 canlı doğum başına hesaplar. Gereksiz antibiyotik ve invaziv test kullanımını yaklaşık %50 azaltır [6]. Hesaplayıcı yalnız iyi görünümlü, asemptomatik bebeklerde kullanılmalıdır. Semptomatik bebekte hesaplayıcı kesinlikle kullanılmaz. Bu bebeklerde doğrudan sepsis çalışması yapılır ve tedavi başlanır [5].

Hesaplayıcı 2024 yılında büyük bir güncelleme geçirdi. Eski model 1993–2007 verilerine dayanıyordu. Yeni model evrensel GBS taraması dönemindeki 412.595 bebeğe dayanır [7]. GBS durumu bilinmeyen anne için odds oranı 1,01'den 3,11'e yükseldi. Klinik hastalık için olabilirlik oranı 21,2'den 14,5'e düşürüldü. Şüpheli durum için 5,0'dan 3,65'e indi. İyi görünüm için olabilirlik oranı 0,36 oldu. Duyarlılık %76'dan %80'e yükseldi [7].

AAP 2021 kılavuzu iyi görünümlü ateşli bebekleri üç gruba ayırır [8]. 8–21 günlük bebekler en yüksek risk grubudur. Kan ve idrar kültürü ile lomber ponksiyon zorunludur. Belirteçler normal olsa da bebek yatırılır ve parenteral antibiyotik başlanır. 22–28 günlük bebeklerde karar biyobelirteçlere göre verilir. Prokalsitonin <0,5 ng/mL, CRP <20 mg/L ve mutlak nötrofil sayısı <4000/mm³ düşük risktir. İdrar tetkiki de negatif olmalıdır. Bu durumda lomber ponksiyon ertelenebilir. Tek doz parenteral sefalosporin sonrası 24 saat içinde kontrol şartıyla taburculuk yapılabilir. 29–60 günlük bebeklerde belirteçler normalse lomber ponksiyon gerekmez. Antibiyotiksiz ve yakın takiple taburculuk yapılabilir [8].

Tanıda altın standart kan kültürüdür. Olguların %25'inde bakteri yükü 4 CFU/mL ve altındadır. Bu nedenle en az 1,0 mL kan alınmalıdır [9]. 0,5 mL altındaki alımlar üreme şansını yarıya indirir. Kültürlerin %90'ı ilk 48 saatte üremektedir [1]. Kanıtlanmış sepsisin %13–25'ine menenjit eşlik eder. BOS'ta lökosit 20–30/mm³ üzeri anlamlıdır. BOS proteini termde 100 mg/dL, pretermde 150 mg/dL üzeri anlamlıdır. BOS glukozunun eş zamanlı kan glukozunun %50–60'ından az olması menenjit lehinedir [1]. Menenjitte tedavi süresi uzatılmalıdır.

CRP ilk saatlerde normal çıkabilir. Başvurudaki normal CRP sepsisi dışlamaz. CRP pik değerine 18–24. saatlerde ulaşır. 12–24 saat arayla bakılan seri CRP'lerin negatifliği %99,7 negatif prediktif değere sahiptir [10]. Prokalsitonin ilk 2–4 saatte yükselir ve daha özgüldür. I/T oranının 0,2 üzerinde olması sepsisi güçlü destekler [1].

Erken sepsiste ampirik tedavi ampisilin (60 mg/kg) ve gentamisindir (5 mg/kg) [1,5]. Bu rejim GBS, E. coli ve Listeria'yı kapsar. Menenjit şüphesinde ampisilin ve sefotaksim kullanılır. Sefotaksim BOS'a çok iyi geçer. Sefalosporinlerin Listeria'ya etkinliği yoktur. Bu nedenle ampisilin rejimde mutlaka bulunmalıdır [1]. Kültürler 36–48. saatte negatif ve bebek stabilse tedavi kesilmelidir [5].

Seftriakson ilk 28 günde kesinlikle kullanılmamalıdır. Bilirubini albüminden ayırır ve kernikterus riskini artırır. Kalsiyum içeren intravenöz solüsyonlarla ölümcül çökelti oluşturur. Bu kristaller akciğer ve böbrekte birikir [11]. Sepsiste glikojen depoları hızla tükenir. Kan şekeri 40–48 mg/dL altındaysa 2 mL/kg %10 dekstroz verilir. %25 veya %50 dekstroz asla kullanılmaz. Ardından 4–8 mg/kg/dk glukoz infüzyonu sürdürülür [12].

Oral tedaviye geçiş yeni bir yaklaşımdır. NICE 2026 güncellemesi bu geçişi önermektedir [5]. NIVOS ve NOAH protokolleri bu yaklaşımı uygular [13]. Bebek 35 hafta ve üzeri, 2000 g ve üzeri olmalıdır. Klinik olarak iyi olmalı ve beslenmeyi tolere etmelidir. Tepe CRP 50 mg/L altında olmalıdır. Kan ve BOS kültürleri negatif kalmalıdır [5,13]. Bu bebekler 36. saatten sonra oral amoksisiline geçirilebilir. Bu yaklaşım hastanede kalışı ortalama 2,7 gün kısaltır [14].

Yenidoğan sepsisi sinsi başlar ve hızla ilerler. Kırmızı bayraklar gecikmeden tanınmalıdır. Risk hesaplayıcıları yalnız iyi görünümlü bebeklerde kullanılmalıdır. Akılcı antibiyotik kullanımı tedavinin temelidir.

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M4606-Tam Metin

ÇOCUK VERTEBRAL TRAVMALARINDA İKİNCİL HASARIN ÖNLENMESİ

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Amaç

Çocukluk çağı vertebral travmalarında birincil hasar, travmanın kendisiyle eş zamanlı olarak oluşur ve büyük ölçüde geri döndürülemez; bu nedenle klinisyenin asıl müdahale alanı, saatler ve günler içinde iskemi, ödem, inflamasyon ve süregen mekanik harekete bağlı olarak gelişen ikincil hasardır (Mandadi ve ark., 2024). Bu çalışmanın amacı, hastane öncesi dönemden rehabilitasyona uzanan klinik basamaklar boyunca ikincil hasarı önlemeye yönelik güncel kanıtları ve sınıflandırma sistemlerini derleyip acil tıp pratiğine uygulanabilir mesajlar hâline getirmektir.

Yöntem

2018–2025 yılları arasında yayımlanmış, pediatrik spinal travma, SCIWORA (radyolojik bulgu olmaksızın spinal kord yaralanması), spinal hareket kısıtlaması (SHK) ve servikal sınıflandırma sistemlerini ele alan uluslararası ve ulusal literatür (PECARN, ILCOR, AO Spine/Praxis, WFNS Spine Committee kılavuzları dahil) tarandı; bulgular hastane öncesi, acil servis, ilk saatler, görüntüleme/sınıflama, farmakoloji, cerrahi zamanlama ve sonraki dönem başlıkları altında sentezlendi.

Bulgular

Sekonder hasar dört evrede ilerler: dakikalar içinde başlayan iskemi/hipoperfüzyon, saatler içinde gelişen ödem, saatler-günler süren inflamasyon/eksitotoksisite ve önlenebilir tek evre olan devam eden mekanik kompresyon.

Pediatrik omurga, büyük baş-küçük gövde oranı, yatay-sığ faset eklemler ve ligamentöz laksite nedeniyle erişkinden farklı yaralanma paternleri gösterir; sekiz yaş altında üst servikal/ligamentöz yaralanmalar, sekiz yaş üstünde erişkine benzer fraktür/faset dislokasyonu paterni baskındır (Tekcan Şanlı ve ark., 2024).

Hastane öncesinde SHK artık seçici uygulanmalıdır; PECARN'ın 7.721 çocuğu kapsayan analizi SHK sıklığı ile gerçek servikal kord hasarı arasında belirgin bir uyumsuzluk göstermiştir (Ward ve ark., 2025) ve ILCOR'un 2025 tarihli kapsam taraması SHK'nin sekonder hasarı azalttığına dair güçlü bir kanıt bulamamıştır (Laermans ve ark., 2025).

Acil serviste ABCDE değerlendirmesi immobilizasyonla eş zamanlı yürütülür. Görüntüleme kararında NEXUS'un beş düşük-risk ölçütü (normal bilinç, orta hat hassasiyeti yok, nörolojik defisit yok, intoksikasyon yok, dikkat dağıtıcı yaralanma yok) ve Kanada Servikal Omurga Kuralları'nın yaş/mekanizma/ambulasyon temelli algoritması yol göstericidir; PECARN'ın 2024 pediatrik kuralı (yaklaşık 22.400 çocuk; sensitivite %94,3, negatif prediktif değer %99,9, olası bilgisayarlı tomografi [BT] azaltımı >%50) orta risk grubunda önce direkt grafiyi önerir (Leonard ve ark., 2024).

Servikal stabiliteyi standart biçimde değerlendirmek için AO sınıflaması (kompresyon/bant/translasyon tipleri) yaygın kabul görmektedir; alt tipleri arasında Jefferson kırığı (C1 burst), Anderson-D'Alonzo odontoid sınıflaması (Tip 1–3) ve Hangman kırığında Levine-Edwards sınıflaması (Tip 1–3) klinik kararı doğrudan yönlendirir — örneğin Tip 2

odontoid kırıkları düşük stabiliteleri nedeniyle sıklıkla cerrahi gerektirirken Tip 1 ve 3 konservatif izlenebilir (Tekcan Şanlı ve ark., 2024).

İlk saatlerde ortalama arter basıncının (OAB) 75–80 mmHg altına düşmemesi, 90–95 mmHg'yi de aşmaması önerilir (Kwon ve ark., 2024); ancak bu aralık tamamen erişkin verisine dayanır ve pediatrik randomize kanıt yoktur. Norepinefrin ilk basamak vazopresör olarak tercih edilir.

Metilprednizolonun rutin kullanımı güncel kılavuzlarca önerilmemektedir; Amerikan Gıda ve İlaç Dairesi (FDA) onayı yoktur ve komplikasyon riski (enfeksiyon, gastrointestinal sistem [GİS] kanaması, sepsis) fayda potansiyelinin önüne geçmektedir (Fehlings ve ark., 2017). Bununla birlikte erken/geç tedavi başlanan iki pediatrik SCIWORA olgusunun karşılaştırıldığı bir seri, erken metilprednizolon tedavisi alan olguda belirgin fonksiyonel iyileşme, geç tedavi edilen olguda iyileşme olmadığını göstermiştir — bu klinik gözlem tartışmanın olgu bazında ele alınması gerektiğine işaret etmektedir (Canpolat ve ark., 2015).

SCIWORA'da tanı manyetik rezonans görüntüleme (MRG) ile konur; WFNS Spine Committee %100 konsensüsle nörolojik bulgusu olan ve grafi/BT'si normal her çocuğa MRG'yi, irredükte atlanto-oksipital dislokasyonda cerrahiyi şart koşmakta, MRG bulgularının nörolojik sonucu öngördüğünü (%91) ve normal/intranöral MRG bulgusu olan olgularda konservatif tedavinin tercih edilmesini (%82) önermektedir (Konovalov ve ark., 2020).

Akut dönem sonrasında otonomik disrefleksi, ortostatik hipotansiyon, bası yaraları ve derin ven trombozu gibi sekonder komplikasyonların önlenmesi, erken multidisipliner konsültasyonla sağlanır (Gündüz & Turna, 2018).

Sonuç

İkincil hasarın önlenmesi tek bir işlemden değil, olay yerinden rehabilitasyona uzanan bir zincirden oluşur: seçici SHK, PECARN/NEXUS/CCR ile yönlendirilen görüntüleme, standart sınıflandırma sistemleriyle (AO, Jefferson, Hangman, Anderson-D'Alonzo) desteklenen stabilite kararı, hipotansiyondan kaçınma, metilprednizolonun bireyselleştirilmiş kullanımı, SCIWORA'da WFNS konsensüs ilkeleri ve zamanında cerrahi karar. Bu mesajlar günlük acil tıp pratiğine doğrudan uygulanabilir niteliktedir.

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M4461-Tam Metin

WHEN İNTERNAL PERFORMANCE DOES NOT TRANSFER: AN OUT-OF-DOMAİN STRESS TEST OF DEEP LEARNİNG-BASED FRACTURE CLASSİFİCATİON İN PEDİATRİC WRİST TRAUMA

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AIM

Deep learning systems may achieve favorable internal fracture-detection performance but lose reliability when applied to populations or imaging environments that differ from the development dataset [3,4]. This study aimed to compare three FracAtlas-trained fracture-classification strategies and evaluate their transportability to a deliberately mismatched pediatric wrist radiograph dataset.

METHODS

An ImageNet-pretrained ResNet18 was trained on FracAtlas, an open-access musculoskeletal radiograph dataset [1]. After exclusion of 59 unreadable or truncated images, 4,024 radiographs remained (3,307 non-fractured and 717 fractured). The dataset was stratified into training (n=2,816), validation (n=604), and internal test (n=604) sets. Model A used neither augmentation nor class weighting; Model B used conventional augmentation; and Model C used augmentation with class-weighted cross-entropy loss. All models were evaluated at a threshold of 0.500. Model C was additionally assessed at a validation-derived Youden threshold of 0.441.

Out-of-domain performance was evaluated on GRAZPEDWRI-DX, an open-access pediatric wrist trauma dataset [2]. After restricting the analysis to initial examinations and excluding uncertain diagnoses and images containing cast or metal, 9,907 radiographs remained (5,440 non-fractured and 4,467 fractured). GRAZPEDWRI-DX was not used for training, model selection, class weighting, or threshold optimization. Performance was assessed using sensitivity, specificity, and area under the receiver operating characteristic curve (AUC). Bootstrap resampling with 1,000 iterations was used to estimate 95% confidence intervals. Because the datasets differed in age, anatomy, skeletal maturity, acquisition characteristics, preprocessing, and label construction, the analysis was interpreted as an out-of-domain stress test rather than external clinical validation. Only publicly available anonymized datasets were used.

RESULTS

Internal AUC values were 0.875, 0.893, and 0.900 for Models A, B, and C, respectively. Despite moderate-to-good internal discrimination, all models showed marked performance degradation in the pediatric out-of-domain dataset.

Model A retained very high specificity (0.995) but detected only 1.7% of pediatric fractures, producing 4,390 false-negative classifications. Model B had an out-of-domain AUC of 0.487, with sensitivity of 0.664 and specificity of 0.326. Model C showed the opposite failure pattern. At the default threshold, sensitivity was 0.994 but specificity was only 0.008, resulting in 5,397 false-positive classifications. Applying the FracAtlas-derived Youden threshold increased sensitivity to 0.997 but further reduced specificity to 0.003. AUC remained 0.562 because threshold modification did not alter probability ranking. Key performance results are summarized in Table 1. Representative differences between the development and out-of-domain datasets are shown in Figure 1.

Table 1. Internal and out-of-domain performance of the evaluated models

Model (threshold)	FracAtlas AUC	Sensitivity / Specificity	GRAZPEDWRI-DX AUC	Sensitivity / Specificity
Model A (0.500)	0.875	0.439 / 0.962	0.573	0.017 / 0.995
Model B (0.500)	0.893	0.654 / 0.940	0.487	0.664 / 0.326
Model C (0.500)	0.900	0.804 / 0.813	0.562	0.994 / 0.008
Model C (0.441)	0.900	0.869 / 0.791	0.562	0.997 / 0.003

AUC: area under the receiver operating characteristic curve.

Figure 1. Representative non-fractured and fractured radiographs from FracAtlas and GRAZPEDWRI-DX, illustrating differences in anatomy, skeletal maturity, field of view, and image characteristics. The examples are not matched pairs and do not identify the individual cause of model failure.

CONCLUSION

FracAtlas-trained models did not transfer adequately to pediatric wrist radiographs despite acceptable internal discrimination. The direction of failure depended on the training strategy: the baseline model classified almost all target images as non-fractured, whereas the class-weighted model classified almost all as fractured. Augmentation, class weighting, and validation-derived threshold selection therefore did not ensure transportability under bundled domain shift. Pediatric

fracture artificial-intelligence systems should undergo population-specific development, calibration, and independent validation before clinical implementation.
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M4607-Özet Metin

TRİAJDA GÖZDEN KAÇAN MİNÖR GÖRÜNÜMLÜ MAJÖR TRAVMALAR

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Açılış

Değerli başkan, kıymetli meslektaşlarım; bugün pediatrik travmada bizi en çok yanıltan klinik durumlardan birini, ilk bakışta küçük görünen fakat ciddi yaralanma barındırabilen çocukları konuşacağım. Amacım her minör travmayı majör kabul etmek değil; görünümle mekanizma ve gerçek yaralanma yükü arasındaki uyumsuzluğu zamanında fark edebilmek için pratik bir yaklaşım sunmaktır.

Minör Görünümlü Majör Travma

Çocuklar küçük erişkinler değildir; majör yaralanmış bir çocuk da her zaman majör yaralanmış gibi görünmez. Esnek iskelet ve göğüs duvarı, enerjiyi kırık oluşturmadan iç organlara iletebilir. Büyük baş, zayıf boyun kasları, ince abdominal duvar ve daha az korunan solid organlar yaralanma riskini artırır. Güçlü fizyolojik kompansasyon ise kan basıncını ciddi kan kaybına kadar koruyabilir. Hipotansiyon bu nedenle geç ve kaygı verici bir bulgudur. Sözel iletişimin sınırlılığı, korku ve ağrı da üçüncü bir tanısal kamuflaj oluşturur. İlk görünüm, tek başına güvenlik ölçütü değildir.

Standart Klinik Değerlendirme

Değerlendirme ayrıntılı mekanizma analiziyle başlamalıdır: hız, düşme yüksekliği, darbenin yönü, koruyucu sistemler ve olaydan sonraki değişim sorgulanmalıdır. Ardından katastrofik kanamayı da içeren XABCDE yaklaşımı ve AMPLE öyküsü uygulanır. AMPLE; alerjileri, kullanılan

ilaçları, özgeçmişi, son oral alımı ve olaya ilişkin ayrıntıları sistematik biçimde tamamlar. Bulgular yaşa göre yorumlanmalı; taşikardi, kapiller dolum, nabız kalitesi, cilt ısısı, mental durum, solunum işi ve idrar çıkışı birlikte okunmalıdır. Stabilizasyon sonrasında çocuk tamamen, fakat hipotermiden korunarak soyulmalı; baştan ayağa sekonder bakı ve log-roll tamamlanmalıdır. Tek bir normal tansiyon, negatif FAST, normal grafi veya sakin muayene değerlendirmeyi bitirmez. Klinik kötüleşmede primer bakı yeniden yapılır; seri muayene zamanın sağladığı tanısal bilgiyi görünür kılar. Ağrı ve korku yalnız konfor sorunu değildir; yaşa uygun analjezi, bakım veren desteği ve dikkat dağıtma daha güvenilir tekrar muayenesinin ön koşuludur.

Nörotravma

Kafa travmalarının çoğu GKS 14-15 ile başvurur; özellikle iki yaş altındaki çocukta ciddi beyin hasarı belirgin yakınma vermeyebilir. Mekanizma, bilinç kaybı, nöbet, kusma, baş ağrısı ve davranış değişikliği sorgulanmalı; yaşa uygun GKS, pupiller, fokal bulgular ve yürüyüş seri değerlendirilmelidir. Hipoksi ve hipotansiyon önlenebilir ikincil beyin hasarının başlıca nedenleri olduğundan hızla düzeltilmelidir. PECARN gibi yaşa özgü karar araçları BT ile gözlem seçimini destekler. Bununla birlikte normal BT konküzyonu veya diffüz aksonal hasarı bütünüyle dışlamaz. Asıl güvence, tek GKS değeri değil, nörolojik durumun zaman içinde stabil kalmasıdır.

Servikal Omurga

Küçük çocukta büyük baş, bağ gevşekliği ve yüksek hareket merkezi nedeniyle yaralanmalar daha çok oksiput-C3 düzeyindedir. Omurga esneyebilirken omurilik aynı ölçüde esneyemez; böylece normal grafi veya BT ile birlikte SCIWORA gelişebilir. Geçici parestezi ya da güçsüzlük bile önemlidir. Boyun ağrısı, orta hat hassasiyeti, tortikollis, nörolojik bulgu ve riskli mekanizmada immobilizasyon sürdürülmeli; kalıcı veya gecikmiş nörolojik bulguda MRG düşünülmelidir. Emniyet kemeri izi de abdominal yaralanmayla birlikte Chance kırığını akla getirmelidir.

Toraks Travması

Çocuğun kompliyan göğüs kafesi kırılmadan deforme olur ve enerjiyi akciğer, kalp ve mediastene aktarır. Bu nedenle kot kırığı olmaması pulmoner kontüzyonu dışlamaz; kot kırığı ise yüksek enerji aktarımının göstergesidir ve özellikle posterior ya da çoklu olduğunda istismar da düşünülmelidir. İlk akciğer grafisi kontüzyon veya supin pnömotoraksta normal olabilir; bulgular 4-6 saatte belirginleşebilir. Solunum işi, SpO2 ve hava girişi seri izlenmelidir. Tansiyon pnömotoraks klinik tanıdır ve görüntüleme beklenmez. Diyafram hernisinin pnömotoraksı taklit edebileceği de unutulmamalıdır.

Abdominal Travma

Karındaki küçük iz, derindeki yaralanmanın ölçüsü değildir. Gidon izi pankreas, duodenum, karaciğer veya bağırsak yaralanmasını; emniyet kemeri izi bağırsak-mezenter hasarı ve Chance kırığını haber verebilir. Normal abdominal muayenesi olan çocuklarda bile önemli yaralanma bulunabilir. Persistan taşikardi, solukluk, kusma, alt toraks hassasiyeti ve perfüzyon bozukluğu alarmdır. AST'nin 200, ALT'nin 125 ünite/litrenin üzerinde olması kuşkuyu artırır; ancak laboratuvar tek başına karar verdirmez. Negatif FAST yaralanmayı dışlamaz. Stabil ve anlamlı risk taşıyan çocukta IV kontrastlı BT değerlidir; yine de erken bağırsak, mezenter ve pankreas yaralanmaları kaçabilir. Bu nedenle seri muayene, laboratuvar eğilimi ve klinik gözlem korunmalıdır.

Yüz Göz ve Hava Yolu

Yüzdeki en görünür lezyon, en tehlikeli lezyon olmayabilir. Ses değişikliği, stridor, salya, disfaji, hemoptizi, cilt altı amfizemi veya genişleyen hematom ilerleyici hava yolu tehdididir. Küçük pediatrik hava yolunda sınırlı ödem bile hızlı kötüleşme yaratabilir. Görme keskinliği, pupiller ve göz hareketleri şişlik artmadan belgelenmelidir. Glob rüptürü şüphesinde göze bası yapılmaz; muayene sonlandırılır, rijit kalkan yerleştirilir ve acil oftalmoloji değerlendirmesi sağlanır.

Pelvik ve Genitoüriner Travma

Minimal deplase pelvis kırığı dahi yüksek enerjinin ve eşlik eden abdominal ya da üriner yaralanmanın işareti olabilir. Hematürinin yokluğu renal pedikül veya üreter yaralanmasını; azlığı da yüksek dereceli renal hasarı dışlamaz. Flank ve perine bulguları, suprapubik hassasiyet, işeyememe, yürüme güçlüğü ve üretral meatusta kan özellikle aranmalıdır. Üretra yaralanması kuşkusunda Foley kateterden önce retrograd üretrografi yapılır. Normal ultrason veya pelvis grafisi güçlü klinik kuşkuyu sonlandırmamalıdır.

Çoklu Travma

Çoklu travma, görünür yara sayısından çok enerjinin izlediği yolu anlatır. Küçük vücut ve organların yakınlığı, tek kuvvetin birçok kompartımanı yaralamasına neden olur. Belirgin bir kırığa ya da laserasyona odaklanarak tanıyı erken kapatmamalıyız. Dikkat dağıtıcı yaralanma, sedasyon ve iletişim güçlüğü diğer bölgelere ait bulguları örtebilir. İlk 24 saatte yapılacak tersiyer bakı; tekrar muayeneyi, laboratuvar eğilimlerini ve nihai radyoloji raporlarını bir araya getirir. Temel soru, "Neresi yaralanmış?" değil, "Enerji vücutta hangi yolu izlemiş olabilir?" sorusudur.

Kas İskelet Yaralanmaları

Pediatrik kemik esnek, büyüme plağı ise zayıftır. Salter-Harris tip I, tip V, toddler kırığı ve plastik deformasyon ilk grafide görünmeyebilir. Dirsekte yağ yastıkları ve CRITOE dizilimi; ulna kırığında radyokapitellar çizgi dikkatle incelenmelidir. Motor, duyu, kapiller dolum ve nabız atelleme ya da redüksiyondan önce ve sonra kaydedilir. Kompartman sendromunda orantısız ağrı ve pasif germeyle ağrı erkendir; nabızsızlık geç bulgudur. Küçük çocukta artan analjezik gereksinimi, anksiyete ve ajitasyon üç önemli uyarıdır.

Delici Penetran Travma

Küçük bir cilt açıklığı, küçük yaralanma demek değildir. Çocuğun dar gövdesinde kısa görünen bir trakt plevra, akciğer, kalp, diyafram ve batını birlikte geçebilir. Tüm yüzeylerde giriş ve olası çıkışlar aranmalı; komşu damar, sinir, tendon, eklem ve organlar değerlendirilmelidir. Hemodinamik instabilite veya peritonit acil cerrahi gerektirir. Stabil çocukta dahi erken cerrahi görüş, hedefli görüntüleme ve seri muayene gerekir. Ciltteki deliği değil, içerideki yolu okumalıyız.

Elektrik ve Yıldırım

Elektrik yaralanmasında yüzey yanığı akımın yalnızca giriş ve çıkış kapısıdır. Akım yolu, voltaj ve temas süresi; ritim bozukluğu, kas nekrozu, rabdomiyoliz, böbrek hasarı ve kompartman sendromu riskini belirler. Fırlatılma varsa hasta aynı zamanda travma hastasıdır. Trivial olmayan temaslarda EKG; yüksek voltaj, yıldırım, bilinç kaybı, göğüs ağrısı veya anormal EKG'de monitörizasyon gerekir. Oral komissür yanığı 2-21 gün sonra labial arter kanaması yapabilir. Yıldırımda kardiyak arrestli hastaya öncelik veren ters triyaj uygulanır.

Yanık ve Duman İnhalasyonu

Çocuk derisi ince olduğu için yanık başlangıçta yüzeyel görünüp 24-48 saatte derinleşebilir. Kapalı alan yangınında normal akciğer grafisi ve normal pulse oksimetre yanıltıcıdır; karbonmonoksitte SpO2 yalancı yüksek olabilir ve karboksihemoglobin ko-oksimetriyle ölçülmelidir. Ses kısıklığı, stridor ve ilerleyici solunum bulgularında 2-8 saatte gelişebilecek ödem beklenmeden hava yolu güvenceye alınır. Bilinç değişikliği, asidoz ve belirgin laktat yüksekliği siyanürü düşündürür. Yüz, el, ayak, perine, genital bölge ve büyük eklem yanıkları küçük alanlı olsa da önemlidir.

Boğulma

Boğulmada temel sorun suyun türü değil hipoksidir. İlk anda iyi görünen ve yalnız hafif öksüren çocukta solunum bulguları saatler içinde gelişebilir. Seri SpO2, akciğer ve nörolojik değerlendirme yapılmalı; seçilmiş olgular en az 4-6 saat gözlenmelidir. Apne veya hipopnede erken kurtarıcı soluk ve oksijen önceliklidir; yalnız kompresyonlu KPR uygun değildir. Heimlich manevrası ventilasyonu geciktirir. Profilaktik antibiyotik ve kortikosteroid rutin değildir.

Isırıklar ve Sokmalar

Birkaç milimetrelik ısırık ekleme, tendon kılıfına veya kemiğe uzanabilir. Yara irrigasyonu ve eksplorasyonu yanında nörovasküler durum, tetanoz ve kuduz riski değerlendirilmelidir. Sokma sonrası lokal bulgu sakin görünürken anafilaksi gelişebilir; ilk tedavi gecikmeden intramüsküler adrenalindir. Yılan, akrep ve örümcek temaslarında ağrı ve şişliğin ilerleyişi, koagülasyon, nörolojik-solunumsal bulgular ve sistemik toksisite seri izlenmelidir.

Çocuk İstismarı

İstismar tanısı tek bir morluğa değil; öykü, gelişim düzeyi, yaralanma örüntüsü, laboratuvar-radyoloji ve etkileşimin bütününe dayanır. Değişen ya da gecikmiş öykü, mekanizmayla uyumsuz şiddet ve mobil olmayan bebekte herhangi bir morluk uyarıcıdır. TEN-4-FACES yaklaşımı şüpheli morluk bölgelerini hatırlatır. Dış bulgu olmadan kafa veya abdominal yaralanma bulunabilir; açıklanamayan kusma, letarji ve şok dikkatle değerlendirilmelidir. Bulgular nesnel belgelenmeli; makul şüphede kesinlik beklenmeden güvenlik ve bildirim süreci başlatılmalıdır.

Gelecek Araştırma Alanları

Araştırmaların sonlanımı yalnız görüntülemede lezyon değil; gecikmiş girişim, yoğun bakım, nörolojik kötüleşme, yeniden başvuru ve tanı gecikmesi olmalıdır. "Minör görünümlü" kavramı mekanizma, yaşa uygun fizyoloji, muayene güvenilirliği ve klinik trendle tanımlanmalıdır. Seri değerlendirme protokolleri, seçici görüntüleme, laboratuvar eşikleri ve pediatrik servikal karar araçları çok merkezli, prospektif ve dış doğrulamalı çalışmalarla sınanmalıdır. Preverbal çocuklar, gelişimsel farklılığı olanlar, kanama bozukluğu bulunanlar, VP şantlı hastalar ve istismar şüphesi taşıyanlar dışlanmamalıdır. Kaçırılan yaralanmanın yalnız bilgi eksikliği değil, sistem tasarımı sorunu olduğu da araştırılmalıdır.

Sonuç

Kapanışta klinik yaklaşımı beş cümlede toplayabiliriz. Mekanizmayı görünümden önce okuyun. Yaşa uygun fizyolojiyi değerlendirin ve hipotansiyonu beklemeyin. Görüntülemeyi standart bir paket olarak değil, yönetimi değiştirecek klinik soruya yanıt için seçin; rutin pan-scan yerine ALARA ilkesini ve hedefli incelemeyi uygulayın. Gözlemi pasif bekleyiş değil, bazale göre değişimi arayan aktif tanı süreci olarak kullanın. Taburculuğu da yalnız "şimdi normal" kararı olarak görmeyin; güvenilir bakım veren, ulaşılabilir yeniden başvuru, yazılı alarm bulguları ve

uygun takip planı sağlayın. Özellikle iyi görünümle demirlenme, ilk bulunan lezyonda aramayı durdurma ve negatif tek testi dışlama kanıtı sayma eğilimlerine karşı bilinçli olmalıyız.
Persistan taşikardi, bozulan perfüzyon, yeni hipoksi, düşen GKS, artan karın ağrısı, safralı kusma, orantısız ekstremite ağrısı veya yeni nörovasküler bulgu gözlemi sonlandırıp ileri inceleme, konsültasyon ya da yatış gerektirir. Merkezin pediatrik hava yolu, yoğun bakım, cerrahi veya kan ürünü kapasitesi çocuğun gereksinimini karşılamıyorsa sevk hazırlığı resüsitasyonla eş zamanlı yürütülmeli; gereksiz tekrar görüntüleme nakli geciktirmemelidir. Özel hasta gruplarında bakım verenin bildirdiği bazal durum ayrıca klinik veri kabul edilmelidir.
Sonuç olarak güvenli pediatrik travma yaklaşımı, tek bir normal bulguya yaslanmaz; mekanizma, anatomi, fizyoloji, seri muayene ve hedefli testlerin birlikte yorumlanmasına dayanır. Minör görünüm bir tanı değildir. Yalnızca değerlendirmeyi zorlaştıran ilk izlenimdir.

M4608-Özet Metin

ÇOCUKLARDA DİYABETİK KETOASİDOZ İLE İLİŞKİLİ SEREBRAL HASAR VE SUBKLİNİK SEREBRAL ÖDEM RİSK FAKTÖRLERİ

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Giriş ve Amaç
Diyabetik ketoasidoz (DKA), çocukluk çağı tip 1 diabetes mellitus vakalarının en ciddi ve hayatı tehdit eden akut metabolik komplikasyonlarından biridir. DKA seyrinde gelişebilecek en yıkıcı ve morbiditesi yüksek komplikasyon ise serebral hasar, diğer bir ifadeyle serebral ödem tablosudur. Serebral ödem, DKA tanısı alan çocuklarda nadir görülen bir komplikasyon (%0,5-1) olarak bildirilmekle birlikte, yüksek mortalite oranı (%20-25) ve kalıcı nörolojik sekel riski nedeniyle klinik yönetimde en çok çekinilen durumdur. Bu patolojinin gelişme riski, erişkin popülasyonu ile kıyaslandığında çocuk yaş grubunda belirgin derecede daha yüksek seyretmektedir. Serebral hasara ait klinik belirti ve semptomlar, hasta henüz sağlık merkezine başvurduğunda veya tedaviye başlanmadan önce mevcut olabileceği gibi, çok büyük bir sıklıkla tedavi sürecinde (insülin ve sıvı replasmanı başlandıktan sonra) ortaya çıkmaktadır. Klinik gözlemler, vakaların önemli bir kısmında semptomların tedavinin başlanmasını takip eden ilk 12 saat içinde belirgin hale geldiğini, 24 saatten sonra ise nadiren yeni gelişim gösterdiğini ortaya koymaktadır. Bu bildirinin amacı, DKA tanılı çocuklarda klinik ve subklinik serebral ödem gelişimine zemin hazırlayan risk faktörlerini, patofizyolojik mekanizmaları ve radyolojik görüntüleme bulgularını sunum verileri doğrultusunda kapsamlı bir şekilde incelemektir.
Subklinik Serebral Ödem: Gizli Tehlike ve Görüntüleme Bulguları
Klinik olarak belirgin serebral ödem tablosu buzdağının sadece görünen kısmını oluşturmaktadır. Yapılan modern nörogörüntüleme çalışmaları, belirgin hiçbir nörolojik semptom veya klinik bulgu sergilemeyen DKA'lı çocukların çok büyük bir bölümünde subklinik düzeyde serebral ödemin zaten mevcut olduğunu kanıtlamıştır. Subklinik serebral ödem; bilgisayarlı tomografi (BT) ve özellikle manyetik rezonans görüntüleme (MRG) çalışmalarında lateral ventriküllerde daralma (ventriküler kompresyon) veya beyin dokusundaki su dağılımındaki mikroskobik değişikliklerin saptanmasıyla tanımlanmaktadır.
Literatürde yer alan ve DKA tanısıyla takip edilen 41 çocuk üzerinde gerçekleştirilen prospektif bir çalışmada, hastaların aktif DKA tedavisi gördükleri esnadaki lateral ventrikül genişlikleri, metabolik tablonun tamamen düzeldiği iyileşme sonrası dönemle MRG üzerinden kıyaslanmıştır. Elde edilen veriler doğrultusunda, tedavi sırasındaki ortalama lateral ventrikül genişliğinin iyileşme sonrasına göre istatistiksel olarak anlamlı ölçüde dar olduğu saptanmıştır (9,3±0,3 mm'ye karşı 10,2±0,3 mm). İncelenen çocukların %56'sında aktif DKA tedavisi sırasında radyolojik

olarak net bir ventriküler daralma (kompresyon) tespit edilmiştir. Aynı çalışmanın dikkat çekici bir diğer bulgusu ise, bu ventriküler daralmanın DKA seyri esnasında hafif zihinsel durum anormallikleri veya Glasgow Koma Skalası (GKS) skorlarında hafif düşüşler sergileyen çocuklarda çok daha sık ve belirgin görülmesidir.

Ayrıca subklinik hasarın hücresel düzeydeki mekanizmalarını aydınlatmak amacıyla yapılan deneysel juvenil DKA sıçan modellerinde, histopatolojik olarak reaktif astrogliozis (nöroinflamasyon) varlığı net bir şekilde gösterilmiştir. Bu deneysel bulgular, DKA'nın beyin dokusu ve kan-beyin bariyeri üzerinde doğrudan inflamatuar süreçleri tetikleyebileceğini düşündürmektedir. Difüzyon ağırlıklı MRG (DWI) ile yapılan değerlendirmelerde, subklinik serebral ödemin şiddetinin, hastaların klinik risk profili ve metabolik parametrelerinin ağırlığı ile doğrudan paralellik gösterdiği saptanmıştır. Bu durum, subklinik süreçlerin klinik tabloyla kopmaz bir bağı olduğunu göstermektedir.

Klinik Bulgular ve Erken Tanının Önemi

Serebral hasarın klinik olarak geri dönüşümsüz bir aşamaya gelmeden önce erken dönemde fark edilmesi, mortalitenin azaltılması ve nörolojik sekellerin önlenmesi açısından hayati önem taşımaktadır. Serebral ödem şüphesinde hızlı bir radyolojik değerlendirme için bilgisayarlı tomografi (BT) de kullanılabilmekte, ventriküler kompresyon ve beyin dokusu değişiklikleri hızlıca görüntülenebilmektedir. Ancak en kritik yaklaşım, görüntüleme bulgularının klinik semptomlarla birlikte dinamik olarak değerlendirilmesidir. Serebral hasarın klinik takibinde monitorize edilmesi gereken bulgular üç temel grupta incelenmektedir:

1. Nörolojik Belirtiler: Baş ağrısı, letarji, belirgin bilinç değişiklikleri, konfüzyon durumu ve GKS skorlarında progresif olarak gözlenen düşüşler serebral hasarın en erken işaretleridir. Subklinik vakalarda bu belirtiler hafif ve geçici seyredebilir ancak yakından izlenmelidir.
2. Göz (Oftalmik) Bulguları: Pupil çaplarında değişiklikler (anizokori, ışık refleksinde yavaşlama), iki taraflı veya tek taraflı bakış parezisi ve fundus muayenesinde papilödem saptanması, kafa içi basıncının (KİB) tehlikeli düzeyde arttığını gösteren majör işaretlerdir. Bu bulguların varlığında vakit kaybetmeden acil görüntüleme ve anti-ödem tedavisine başlanmalıdır.
3. Vital Bulgular (Cushing Triadı): Bradikardi (nabız hızında düşme), sistemik hipertansiyon (kan basıncında yükselme) ve düzensiz/yüzeyel solunum paterninin bir arada görülmesi, artmış kafa içi basıncının geç ve terminal bulgularıdır. Bu aşamada acil tıbbi müdahale hayati önem arz eder.

Serebral Hasar Açısından Yüksek Risk Grupları ve Risk Faktörleri

DKA'lı çocuklarda serebral hasar gelişim riskini artıran ve hastanın başvuru anındaki parametrelerinden öngörülebilen spesifik risk faktörleri tanımlanmıştır. Bu faktörlerin klinisyen tarafından iyi bilinmesi, yüksek riskli hastaların erken seçilmesini ve yakın takibe alınmasını sağlar. Tanımlanmış majör risk faktörleri şunlardır:

• Yüksek Kan Üre Nitrojeni (BUN) Düzeyleri: Başvuru anında saptanan yüksek BUN seviyeleri, hastadaki dehidratasyonun derinliğini ve DKA tablosunun ciddiyetini yansıtan en güçlü bağımsız risk faktörlerinden biridir. Difüzyon ağırlıklı MRG çalışmalarında, yüksek BUN ile başvuran çocuklarda subklinik serebral ödemin çok daha şiddetli olduğu gösterilmiştir.

• Ağır Metabolik Asidoz ve Hipokapni: Başvuru anındaki pH ve bikarbonat değerlerinin aşırı düşük olması (ağır asidoz) ve buna eşlik eden derin hipokapni (düşük $PaCO_2$ düzeyleri) serebral hasar riskini katlayarak artırmaktadır.

• Ağır Hiperventilasyon: Metabolik asidozu kompanse etmek amacıyla gelişen ağır hiperventilasyon (Kussmaul solunumu), serebral vazokonstriksiyona ve buna bağlı olarak serebral perfüzyonda hipoksik bozukluklara yol açarak ödem sürecini hızlandırabilmektedir. Ağır hiperventilasyonu olan çocuklarda subklinik ödemin radyolojik skoru belirgin derecede yüksek bulunmuştur.

• Genç Yaş ve Yeni Tanı: Yaşça daha küçük olan çocuklar (özellikle 5 yaş altı) ve daha önceden diyabet tanısı olmayıp ilk kez DKA tablosuyla başvuran (yeni tanı) hastalar en büyük risk grubunu oluşturur. Bu yaş grubunda baş ağrısı veya letarji gibi nörolojik semptomların çocuk tarafından

ifade edilememesi ya da aile tarafından fark edilememesi, tanı ve tedavide gecikmelere yol açarak DKA'nın çok daha ağır evrelerde prezante olmasına neden olmaktadır.

Sonuç

Sonuç olarak, diyabetik ketoasidoz tanılı çocuklarda gözlenen klinik serebral ödem vakaları, aslında hastaların büyük çoğunluğunda subklinik olarak seyreden yaygın bir patolojik fenomenin en ağır, görünür ve terminal sunumudur. Başvuru anında derin asidozu, hipokapnisi, belirgin hiperventilasyonu ve yüksek BUN düzeyleri olan, özellikle genç yaşta ve yeni tanı almış hastalar serebral hasar açısından en yüksek risk altındaki grubu oluşturmaktadır. Bu çocukların tedavi süreçlerinde sıvı replasman hızının ve osmolalite değişimlerinin çok titiz yönetilmesi, nörolojik, vital ve oftalmik parametrelerinin saatlik takipleri, mortalite ve kalıcı nörolojik hasar oranlarının düşürülmesinde anahtar role sahiptir.

M4609-Tam Metin

DEPREM SONRASI YETİŞKİNLER VE ÇOCUKLU AİLELERDE TRAVMA: PSİKOSOSYAL DEĞERLENDİRME VE MÜDAHALE

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ÖZET

Doğal afetler, yol açtıkları yıkım ve fiziksel kayıpların ötesinde, toplumların ruh sağlığı ve sosyal dokusu üzerinde derin ve uzun vadeli etkiler bırakan karmaşık krizlerdir. Türkiye, jeolojik ve tektonik yapısı itibarıyla deprem riski yüksek bir coğrafyada yer almakta; 1999 Marmara ve 6 Şubat 2023 Kahramanmaraş merkezli çifte depremler başta olmak üzere tarih boyunca büyük afetlerle karşılaşmaktadır. Afet sürecinde yetişkinler ve özellikle çocuklu aileler, gelişimsel bağımlılıklar, bilişsel olgunluk farklılıkları ve ebeveyn koruyucu kalkanının sarsılması nedeniyle yüksek oranda travmatize olmaktadır. Bu bildiri çalışmasında, deprem sonrası erken ve geç dönemlerde yetişkin ile çocuk odaklı psikososyal değerlendirme esasları, Psikolojik İlk Yardım (PİY), Dinle-Koru-Bağla (LPC) modeli, travma derecelendirme araçları (PsySTART, CRIES-13), kötü haber verme ve yas yönetimi protokolleri ile hekimlerin üstlendiği çok boyutlu roller (normalleştirici, bilgilendirici, yönlendirici, koordinatör) ele alınmaktadır. Ayrıca sağlık çalışanlarının maruz kaldığı ikincil travmatik stres ve tükenmişlik ile başa çıkmada öz-bakım ve ekip dayanışmasının önemi vurgulanmaktadır.

Anahtar Kelimeler: Deprem, Çocuk, Aile, Psikososyal Müdahale, Travma Sonrası Stres Bozukluğu (TSSB), Psikolojik İlk Yardım.

ABSTRACT

Natural disasters are complex crises that leave deep and long-lasting impacts on the mental health and social fabric of communities beyond physical damage and loss of life. Turkey, situated in a seismically active region, has historically faced catastrophic events, notably the 1999 Marmara earthquake and the February 6, 2023 Kahramanmaraş double earthquakes. During disasters, adults and particularly families with children experience severe psychological trauma due to developmental vulnerabilities, differences in cognitive maturity, and the disruption of the parental

protective shield. This proceedings paper examines post-earthquake psychosocial assessment and intervention strategies for children and adults, focusing on Psychological First Aid (PFA), the Listen-Protect-Connect (LPC) model, trauma screening tools (PsySTART, CRIES-13), breaking bad news, grief management, and the physician's multidimensional roles (normalizer, educator, referrer, coordinator). Furthermore, the necessity of physician self-care and team support in mitigating secondary traumatic stress and burnout among healthcare responders is detailed.
Keywords: Earthquake, Children, Family, Psychosocial Intervention, PTSD, Psychological First Aid.

1. GİRİŞ VE TÜRKİYE'NİN DOĞAL AFET PROFİLİ

Doğal afet, yalnızca jeolojik veya meteorolojik bir doğa olayının kendisi değil; insanlar ve yerleşim birimleri üzerinde fiziksel, ekonomik, sosyal ve çevresel kayıplara yol açan, normal yaşam akışını kesintiye uğratan ve etkilenen topluluğun kendi imkanlarıyla üstesinden gelemeyeceği yıkıcı sonuçların toplamıdır. Dolayısıyla afet, olayın kendisi değil; doğurduğu insani ve toplumsal sonuçlardır.
Türkiye, tektonik oluşumu, topoğrafik yapısı ve iklim özellikleri nedeniyle çok sayıda doğal afet riski taşımaktadır. 20. yüzyıldan günümüze kadar afetlerde 87.000'den fazla vatandaşımız hayatını kaybetmiş, 210.000'i aşkın kişi yaralanmış ve 651.000 konut yıkılmış veya ağır hasar görmüştür. Türkiye'de doğal afetler nedeniyle yıkılan konutların afet türlerine göre dağılımı incelendiğinde, depremlerin %76'lık oran ile ilk sırada yer aldığı görülmektedir.

Afet Türü	Yıkılan Konut Sayısı	Oran (%)
Depremler	495.000	%76,0
Heyelanlar	63.000	%10,0
Su Baskınları	61.000	%9,0
Kaya Düşmeleri	26.500	%4,0
Çığ Düşmeleri	5.154	%1,0

Tarihsel perspektiften bakıldığında, 17 Ağustos 1999 Marmara Depremi (18.373 can kaybı, 48.901 yaralı, 96.796 ağır hasarlı konut ve çocuklarda %25 TSSB oranı) ülkemizde afet psikososyal hazırlığı ve kriz yönetimi açısından bir milat oluşturmuştur. Ancak 6 Şubat 2023 tarihinde gerçekleşen Kahramanmaraş merkezli çifte depremler, 11 ili doğrudan etkileyerek yıkımın boyutunu eşsiz bir seviyeye taşımıştır. 6 Şubat depremlerinden 8 ay sonra yapılan sahra taramalarında ergenlerde CRIES-13 kesim noktası üzerinde Travma Sonrası Stres Bozukluğu (TSSB) semptom sıklığı %39,8 olarak saptanmıştır. Bu yüksek oran, çifte depremin şiddeti, geniş etki alanı ve kayıpların derinliği ile doğrudan ilişkilidir.

2. AFET FAZLARI VE ZAMAN HARİTASI

Bir felaketin psikososyal etkileri zamana yayılan dinamik süreçlerdir. Hekimin müdahale stratejisini belirlemede 'Afet Zaman Haritası' rehberlik eder:

- **1. Kurtarma ve Yardım Fazı:** Afetin ilk saatleri ve 1-3. günlerini kapsar. Toplumsal birliktelik, yüksek motivasyon ve kahramanlık hissi ön plandadır. Öncelik güvenlik, barınma ve acil tıbbi ihtiyaçlardır.
- **2. Keşif ve Anlama Fazı:** İlk haftaları kapsar. Gerçeğin tam olarak kavranması ve yıkımın netleşmesiyle başlar. Bu aşamada psikoeğitim ve yapıcı bilgilendirmeler başlatılmalıdır.
- **3. Hayal Kırıklığı Fazı:** Sonraki haftaları kapsar. Beklentilerin gecikmesi, verilen sözlerin aksaması ve fiziksel yorgunlukla öfke, çökkünlük ve hayal kırıklığı gelişir. Destek sistemlerinin sürdürülebilirliği kritiktir.

- **4. Yeniden Yapılanma Fazı:** 1 ila 3 yıla yayılan uzun vadeli toparlanma evresidir. Bireylerin ve ailelerin yeni bir yaşam kurması, TSSB ve uzamış yas gibi klinik tabloların tedavisi bu evrede yürütülür.

3. ÇOCUK VE AİLE ODAKLI PSİKOSOSYAL MÜDAHALE İLKELERİ

Çocuklar, gelişimsel özellikleri, bilişsel olgunluk düzeyleri ve ebeveyn bağımlılıkları nedeniyle afetlerden yetişkinlere kıyasla daha ağır biçimde etkilenirler. ABD verilerine göre çocukların %14'ü en az bir afete maruz kalırken, afete uğrayan 60.000'i aşkın çocuk üzerinde yapılan derlemeler çocuklarda ağır psikopatoloji gelişme riskinin yüksekliğini kanıtlamaktadır.
Deprem sonrası akut dönemde tanısal sınırlar net çizilmelidir: Travmadan sonraki 3 gün ile 4 hafta arasında görülen tepkiler Akut Stres Bozukluğu çerçevesinde değerlendirilirken; ICD-11 bu belirtilerin 2 hafta içinde yatışmasını bekler. Belirtilerin 4 haftadan uzun sürmesi durumunda Yeniden Yaşantılama, Kaçınma, Negatif Biliş/Duygulanım ve Aşırı Uyarılmışlık semptomları ile TSSB tanısı değerlendirilir. DSM-5, 6 yaş ve altı çocuklar için gelişimsel modifikasyonlar içeren özel okul öncesi TSSB alt tipini tanımlamıştır.

3.1. Psikolojik İlk Yardım (PİY) ve 5 Temel İlke

Psikolojik İlk Yardım (PİY), acil ve felaket durumlarında psikiyatrist olmayan tüm hekim ve sağlık çalışanlarının uygulayabileceği kanıta dayalı, insani ve destekleyici bir müdahaledir. PİY 5 temel ilkeye dayanır:

- **1. Güvenliği Sağlamak:** Fiziksel ve emniyetli ortamın temini.
- **2. Sakinleştirmek:** Aşırı fizyolojik uyarılmışlık ve panik tepkilerini yatıştırmak.
- **3. Öz-Yeterliliği Desteklemek:** Bireyin ve çocuğun kendi başa çıkma becerilerini harekete geçirmek.
- **4. Bağlantı Kurmak:** Aile bireyleri, yakınlar ve sosyal destek ağlarıyla buluşturmak.
- **5. Umut Aşılama:** Gerçekçi olmayan vaatlerde bulunmadan iyileşme sürecine dair umut vermek.

3.2. Dinle - Koru - Bağla (LPC) Modeli ve Ebeveyn Kalkanı

Çocuklara yönelik saha uygulamasında 'Dinle - Koru - Bağla' (LPC) modeli öne çıkar. Çocuğun kaygıları sözel ve sözel olmayan boyutta 'Dinlenmeli'; medya maruziyeti ve uygunsuz detaylardan 'Korunmalı'; sağlık, okul ve sosyal destek sistemlerine 'Bağlanmalıdır'.
Çocukların afete verdikleri tepkiler, ebeveynlerinin olayı nasıl değerlendirdiğinden ve kendi kaygılarını nasıl yönettiklerinden doğrudan etkilenir. 'Ebeveynin Ruh Sağlığı = Çocuğun Kalkanı' ilkesi gereğince, ebeveyn desteği olmadan yürütülen çocuk müdahaleleri eksik kalmaya mahkumdur. Aile bütünlüğünün korunması ve birleştirilmesi en koruyucu eylemdir; kurumsal bakım son çare olarak değerlendirilmelidir.

3.3. İlk Ayda Yapılmaması Gerekenler

- **Geleneksel Psikoterapiler:** Travmayı izleyen ilk 1 ay içinde analitik terapi, uzamış alıştırma (prolonged exposure) veya EMDR gibi derin psikoterapi teknikleri uygulanmamalıdır.
- **Medyaya ve Detaya Maruz Bırakma:** Çocuğu travmatik olayın ayrıntılarını anlatmaya zorlamak veya televizyon/sosyal medyadaki enkaz görüntülerine maruz bırakmak zararlıdır.
- **Kanıtsız Müdahaleler:** Etkinliği kanıtlanmamış deneysel yöntemlerden kaçınılmalı; 'önce zarar verme' (primum non nocere) ilkesine uyulmalıdır.

4. KÖTÜ HABER VERME VE YAS YÖNETİMİ

Afet sahasında hekimin en zorlu görevlerinden biri ölüm haberinin iletilmesidir. Yapılandırılmış kötü haber verme rehberi 4 adımdan oluşur:

- **1. Ortamı Hazırlamak:** Görüşme yüz yüze, gürültüsüz, sessiz ve mümkünse yakınının eşlik ettiği özel bir alanda yürütülmelidir.
- **2. Bağlantı Kurmak:** Kişiye ismiyle hitap edilmeli, göz teması kurulmalı ve kötü bir haber verileceği önceden ihsas ettirilmelidir.
- **3. Net ve Somut Dil:** Teknik tıbbi terimlerden ve soyut metaforlardan ('melek oldu', 'derin uykuya daldı') kaçınılmalı; net, somut ve yalın bir dil kullanılmalıdır.
- **4. Tepkilere Duyarlılık:** Şok, inkar, öfke, feryat veya donukluk tepkilerine hazırlıklı olunmalı; duygu ifadesine izin verilmeli ve dürüstçe sorular yanıtlanmalıdır.

Yas tutan çocuklarda uzamış yas bozukluğu, depresyon ve TSSB bir arada görülebilir. Çocukların duygularını resim, oyun ve hikaye anlatımı yoluyla dışa vurmalarına imkan tanınmalıdır.

5. HEKİMİN ÇOK BOYUTLU GÖREVLERİ

Afet ortamında hekim sadece tıbbi tedavi uygulayıcı değil, çok boyutlu bir psikososyal koordinatördür:

Hekim Rolü	Klinik Açıklama ve Görev Alanı
Normalleştirici	Akut dönemde verilen uyku bozukluğu, irkilme ve öfke tepkilerini patoloji olarak etiketlemeden 'olağandışı olaya verilen olağan tepkiler' şeklinde tanımlar.
Bilgilendirici	Aileye ve çocuğa gelişimsel düzeylerine uygun psikoeğitim verir; iyileşme sürecine dair dürüst ve net beklentiler sunar.
Yönlendirici	Semptom odaklı olmayan risk faktörlerine dayalı PsySTART triajı ve CPSS/CRIES-13 ölçekleri ile yüksek riskli olguları uzman klinik bakıma sevk eder.
Koordinatör	Okul, aile, sağlık merkezleri ve toplum destek ağları arasında köprü kurarak bütüncül bakım (Medical Home) modelini işletir.

6. İKİNCİL TRAVMA, TÜKENMİŞLİK VE HEKİMİN ÖZ-BAKIMI

Afet sahasında kesintisiz çalışan hekimler ve acil tıp personeli, sürekli travmatik içeriklere, kayıplara ve belirsizliklere maruz kaldıkları için ikincil travmatik stres ve tükenmişlik riski altındadır. ICD-11, tükenmişliği (burnout) 'başarılı biçimde yönetilememiş kronik işyeri stresi sonucu ortaya çıkan sendrom' olarak tanımlamaktadır.
Hekimlerin ruh sağlığını koruması, hastalara sunulan bakımın niteliği için zorunludur. Hekimin kendini koruması için adımlar:

- **Sınır Koyma ve Öz-Bakım:** Çalışma ve dinlenme sürelerinin sınırlandırılması, uyku ve beslenmenin aksatılmaması.
- **Ekip Dayanışması:** Yalnız çalışmaktan kaçınılması, meslektaşlarla duygu paylaşımı yapılması ve süpervizyon desteği alınması.
- **Hazırlık ve Debriefing:** Afet bölgesine gitmeden önce psikolojik hazırlık yapılması, saha dönüşünde ise yapılandırılmış debriefing (bilgi alma/rahatlatma) oturumlarına katılım sağlanması.

7. SONUÇ VE ÖNERİLER

Deprem gibi felaketlerin ardından yürütülen psikososyal müdahaleler tek anlık bir yardım değil; haftalara, aylara ve yıllara yayılan süreklilik arz eden bir taahhüttür. Çocuklu ailelerin desteklenmesi, ebeveyn koruyucu kalkanının güçlendirilmesi, okul ve toplum odaklı koordinasyon kanallarının açık tutulması ve hekimlerin ikincil travmadan korunması, sağlıklı bir iyileşme sürecinin vazgeçilmez unsurlarıdır.

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M4460-Tam Metin

PEDİATRİK DİRSEK KIRIKLI ÇIKIKLARINDA CERRAHİ TEDAVİ SEÇİMİNİ VE FONKSİYONEL SONUÇLARI BELİRLEYEN ETMENLER: SİSTEMATİK DERLEME

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AMAÇ

Pediatrik dirsek kırıklı çıkıklarında cerrahi karar; eşlik eden kırığın özellikleri, deplasman ve eklem stabilitesine göre verilmektedir. Ancak cerrahi seçimi etkileyen faktörlerin uzun dönem fonksiyonel sonucu da öngörüp öngörmediği belirsizdir. Bu sistematik derlemenin amacı; redüksiyon sonrası deplasman, tedavi yöntemi, eşlik eden kırık yükü, immobilizasyon süresi ve cerrahi zamanlamanın cerrahi seçim ve fonksiyonel sonuçlarla ilişkisini değerlendirmektir.

YÖNTEM

PubMed/MEDLINE ve OpenAlex veri tabanları başlangıçtan 1 Ağustos 2026'ya kadar tarandı. On sekiz yaşından küçük, akut travmatik ulnohumeral çıkığı bulunan, en az 10 hastalık ve cerrahi seçim veya fonksiyonel sonuçlara ilişkin nicel karşılaştırma sunan kohort çalışmalar dahil edildi. Monteggia lezyonları, izole radiokapitellar çıkıklar, kronik veya ihmal edilmiş çıkıklar ve ayrıştırılabilir akut ulnohumeral çıkık verisi bulunmayan çalışmalar dışlandı. Çalışma tasarımı, örneklem büyüklüğü, kırık özellikleri, tedavi yöntemi, redüksiyon sonrası deplasman, immobilizasyon, cerrahi zamanlama, hareket açıklığı ve fonksiyonel skorlar kaydedildi. Klinik ve

metodolojik heterojenlik nedeniyle meta-analiz yapılmadı; bulgular anlatı senteziyle değerlendirildi.

BULGULAR

Toplam 660 çocuğu içeren 10 karşılaştırmalı kohort dahil edildi; dokuzu retrospektif, biri prospektifti. Redüksiyon sonrası deplasman, açık redüksiyon ve internal fiksasyon uygulananlarda uygulanmayanlara göre daha fazlaydı (10,58'e karşı 4,30 mm; p=0,0004); medial epikondil alt grubunda da benzer fark bulundu (12,85'e karşı 4,30 mm; p<0,0001) [1]. Buna karşın uzun dönem Mayo Elbow Performance Score (MEPS) cerrahi ve cerrahi dışı gruplarda benzerdi (97,2'ye karşı 97,1; p=0,53) ve başlangıç deplasmanı fonksiyonel sonuçla ilişkili değildi [2].

Çoklu eşlik eden kırığı bulunan çocuklarda Mayo Elbow Performance Index (MEPI) daha düşüktü (83'e karşı 91; p=0,02) [3] ve çoklu kırık varlığı mükemmelin altında sonuçla ilişkiliydi (p=0,001) [4]. Yaklaşık üç haftalık standart immobilizasyon uygulanan prospektif kohortta eşlik eden kırığı olan ve olmayan çocukların son MEPS değerleri (99,5'e karşı 100; p=0,13) ve hareket kayıpları (4,78°'ye karşı 4,67°; p=0,64) benzerdi [5]. Cerrahinin ilk 24 saat içinde veya daha sonra yapılması MEPI açısından fark oluşturmadı (90,3'e karşı 88,6; p=0,60) [3].

Operatif ve cerrahi dışı tedavi karşılaştırmaları diğer kohortlarda da değişken sonuçlar gösterdi. Medial epikondil yaralanmalarında Hyvönen ve ark. cerrahi ve cerrahi dışı tedaviden sonra tatmin edici sonuç oranları arasında anlamlı fark bildirmedi (18/22'ye karşı 5/8; p=0,345) [6]. Agar ve ark. kırıklı çıkıklarda basit çıkıklara göre daha düşük MEPS (90,0'a karşı 95,1; p=0,046), daha düşük hareket açıklığı (132,6°'ye karşı 138,7°; p=0,023) ve daha uzun immobilizasyon süresi (3,76'ya karşı 2,00 hafta; p=0,001) bildirdi [7]. Bua ve ark. kırıklı ve açık tedavi uygulanan grupla basit çıkık ve kapalı tedavi uygulanan grup arasında Kim skorunda anlamlı fark saptamadı (77,5'e karşı 87,5; p=0,08); ancak yaralanma tipi ile tedavi yönteminin tamamen örtüşmesi tedavi etkisinin bağımsız değerlendirilmesini engelledi [8].

Tablo 1. Cerrahi seçim ve fonksiyonel sonuçlarla ilişkili temel bulgular

Karşılaştırma	Sonuç	Bulgular
ORIF / ORIF yok	Redüksiyon sonrası deplasman	10,58 / 4,30 mm; p=0,0004
Medial epikondil, ORIF / ORIF yok	Deplasman	12,85 / 4,30 mm; p<0,0001
Cerrahi / cerrahi dışı	MEPS	97,2 / 97,1; p=0,53
Çoklu / tek kırık	MEPI	83 / 91; p=0,02
İmmobilizasyon >2 hafta	Ekstansiyon kaybı	p<0,001
Kırık var / yok	MEPS	99,5 / 100; p=0,13
Kırık var / yok	Hareket kaybı	4,78° / 4,67°; p=0,64
Cerrahi ≤24 saat / >24 saat	MEPI	90,3 / 88,6; p=0,60

ORIF: Açık redüksiyon ve internal fiksasyon; **MEPS:** Mayo Elbow Performance Score; **MEPI:** Mayo Elbow Performance Index.

SONUÇ

Redüksiyon sonrası deplasman pediatrik dirsek kırıklı çıkıklarında cerrahi seçimle ilişkili olmakla birlikte, uzun dönem fonksiyonel sonucun bağımsız belirleyicisi olarak gösterilememiştir. Çoklu eşlik eden kırıklar ve uzamış immobilizasyon fonksiyonel kısıtlılıkla daha tutarlı ilişki göstermektedir. Cerrahi karar yalnızca deplasmana dayandırılmamalı; kırık paterni, eklem uyumu ve stabilitesi, eklem içi fragman ve nörovasküler durum birlikte değerlendirilmelidir. Mevcut gözlemsel kanıtlar cerrahi veya cerrahi dışı yaklaşımın genel üstünlüğünü göstermemektedir.

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M4610-Özet Metin

PERİNEAL YARALANMALARDA ERKEN CERRAHİ MÜDAHALE

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Perine bölgesi; üriner sistem, gastrointestinal sistem, pelvik taban kasları ve dış genital organların anatomik olarak birbirine yakın komşuluk gösterdiği kompleks bir anatomik alandır. Bu nedenle perineal bölgede meydana gelen travmalar, yüzeyel olarak sınırlı görünse bile altta daha ciddi ve çoklu organ yaralanmalarını barındırabilir.

Çocuklarda görülen perineal yaralanmalar erişkinlere göre daha seyrek görülmesine rağmen, büyüme ve gelişme çağındaki dokuların etkilenmesi nedeniyle fonksiyonel sonuçları çok daha ağır olabilir. Anal inkontinans, üriner inkontinans, üretral darlık, fistül gelişimi ve kozmetik deformiteler hastaların yaşam kalitesini belirgin şekilde etkileyebilir.

Perineal travmalarda önemli noktalardan biri, ciltte görülen yaralanmanın travmanın gerçek boyutunu her zaman yansıtmamasıdır. Travma sonrasında görülen küçük cilt laserasyonları, derin doku yaralanmalarını maskeleyebilir. Özellikle pediatrik hastalarda yüzeyel görünüm yanıltıcı olabilir. Bu nedenle temel prensibimiz şudur: **Küçük yara, küçük travma anlamına gelmez.** Perinede görülen sınırlı bir cilt yaralanması, derin sfinkter veya üretral yaralanmayı dışlamaz.

Epidemiyoloji ve Travma Nedenleri

Pediatrik perineal travmalar nadir görülmekle birlikte, özellikle çoklu organ yaralanmalarıyla birlikte olduğunda mortalite ve morbidite belirgin şekilde artmaktadır.

En sık karşılaşılan nedenlerin başında bisiklet veya straddle yaralanmaları gelmektedir. Bunun dışında düşmeler, trafik kazaları, penetran travmalar ve hayvan saldırıları önemli nedenler arasındadır. Ayrıca anamnez ile fizik muayene bulgularının uyumsuz olduğu durumlarda cinsel istismar mutlaka akılda bulundurulmalıdır.

Pediatrik hastalar ile erişkinler arasında bazı önemli anatomik ve klinik farklılıklar bulunmaktadır. Çocuklarda mesane daha abdominal yerleşimlidir ve dokuların elastikiyeti daha yüksektir. Buna karşılık erişkinlerde mesane pelvis içerisinde daha iyi korunur ve fibrozis daha belirgin olabilir. Pediatrik hastalarda muayene güçlüğü nedeniyle anestezi altında değerlendirme, yani Examination Under Anesthesia (EUA), daha sık gerekli olmaktadır. Ayrıca çocuklarda istismar olasılığı mutlaka değerlendirilmelidir.

Bu farklılıklar bir yandan pediatrik hastalarda primer anatomik onarım başarısını artırırken, diğer yandan derin yaralanmaların yüzeyel bulgularla gizlenmesine neden olabilir. Anal sfinkter kompleksi, dış genital organlar ve üretra arasındaki anatomik yakınlık nedeniyle tek bir travma mekanizması aynı anda hem üriner sistemi hem de anorektal yapıları etkileyebilir.

Travma Mekanizmasının Önemi

Travma mekanizmasının bilinmesi, olası organ yaralanmalarının öngörülmesinde önemli ipuçları sağlar ve cerrahi planlamayı doğrudan etkiler.

Düşük enerjili travmalar daha sık görülmektedir. Bisiklet kazaları, oyun parkı yaralanmaları ve ev kazaları bu grupta yer almaktadır.

Yüksek enerjili travmalarda ise pelvik kırıklar, üretra yaralanmaları ve anorektal hasarın birlikteliği mutlaka akılda tutulmalıdır. Trafik kazaları, ezilme yaralanmaları ve penetran yaralanmalar bu gruba örnek olarak verilebilir.

İlk Yaklaşım

Perineal yaralanmalı hastanın ilk değerlendirmesinde öncelikle hava yolu, solunum ve dolaşım güvence altına alınmalıdır. Ardından perine bölgesi ayrıntılı olarak değerlendirilmelidir. Aktif kanama kontrolü sağlanmalı ve eşlik eden pelvik kırık, batın yaralanması ve ekstremite travmaları araştırılmalıdır.

Çocuk hastalarda ağrı ve kooperasyon güçlüğü nedeniyle fizik muayene çoğu zaman yetersiz kalabilmektedir. Bu nedenle şüpheli olgularda anestezi altında değerlendirme tanısal doğruluğu belirgin şekilde artırmaktadır.

Değerlendirme sırasında bazı alarm bulgularına özellikle dikkat edilmelidir. Aktif kanama, hematüri, idrar retansiyonu, rektal kanama, geniş hematom ve pelvik instabilite önemli uyarıcı bulgulardır.

Fizik Muayene

Perineal yaralanmalarda inspeksiyon tek başına yeterli değildir. Genital organlar, anal sfinkter, vajen ve rektum sistematik olarak değerlendirilmelidir.

Üretral meatus çevresinde kan görülmesi, hematüri veya idrar yapamama üretral yaralanma açısından uyarıcıdır. Rektal kanama ise rektum perforasyonu veya anal sfinkter yaralanmasını düşündürmelidir.

Çocuklarda kooperasyon güçlüğü nedeniyle eksik değerlendirme sık görülmektedir. Bu nedenle özellikle derin yaralanma şüphesi bulunan olgularda düşük eşikle EUA planlanmalıdır.

Önemli bir diğer prensip ise perine muayenesi tamamlanmadan yaranın kapatılmamasıdır. Yalnızca dışarıdan görülen cilt yarasına odaklanmak, altta bulunan sfinkter, rektum veya üretra yaralanmalarının gözden kaçmasına neden olabilir.

Görüntüleme

Her pediatrik perineal yaralanmada ileri görüntüleme gerekli değildir. Ancak derin yaralanma şüphesi bulunan olgularda uygun görüntüleme yöntemi seçilmelidir.

Bilgisayarlı tomografi pelvik organ yaralanmalarının değerlendirilmesinde ilk tercih olarak kullanılabilir. Retrograd üretrografi üretra yaralanmasının tanısında altın standarttır. Sistografi ise mesane yaralanmasından şüphelenilen olgularda kullanılabilir.

Ultrasonografi hematom ve serbest sıvının değerlendirilmesinde yararlı olmakla birlikte, tek başına derin yaralanmayı dışlayamaz.

Hematüri, idrar retansiyonu, pelvik kırık, penetran travma ve derin laserasyon varlığında görüntüleme ihtiyacı özellikle değerlendirilmelidir.

Çocuklarda EUA

Pediatrik hastalarda Examination Under Anesthesia, yani EUA, yalnızca ayrıntılı fizik muayene yapılmasını sağlamakla kalmaz; aynı seansta tanısal ve tedavi edici girişimlerin planlanmasına da olanak tanır.

Özellikle anal sfinkter, vajen ve posterior üretranın ayrıntılı değerlendirilmesi açısından EUA büyük önem taşımaktadır. Literatürde EUA sayesinde ilk değerlendirmede gözden kaçan yaralanmaların önemli bir kısmının tanınabildiği bildirilmektedir.

Bu nedenle yüzeyel görünen ancak derin yaralanma şüphesi taşıyan pediatrik hastalarda EUA gecikmeden uygulanmalıdır.

Erken Cerrahi Müdahale Neden Gereklidir?

Perineal yaralanmalarda ilk 24 saat içerisinde gerçekleştirilen anatomik onarım, doku planlarının henüz korunmuş olması nedeniyle daha başarılı sonuçlar verebilmektedir.

Erken cerrahi; enfeksiyon, yara ayrışması, fistül gelişimi ve anal inkontinans riskini azaltırken, kozmetik sonuçları da iyileştirir. Özellikle çocuklarda yüksek doku rejenerasyonu sayesinde primer rekonstrüksiyonun başarı oranı erişkinlere göre daha yüksek olabilir.

Burada erken müdahalenin temel amacı yalnızca yaranın kapatılması değildir. Asıl amaç, üriner ve anorektal fonksiyonların uzun dönemde korunmasıdır.

Cerrahi Karar Ne Zaman Verilmeli?

Perineal travmalarda cerrahi gereksinimi; yaralanmanın derinliği, kontaminasyon derecesi, kanama miktarı ve eşlik eden organ yaralanmalarına göre belirlenmelidir.

Yüzeyel abrazyonlar ve küçük laserasyonlar çoğu zaman konservatif olarak tedavi edilebilir. Ancak anal sfinkter, rektum, vajen veya üretranın etkilendiği derin yaralanmalarda cerrahi geciktirilmemelidir.

Hemodinamik olarak stabil hastalarda erken dönemde yapılacak ayrıntılı değerlendirme ve primer anatomik onarım, hem kısa hem de uzun dönem fonksiyonel sonuçları belirgin şekilde iyileştirebilir.

Cerrahi gerektiren başlıca durumlar; derin perineal laserasyon, devam eden aktif kanama, anal sfinkter yaralanması, rektal perforasyon, üretral yaralanma, vajinal yaralanma, kontamine yara ve geniş hematomdur.

Burada tekrar vurgulamak istediğim nokta, **yaranın büyüklüğünden çok derinliğinin cerrahi kararı belirlediğidir.** Yalnızca cilt laserasyonuna odaklanmak, özellikle anal sfinkter yaralanmasının gözden kaçmasına neden olabilir.

Erken Cerrahinin Avantajları

Uygun hasta seçimi ile ilk 24 saat içerisinde gerçekleştirilen primer anatomik onarımın enfeksiyon, fistül, anal inkontinans ve kozmetik deformite oranlarını anlamlı ölçüde azaltabileceği bildirilmektedir.

Erken cerrahi sırasında anatomik planların henüz korunmuş olması, doku ödeminin sınırlı olması ve nekroz gelişmemiş olması cerrahi başarıyı artıran temel faktörlerdir.

Buna karşılık gecikmiş onarım, fibrozis gelişmesine ve anatomik planların kaybolmasına neden olabilir. Bu durum sfinkter rekonstrüksiyonunu güçleştirebilir ve fonksiyonel sonuçların kötüleşmesine yol açabilir.

Erken cerrahinin temel kazanımları daha düşük enfeksiyon riski, daha düşük fistül oranı, daha iyi kontinans, daha iyi kozmetik sonuç ve daha kısa hastanede kalış süresidir.

Debridman ve Yara Hazırlığı

Başarılı cerrahinin ilk basamaklarından biri yeterli debridmandır. Ancak debridman sırasında gereksiz doku eksizyonundan kaçınılmalıdır. Vaskülaritesi iyi olan dokular mümkün olduğunca korunmalı ve anatomik planlar dikkatle belirlenmelidir.

Cerrahi sırasında bol serum fizyolojik ile irrigasyon yapılmalı ve yabancı cisimler uzaklaştırılmalıdır.

Kontamine yaralarda uygun debridman ve irrigasyon yapıldıktan sonra primer onarım, birçok olguda güvenle uygulanabilmektedir.

Anal Sfinkter Yaralanmaları

Anal sfinkter yaralanmaları, uzun dönem anal kontinansı belirleyen en önemli yaralanmalardan biridir. Bu nedenle erken tanı ve anatomik primer onarım büyük önem taşımaktadır.

Cerrahi sırasında internal ve eksternal sfinkter mümkün olduğunca ayrı ayrı tanımlanmalı ve gerilimsiz şekilde anatomik olarak onarılmalıdır.

Primer onarım sonrasında fekal kontaminasyonun derecesine göre koruyucu kolostomi gereksinimi değerlendirilmelidir. Ancak her olguda rutin kolostomi önerilmemektedir.

Özellikle sfinkter uçları tanımlanmadan kör sütür uygulanmamalıdır. Yalnızca cildin kapatılması ise ilerleyen dönemde anal inkontinansa yol açabilecek yetersiz bir onarım olacaktır.

Üretral Yaralanmalara Yaklaşım

Üretral yaralanmayı düşündüren başlıca alarm bulguları meatusda kan görülmesi, idrar retansiyonu, pelvik kırık ve perineal hematomdur.

Pediatrik perineal travmalarda üretral yaralanma özellikle pelvik kırıklar ve yüksek enerjili travmalarla birlikte görülebilir.

Meatusda kan bulunan hastalarda, retrograd üretrografi ile değerlendirme yapılmadan zorlayıcı Foley kateterizasyonundan kaçınılmalıdır.

Parsiyel yaralanmalarda kateter drenajı yeterli olabilirken, komplet yaralanmalarda suprapubik sistostomi ve gecikmiş rekonstrüksiyon ya da seçilmiş olgularda primer rekonstrüksiyon planlanabilir.

Rektal Yaralanmalar

Pediatrik rektal yaralanmalar nadir görülmekle birlikte yüksek morbidite taşımaktadır. Rektal kanama, gaz kaçağı, derin perine yarası ve pelvik kırık rektal yaralanma açısından şüphe uyandıran bulgulardır.

Rektal kanama, geniş perineal laserasyon veya penetran travma varlığında rektum mutlaka araştırılmalıdır. Gerektiğinde rektoskopi veya EUA ile değerlendirme yapılabilir.

İntraperitoneal ve ekstraperitoneal rektal yaralanmaların yönetimi birbirinden farklıdır. Yaygın kontaminasyon bulunan olgularda diversiyon gereksinimi hasta bazında değerlendirilmelidir.

Rektal yaralanmanın atlanması enfeksiyon ve fistül gelişme riskini belirgin olarak artırabilir.

Antibiyotik Tedavisi ve Enfeksiyon Kontrolü

Perine bölgesi yüksek bakteriyel yük nedeniyle enfeksiyon açısından riskli bir anatomik alandır. Bu nedenle özellikle kontamine yaralanmalarda geniş spektrumlu antibiyotik tedavisi erken dönemde başlanmalıdır.

Bununla birlikte cerrahi debridman ve yeterli irrigasyon antibiyotik tedavisinin yerini tutmaz; enfeksiyon kontrolünün temel bileşenleridir.

Antibiyotik seçimi; yaralanmanın kontaminasyon derecesine, rektal yaralanma varlığına ve hastanenin mikrobiyolojik özelliklerine göre planlanmalıdır.

Sonuç

Sonuç olarak pediatrik perineal yaralanmalarda temel yaklaşım, yüzeyel bulgulara aldanmadan altta yatan yaralanmanın doğru şekilde ortaya konulmasıdır.

Küçük yara, küçük travma anlamına gelmez.

Ayrıntılı fizik muayene, gerekli olgularda EUA ve uygun görüntüleme yöntemlerinin kullanılması, özellikle üretra, anal sfinkter, rektum ve genital organ yaralanmalarının tanınmasında kritik öneme sahiptir.

Derin yaralanma saptanan uygun hastalarda erken dönemde gerçekleştirilen anatomik primer onarım; enfeksiyon, fistül, inkontinans ve kozmetik problemlerin azaltılmasına katkı sağlayabilir.

Dolayısıyla perineal travmalarda hedef yalnızca yaranın kapatılması değil, hastanın uzun dönem üriner, anorektal ve fonksiyonel sonuçlarının mümkün olduğunca korunması olmalıdır.

M4611-Özet Metin

MİNÖR KAFA TRAVMASI SONRASI GELİŞEN KOMPLİKASYONLAR: NE ZAMAN BEYİN CERRAHİSİ?

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Amaç

Çocukluk çağı kafa travmalarının %80-90'ını Glasgow koma skalası (GKS) 14-15 ile başvuran minör kafa travmaları oluşturur. Bu grupta klinik önemli travmatik beyin hasarı (ciTBI) %5'in, beyin cerrahisi girişimi gerektiren olgular ise %1'in altındadır; ancak mutlak olgu sayısı yüksek olduğundan gözden kaçan olgular kalıcı nörolojik hasar ve ölümle sonuçlanabilir. Bu konuşmanın amacı, pediatrik minör kafa travması sonrası gelişebilen akut ve uzun dönem komplikasyonları özetlemek; hangi olgularda bilgisayarlı tomografi (BT), hastaneye yatış ve cerrahi gerektiğini tanımlamak ve düşük değerli uygulamalardan kaçınma ilkesini vurgulamaktır.

Yöntem

Sunum, güncel kılavuzların derlenmesine dayanan anlatısal bir derlemedir. Pediatric Emergency Care Applied Research Network (PECARN) klinik karar kuralı, Fransız Nöroşirürji Derneği 2025 akut travmatik beyin hasarı kılavuzu, Amerikan Hastalık Kontrol ve Önleme Merkezi (CDC) pediatrik hafif travmatik beyin hasarı kılavuzu, persistan postkonküzyonel semptomlara ilişkin sistematik derleme ve meta-analiz ile temel nöroşirürji kaynakları incelenmiştir. Komplikasyonlar akut dönem ve uzun dönem olarak iki grupta sınıflandırılmıştır.

Bulgular

Sınıflama GKS'ye dayanır; iki yaş altında sözel yanıt gelişmediğinden pediatrik uyarlamalı skala kullanılmalıdır. PECARN algoritması hastaları üç risk grubuna ayırır (Tablo 1). Yüksek risk grubunda ciTBI riski iki yaş altında %4,4, iki yaş ve üzerinde %4,3'tür ve BT önerilir. Orta risk grubunda risk %0,8-0,9 olup aile uyumlu ve gözlem olanağı varsa 4-6 saatlik acil gözlemi BT'ye

alternatiftir. Çok düşük risk grubunda risk %0,02-0,05'in altındadır ve BT önerilmez. Frontal dışı hematomlar; parietal ve temporal kemiğin inceliği, orta meningeal arter komşuluğu ve açık sütürler nedeniyle özel önem taşır.

Uzun dönemde travmayı izleyen dört haftada baş ağrısı,, vestibülo-oküler disfonksiyon, uyku bozuklukları, anksiyete ve irritabilite gibi postkonküzyonel semptomlar beklenebilir. Dört haftayı aşan semptomlar persistan postkonküzyonel semptom (PPKS) olarak tanımlanır ve travmatik beyin hasarı geçiren çocukların yaklaşık üçte birinde görülür; multidisipliner takip gerektirir.

Cerrahi gerektiren başlıca patolojiler epidural hematom (EDH), subdural hematom (SDH) ve çökme kırıklarıdır (Tablo 2). EDH'de GKS ≤8, pupil asimetrisi, hacim >30 mL, orta hat kayması >5 mm ve beyin sapı basısı acil cerrahi gerektirir; venöz kaynaklı, kendini sınırlayan EDH'de konservatif izlem tercih edilir ve ilk BT ilk altı saatte çekildiyse yakınma olmasa da altıncı saatte kontrol BT önerilir. Bir yaş altında açık fontanel ve sütürler kafa içi basınç artışına tolerans sağladığından kalınlık <20 mm, orta hat kayması ve GKS düşüşü yoksa yoğun bakımda izlem uygundur. SDH'de GKS ≤8, izlemde ≥2 puanlık akut düşüş, kalınlık >10 mm veya orta hat kayması >5 mm cerrahi endikasyondur; iki yaş altında gergin fontanel, GKS ≤12 ve transkraniyal Doppler'de kafa içi basınç artışı bulguları cerrahi kararı belirler ve sarsılmış bebek sendromu açısından multidisipliner değerlendirme zorunludur. Çökme kırıklarında açık yara, dural açıklık, pnömosefali, aktif beyin omurilik sıvısı (BOS) sızıntısı ve kitle etkisi ilk 24 saatte cerrahi gerektirir; kapalı, basısız ve ping-pong kırıklar izlenebilir, ancak büyüyen kafatası kırığı riski nedeniyle tüm kırık olguları 4-6 hafta içinde poliklinik kontrolüne çağrılmalıdır.

Yatış ölçütleri PECARN orta veya yüksek risk, BT'de lezyon ve güvenilir gözlem ortamının sağlanamamasıdır. Şiddetlenen baş ağrısı, tekrarlayan kusma, fokal defisit, peltek konuşma, uyuşukluk ve nöbet alarm bulgularıdır ve taburculuk öncesi aileye aktarılmalıdır.

Tablo 1. PECARN risk grupları ve öneriler

Risk grubu	<2 yaş ölçütleri	≥2 yaş ölçütleri	ciTBI riski	Öneri
Yüksek	GKS 14 veya mental durum değişikliği; palpabl kafatası kırığı	GKS 14 veya mental durum değişikliği; kafatası tabanı kırığı bulguları	%4,4 / %4,3	BT önerilir
Orta	>5 sn bilinç kaybı; frontal dışı hematom; anormal davranış; ciddi mekanizma	Bilinç kaybı; kusma; şiddetli baş ağrısı; ciddi mekanizma	%0,9 / %0,8	Gözlem veya BT
Çok düşük	Ölçütlerin hiçbiri yok	Ölçütlerin hiçbiri yok	<%0,02 / <%0,05	BT önerilmez

Tablo 2. Cerrahi endikasyonlar ve konservatif izlem koşulları

Patoloji	Acil cerrahi ölçütleri	Konservatif izlem
EDH	GKS ≤8; pupil asimetrisi; hacim >30 mL; orta hat kayması >5 mm; beyin sapı basısı	Venöz kaynaklı EDH; <1 yaşta kalınlık <20 mm, kayma ve GKS düşüşü yok; 6. saatte kontrol BT
SDH	GKS ≤8 veya ≥2 puan düşüş; dirençli kafa içi basınç artışı; kalınlık >10 mm; kayma >5 mm; <2 yaşta gergin fontanel, GKS ≤12	İnce (1-2 mm) SDH, kayma yok, klinik stabil; GKS düşüşünde hızlı BT

Patoloji	Acil cerrahi ölçütleri	Konservatif izlem
Çökme kırığı	Açık yara; dural açıklık; pnömosefali; BOS sızıntısı; kitle etkisi; belirgin deformite (ilk 24 saat)	Kapalı, basısız, ping-pong kırık; 4-6 haftada poliklinik kontrolü

Sonuç

Minör kafa travmasında cerrahi gereksinim nadirdir, ancak önemsiz değildir. PECARN gibi algoritmalar az sayıdaki cerrahi acili kaçırmama ile geniş düşük riskli popülasyonda gereksiz BT, yatış ve kaynak tüketiminden kaçınma arasındaki dengeyi sağlar.

Destek

Herhangi bir proje desteği veya araştırma desteği almamıştır.

Finansal bağlantı

Yazarın herhangi bir finansal bağlantısı yoktur.

M4612-Tam Metin

İNTRAVENÖZ SIVI SEÇİMİNDE GÜNCEL KILAVUZLAR VE HATALAR

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Amaç

Bu konuşmanın amacı, çocuklarda intravenöz sıvı yönetimindeki güncel yaklaşımları, özellikle 2020 sonrası değişen paradigmaları ve acil servis pratiğinde sık yapılan hataları, Malatya Pediatrik Aciller Kongresi'nde acil tıp profesyonellerine sunmaktır. Pediatrik sıvı tedavisinde eski alışkanlıkların ve hatalı yaklaşımların devam ettirilmesinin oluşturabileceği istenmeyen durumları vurgulamak ve güncel kılavuzlar eşliğinde güvenli sıvı resüsitasyon stratejilerini ortaya koymaktır.

Yöntem

Bu sunum için öncelikle 2020 sonrası yayınlanan temel pediatrik sıvı ve resüsitasyon kılavuzları detaylı olarak incelenmiştir. Amerikan Pediatri Akademisi (AAP) [1], Ulusal Sağlık ve Bakım Mükemmelliği Enstitüsü (NICE) [2], Pediatrik İleri Yaşam Desteği (PALS) ve Avrupa Resüsitasyon Konseyi (ERC) [3] kılavuzları temel referans noktaları olarak belirlenmiştir. Ayrıca, Sepsiste Sağkalım Kampanyası (Surviving Sepsis Campaign) [4], ISPAD [5], ESPGHAN [6] ve Dünya Sağlık Örgütü (DSÖ/WHO) ETAT [7] raporları taranarak sepsis, diyabetik ketoasidoz (DKA), akut gastroenterit ve ağır malnütrisyon gibi özel durumlardaki sıvı yönetim algoritmaları değerlendirilmiştir. DKA'da serebral ödem korkusuyla ilgili olarak, geleneksel yaklaşımları değiştiren PECARN [8] çalışması da özellikle ele alınmıştır. Sunum; iatrojenik hiponatremi, hiperkloremik asidoz, aşırı sıvı yüklenmesi (fluid overload) ve hipoglisemi gibi acil serviste en sık yapılan hatalar üzerinden, klinik senaryolar ve interaktif soru-cevap bölümleriyle zenginleştirilerek 28-30 Ağustos 2026 tarihleri arasında düzenlenen Malatya Pediatrik Aciller Kongresi'nde sunulmuştur. Bu sunum ile teorik bilginin klinik pratiğe doğrudan entegrasyonu hedeflenmiştir.

Bulgular

Çocuklar yetişkinlerden fizyolojik olarak birçok farklılık içerir. Sıvı tedavisi açısından bakıldığında ise çocuklar, özellikle bebekler, erişkinlere göre (sırasıyla %75, %65 ve %60) daha yüksek oranda vücut suyuna sahiptir (3). Tedavi yaklaşımında stratejimize yön veren bir diğer farklılık ise çocukluk çağında yüksek metabolik hız, geniş vücut yüzey alanı ve ateşe bağlı insensibl kayıplar, bu yaş grubu hastaları dehidratasyona çok daha duyarlı hale getirir (3,6).
Fizyolojik açıdan bir diğer önemli farklılık da çocuklarda kalp debisinin temel olarak kalp hızıyla korunmasıdır (3). Bu durum, şokun erken evrelerinde (kompanze şok) taşikardi ve vazokonstriksiyon sayesinde kan basıncının normal sınırlar içinde kalmasını sağlar. Çocuklarda açıklanamayan taşikardi ve uzamış kapiller dolum zamanı, aksini ispatlayana kadar şok olarak kabul edilmelidir. "Hipotansiyonu beklemek, arresti beklemektir" anlayışıyla, bu hastaların erken resüsitasyona alınması gerektiği akılda tutulmalıdır (3,7).
Güncel kılavuzlar ve literatür incelendiğinde pediatrik yaş grubunda idame sıvı tedavilerinde paradigma değişiklikleri olduğu açık bir şekilde görülmektedir. Çünkü geleneksel hipotonik sıvı (örneğin 1/3 İzodeks) kullanımının, acil serviste ağrı ve strese bağlı artan non-osmotik ADH salınımı nedeniyle ölümcül iatrojenik hiponatremiye yol açabildiği görülmüştür. AAP ve NICE kılavuzları, 28 günden büyük tüm çocuklarda idame sıvı olarak mutlaka izotonik sıvıların (%0.9 NaCl veya dengeli solüsyonlar) ve %5 dekstrozun kullanılmasını zorunlu kılmaktadır. İdame sıvı hesabında Holliday-Segar kuralı ise halen geçerliliğini korumaktadır (1,2).
Resüsitasyonda dengeli solüsyonların kullanımı öne çıkan bir diğer başlıktır. Pediatrik yaş grubunda resüsitasyon amacıyla masif (>40 cc/kg) izotonik (%0.9 NaCl) yüklemelerinin, yüksek klor içeriğine bağlı hiperkloremik metabolik asidoz ve akut böbrek hasarı riskini artırdığı saptanmıştır. Bu nedenle Ringer Laktat veya Plasmalyte gibi dengeli kristalloidlerin tercih edilmesi önerilmektedir. Ayrıca Sepsis kılavuzları, aşırı sıvı yüklenmesini (raller, hepatomegali) önlemek için 20 cc/kg bolusları yerine daha temkinli bir yaklaşım olan 10-20 cc/kg bolus dozlarını ve bununla birlikte erken vazoaktif ajan yaklaşımını önermektedir (4).
Kanamalı travma hastalarında agresif kristalloid sıvı (maksimum 20 cc/kg ile sınırlandırılmalı) tedavisinin taze pıhtıların yerinden kopmasına neden olduğu("Pop the Clot") ve asidoz-hipotermi-koagülopati triadını derinleştirdiği gösterilmiştir. Güncel literatürde bunun yerine erken kan ürünü ve Traneksamik asit kullanımının (TXA) önemi vurgulanmıştır. İzole kafa travmalarında (TBI) ise permisif hipotansiyondan ve hipotonik nitelikteki Ringer Laktattan kaçınılması, %0.9 NaCl veya hipertonik salin kullanılması gerektiği belirtilmektedir (3).
DKA ve iatrojenik serebral ödem ilişkisi açısından önemli olan PECARN çalışmasının sonuçlarına göre, DKA'da serebral ödemin verilen sıvı miktarına bağlı gelişebileceği geleneksel bilgisi geçerliliğini yitirmektedir. Bu çalışma ile DKA'da serebral ödemin hastalığın şiddetiyle ilişkili olduğu gösterilmiştir (8). Bu nedenle şok bulguları olan DKA'lı çocukta, serebral ödem endişesiyle hayat kurtarıcı 10-20 cc/kg izotonik bolusundan asla kaçınılmamalıdır (5,8).
Elektrolit acilleri açısından bakıldığında; semptomatik hiponatremide (nöbet) acil %3 hipertonik salin bolusu, hiperkalemide ilk hamle olarak Kalsiyum Glukonat, hipernatremide sıvı düzeltmesinin yavaş yapılması (48-72 saat) ve hipokalemide periferik potasyum hız sınırları (0.5 mEq/kg/saat) kritik noktalar olarak sunulmuştur (1,3).

Sonuç

İntravenöz sıvılar basit bir "su" değil, endikasyonu, dozu, hızı, kontrendikasyonu ve potansiyel toksisitesi olan ilaçlardır. Çocuklar sadece "küçük erişkinler" değildir. Kompanzasyon mekanizmaları güçlüdür, ancak bir kez dekompanze olduklarında tablo çok daha hızlı ve gürültülü seyreder. Acil tıp uzmanları, pediatrik yaş grubundaki sıvı tedavilerini geleneksel alışkanlıklarla değil, güncel kanıtlar ışığında ve hastanın fizyolojik ihtiyacına göre dinamik olarak yönetmelidir.

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M4613-Tam Metin

KETAMİNE SAFETY AND ADVERSE EFFECTS İN PEDİATRİC TRAUMA PATİENTS

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Aim

Ketamine is the most widely used agent for procedural sedation and analgesia in injured children, yet everyday practice is still shaped by recurring questions: how frequent are serious adverse events (AE), who is at higher risk, must the child be fasted, and is ketamine safe in head injury? This invited lecture summarized the safety profile of ketamine in pediatric trauma using verified evidence published between 2009 and 2026.

Method

A structured narrative review was performed for the lecture. Findings were drawn from large multicenter datasets: an individual patient data (IPD) meta-analysis of 8,282 children, prospective multicenter cohorts of 6,295 and 6,183 children, contemporary registry series and a systematic review reaching 67,871 children (2025-2026), a national pediatric airway registry of 10,750 intubations, a randomized controlled trial of intranasal (IN) analgesia and a 2026 meta-analysis in traumatic brain injury (TBI). All citations were verified through PubMed and publisher records.

Findings

In the IPD meta-analysis, the most common AEs were vomiting (8.4%) and recovery agitation (7.6%; clinically important in only 1.4%), followed by airway and respiratory events (3.9%); laryngospasm occurred in 0.3% and was not predictable from age, dose or clinical factors [1]. Ketamine alone carried the lowest serious AE rate (0.4%) in a comparative cohort of 6,295 children, while co-administration increased risk: ketamine plus propofol 2.1% (odds ratio [OR] 4.4), ketamine plus fentanyl 3.2% (OR 6.5) and propofol alone 3.7% (OR 5.6) [2]. Preprocedural fasting duration was not associated with adverse events in 6,183 children (OR approximately 1.0) and no pulmonary aspiration occurred [3]. In contemporary series, high-risk airway events occurred in 0.52% of sedations, critical events in 1 per 2,594 and sentinel events in 1 per 11,558, with no deaths reported across large series [4,5]. Classic risk factors (age under 2 or over 13 years, high intravenous [IV] dose, co-administered benzodiazepine or anticholinergic) only partially overlap with contemporary predictors (age 10 years or older, co-administered opioid), and dose and route no longer appear predictive [1,4,5]. In TBI, a meta-analysis of 15 studies found no difference in mortality (risk ratio [RR] 1.18) or intracranial pressure elevation (RR 0.67) but more hypotension episodes (RR 1.47), derived mostly from adult data [6]. During rapid sequence intubation of critically ill children, ketamine was associated with fewer adverse hemodynamic events (adjusted OR 0.74), an effect consistent regardless of shock status [7]. For children without vascular access, IN ketamine 1.5 mg/kg provided analgesia non-inferior to IN fentanyl, with minor and transient AEs only [8]. Guideline-based dosing is 1.5-2 mg/kg IV over 30-60 seconds (repeat 0.5-1 mg/kg as needed) or 4-5 mg/kg intramuscularly; rapid IV push should be avoided, routine prophylactic benzodiazepine or atropine is not recommended, and age under 3 months is a contraindication [9].

Conclusion

In prepared hands, ketamine alone has one of the best-documented safety profiles in pediatric trauma: serious events are rare, no deaths were reported in large series, and the common adverse events are benign and manageable. Because laryngospasm is unpredictable, oxygen, bag-valve-mask and suction must be ready at every sedation. Historical dogmas concerning fasting, intracranial and intraocular pressure are not supported by current evidence, although hemodynamic monitoring remains prudent in head injury. Single-agent use, guideline-based dosing, caution with co-administered opioids in older children and structured family counselling summarize current best practice.

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M4614-Tam Metni

YÜKSEK AKIŞLI NAZAL KANÜL (HFNC) KULLANIM ENDİKASYONLARI

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AMAÇ

Yüksek akışlı nazal kanül (High-Flow Nasal Cannula, HFNC), ısıtılmış ve aktif olarak nemlendirilmiş hava-oksijen karışımının nazal kanül aracılığıyla yüksek akımda verilmesini sağlayan noninvaziv bir solunum desteğidir. HFNC'nin klinik etkileri yalnızca yüksek konsantrasyonda oksijen sağlamasından kaynaklanmamakta; hastanın inspiratuvar akım ihtiyacının karşılanması, nazofaringeal anatomik ölü boşluğun yıkanması, karbondioksitin yeniden solunmasının azaltılması, akıma bağlı pozitif havayolu basıncı oluşturulması ve solunum işinin azaltılması gibi çeşitli fizyolojik mekanizmaları içermektedir [1]. Bu konuşmanın amacı, HFNC'nin erişkin ve pediatrik hastalardaki başlıca kullanım endikasyonlarını, tedaviye başlama prensiplerini ve tedavi başarısızlığının erken tanınmasına yönelik güncel klinik yaklaşımı değerlendirmektir.

YÖNTEM

HFNC kullanımına ilişkin güncel klinik kılavuzlar, uzman konsensusları ve klinik pratiği şekillendiren temel çalışmalar anlatısal olarak değerlendirilmiştir. Erişkin akut hipoksemik solunum yetmezliğinde HFNC kullanımına ilişkin güncel öneriler ile pediatrik hastalarda, özellikle bronşiolitte HFNC kullanımını ele alan çalışmalar incelenmiştir [2,3,6,9]. Ayrıca tedavi başarısızlığının erken belirlenmesinde klinik bulgular, ROX indeksi ve erişkin ve pediatrik popülasyonlarda gerçekleştirilen önemli klinik çalışmaların sonuçları değerlendirilmiştir [4,5,10,11].

BULGULAR

HFNC, yüksek akım sayesinde hastanın inspiratuvar akım gereksinimini karşılayarak veya buna yaklaşarak oda havası ile karışımı azaltmakta ve daha stabil bir inspire edilen oksijen fraksiyonu (FiO_2) sağlamaktadır. Nazofaringeal anatomik ölü boşluğun yıkanması ile ekshale karbondioksitin yeniden solunması azalırken, akıma bağlı oluşan değişken pozitif havayolu basıncı end-ekspiratuvar akciğer volümünü ve alveoler rekrutmanı artırabilmektedir. Isıtılmış ve nemlendirilmiş gaz verilmesi ise mukosiliyer fonksiyonu, sekresyon klirensini ve hasta toleransını desteklemektedir [1].

Erişkinlerde HFNC'nin başlıca kullanım alanı **akut hipoksemik solunum yetmezliğidir**. Konvansiyonel oksijen tedavisine rağmen hipoksemisi devam eden, taşipne ve klinik solunum sıkıntısı bulunan ancak acil entübasyon gerektirmeyen hastalarda HFNC düşünülebilir [2,3].

Pnömoni ve ARDS gibi hipoksemik tabloların yanı sıra preoksijenasyon, peri-entübasyon dönemi ve ekstübasyon sonrası solunum desteğinde de HFNC kullanılabilmektedir [2,3]. Akut hipoksemik solunum yetmezliğinde gerçekleştirilen FLORALI çalışması, HFNC'nin bu hasta grubundaki klinik kullanımının şekillenmesinde temel çalışmalardan biri olmuştur [5]. Buna karşılık hiperkapnik solunum yetmezliğinde HFNC rutin ilk seçenek değildir; özellikle ventilatuvar desteğe ihtiyaç duyan hastalarda noninvaziv ventilasyon (NIV) öncelikli yaklaşım olmaya devam etmektedir [2]. HFNC kullanımındaki en önemli güvenlik prensiplerinden biri, gerekli entübasyonun geciktirilmemesidir [2,3].

Tedavi başarısızlığının erken tanınmasında artan oksijen gereksinimi, persistan veya artan taşipne, yardımcı solunum kası kullanımında artış, düzelmeyen hipoksemi, ilerleyen hiperkapni veya asidoz, bilinç değişikliği ve hemodinamik instabilite önemli alarm bulgularıdır [3,4]. Erişkin hastalarda **ROX indeksi**, SpO_2/FiO_2 oranının solunum sayısına bölünmesiyle hesaplanmaktadır. Akut hipoksemik solunum yetmezliğinde HFNC tedavisine yanıtın değerlendirilmesi amacıyla geliştirilen ROX indeksinde, **4,88 ve üzerindeki değerler**, özellikle seri ölçümlerde, daha düşük entübasyon riskiyle ilişkilidir [4]. Bununla birlikte ROX indeksi tek başına entübasyon kararını belirlememeli; seri değişimi ve hastanın klinik gidişi birlikte değerlendirilmelidir [4].

Pediatrik hastalarda HFNC'nin en sık ve en iyi çalışılmış kullanım alanı **bronşiolittir** [6,8]. Bununla birlikte bronşiolitte HFNC rutin ilk basamak tedavi olarak kullanılmamalı; konvansiyonel oksijen tedavisine rağmen devam eden hipoksemi, artmış solunum işi veya klinik kötüleşme varlığında düşünülmelidir [6,9]. Pediatrik hastalarda başlangıç akımı çoğunlukla **1,5–2 L/kg/dk** aralığında olup, yaygın kullanılan başlangıç değeri **2 L/kg/dk**'dır [7,8]. Akım temel olarak solunum işini azaltmaya, FiO_2 ise hedef oksijenasyonu sağlamaya yönelik titre edilmelidir. Nazal kanül burun deliğini tamamen kapatmamalı ve kanül çapı burun deliğinin yaklaşık %50'sinden fazlasını oklüde etmemelidir [8].

HFNC başlandıktan sonra tedavi yanıtı özellikle **ilk 30–120 dakika içinde** solunum sayısı, retraksiyonlar, kalp hızı, SpO_2, FiO_2 gereksinimi ve genel klinik görünüm üzerinden yeniden değerlendirilmelidir [6,9]. Persistan veya artan taşipne, taşikardinin düzelmemesi, artan FiO_2 ihtiyacı, apne veya bradikardi, klinik tükenme ve ilerleyen hiperkapni tedavi başarısızlığını düşündüren önemli bulgulardır [9,11].

Bronşiolitli **1472 infantı** içeren çok merkezli randomize kontrollü çalışmada, tedavi başarısızlığı nedeniyle bakım eskalasyonu HFNC grubunda **%12**, standart oksijen grubunda ise **%23** olarak bildirilmiş; mutlak risk azalması %11 ve tedavi için gerekli hasta sayısı (NNT) yaklaşık **9** olarak hesaplanmıştır [10]. Bununla birlikte bu sonuçlar HFNC'nin tüm bronşiolit olgularında rutin ilk basamak tedavi olarak kullanılması gerektiği anlamına gelmemektedir [6,10]. Prospektif pediatrik veriler, özellikle HFNC başlandıktan sonraki **ikinci saatte devam eden taşipne ve taşikardi, persistan hiperkapni ve yüksek FiO_2 gereksiniminin** tedavi başarısızlığı açısından önemli uyarıcı bulgular olduğunu göstermektedir [11].

SONUÇ

HFNC yalnızca yüksek konsantrasyonda oksijen sağlayan bir yöntem değil, birden fazla fizyolojik mekanizma üzerinden etkili olan noninvaziv bir solunum desteğidir [1]. Güvenli ve etkili kullanım için uygun hasta seçimi, doğru akım ve FiO_2 ayarları ile tedavi yanıtının erken ve seri olarak değerlendirilmesi gereklidir. Pediatrik hastalarda özellikle bronşiolit önemli bir kullanım alanı olmakla birlikte HFNC her hastaya rutin olarak başlanmamalıdır [6,9]. Klinik düzelme göstermeyen veya kötüleşen hastalarda CPAP/NIV veya invaziv mekanik ventilasyona eskalasyon geciktirilmemelidir [2,9].

Doğru hasta seçimi, doğru akım ve yakın klinik takip, güvenli HFNC kullanımının temelini oluşturmaktadır.

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M4615-Özet Metin

NEKROTİZAN ENTEROKOLİT EVRELEMESİNDE DİREKT GRAFİ BULGULARI

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AMAÇ

Nekrotizan enterokolit (NEK), başta prematüre yenidoğanlar olmak üzere bağırsak mukozasının iskemik-inflamatuar nekrozu ile seyreden, tanı ve tedavi kararında görüntülemenin belirleyici olduğu acil bir gastrointestinal hastalıktır. Bu çalışmanın amacı, ayakta direkt karın grafisinin (ADKG) NEK evrelemesindeki bulgularını, abdominal ultrasonografi (USG) ile karşılaştırmalı tanısal değerini ve bu bulguların cerrahi karar sürecine katkısını güncel ulusal rehber verileri temelinde özetlemektir.

YÖNTEM

Türk Neonatoloji Derneği (TND) 2025 Nekrotizan Enterokolit Rehberi ile NEK görüntülemesine ilişkin klasik ve güncel literatür gözden geçirilmiş; direkt grafi bulguları Modifiye Bell evrelemesine göre sınıflandırılarak derlenmiştir. Çalışma, orijinal hasta verisi içermeyen bir literatür derlemesidir.

BULGULAR

NEK, yenidoğan yoğun bakım ünitelerinde yatan bebeklerin %3-15'ini etkilemekte, olguların %90'dan fazlası 32. gestasyon haftasının altındaki prematürelerde görülmektedir; erken tanı ve agresif tedaviye rağmen mortalite %15-30 aralığındadır. Erken evrede normal mozaik gaz paterninin kaybolması ve bağırsak dilatasyonu görülür; nonspesifik olmakla birlikte uyarıcı bir bulgudur. Pnömatozis intestinalis, bakteri kaynaklı gazın bağırsak duvarında birikmesiyle oluşur, olguların büyük kısmında izlenir ve NEK için tanı koydurucu kabul edilir; direkt grafide lineer veya kistik radyolüsensiler şeklinde görülür, ancak ileri olguların bir bölümünde dahi saptanamayabilir. Portal venöz gaz, karaciğer üzerinde periferik yerleşimli dallanan radyolüsen çizgiler şeklinde izlenir, ilerlemiş hastalığı düşündürür; ancak tek başına cerrahi endikasyon oluşturmaz. Belirgin asit ileri evre (Evre IIIA) bulgusudur; direkt grafide özgüllüğü düşük olup bu alanda USG üstündür. Pnömoperitonyum, bağırsak perforasyonunun doğrudan kanıtıdır ve tek başına kabul edilen mutlak cerrahi endikasyondur; büyük miktarda serbest hava “futbol topu” görünümü, falsiform ligaman ise “ip belirtisi” olarak tanımlanır, az miktardaki hava sol lateral dekübit pozisyonda daha kolay saptanır. Perforasyon gelişen olguların yalnızca bir kısmında direkt grafide serbest hava gösterilebildiğinden, klinik kötüleşme olup grafide pnömoperitonyum saptanmayan olgularda USG tanısal katkı sağlar.

ADKG halen NEK izleminde standart yöntemdir; USG ise barsak duvar kalınlığı, ekojenitesi, peristaltik aktivite ve perfüzyonun değerlendirilmesinde daha yüksek duyarlılık ve özgüllük sunar (Tablo 1). Bell ve arkadaşlarının sınıflaması, Walsh ve Kliegman tarafından klinik, sistemik ve radyolojik bulguları bütünleştiren Modifiye Bell Kriterleri olarak güncellenmiş olup halen evreleme ve tedavi kararında yaygın kullanılmaktadır (Tablo 2). Radyolojik bulgular arasında yalnızca pnömoperitonyum mutlak cerrahi endikasyon oluştururken; tıbbi tedaviye yanıtsızlık,

fikse bağırsak segmenti eşliğinde ciddi pnömatozis, abdominal duvarda eritem, metabolik asidoz ve pozitif parasentez gibi göreceli kriterlerin birlikteliği cerrahi ihtiyacı olasılığını artırır. Modifiye Bell evre II ve üzeri olgularda cerrahi tedavi gereksinimi %30-50 olup, cerrahiye giden olguların %55'inde multifokal, %15'inde panintestinal tutulum bildirilmiştir; mortalite medikal tedavide %20-30, cerrahi tedavide %30-40, doğum ağırlığı <1000 g olan bebeklerde ise %38-64'e ulaşmaktadır. Cerrahi teknik seçiminde laparotomi (rezeksiyon ± anastomoz veya enterostomi) standart yaklaşım olup, doğum ağırlığı <1000 g olan ve laparotomiye uygun olmayan bebeklerde primer peritoneal drenaj ilk tercih olabilmektedir.

Tablo 1. Nekrotizan enterokolit tanısında ADKG ve USG'nin karşılaştırmalı tanısal performansı

Bulgu	ADKG Özgüllük	ADKG Duyarlılık	USG Özgüllük	USG Duyarlılık
Asit	Düşük	Düşük	Yüksek	Yüksek
Perforasyon	Yüksek	Düşük	Yüksek	Yüksek
Bağırsak duvar kalınlığı	Düşük	Düşük	Yüksek	Yüksek
Bağırsak dilatasyonu	Yüksek	Orta	Yüksek	Yüksek
Pnömatozis intestinalis	Orta	Orta	Yüksek	Yüksek
Motilite	—	—	Yüksek	Yüksek

Kaynak: Türk Neonatoloji Derneği Nekrotizan Enterokolit Rehberi 2025.

Tablo 2. Modifiye Bell kriterlerine göre direkt grafi bulguları

Evre	Radyolojik Bulgu
IA-IB (Şüpheli NEK)	Normal gaz dağılımı veya hafif-orta intestinal dilatasyon
IIA (Kesin NEK)	İntestinal dilatasyon + pnömatozis intestinalis
IIB (Kesin NEK)	IIA bulguları + portal vende gaz ± asit
IIIA (İleri NEK)	IIB bulguları + belirgin asit
IIIB (İleri NEK)	IIIA bulguları + pnömoperitonyum

Kaynak: Bell MJ ve ark. Ann Surg 1978;187:1-7; Walsh MC, Kliegman RM. Pediatr Clin North Am 1986;33:179-201.

SONUÇ

Direkt grafi bulguları şu şekilde ilerler: hafif dilatasyon (Evre I), pnömatozis ± portal venöz gaz (Evre IIA-IIB), belirgin asit (Evre IIIA), pnömoperitonyum (Evre IIIB). Pnömatozis tanı koydurucudur, portal venöz gaz ilerlemiş hastalığı gösterir ancak tek başına ameliyat kararı verdirmez, pnömoperitonyum ise mutlak cerrahi endikasyondur. Klinik seyirle örtüşmeyen olgularda tamamlayıcı USG incelemesi önerilir; NEK yönetiminde radyolog, neonatolog ve çocuk cerrahından oluşan multidisipliner yaklaşım vazgeçilmezdir.

DESTEK

Bu çalışma için herhangi bir kurum, kuruluş veya bireyden maddi ya da teknik destek alınmamıştır.

FİNANSAL BAĞLANTI

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M4616-Özet Metin

SELECTİON OF İNOTROPES AND VASOPRESSORS İN PEDİATRİC SEPSİS AND SHOCK

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Unlike adults, pediatric patients have more immature organ systems—particularly the cardiovascular system—making them more prone to the early onset of signs of circulatory overload during fluid replacement. In pediatric cases, stroke volume capacity is limited; therefore, cardiac output is heavily dependent on heart rate. Consequently, signs of fluid overload must be monitored at frequent intervals during fluid replacement. Current guidelines for pediatric sepsis emphasize the rapid restoration of adequate circulation while avoiding excessive fluid administration and prolonged tissue hypoperfusion [1,2].

The primary treatment step is initiating broad-spectrum antibiotics after obtaining cultures. Identifying the patient's specific type of shock guides treatment; while clinical presentations may evolve, two shock phenotypes exist:

1: Cold Shock
- Cold extremities
- Prolonged capillary refill time
- Weak peripheral pulses
- Narrow pulse pressure
- Often low cardiac output (CO) / high systemic vascular resistance (SVR)

2: Warm Shock
- Rapid capillary refill time
- Bounding pulses
- Wide pulse pressure
- Often preserved/high cardiac output (CO) / low systemic vascular resistance (SVR)

In septic shock, the first step following antibiotic administration is fluid resuscitation (10–20 mL/kg). However, as previously noted, pediatric patients—and especially neonates—require close monitoring for fluid overload due to their limited physiological reserves. Monitoring should involve assessing for hepatomegaly, rales, increased tachypnea, pulse quality, and findings from bedside lung ultrasound (POCUS: Point-of-Care Ultrasound).

The timing and route of administration of vasoactive therapy are also clinically important. Children with septic shock who persist in hypotension or have inadequate perfusion despite appropriate initial fluid management should receive vasoactive support without undue delay. The 2026 guideline supports initiating vasoactive agents peripherally intravenously when central venous access would delay treatment [1]. Epinephrine and norepinephrine are the preferred first-line vasoactive agents. The prevailing view regarding these two agents in recent years is that there is insufficient evidence to establish the superiority of one over the other, and that the choice of agent should be determined based on clinical considerations [3].

Epinephrine: It is an agent effective in cases of reduced myocardial contractility, hypotension, low cardiac output, and vasodilation. However, caution must be exercised due to its potential to cause tachycardia, arrhythmias, and—consequently—increased myocardial oxygen consumption, as well as hyperglycemia, β_2-mediated lactate elevation, and peripheral ischemia. The dosage should be titrated between 0.01 and 0.05 µg/kg/min based on the clinical situation.

Norepinefrin: This agent may be considered more suitable for patients with low systemic vascular resistance (SVR) and vasoplegia—typically those with preserved CO and warm extremities. However, it can cause excessive increases in afterload and peripheral vasoconstriction; therefore, close monitoring is essential. The dosage should be titrated between 0.02 and 0.05 µg/kg/min according to clinical parameters (such as mean arterial pressure and perfusion).

Dopamin: Although dopamine continues to be used due to established habits, it is not recommended as a first-line agent due to unpredictable responses and the risk of tachyarrhythmias. However, it may be used in selected cases of bradycardia and hypotension when epinephrine and/or norepinephrine are unavailable [4].

Doputamine: it is recommended for cases with low CO where mean arterial pressure is preserved, hough it is not a first-line agent.

Vasopressin: İt is an agent that can be used as an adjunct in cases of catecholamine-resistant shock or persistent low SVR; however, it is not a first-line choice. Side effects such as mesenteric ischemia and hyponatremia should be carefully monitored.

In cases of refractory shock persisting despite adequate fluid resuscitation and vasoactive agents, treatments such as steroids (for adrenal insufficiency, etc.) and—in experienced centers—ECMO offer potential therapeutic benefits; however, factors such as the level of evidence and implementation challenges also entail potential risks

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M4617-Özet Metin

KRİTİK HASTANIN HASTANE İÇİ VE HASTANELER ARASI TRANSFERİNDE ACİL HEKİMİNİN ROLÜ

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Kritik hasta transferi, hastanın yalnızca bir yerden başka bir yere taşınması değildir. Monitörizasyonun, tedavinin ve klinik sorumluluğun kesintisiz sürdürüldüğü mobil bir kritik bakım sürecidir. Transfer hastane içinde görüntüleme, girişim veya yoğun bakım amacıyla yapılabilir. Hastaneler arasında ise ileri tanı, özellikli tedavi veya uygun yoğun bakım kapasitesine erişim amacıyla gerçekleştirilebilir. Her iki durumda da hasta fizyolojik bozulma, iletişim hatası ve ekipman sorunları açısından risk altındadır [1,2]. Bir sistematik derlemede hastane içi transferlerde tüm advers olayların birleşik sıklığı %26,2 olarak bildirilmiştir. Yaşamı tehdit eden olayların sıklığı daha düşük olmakla birlikte klinik sonuçları ağır olabilir [3].

Transfer kararı bireysel risk–yarar değerlendirmesine dayanmalıdır. Hedef merkezin sağlayacağı tanı veya tedavi hastanın prognozunu değiştirebilmelidir. Transferin gecikmesi ile transport sırasında gelişebilecek komplikasyonların riski birlikte değerlendirilmelidir [1,4]. Hastane içi transferlerde istenecek tetkik veya girişimin hasta yönetimini değiştirip değiştirmeyeceği sorgulanmalıdır. Hastaneler arası transferlerde kabul eden hekim ve birimle doğrudan iletişim kurulmalıdır. Hedef merkez, transfer nedeni, mevcut klinik durum ve beklenen tedavi açık biçimde belirlenmelidir. Acil hekimi bu kararın klinik lideridir. Sorumluluğu yalnız sevk kararını vermek değil, güvenli transfer zincirini kurmaktır.

Transfer öncesinde sistematik bir ikinci ABCDE değerlendirmesi yapılmalıdır. Havayolu açıklığı ve korunabilirliği yeniden değerlendirilmelidir. Transfer sırasında entübasyon gereksinimi gelişmesi bekleniyorsa işlem hareket öncesinde kontrollü koşullarda tamamlanmalıdır [1,2]. Endotrakeal tüpün seviyesi ve fiksasyonu kontrol edilmelidir. Entübe hastada dalga formlu kapnografi kullanılmalıdır. Oksijenasyon ve ventilasyon optimize edilmelidir. Uygun transport ventilatörü manuel ventilasyona tercih edilmelidir. Oksijen rezervi planlanan transfer süresine ek gecikmeleri karşılayacak şekilde hazırlanmalıdır [1,4].

Dolaşım yalnız kan basıncıyla değerlendirilmemelidir. Nabız, kapiller dolum, periferik perfüzyon, bilinç durumu ve idrar çıkışı birlikte incelenmelidir. Aktif kanama kontrol altına alınmalıdır. Yeterli damar yolu sağlanmalı ve tüm kateterler sabitlenmelidir. Vazopressör veya kritik ilaç infüzyonları transfer sırasında kesilmemelidir. İlaç miktarı ve infüzyon pompası bataryası olası gecikmeler dikkate alınarak planlanmalıdır. Sedasyon ve analjezi sürekliliği sağlanmalıdır. Tüp, kateter ve drenler hareket öncesinde ikinci kez kontrol edilmelidir [1,2,4].

Transfer ekibi hastanın gereksinimine göre belirlenmelidir. Ekipte bir klinik lider bulunmalı ve görev dağılımı hareket öncesinde yapılmalıdır. Ekipman standartlaştırılmalı ancak hastaya özgü gereksinimler ayrıca değerlendirilmelidir. EKG, oksijen satürasyonu ve kan basıncı en az monitörizasyon düzeyini oluşturur. Entübe hastada kapnografi kesintisiz sürdürülmelidir [1,4]. Defibrilatör, aspiratör, balon-valf-maske, zor havayolu ekipmanı, acil ilaçlar ve yedek enerji kaynakları erişilebilir olmalıdır. Kontrol listeleri unutulan ekipman ve hazırlık basamaklarını azaltabilir. Kontrol listesi uygulamasının güvenlik kılavuzlarına uyumu artırdığı gösterilmiştir [5]. Ancak kontrol listesi klinik değerlendirmenin yerine geçmemelidir. Hareket öncesinde ekipçe sesli bir "transfer time-out" yapılmalıdır.

Transfer sırasında yeni gelişen alarm veya fizyolojik değişiklik gerçek kabul edilmelidir. Önce hasta, ardından monitör, devre ve ekipman değerlendirilmelidir. Araç içindeki müdahalelerde ekip ve trafik güvenliği korunmalıdır. Gerektiğinde araç güvenli bir yerde durdurulmalıdır. ABCDE yaklaşımı yeniden uygulanmalıdır. Entübe hastada ani desatürasyonda tüp yer değiştirmesi,

obstrüksiyon, pnömotoraks ve ekipman arızası hızla araştırılmalıdır. Stabilizasyon sağlanamıyorsa gönderen merkeze dönüş, en yakın uygun merkeze yönelme veya hedef merkeze devam seçenekleri yeniden değerlendirilmelidir. Karar hastanın klinik ihtiyacı, mesafe, süre ve merkezlerin kapasitesine göre verilmelidir [4].

Hasta devri transferin son ve kritik aşamasıdır. Devir multidisipliner, yüz yüze ve yapılandırılmış biçimde yapılmalıdır. SBAR gibi standart iletişim araçları bilgi kaybını azaltabilir [6]. Hastanın kimliği, transfer nedeni, klinik seyri, mevcut vital bulguları, havayolu ve ventilatör ayarları, damar yolları, ilaç infüzyonları, son uygulanan tedaviler ve beklenen riskler aktarılmalıdır. Sözlü devir yazılı ve elektronik kayıtla desteklenmelidir. Klinik sorumluluğun hangi anda ve kime devredildiği açık olmalıdır. Transfer nedeni, kabul eden hekim, hareket ve varış saatleri, transfer boyunca gelişen olaylar ve yapılan müdahaleler kaydedilmelidir.

Güvenli transfer yalnız bireysel dikkatle sağlanamaz. Kurumların standart transfer protokolleri, kontrol listeleri ve eğitim programları bulunmalıdır. Ekiplerin simülasyon temelli eğitimlerle klinik bozulma, havayolu sorunu ve ekipman arızalarına hazırlanması yararlı olabilir. Advers olaylar cezalandırıcı olmayan bir sistem içinde bildirilmeli ve incelenmelidir. Transfer verileri düzenli olarak denetlenmeli ve süreçler geri bildirimle geliştirilmelidir [4,7].

Kritik hasta transferi dinamik ve yüksek riskli bir klinik süreçtir. Acil hekiminin rolü transfer endikasyonunu belirlemekle başlar. Stabilizasyon, ekip seçimi, ekipman hazırlığı, iletişim, monitörizasyon ve güvenli hasta devriyle devam eder. Temel amaç doğru hastayı, doğru zamanda, doğru merkeze, mevcut bakım standardını kesintiye uğratmadan ulaştırmaktır. Transfer edilen yalnızca hasta değil; hastanın monitörizasyonu, tedavisi, bilgisi ve klinik sorumluluğudur.

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M4481-Tam Metin

APPROACH TO BACTERİAL MENİNGİTİS İN THE PEDİATRİC EMERGENCY DEPARTMENT

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Introduction

Bacterial meningitis is one of the most life-threatening infections of the central nervous system in childhood. Early diagnosis and appropriate treatment are essential for reducing mortality and neurological sequelae (1,2).

The widespread implementation of vaccination programs has changed the epidemiology of major pathogens, including Haemophilus influenzae type b, Streptococcus pneumoniae, and Neisseria meningitidis. Nevertheless, bacterial meningitis remains a major health problem among children worldwide (1,3).

The causative pathogens of bacterial meningitis vary according to the patient's age (2). Neisseria meningitidis and Streptococcus pneumoniae are among the most common bacterial pathogens. Although less common, Group A Streptococcus may be associated with a severe clinical course (4,5).

The early clinical manifestations of viral and bacterial meningitis may be similar. Clinical findings alone are often insufficient to distinguish between the two conditions. Therefore, laboratory investigations and cerebrospinal fluid analysis play a crucial role in establishing the diagnosis (6,7).

The clinical presentation ranges from mild fever and irritability to rapidly progressive sepsis, shock, and meningoencephalitis. Early manifestations may be nonspecific, particularly in young children. This may delay the diagnosis and initiation of treatment (2,8).

Children with bacterial meningitis may develop permanent neurological sequelae, including hearing loss, seizures, motor impairment, and cognitive dysfunction. Therefore, long-term follow-up is as important as acute treatment **(1,5).**

A detailed medical history, thorough physical examination, and timely diagnostic investigations in the pediatric emergency department facilitate early treatment. Prompt initiation of empirical antibiotic therapy may improve clinical outcomes **(2,7).**

The aim of this review is to summarize the etiology, pathophysiology, clinical manifestations, diagnostic evaluation in the pediatric emergency department, and current treatment approaches for bacterial meningitis in children based on the current literature.

Etiology and Pathophysiology

Bacterial meningitis develops when microorganisms reach the central nervous system through the bloodstream or from adjacent sites of infection. The distribution of causative pathogens varies according to age, immune status, and vaccination history **(1,2).**

The most common causative pathogens in children are *Neisseria meningitidis* and *Streptococcus pneumoniae* **(4,9).** Although less common, Group A *Streptococcus* may be associated with a severe clinical course and high mortality **(4).**

Meningococcal infections occur predominantly in infants, young children, and adolescents. A considerable proportion of patients present with meningitis or sepsis, whereas some develop both conditions simultaneously **(8).**

Group A *Streptococcus* meningitis usually develops secondary to otitis media, sinusitis, mastoiditis, or soft tissue infections. A history of varicella infection and cerebrospinal fluid leakage may increase the risk of disease **(4).**

Once bacteria enter the subarachnoid space, they multiply rapidly. This triggers a marked inflammatory response. Inflammation increases the permeability of the blood–brain barrier, which may result in cerebral edema and elevated intracranial pressure. This process represents the main mechanism of neurological injury **(1).**

During the inflammatory response, cytokine release and increased vascular permeability may impair cerebral perfusion. In severe cases, vasculitis, cerebral ischemia, and cerebral infarction may occur. These complications are associated with permanent neurological sequelae **(1,9).**

In meningococcal infections, bacteremia may progress rapidly. Some patients may develop septic shock, purpura fulminans, and multiple organ failure within a short period. Therefore, early diagnosis and prompt treatment are essential **(8).**

Group A *Streptococcus* meningitis may be complicated by subdural empyema, brain abscess, and streptococcal toxic shock syndrome. These complications may increase the risk of mortality, particularly in young children **(4).**

Clinical manifestations may be less apparent in infants younger than 90 days. In this age group, severe clinical presentation and certain laboratory abnormalities have been associated with poor prognosis **(10).**

Neurological sequelae may persist after bacterial meningitis. Hearing loss, aphasia, seizures, motor deficits, and cognitive impairment are among the most common long-term complications **(1,3).**

Clinical Manifestations and Evaluation in the Pediatric Emergency Department

The clinical presentation of bacterial meningitis varies according to the patient's age, the causative pathogen, and the severity of infection. Manifestations range from mild fever to rapidly progressive septic shock **(2,8).**

The most common presenting symptoms in children are fever, vomiting, headache, and altered consciousness. In young children, irritability, poor feeding, and lethargy may be the predominant manifestations. Signs of meningeal irritation may not be present in every patient **(2,4).**

Clinical manifestations may be less apparent in infants younger than 90 days. In this age group, severe clinical presentation and certain laboratory abnormalities have been associated with poor prognosis **(10).**

In meningococcal infections, the clinical condition may deteriorate rapidly within hours. Petechiae, purpura, hypotension, and circulatory impairment are important warning signs of invasive disease. Some patients may present with both meningitis and sepsis **(8).**

In Group A *Streptococcus* meningitis, fever, headache, seizures, and altered consciousness are common clinical findings. A history of otitis media, sinusitis, or mastoiditis may provide important diagnostic clues **(4).**

he initial assessment in the pediatric emergency department should follow the ABCDE approach. The level of consciousness, airway patency, respiratory status, and circulatory function should be assessed promptly. Life-saving interventions should not be delayed in patients with hemodynamic instability.

When obtaining the medical history, the onset of symptoms, duration of fever, presence of seizures, and recent infections should be evaluated. A history of varicella infection, head trauma, cerebrospinal fluid leakage, and immunodeficiency should also be considered as potential risk factors **(4,8).**

During physical examination, vital signs should be assessed carefully. Petechial rash, neck stiffness, altered consciousness, and focal neurological deficits are important findings suggestive of bacterial meningitis. Signs of shock should raise suspicion for invasive meningococcal disease **(2,8).**

The early clinical manifestations of viral and bacterial meningitis may be similar. Clinical findings alone are often insufficient to differentiate between the two conditions. Therefore, laboratory investigations and cerebrospinal fluid analysis play a crucial role in establishing the diagnosis **(6,7).**

Laboratory evaluation may include a complete blood count, C-reactive protein, and other inflammatory biomarkers. Cerebrospinal fluid microbiological examination is essential for a definitive diagnosis. Culture, Gram staining, and molecular methods contribute to pathogen identification **(2,7).**

In some patients, blood cultures may be positive despite negative cerebrospinal fluid cultures. Molecular diagnostic techniques may facilitate pathogen detection, particularly in patients who have already received antibiotic therapy **(4,7).**

Neuroimaging is not required in every patient. However, computed tomography and magnetic resonance imaging may help identify intracranial complications in patients with neurological deficits, suspected complications, or clinical deterioration **(3,9).**

Children with bacterial meningitis should be monitored not only during the acute phase but also after hospital discharge because neurological sequelae, including hearing loss, aphasia, seizures, and other neurological deficits, may develop. Long-term follow-up may facilitate the early recognition of permanent neurological complications **(1,3).**

Emergency Treatment and Management

The primary goals of bacterial meningitis treatment are the rapid control of infection and the prevention of neurological complications. Treatment should not be delayed when clinical suspicion is high **(1,2).**

The initial management in the pediatric emergency department should be guided by the patient's hemodynamic status. Airway, breathing, and circulation should be assessed promptly. Adequate oxygenation and tissue perfusion should be maintained. Close monitoring is recommended for patients with severe clinical manifestations.

Empirical intravenous antibiotic therapy should be initiated as soon as bacterial meningitis is suspected. Collection of culture specimens should not delay treatment. Antibiotic therapy should be adjusted according to the identified causative pathogen **(1,2).**

In meningococcal infections, early antibiotic therapy is critical for reducing mortality. Treatment should not be delayed because the disease may rapidly progress to sepsis and multiple organ failure **(8).**

Patients with Group A *Streptococcus* meningitis who develop complications may require prolonged intravenous antibiotic therapy. Surgical drainage may be necessary in patients with subdural empyema or brain abscess **(4).**

Patients who develop seizures should receive appropriate antiepileptic treatment. Airway protection should be ensured in patients with impaired consciousness or respiratory failure, and mechanical ventilation should be considered when indicated **(1,4).**

Patients with septic shock may require fluid resuscitation, vasoactive support, and intensive care monitoring. Early admission to the intensive care unit is essential in invasive meningococcal disease because circulatory deterioration may progress rapidly **(4,8).**

Patients with intracranial complications should be evaluated by pediatric neurosurgery, pediatric infectious diseases, and pediatric intensive care specialists. Subdural empyema, hydrocephalus, and brain abscess may require surgical intervention **(4,9).**

Patients should be re-evaluated for neurological sequelae after the acute phase. Regular follow-up is recommended because hearing loss, speech disorders, seizures, and cognitive impairment may develop **(1,5).**

Conclusion

Bacterial meningitis is a serious childhood infection associated with high mortality and morbidity. Early recognition and prompt initiation of treatment are among the most important factors affecting prognosis **(1,2).**

A thorough clinical assessment, appropriate microbiological investigations, and timely initiation of empirical antibiotic therapy in the pediatric emergency department may be lifesaving **(5,9).** Patients with invasive meningococcal disease and Group A *Streptococcus* meningitis require close monitoring because of the risk of rapid clinical deterioration **(4,8).**

Neurological sequelae may persist after bacterial meningitis. Therefore, multidisciplinary follow-up after hospital discharge, including hearing and neurodevelopmental assessments, is essential **(1,3).**

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M4488-Özet Metin

CLİNİCAL CHARACTERİSTİCS OF CHİLDREN HOSPİTALİZED FOR DİABETES FROM THE PEDİATRİC EMERGENCY DEPARTMENT: A SİNGLE-CENTER EXPERİENCE

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Introduction: Diabetic ketoacidosis (DKA) is a common endocrine emergency in children with diabetes. This study evaluated clinical characteristics, DKA severity, and hospitalization patterns of children admitted from the pediatric emergency department.
Methods: This retrospective descriptive study included hospitalized children with pre-existing or newly diagnosed diabetes who presented directly or via referral to the pediatric emergency department between February 2024 and July 2026.
Results: A total of 71 children with diabetes were included. The mean age was 11.5±4.2 years. Forty-seven patients (66.2%) were newly diagnosed, while 24 (33.8%) had a previous diagnosis of diabetes. Thirty-five patients (49.3%) were referred from another healthcare facility, whereas 36 (50.7%) presented directly. DKA was present in 50 patients (70.4%). Among patients with DKA, 29 (58.0%) had mild, 6 (12.0%) moderate, and 15 (30.0%) severe DKA. Twenty-seven patients (38.0%) required admission to the intensive care unit. Mean hospital stay was 7.0±2.5 days. The frequency of DKA at presentation was similar between referred and directly presenting patients (74.3% vs. 66.7%, p=0.605). ICU admission rates increased significantly with increasing DKA severity ($p<0.001$). Patients presenting directly to the emergency department had significantly higher blood glucose levels at admission than referred patients (median 509 vs. 380 mg/dL, p=0.012). There were no significant differences between the groups regarding admission pH, total length of hospital stay, or ICU stay duration (all $p>0.05$).
Conclusion: DKA accounts for a substantial proportion of diabetes-related hospital admissions from the pediatric emergency department. Early assessment of DKA severity may improve hospitalization planning and patient management.
Keywords: pediatric emergency department, diabetic ketoacidosis, type 1 diabetes mellitus, hospitalization.

M4618-Konuşma Metni

MAKSİLLA VE MANDİBULA KIRIKLARINDA ERKEN DÖNEM HAVAYOLU GÜVENLİĞİ

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Giriş

Maksillofasiyal travmalar, yüz iskeletinin üst, orta ve alt bölümlerini etkileyen ve özellikle havayolu güvenliği açısından hızlı değerlendirme gerektiren yaralanmalardır. Maksilla ve mandibula kırıklarında anatomik bütünlüğün bozulmasının yanı sıra kanama, yumuşak doku ödemi, kırık kemik ve diş fragmanları, sekresyonlar ve eşlik eden servikal yaralanmalar havayolu yönetimini güçleştirebilir. Pediatrik hastalarda ise erişkinlerden farklı havayolu anatomisi ve daha sınırlı fizyolojik rezerv nedeniyle bu sorunlar daha hızlı klinik bozulmaya yol açabilir.

Maksilla kırıklarında kırık segmentlerin posteroinferior yönde yer değiştirmesi nazofaringeal havayolunda obstrüksiyona neden olabilir. Bilateral anterior mandibula kırıklarında ise dilin anterior bağlantılarının desteğini kaybetmesi ve posteriora yer değiştirmesi orofaringeal obstrüksiyon oluşturabilir. Ayrıca aktif kanama ve sekresyonlar laringoskopik görüntüyü bozarken, travmaya bağlı trismus doğrudan laringoskopiyi güçleştirebilir veya olanaksız hale getirebilir.

Bu çalışmada, pediatrik maksilla ve mandibula travmalarında erken dönemde havayolunu tehdit eden faktörlerin ve güvenli havayolu yönetiminde uygulanabilecek temel yaklaşımların güncel literatür doğrultusunda değerlendirilmesi amaçlandı.

Yöntem

Bu çalışma, pediatrik maksillofasiyal travmalarda erken havayolu güvenliğine ilişkin literatürün derlenmesine dayalı anlatısal bir değerlendirme olarak planlandı. Maksilla ve mandibula kırıklarının havayolu üzerindeki etkileri; pediatrik havayolunun anatomik ve fizyolojik özellikleri, travma hastasında ilk havayolu değerlendirmesi, servikal omurga güvenliği, preoksijenasyon, kontamine havayolunun yönetimi, entübasyon stratejileri, supraglottik havayolu araçları ve başarısız havayolu durumunda uygulanabilecek kurtarıcı yaklaşımlar açısından değerlendirildi.

Havayolu yönetiminde temel yaklaşım olarak oksijenasyonun sürdürülmesi, servikal omurganın korunması, başarısız entübasyon girişimlerinin sınırlandırılması ve alternatif havayolu planlarının erken hazırlanması esas alındı.

Bulgular

Literatür değerlendirmesinde, maksillofasiyal travmada havayolu obstrüksiyonunun tek bir mekanizmaya bağlı olmadığı görüldü. Maksillanın posteroinferior deplasmanı nazofaringeal obstrüksiyona, bilateral anterior mandibula kırıkları ise dilin posteriora yer değiştirmesi sonucu orofaringeal obstrüksiyona neden olabilmektedir. Diş ve kemik fragmanları, kan, kusmuk, sekresyonlar ve protezler havayolunu doğrudan tıkayabilir. Yumuşak doku ödemi başlangıçta

stabil görünen hastada gecikmiş havayolu obstrüksiyonuna yol açabilir. Trismus ise ağız açıklığını kısıtlayarak laringoskopiyi güçleştirebilir.

Pediatrik hastalarda nispeten büyük dil, daha küçük havayolu çapı ve hızlı oksijen tüketimi travmaya bağlı havayolu sorunlarının etkisini artırmaktadır. Havayolu çapındaki küçük bir azalma dahi dirençte belirgin artışa neden olabileceğinden, sınırlı miktardaki ödem çocuklarda klinik olarak önemli obstrüksiyona dönüşebilir. Bu nedenle başlangıçta açık olan havayolunun izlem sırasında hızla bozulabileceği göz önünde bulundurulmalıdır.

İlk yaklaşımda havayolu güvenliği ile servikal omurganın korunması birlikte ele alınmalıdır. Servikal yaralanma olasılığında manuel in-line stabilizasyon uygulanması servikal hareketi azaltırken, glottik görüntüyü ve entübasyon koşullarını zorlaştırabilir. Preoksijenasyon güvenli apne süresini uzatmak açısından önemlidir; ancak yüz travmasına bağlı anatomik bozulma nedeniyle maske ile yeterli sızdırmazlık sağlanamayabilir.

Kan veya kusmukla kontamine havayolunda etkin aspirasyon kritik öneme sahiptir. Suction-Assisted Laryngoscopy and Airway Decontamination (SALAD) yaklaşımı, laringoskopi sırasında sürekli aspirasyona olanak sağlayarak havayolunun temizlenmesine yardımcı olabilir. Direkt laringoskopi, video laringoskopi ve fiberoptik yöntemlerin her birinin avantaj ve sınırlılıkları bulunmaktadır. Yoğun kan ve sekresyonlar özellikle video laringoskop ve fiberoptik görüntüyü bozabilir. Supraglottik havayolu cihazları ise başarısız ventilasyon veya entübasyonda kurtarıcı oksijenasyon amacıyla kullanılabilir. Orta yüz veya kafa tabanı yaralanması şüphesinde kör nazal entübasyondan kaçınılmalıdır.

Entübasyon ve oksijenasyonun sağlanamadığı CICO durumunda boyun önünden havayolu erişimi gündeme gelir. Pediatrik hastalarda krikotiroid membranın küçük olması ve anatomik yapıların belirlenmesindeki güçlük nedeniyle karar erişkinlere göre daha karmaşıktır. Uygun yaklaşım çocuğun yaşı, anatomisi, mevcut ekipman ve ekibin deneyimine göre belirlenmeli; mümkün olduğunda KBB desteği ve definitif havayolu planı erken dönemde hazırlanmalıdır.

Sonuç

Pediatrik maksilla ve mandibula kırıklarında erken dönem yönetimin temel hedefi kırığın tedavisinden önce yeterli oksijenasyonun ve güvenli havayolunun sağlanmasıdır. Havayolu başlangıçta açık olsa dahi kanama ve ilerleyici ödem nedeniyle hızla bozulabileceğinden yakın takip gereklidir. Başarısız entübasyon girişimleri sınırlandırılmalı, yoğun kontaminasyonda etkin aspirasyon sağlanmalı ve alternatif havayolu stratejileri ilk girişimden önce hazırlanmalıdır.

Güvenli havayolu yönetimi tek bir cihaz veya tekniğe değil; erken risk değerlendirmesi, uygun hazırlık, ekip iletişimi ve Plan A ile birlikte Plan B ve C'nin önceden belirlenmesine dayanır.

Anahtar Kelimeler: Maksillofasiyal travma; pediatrik havayolu; maksilla kırığı; mandibula kırığı; zor havayolu; havayolu güvenliği.

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M4619-Özet Metin

AKUT BAKTERİYEL MENENJİT VE VİRAL ENSEFALİTTE AMPİRİK TEDAVİ PROTOKOLLERİ

Mehtap GÜRGER

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1. Bakteriyel Menenjit

1.1 Giriş ve Tanısal Yaklaşım

Santral sinir sistemi (SSS) enfeksiyonları, yüksek mortalite ve kalıcı nörolojik sekel riskleri nedeniyle acil tıbbi müdahale gerektiren kritik tablolardır. Akut bakteriyel menenjitte **ateş, baş ağrısı, ense sertliği ve bilinç değişikliği** temel klinik bulguları oluşturur; tabloya bulantı, nöbet, fokal nörolojik defisitler, döküntü ve papil ödem eşlik edebilir. Tanının altın standardı lomber ponksiyon (LP) ile beyin omurilik sıvısından (BOS) etkenin izole edilmesidir. BOS pleositozu varlığında kültür negatif olsa dahi kan kültürü pozitifliği tanıyı doğrular. Etkin antibiyotik tedavisine rağmen mortalite %5–40, kalıcı sekel oranı ise %19–30 arasında seyretmektedir.

1.2 Akut Bakteriyel Menenjitte Ampirik Tedavi Protokolleri

Menejit şüphesinde olası etkene yönelik ampirik antibiyotik tedavi ilk 1 saat içerisinde başlatılmalıdır. LP işlemi mümkün olan en kısa sürede, tercihen antibiyotik tedavisi öncesinde yapılmalıdır. Ancak LP işlemi herhangi bir nedenle gecikecekse veya kontrendike ise vakit kaybetmeden kan kültürleri alınmalı ve ampirik antibiyotik tedavisi derhal başlatılmalıdır. Tablo 1'de yaş gruplarına göre sık görülen etkenler ve önerilen antibiyotik rejimi verilmiştir.
Deksametazon Tedavisi: Meningeal inflamasyonu ve sekel riskini azaltmak amacıyla deksametazon (0.15 mg/kg IV, 6 saatte bir), antimikrobiyal ajandan hemen önce veya eş zamanlı uygulanmalıdır. Antibiyotik verilmişse en geç 6 saate kadar uygulanabilir.

Tablo 1: Yaş Gruplarına Göre Ampirik Antibiyotik Rejimleri

Yaş Grubu	Sık Görülen Patojenler	Önerilen Ampirik Tedavi Rejimi

< 1 Ay (Yenidoğan)	S. agalactiae, E. coli, L. monocytogenes, Klebsiella, Enterokoklar	Ampisilin + Sefotaksim (veya Seftazidim/Aminoglikozit). *Gram(-) basil: Meropenem. HSV Şüphesi: Asiklovir.
1 – 24 Ay	S. pneumoniae, N. meningitidis, H. influenzae, S. agalactiae, E. coli	3. Kuşak Sefalosporin (Seftriakson / Sefotaksim) + Vankomisin
2 – 50 Yaş	Streptococcus pneumoniae, Neisseria meningitidis	3. Kuşak Sefalosporin (Seftriakson / Sefotaksim) + Vankomisin
> 50 Yaş	S. pneumoniae, N. meningitidis, L. monocytogenes, Gram(-) basiller	3. Kuşak Sefalosporin + Vankomisin + Ampisilin

Not: Yenidoğanlarda Seftriakson bilirubin toksisitesi ve kalsiyum çökmesi riski nedeniyle kontrendikedir; Sefotaksim tercih edilir. Listeria riskinde (ileri yaş, gebelik, yenidoğanlar, immünsüpresyon, diabet, karaciğer sirozu, ileri evre böbrek yetmezliği) rejime IV Ampisilin eklenmesi zorunludur.

Özel Risk Durumlarında Ampirik Protokoller

- **Kafa Travması, Beyin Cerrahisi veya Şant Öyküsü:** Olası etkenler S. aureus, S. epidermidis ve aerobik gram-negatif basillerdir. **Tedavi Rejimi: Vankomisin + Antipsödomonal Beta-Laktam (Sefepim, Seftazidim veya Meropenem).**
- **Kafatası Tabanı Kırığı:** Olası etkenler S. pneumoniae, H. influenzae ve A grubu β hemolitik streptokoklardır. **Tedavi Rejimi: Vankomisin + 3. Kuşak Sefalosporin.**
- **İmmün Yetmezlik Durumu:** Olası etkenler S. pneumoniae, N. meningitidis, L. monocytogenes ve aerobik gram-negatif basillerdir. **Tedavi Rejimi: Vankomisin + 4. Kuşak Sefalosporin (Sefepim) veya Meropenem.**

1.3. Tedavi Süreleri ve Temas Sonrası Profilaksi

Ampirik Tedaviyi Sonlandırma: BOS ve kan kültürlerinde etken saptanmayan ve klinik iyileşme gözlenen vakalarda ampirik tedavi 7. günde güvenle sonlandırılabilir. Etken izole edildiğinde ise spesifik süreler uygulanır: N. meningitidis için 5–7 gün; H. influenzae için 7–10 gün; S. pneumoniae ve S. agalactiae için 10–14 gün; Enterokoklar, L. monocytogenes ve Gram-negatif basiller için 14–21 gün.
Meningokok Profilaksisi: İndeks vakanın semptomlarından önceki 7 gün ile antibiyotik başlangıcından sonraki ilk 24 saatte temas eden kişilere ilk 14 gün içinde kemoprofilaksi verilmelidir. Rejimler: Tek doz Seftriakson (250 mg IM; <15 yaş 125 mg IM), tek doz Siprofloksasin (500 mg PO) veya 2 gün Rifampisin (600 mg PO bid).

2. Viral Ensefalit Yönetimi:

2.1. Klinik Tablo ve Etiyolojik Yapı

Ensefalit, beyin parankim inflamasyonu ile seyreden ve olguların %50'sinden fazlasında spesifik etiyolojik ajanın gösterilemediği ağır bir tablodur. En sık sporadik neden Herpes Simplex virüsüdür (HSV).

2.2 Ensefalit Tanı Kriterleri

Ana kriter; >24 saat süren psikiyatrik belirtiler, bilinç azalması veya kişilik değişikliğinin olması ve bu tabloyu açıklayacak alternatif bir tanının bulunmamasıdır. Tanı için ana kriterin yanında en az iki ikincil kriter (ateş ≥38.0°C, yeni nöbet/fokal bulgu, BOS pleositozu ≥5/mm³, uyumlu MRG/EEG) bulunmalıdır.

2.3. Viral Ensefalit ve Meningoensefalit Yönetimi

SSS viral enfeksiyonlarının büyük çoğunluğunda spesifik bir antiviral tedavi bulunmamaktadır ve süreç sıklıkla kendini sınırlar. Tedavinin temelini destekleyici önlemler oluşturur: ABC (hava yolu, solunum, dolaşım) stabilizasyonu, hidrasyon, analjezi, antipiretik tedavi, beslenme desteği, nöbet yönetimi ve elektrolit dengesizliklerinin düzeltilmesi.

2.4. Viral Ensefalit Antiviral Tedavi Protokolleri

Ensefalit şüphesinde vakit kaybetmeden ampirik **IV Asiklovir** (HSV ve VZV' ne karşı etkilidir. Doz: yetişkin: 10 mg/kg q8h; çocuk: 30–45 mg/kg q8h) başlanmalıdır. LP 6 saatten fazla gecikecekse tedavi beklenmeden verilmelidir. Akut meningoensefalitte bakteriyel ayrım zor olduğundan tanı netleşene kadar ampirik antibiyotik, antiviral tedaviye mutlaka eşlik etmelidir. İmmün yetmezlikli HSE hastalarında Asiklovir tedavisi en az 21 gün sürdürülmelidir. Ensefalitte rutin kortikosteroid önerilmez; yalnızca dirençli beyin ödeminde ve kafa içi basınç artışı gösterilen vakalarda düşünülür.

Özgül Viral Etkenlerin Yönetimi

Varisella Zoster Virüsü (VZV) Ensefaliti: Tedavide IV Asiklovir ilk seçenektir ve oldukça etkilidir.

Enterovirüs Ensefaliti: Rutin onaylı tedavisi yoktur. Ağır seyreden vakalarda Plekonaril veya IVIG (Intravenöz İmmünoglobulin) kullanımı düşünülebilir.

Sitomegalovirüs (CMV) Ensefaliti: Gansiklovir ve Foskarnet tedavisi veya kombinasyonları tercih edilir.

İnfluenza Virüsüne Bağlı Ensefalit: Oral Oseltamivir başlanır. Oral tolere edemeyen ağır hastalarda IV Peramivir uygulanır.

M4620-Özet Metin

YENİDOĞAN KONVÜLZİYONLARINA ACİL YAKLAŞIM

Meral Alagöz

Malatya Eğitim ve Araştırma Hastanesi, Çocuk Sağlığı ve Hastalıkları Kliniği, Malatya

AMAÇ

Sunumun amacı; çocuk acil kliniğine konvülsiyon ile başvuran yenidoğanlarda; nöbet tespit edildiğinde altta yatan etiyolojinin belirlenmesi ve değerlendirilmesi, nöbetin teşhisi ile tedavisinin eş zamanlı olarak yapılması ve nöbetler dışlandıktan sonra alternatif tanıların göz önünde bulundurulmasıdır.

YÖNTEM

Sunum sırasında yenidoğan konvülsiyonlarının epidemiyolojisi ve etiyolojisi gözden geçirilecek; klinik özellikler, elektroensefalografi (EEG) bulguları, eşlik eden fizik muayene ve laboratuvar bulguları ile tedavi yaklaşımları değerlendirilecektir.

BULGULAR

Nöbetler, yaşamın diğer dönemlerine göre yenidoğan döneminde daha sık görülür. Bildirilen insidans yenidoğanlarda 1000'de 1,5 ila 5,5 arasında değişmektedir ve prematüre bebeklerde insidans daha yüksektir. Yenidoğan nöbetleri çok geniş bir etiyolojiye sahiptir ve nöbet düşünülmesi durumunda etiyolojik neden hızlı şekilde değerlendirilmelidir. Yenidoğan hipoksik iskemik ensefalopatisi, santral sinir sistemi enfeksiyonları, metabolik bozukluklar, intrakranial kanamalar, inme, kofaktör ve vitamin eksiklikleri, epilepsi sendromları, metabolik hastalıklar gibi çok farkli etiyolojiler yenidoğan dönemi konvulziyonlarına neden olur.

Klinik Özellikler: Yenidoğan nöbetleri, daha büyük bebek ve çocuklardaki nöbetlere göre benzersiz klinik özelliklere sahiptir. Yenidoğan nöbetlerine en tutarlı şekilde neden olan klinik olaylar fokal klonik ve fokal tonik nöbetlerdir. Nöbet dışı paroksismal olaylar bu yaş grubunda yaygındır ve nöbetlerden ayırt edilmesi oldukça zordur. Motor otomatizmler bazen elektroklinik nöbetlerle ilişkilidir, ancak çoğu nöbet dışı olaylardır.

• Fokal klonik nöbetler sık görülen, uzuvların, yüzün veya gövdenin belirli kas gruplarının yavaş tekrarlayan, ritmik kasılmalarından oluşur.
• Fokal tonik nöbetler, gövde veya uzuvların sürekli ancak geçici asimetrik duruşu veya gözlerin tonik sapması ile karakterizedir ve daha az görülür.
• Miyoklonik hareketlerin çeşitli nedenleri vardır. Miyoklonik nöbetler proksimal veya distal uzuv bölgeleri, tüm uzuvlar, gövde, diyafram veya yüz dahil olmak üzere bazı bölgelerdeki kas gruplarının kasılmalarıyla karakterize edilir.
• Epileptik spazmlar nadir olmakla birlikte yenidoğanlarda da görülebilir ve öncelikle gövde kaslarını ve uzuvları etkiler (fleksör, ekstansör veya kombinasyon).

Tanısal Yaklaşım: Nöbet şüphesi olan tüm yenidoğanlarda yatak başında glikoz ölçümü ve elektrolit bozuklukları için laboratuvar testleri yapılmalıdır. Hipoglisemi, hipokalsemi veya hipomagnezemi tespit edilirse, bunların düzeltilmesi akut semptomatik nöbetlerin tedavisi için yeterlidir ve nöbet önleyici ilaçlara gerek kalmaz. Nöbet şüphesi olan her yenidoğan, aksi ispatlanana kadar sistemik ve/veya merkezi sinir sistemi (MSS) enfeksiyonu geçirmiş olarak kabul edilmeli ve ampirik tedavi verilmelidir. Manyetik rezonans görüntüleme (MRG); hipoksik-iskemik hasar, intrakraniyal kanama, iskemik inme veya beyin malformasyonlarını tespit etmesi açısından tercih edilecek yöntemdir. Akut tetikleyici neden belirlenemeyen olgularda genetik test yapılmalıdır.

Akut ve Özgül Tedavi Protokolleri: Yenidoğan nöbetlerinin nedenine yönelik tedavi kritik öneme sahiptir. Hipoglisemisi olan yenidoğana intravenöz (İV) olarak 2 mL/kg dozunda %10'luk glukoz solüsyonu verilir; idame glukoz infüzyonu dakikada maksimum 8 mg/kg olacak şekilde ayarlanır. Hipokalsemi tedavisinde %10'luk kalsiyum glukonat İV infüzyon yoluyla 100 mg/kg (1 mL/kg) 5-10 dakikada verilir. Hipomagnezemide kas içi (İM) enjeksiyon yoluyla 0,25 mL/kg (125 mg/kg) dozunda %50'lik magnezyum sülfat çözeltisi uygulanır.

Antiepileptik İlaç Tedavisi: İlk tercih edilecek ilaç olan fenobarbitalin başlangıç dozu İV infüzyon yoluyla 20 mg/kg'dır; ardından 4-6 mg/kg idame dozu verilir. Yüklemeden sonra nöbetler düzelmezse 24 saat içinde toplam 50 mg/kg'a kadar 10-20 mg/kg tekrar dozları verilebilir; 40 mg/kg'a ulaşıldığında fayda görülmezse başka ilaç eklenir. Fenitoin/fosfenitoin veya karbamazepin (sodyum kanal blokerleri), kanalopatiye bağlı epilepsi öyküsü olan, benign ailesel neonatal epilepsi (SeLNE) ile uyumlu klinik seyir gösteren veya patojen varyantı saptanan yenidoğanlar için birinci basamak ilaçlardır. Oral karbamazepin süspansiyon dozu günde iki kez 10-20 mg/kg'dır (maksimum 35 mg/kg/gün).

Dirençli Nöbetlerde Genetik ve Metabolik Yaklaşım: Antikuitin (ATQ) eksikliğine bağlı piridoksin bağımlı epilepsi (PDE) ve piridoksamin 5'-fosfat oksidaz (PNPO) eksikliği gibi durumlar dirençli nöbetlerin tedavi edilebilir genetik nedenleridir. Geleneksel antiepileptik ilaçlara yanıt vermeyen olgulara piridoksin (100 mg İV, EEG izlemiyle maks 500 mg veya oral 15-30 mg/kg/gün) veya piridoksal 5'-fosfat (PLP) verilir. Yanıt alınamazsa lökovorin (folinik asit, 2,5 mg İV) ve biotin denenmelidir.

SONUÇ

Yenidoğan dönemi; konvülsiyon etiyolojisi, klinik ve laboratuvar bulguları, tanı ile tedavi yaklaşımları açısından özel yaklaşım gerektiren bir dönemdir. Yenidoğan konvülsiyonlarının yönetimi multidisipliner bir yaklaşım gerektirir.

DESTEK

Bu çalışma için herhangi bir kurum veya proje desteği alınmamıştır.

FİNANSAL BAĞLANTI

Yazarların çalışma ile ilgili herhangi bir finansal bağlantısı veya çıkar çatışması bulunmamaktadır.

M4484-Özet Metin

PEDIATRIC PULMONARY HYDATID CYST: SPONTANEOUS REGRESSION OF PERSISTENT CAVITIES AFTER TWO STAGE SURGERY

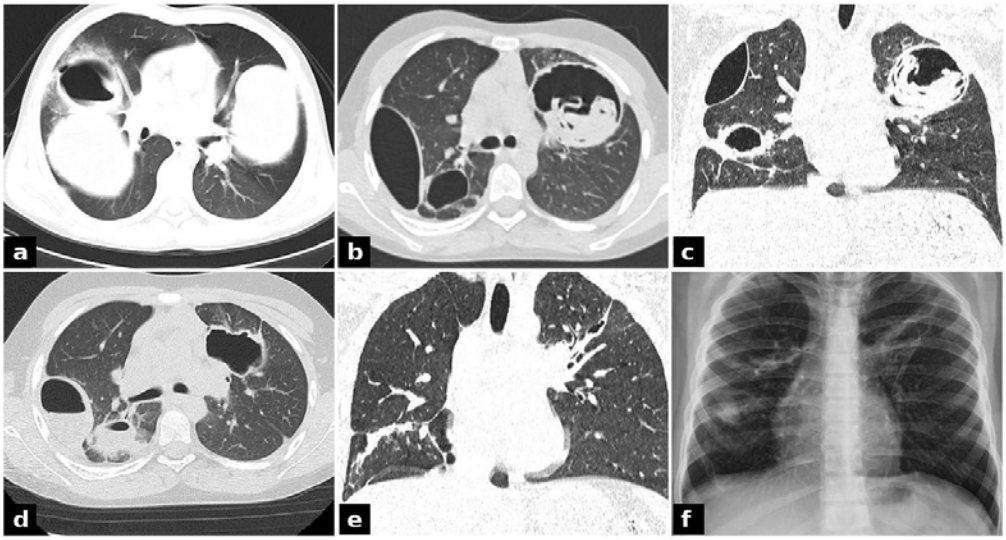
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Introduction/Aim. Hydatid cyst disease, caused by the larval stage of Echinococcus granulosus, is a common zoonosis in rural areas of our country; the lungs are the second most affected organ after the liver. Multiple and bilateral involvement is more frequent in children. Surgery is the standard treatment, but postoperative cystotomy cavities may close spontaneously over time, particularly in children. We present a child who underwent two stage surgery for multiple pulmonary hydatid cysts, with complete resolution of apparently persistent cavities during follow up.

Case Report. A 15 year old boy presented with cough, fever, and vomiting. Chest CT revealed three lesions consistent with hydatid cysts in the left upper lobe lingular segment, right upper/lower lobe superior segment, and right middle/lower lobe anterior segment, the largest approximately 11,5 cm, with air fluid levels and membranous structures. Surgery was planned. Thoracotomy with cystotomy capitonnage was performed for the right cysts; four months later, for the left sided cyst. On follow up, cavities persisted bilaterally; given clinical and radiologic stability, repeat surgery was not considered, and conservative follow-up was planned. The cavities resolved completely during follow up.

Conclusion. Our case shows that apparently persistent postoperative cavities in children can completely resorb spontaneously without additional surgery. Persistent cavities in pediatric patients should not by themselves indicate repeat surgery. The high regenerative capacity of lung tissue in children allows cavities to close spontaneously over time. Close clinical and radiologic follow up, rather than early reoperation, should be considered a safe and effective option after pediatric hydatid cyst surgery. **Figure 1. Imaging findings of the patient**



(a) Axial chest CT showing bilateral cysts on preoperative imaging; (b) postoperative control axial CT after right hemithorax surgery showing cavities on the right and a complicated cyst on the left; (c) coronal image of the same
CT; (d) postoperative control axial CT after the second surgery showing residual cavities; (e) coronal CT during follow up showing resorption of the cavities; (f) follow-up chest X-ray showing regression of the cavities.

M4621-Özet Metin
PEDİATRİK FEBRİL NÖTROPENİDE İLK 60 DAKİKALIK TEDAVİ PLANI

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Ateş ve nötropeni olarak tanımlanmaktadır. Kemoterapi (KT) sonrası çocukta ateş varsa, nötrofil sayımı beklenmeden febril nötropeni (FN) ön tanısıyla hareket edilir. ANC (Absolute Neutrophil Count)(Mutlak nötrofil sayısı) = WBC (hücre/mikroL) x yüzde (PMN'ler + bantlar) / 100 olarak hesaplanmaktadır.
Ateş; tek oral/aksiller ≥38.3 °C veya ≥38.0 °C'nin ≥1 saat sürmesi,
Nötropeni; ANC <500/mm³ veya 24–48 saatte <500/mm³ beklenmesidir.
Febril nötropeniyi America enfeksiyon hastalıkları komitesi (IDSA); ANC'nın 500'ün altında olduğu, 48 saat içinde <500 /mm3 olacağı öngörülen nötropeni ile birlikte, tek oral ölçümde ateşin 38.3 C saptanması, bir saat süreyle 38 C ve üzerinde olması şeklinde tanımlanmaktadır. Avrupa medikal onkoloji komitesi (ESMO); İki saat süreyle 38 C ve üzerinde tespit edilmesi olarak tanımlanır.
Epidemiyoloji: Nötropeni özellikle HIV enfeksiyonu, akut lösemiler ve miyelodisplastik sendromlarla ilişkilidir. FN olan hastaların yaklaşık %50'sinde enfeksiyon gelişir ve bunların %20'sinde, şiddetli nötropeni olanlarda bakteriyemi görülür. Gram-pozitif bakteriler FN'ye neden olan en sık patojenlerdir. Bu enfeksiyonların çoğu uzun süreli yerleştirilmiş santral venöz kateterden (SVK) kaynaklanmaktadır. İlaç kaynaklı nötropeninin yıllık insidansı milyonda bir vaka olarak bildirilmektedir.
Etiyoloji: Tanımlanmış bir enfeksiyon olmaksızın, 38.3°C'den yüksek ateşi olan nötropenik vakalardır. Çoğu enfeksiyon bakteriyeldir, viral veya fungal etiyoloji de mümkündür. Bakteriyemi nedeni olan gram-pozitif, gram-negatif bakterilerin oranı yaklaşık 60'a 40'tır. Yaygın bakteriyel patojenler arasında staphylococcus, streptococcus, enterococcus türleri pseudomonas aeruginosa,

acinetobacter türleri, stenotrophomonas maltophilia, escherichia coli ve klebsiella türleri yer alır. Standart doz KT rejimlerinde 6-8 gün süren nötropeni görülür. KT'nin en sık görülen komplikasyonlarından biridir. KT'nin gecikmesi ve doz azaltımından kaynaklanan KT etkinliğini azaltır. KT alan 1000 hastadan yaklaşık 8'inde görülmektedir. Hastaların %20-30'unda hastaneye yatış gereken komplikasyonlara yol açar. Hastane içi mortalite oranlarının yaklaşık %10'nu kapsar, önemli morbidite nedendir. Batı ülkelerinde hastaneye yatış başına ortalama maliyet yaklaşık 15.000 ABD doları civarındadır. Hastalarda kılavuz uyumlu bakım oranları %20-50 arasındadır.

Patofizyoloji: FN onkolojik bir acildir. Bağışıklık sistemi zayıflamış hastalar enfeksiyonlara karşı yatkın hale gelir. Nötropenide klasik inflamasyon bulguları silik olabilir. Derin ve uzamış nötropenide bakteriyemi riski daha yüksektir. Gram-pozitif etkenler özellikle santral kateterlerle, Gram-negatif etkenler ise şok ve mortaliteyle ilişkilidir. Mukozit, yakın zamanda geniş spektrumlu antibiyotik kullanımı patojen girişini ve direnç riskini artırır.

Şiddetli nötropeni; ANC <500/mm³, derin nötropeni; ANC <100/mm³, agranülositoz; ANC <200 hücre/mikroL, kronik nötropenide üç aydan uzun süren nötropenidir. İlaçlar, beslenme yetersizliğinden folat, bakır, B12 vitamin eksikliği de nötropeniye yol açabilir. Aktif KT veya son 14–30 gün içinde miyelosüpresif tedavi alan, hematopoetik hücre nakli, ağır immünsüpresyonlu hastalar, bilinen ağır nötropeni veya ANC düşüşü beklenen hasta, SVK ile birlikte ateşi olan çocuk FN olarak kabul edilmektedir.

Stabil, iyi görünümlü, beklenen kısa nötropeni, ciddi komorbidite yokluğu, güvenilir takip düşük risk olarak kabul edilir. Akut miyeloid lösemi, relaps ve refrakter hastalık, hematopoetik kök hücre nakli, derin nötropeni, yoğun immünsüpresyon, mukozit, organ disfonksiyonu, sepsis yüksek risk olarak kabul edilir. Pnömoni, tiflitis, abdominal, perineal enfeksiyon, kateter ve cilt odağı, kontrolsüz ağrı, oral alamama, dirençli organizma öyküsü, uygun ev takibinin bulunmaması da yüksek riskli kabul edilir. Risk sınıflamasında amaç ilk saatte taburculuk değil, güvenli ayrıştırmadır. İlk 60 dakikada risk sınıflaması antibiyotiği geciktirmez; sadece antibiyotik spektrumunu ve yatış düzeyini etkiler.

Hemodinamik instabilite veya septik şok, ciddi deri ve yumuşak doku enfeksiyonu, kateter enfeksiyonu, gram-pozitif kok kümeleri, ciddi mukozit ve viridans streptokok riski, pnömoni veya MRSA kolonizasyonu, yerel direnç veya önceki kültür nedeniyle glikopeptid gerektiren durum mevcutsa vancomycin eklenebilir. Sadece SVK bulunması veya stabil hastada ateşin sürmesi vankomisin başlama endikasyonu değildir. Yüksek riskli pediatrik FN'de antipseudomonal penisilin, dördüncü kuşak sefalosporin veya karbapenemden biriyle monoterapi uygundur. İkinci anti-Gram-negatif ajan veya glikopeptid; klinik instabilite ve direnç şüphesi varsa eklenir. İlk 60 dakikada içinde genellikle antifungal tedavi hedefi yoktur. İlk saat odağı bakteriyemi, sepsis ve pseudomonas kapsamasıdır. Stabil yüksek riskli FN'de uygun antipseudomonal β-laktam monoterapisi çoğu kez yeterlidir. 96 saatten uzun süren ateş durumunda invaziv fungal hastalık değerlendirmesi yapılmalıdır. Fungal hastalık açısından yüksek riskli çocukta toraks bilgisayarlı tomografi (BT) ve abdominal BT, hedefe yönelik inceleme yapılmalıdır. Kaspofungin veya lipozomal amfoterisin B ampirik antifungal seçeneklerdir.

Sık yapılan hatalar: Nötrofil sonucunu beklemek, kültür için dakikalar kaybetmek, her hastaya vankomisin veya çift Gram-negatif tedavi başlamak, solunum bulgusu yoksa rutin akciğer grafisi önerilmez. Konsültasyon için ilk antibiyotik dozunu bekletmek, negatif CRP ve prokalsitonin düzeyi enfeksiyonu ekarte ettirmez. Rektal ateş, tuşe, lavman ve supozituvar mukozal travma ve bakteriyemi riski nedeniyle kaçınılmalıdır. Santral kateteri ilk saat içinde kontrolsüz çekilmesidir. Doğru sıralama ilk acil değerlendirme, kültür alınması, ilk antibiyotik ve hemen ardından onkoloji konsültasyonu gereklidir.

M4622-Tam Metin
PEDİATRİK İLEUS VE VOLVULUS: ACİL SERVİSTE SAATLERİN ÖNEM TAŞIDIĞI OLGULAR

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Amaç

Pediatrik intestinal obstrüksiyon, kendiliğinden düzelebilen motilite bozukluklarından bağırsak kaybı ve ölüme yol açabilen strangülasyona kadar geniş bir klinik spektruma sahiptir. Bu metnin amacı, mekanik intestinal obstrüksiyon ile paralitik ileusun ayırıcı özelliklerini ortaya koymak ve özellikle malrotasyon ile midgut volvulusunda erken tanı, stabilizasyon, görüntüleme ve cerrahi değerlendirme ilkelerini acil servis yaklaşımı açısından özetlemektir.

Yöntem

Pediatrik intestinal obstrüksiyon, malrotasyon, midgut volvulusu, adeziv ince bağırsak obstrüksiyonu ve postoperatif ileusa ilişkin temel çocuk cerrahisi kaynakları ile seçilmiş güncel çalışmalar anlatı derlemesi kapsamında değerlendirildi. Klinik bulgular, yaşa göre etiyoloji, görüntüleme seçenekleri, başlangıç tedavisi ve acil cerrahi gerektiren durumlar uygulamaya yönelik olarak sentezlendi.

Bulgular

İleus terimi mekanik intestinal obstrüksiyon ile fonksiyonel motilite kaybını kapsayabilir. Mekanik obstrüksiyonda anatomik bir engel bulunurken paralitik ileusta bağırsak motilitesi mekanik engel olmaksızın baskılanır. Ayrım önemlidir; çünkü mekanik obstrüksiyon kapalı ans, strangülasyon, iskemi, nekroz ve perforasyona ilerleyebilir.

Etiyoloji yaşa göre değişir. Yenidoğanda intestinal atrezi ve stenozlar, malrotasyon, mekonyum ileusu, Hirschsprung hastalığı ve anorektal malformasyonlar öne çıkar. Süt çocuklarında invajinasyon, malrotasyon ve inkarsere herni; büyük çocuklarda postoperatif adezyonlar, internal herni, inflamatuvar darlıklar, bezoar ve kitleler daha olasıdır [1,2]. Önceki abdominal cerrahi adeziv obstrüksiyon için önemli bir risk etkenidir [3].

Safralı kusma, özellikle yenidoğan ve süt çocuğunda, aksi gösterilinceye kadar cerrahi obstrüksiyon ve midgut volvulusu lehine değerlendirilmelidir. Erken volvulusta karın distansiyonu, periton irritasyonu ve direkt grafi bulguları belirgin olmayabilir [2]. Sürekli veya giderek şiddetlenen ağrı, hassasiyet, defans, kanlı dışkı, taşikardi, kötü perfüzyon, metabolik asidoz ve hemodinamik bozulma intestinal iskemi açısından alarm bulgularıdır. Normal laktat erken iskemiyi güvenle dışlamaz.

Başlangıç yaklaşımında oral alım kesilmeli; havayolu, solunum ve dolaşım değerlendirilerek damar yolu açılmalı, sıvı ve elektrolit bozuklukları düzeltilmeli ve gerektiğinde nazogastrik dekompresyon uygulanmalıdır. İskemi, perforasyon veya sepsis şüphesinde geniş spektrumlu antibiyotik başlanmalı ve çocuk cerrahisi değerlendirmesi geciktirilmemelidir.

Direkt karın grafisi bağırsak gaz dağılımını, hava-sıvı seviyelerini ve serbest havayı gösterebilir; normal sonuç volvulusu dışlamaz. Ultrasonografide mezenterik damar ilişkisi ve whirlpool bulgusu tanısal değer taşır [4]. Hemodinamik olarak stabil çocukta üst gastrointestinal sistem kontrast incelemesi malrotasyon tanısında kullanılabilir. Peritonit, şok veya güçlü iskemi şüphesinde ileri görüntüleme cerrahi girişimi geciktirmemelidir.

Midgut volvulusunun tedavisi acil cerrahidir. Ladd ameliyatında volvulus detorsiyone edilir, bağırsak canlılığı değerlendirilir, Ladd bantları kesilir ve mezenter tabanı genişletilir [2]. Canlılığı kuşkulu bağırsakta reperfüzyon sonrası yeniden değerlendirme ve seçilmiş olgularda planlı ikinci bakış ameliyatı, gereksiz geniş rezeksiyon ile kısa bağırsak sendromu riskini azaltabilir. Açık ve laparoskopik yaklaşım hasta özelliklerine göre seçilmelidir [5]. Postoperatif ileus için kullanılan

tanım ve sonuç ölçütlerinin heterojen olması, çocuklara ilişkin çalışmaların karşılaştırılmasını güçleştirmektedir [6].

Sonuç

Pediatrik intestinal obstrüksiyonda temel hedef strangülasyon ve bağırsak iskemisini gecikmeden saptamaktır. Yaşa göre etiyolojinin değerlendirilmesi, seri muayene, eş zamanlı resüsitasyon ve erken çocuk cerrahisi görüşü güvenli yaklaşımın temelini oluşturur. Özellikle safralı kusma ve midgut volvulusu şüphesinde normal muayene, normal direkt grafi veya erken dönemde normal laboratuvar sonuçları güven verici kabul edilmemeli; görüntüleme cerrahi tedaviyi geciktirmemelidir.

Destek

Bu çalışma için herhangi bir kurum veya kuruluştan finansal destek alınmamıştır.

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M4623-Tam Metin

NEKROTİZAN ENTEROKOLİT EVRELEMESİNDE DİREKT GRAFİ BULGULARI: MODİFİYE BELL KRİTERLERİ EŞLİĞİNDE RADYOLOJİK BİR DERLEME

RADİOGRAPHİC FİNDİNGS İN THE STAGİNG OF NECROTİZİNG ENTEROCOLİTİS: A REVİEW GUİDED BY THE MODİFİED BELL CRİTERİA

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ÖZET

Amaç: Nekrotizan enterokolit (NEK), başta prematüre yenidoğanlar olmak üzere bağırsak mukozasının iskemik-inflamatuar nekrozu ile seyreden acil bir gastrointestinal tablodur. Bu derlemenin amacı, ayakta direkt karın grafisinin (ADKG) NEK evrelemesindeki yerini, abdominal ultrasonografi (USG) ile karşılaştırmalı tanısal değerini ve radyolojik bulguların cerrahi karar sürecine katkısını, güncel ulusal rehber verileri ışığında özetlemektir.

Yöntem: Türk Neonatoloji Derneği (TND) 2025 Nekrotizan Enterokolit Rehberi ile NEK görüntülemesine ilişkin klasik ve güncel literatür gözden geçirilmiş; direkt grafi bulguları

Modifiye Bell evrelemesi ile ilişkilendirilerek derlenmiştir. Olgu sunumu niteliği taşımayan bu çalışma, mevcut kanıt düzeyleri esas alınarak hazırlanmış bir literatür sentezidir.

Bulgular: Erken evrede bağırsak gaz paterninin bozulması ve dilatasyon nonspesifik fakat uyarıcı bir bulgudur. Pnömatozis intestinalis olguların büyük bir kısmında görülen ve NEK için tanı koydurucu kabul edilen bulgu olup, ileri evre olguların bir bölümünde dahi saptanamayabilir. Portal venöz gaz ilerlemiş hastalığa işaret etse de tek başına cerrahi endikasyon oluşturmaz. Pnömoperitonyum ise bağırsak perforasyonunun doğrudan radyolojik kanıtıdır ve saptandığında tek başına kesin cerrahi endikasyon kabul edilir. ADKG halen NEK izleminde standart yöntem olmakla birlikte, barsak duvar kalınlığı, ekojenitesi, perfüzyonu ve serbest sıvının değerlendirilmesinde USG daha yüksek tanısal duyarlılık ve özgüllük sunmaktadır.

Sonuç: NEK evrelemesinde direkt grafi, klinik ve laboratuvar bulgularla birlikte değerlendirildiğinde vazgeçilmez bir araç olmaya devam etmektedir; klinik gidiş ile örtüşmeyen olgularda ise tamamlayıcı USG incelemesi tanısal doğruluğu ve cerrahi karar sürecini güçlendirmektedir.

Anahtar Kelimeler: Nekrotizan enterokolit; pnömatozis intestinalis; direkt grafi; portal venöz gaz; Modifiye Bell kriterleri.

ABSTRACT

Purpose: Necrotizing enterocolitis (NEC) is an emergent gastrointestinal condition characterized by ischemic-inflammatory necrosis of the bowel mucosa, predominantly affecting preterm neonates. This review aims to summarize the role of plain abdominal radiography (PAR) in NEC staging, its comparative diagnostic value against abdominal ultrasonography (US), and the contribution of radiologic findings to the surgical decision pathway, based on current national guideline data.

Methods: The 2025 Necrotizing Enterocolitis Guideline of the Turkish Neonatal Society (TND), together with classic and contemporary imaging literature, was reviewed and radiographic findings were mapped onto the Modified Bell staging system. This work is a narrative literature synthesis rather than a case report.

Results: In early disease, disruption of the normal bowel gas pattern and dilatation are nonspecific yet alerting findings. Pneumatosis intestinalis, present in the majority of cases, is regarded as the diagnostic hallmark of NEC, although it may be absent even in a subset of advanced disease. Portal venous gas suggests advanced disease but does not by itself constitute a surgical indication. Pneumoperitoneum is direct radiologic evidence of bowel perforation and, when identified, is accepted as an absolute indication for surgery. While PAR remains the standard modality for NEC monitoring, US offers superior sensitivity and specificity for assessing bowel-wall thickness, echogenicity, perfusion, and free fluid.

Conclusion: Plain radiography, interpreted alongside clinical and laboratory findings, remains indispensable in NEC staging; complementary US evaluation strengthens diagnostic accuracy and surgical decision-making in cases where imaging and clinical course diverge.

Keywords: Necrotizing enterocolitis; pneumatosis intestinalis; plain abdominal radiography; portal venous gas; Modified Bell staging.

1. GİRİŞ VE AMAÇ

Nekrotizan enterokolit, yenidoğan yoğun bakım ünitelerinde yatan bebeklerin yaklaşık %3–15'ini etkileyen ve olguların %90'dan fazlasının 32. gestasyon haftasının altındaki prematürelerde görüldüğü, morbidite ve mortalitesi yüksek bir tablodur. Erken ve agresif tedaviye rağmen mortalite %15–30 aralığında bildirilmekte; buna karşın term yenidoğanlarda daha az sıklıkta (%10–15) ancak genellikle konjenital kalp hastalığı gibi majör bir risk faktörü zemininde ortaya çıkabilmektedir. Klinik bulgular sıklıkla nonspesifik olduğundan, hastalığın evrelenmesinde ve cerrahi tedavi kararının zamanlamasında görüntüleme yöntemleri merkezi bir rol üstlenmektedir.

Ayakta direkt karın grafisi, yaygın erişilebilirliği ve yatak başında tekrarlanabilir olması nedeniyle halen NEK izleminde standart görüntüleme yöntemi konumundadır. Bununla birlikte abdominal ultrasonografinin, özellikle barsak duvarı perfüzyonu ve serbest sıvı değerlendirmesinde sağladığı ek bilgi, son yıllarda tamamlayıcı bir yöntem olarak öne çıkmasına neden olmuştur. Bu bildirinin amacı, güncel ulusal rehber verileri temelinde direkt grafi bulgularını Modifiye Bell evrelemesi ile ilişkilendirerek, radyolojik bulguların tanı ve cerrahi karar sürecindeki yerini kongre katılımcılarına özetlemektir.

2. GEREÇ VE YÖNTEM

Bu çalışma bir olgu sunumu ya da orijinal araştırma verisi içermemekte olup, Türk Neonatoloji Derneği (TND) 2025 Nekrotizan Enterokolit Rehberi ile bu rehberin dayandığı ve NEK görüntülemesine yönelik güncel literatür (RSNA eğitim serisi ve ilgili sistematik derlemeler) taranarak hazırlanmış bir derlemedir. Kaynak seçiminde, ülkemizde klinik pratiği doğrudan yönlendiren güncel ulusal rehber esas alınmış; radyolojik bulgular bu rehberde sunulan kanıt düzeyleri korunarak, direkt grafi ile abdominal USG'nin karşılaştırmalı tanısal performansı ve Modifiye Bell kriterleri temelinde sistematik olarak sınıflandırılmıştır.

3. BULGULAR

3.1. Patogeneze Kısa Bakış

NEK patogenezinde temel zemin, immatür mukozal bariyer, zayıf bağırsak motilitesi ve immatür immün yanıt ile karakterize prematüre intestinal sistemdir. Mikrobiyal disbiyoz, enteral beslenme, hipoksi-iskemi ve bakteriyel ürünlerin (LPS gibi) varlığı gibi tetikleyici faktörler Toll-like reseptör 4 (TLR-4) aktivasyonuna yol açar; bunu TNF-α, trombosit aktive edici faktör (PAF) ve interlökin ailesi üzerinden ilerleyen bir sitokin kaskadı izler. Sonuç olarak transmural bağırsak hasarı, duvar içinde gaz oluşumu (pnömatozis) ve ilerleyici olgularda perforasyon gelişir; bu patofizyolojik zincir, direkt grafide izlenen bulguların temelini oluşturur.

3.2. Klinik ve Laboratuvar Bulgulara Genel Bakış

En erken gastrointestinal bulgular beslenme intoleransı, sıklıkla safralı kusma ve abdominal distansiyondur; rektal kanama eşlik edebilir. Letarji, apne atakları, ısı düzensizliği ve perfüzyon bozukluğu gibi nonspesifik sistemik bulgular hızla ilerleyen şok tablosuna kadar değişen geniş bir spektrum oluşturur. Tanı koydurucu spesifik bir laboratuvar testi bulunmamakla birlikte tam kan sayımında trombositopeni ve lökopeni, ciddi olgularda yaygın damar içi pıhtılaşma ve CRP yüksekliği hastalığın şiddetinin izleminde yol göstericidir.

3.3. Görüntüleme Yöntemlerinin Karşılaştırmalı Tanısal Değeri

ADKG, NEK tanı ve izleminde halen yaygın kullanılan standart yöntemdir; ancak abdominal USG ile karşılaştırıldığında özellikle asit, barsak duvar kalınlığı ve perfüzyon değerlendirmesinde tanısal duyarlılığı ve özgüllüğü daha düşüktür. USG'nin gerçek zamanlı inceleme imkânı sunması, barsak duvar kalınlığı, ekojenitesi, peristaltik aktivite ve Doppler ile perfüzyonu gösterebilmesi, bu yöntemi direkt grafiye tamamlayıcı kılan temel özelliklerdir. Güncel rehber verilerine göre iki yöntemin karşılaştırmalı tanısal performansı Tablo 1'de özetlenmiştir.

Tablo 1. Nekrotizan Enterokolit Tanısında Direkt Grafi (ADKG) ve Abdominal Ultrasonografinin (USG) Karşılaştırmalı Tanısal Performansı

Bulgu	ADKG Özgüllük	ADKG Duyarlılık	USG Özgüllük	USG Duyarlılık
Asit	Düşük	Düşük	Yüksek	Yüksek
Perforasyon	Yüksek	Düşük	Yüksek	Yüksek
Bağırsak duvar kalınlığı	Düşük	Düşük	Yüksek	Yüksek
Bağırsak dilatasyonu	Yüksek	Orta	Yüksek	Yüksek
Pnömatozis intestinalis	Orta	Orta	Yüksek	Yüksek
Motilite	—	—	Yüksek	Yüksek

Kaynak: Türk Neonatoloji Derneği Nekrotizan Enterokolit Rehberi 2025.

3.4. Direkt Grafide Evreye Göre Bulgular

3.4.1. Erken Bulgular: Gaz Paterni Bozulması ve Dilatasyon

Normal yenidoğan bağırsağında gaz, ince ve kalın barsak segmentlerinde toplanır; gazla dolu her segment komşu lupa bası yaparak tipik 'mozaik' görünümü oluşturur ve ince-kalın barsak ayrımı net seçilemez. Bu paternin kaybolması ile birlikte gelişen bağırsak dilatasyonu erken dönemde görülen, ancak özgüllüğü düşük bir bulgudur; orta-ileri olgularda direkt grafide tek bulgu olarak da karşımıza çıkabilir. Sebat eden asimetrik gaz paterni ve dilate lupların varlığı, tedaviye yanıtsızlığın habercisi olabileceğinden özellikle dikkat gerektirir.

3.4.2. Pnömatozis İntestinalis: Tanı Koydurucu Bulgu (Evre IIA)

Bakteriler tarafından üretilen gazın bağırsak duvarında birikmesiyle oluşan pnömatozis intestinalis, NEK için tanı koydurucu kabul edilen radyolojik bulgudur ve olguların büyük çoğunluğunda (yaklaşık %19–98 aralığında bildirilen serilerle) izlenir. Direkt grafide lineer (subseroza yerleşimli, radyolüsen bant tarzında) ya da kistik/bubbly (submukozal, yuvarlak radyolüsensiler şeklinde) paternde görülebilir. Değerlendirmede, gazla dolu üst üste binen barsak luplarıyla karışıklığı azaltmak amacıyla mukoza-submukozayı temsil eden yumuşak doku dansitesindeki 'beyaz çizgilerin' aranması önerilir. Pnömatozisin miktarı klinik ciddiyetle korele değildir; bulgu 12 saat gibi kısa bir sürede oluşup kaybolabilir ve ileri evre olguların bir kısmında (yaklaşık %14) dahi saptanamayabilir; bu nedenle yokluğu NEK tanısını dışlamaz.

3.4.3. Portal Venöz Gaz: İlerlemiş Hastalığın Göstergesi (Evre IIB)

Portal venöz gaz, bağırsak duvarı venlerine giren bakteriyel gazın portal venöz sisteme geçen intramural gazın devamı olarak ortaya çıkar ve NEK olgularının yaklaşık %30'unda bildirilmiştir. Direkt grafide karaciğer üzerinde ana portal venden lobüler dallara doğru uzanan, periferik yerleşimli, dallanan radyolüsen çizgiler şeklinde izlenir; santral yerleşimli olan safra yolu gazından bu periferik yerleşim özelliği ile ayırt edilir. Pnömatozis gibi hızlı oluşup kaybolabilen bu

bulgunun kayboluşu klinik düzelme ile ilişkili değildir. Portal venöz gaz saptanan olguların önemli bir kısmında cerrahi gerekmiş olsa da, bu bulgu mortaliteyi bağımsız olarak etkilememekte ve tek başına kesin cerrahi endikasyon oluşturmamaktadır.

3.4.4. Asit: İleri Evre Bulgusu (Evre IIIA)

Belirgin asit varlığı, ileri NEK (Evre IIIA) tablosunun radyolojik bileşenlerinden biridir ve genellikle ciddi apne, hipotansiyon, miks asidoz, koagülopati ve nötropeni gibi sistemik bulgularla birlikte seyreder. Direkt grafide asit özgüllüğü ve duyarlılığı düşük bir bulgu olmakla birlikte, USG bu alanda direkt grafiye belirgin üstünlük sağlamakta ve serbest sıvıyı yüksek doğrulukla ortaya koyabilmektedir.

3.4.5. Pnömoperitonyum: Cerrahi Acil Bulgusu (Evre IIIB)

Abdominal görüntüleme ile tespit edilen pnömoperitonyum, bağırsak perforasyonunun doğrudan kanıtıdır ve NEK'te tek başına kabul edilen mutlak cerrahi endikasyondur. Büyük miktarda serbest hava, karın ön duvarının hemen altında ortalanarak oval radyolüsen bir alan oluşturur; bu görünüm literatürde 'futbol topu belirtisi' olarak tanımlanır ve bazen ortada ince bir çizgi şeklinde seçilebilen falsiform ligaman 'ip belirtisi' olarak adlandırılır. Az miktardaki serbest havanın gösterilmesinde ise, bebeğin sol yanı üzerine yatırılarak çekilen sol lateral dekübit pozisyon grafisi yardımcıdır; bu pozisyonda karaciğer kenarı ile karın duvarı arasında toplanan hava daha kolay seçilir. Ancak bağırsak perforasyonu gelişen olguların yalnızca bir kısmında (yaklaşık %63) direkt grafide serbest hava saptanabildiği, geri kalan olgularda perforasyon varlığına rağmen grafinin yalancı negatif kalabileceği unutulmamalıdır; bu durum, klinik kötüleşme gösteren ancak direkt grafide pnömoperitonyum saptanmayan olgularda USG'nin tanısal katkısını öne çıkarmaktadır.

3.5. Modifiye Bell Kriterleri: Klinik-Radyolojik Bütünleşik Evreleme

NEK ilk kez Bell ve arkadaşları tarafından sınıflandırılmış, daha sonra Walsh ve Kliegman tarafından klinik, radyolojik ve laboratuvar bulgularını bütünleştiren 'Modifiye Bell Kriterleri' olarak yeniden düzenlenmiştir. Bu sınıflama, radyolojik bulguların abdominal ve sistemik bulgularla birlikte değerlendirilerek hastalığın evresini ve tedavi yaklaşımını belirlemede halen yaygın olarak kullanılmaktadır (Tablo 2).

Tablo 2. Modifiye Bell Kriterlerine Göre NEK Evrelemesi

Evre	Abdominal Bulgular	Sistemik Bulgular	Radyolojik Bulgular
IA (Şüpheli NEK)	Distansiyon, kusma, dışkıda gizli kan	Apne, letarji, ısı düzensizliği	Normal gaz dağılımı veya hafif–orta intestinal dilatasyon
IB (Şüpheli NEK)	IA + dışkıda aşikâr kan	IA ile aynı	IA ile aynı
IIA (Kesin NEK)	Distansiyon, barsak seslerinde azalma, hassasiyet	IA ile aynı	İntestinal dilatasyon + pnömatozis intestinalis
IIB (Kesin NEK)	+ Abdominal selülit, palpabl barsak ansları	+ Hafif metabolik asidoz, trombositopeni	+ Portal vende gaz, asit
IIIA (İleri NEK)	+ Belirgin hassasiyet, sağ alt kadran kitlesi, yaygın peritonit	+ Ciddi apne, hipotansiyon, miks asidoz, koagülopati, nötropeni	+ Belirgin asit

Evre	Abdominal Bulgular	Sistemik Bulgular	Radyolojik Bulgular
IIIB (İleri NEK)	IIIA ile aynı	IIIA ile aynı	+ Pnömoperitonyum

Kaynak: Bell MJ ve ark. Ann Surg 1978;187:1-7; Walsh MC, Kliegman RM. Pediatr Clin North Am 1986;33:179-201 — Türk Neonatoloji Derneği Nekrotizan Enterokolit Rehberi 2025.

3.6. Radyolojik Bulguların Cerrahi Karara Yansıması

Radyolojik bulgular arasında pnömoperitonyum, bağırsak perforasyonunu gösteren ve tek başına kabul edilen mutlak cerrahi endikasyondur. Buna karşılık aşağıdaki göreceli (relatif) endikasyonlar, cerrahi kararın klinik tabloyla birlikte değerlendirilmesini gerektirir:

- Tıbbi tedaviye yetersiz yanıt
- Fikse (sabit) bağırsak segmenti eşliğinde ciddi pnömatozis intestinalis
- Klinik bozulma: abdominal duvarda eritem, palpabl kitle, hipotansiyon
- Metabolik asidoz, hiponatremi
- Pozitif parasentez (kahverengi sıvı ve/veya pozitif Gram boyama)

Vurgulanması gereken önemli bir nokta, portal venöz gazın tek başına kesin bir cerrahi endikasyon oluşturmadığıdır; üç veya daha fazla klinik, metabolik ve radyolojik risk göstergesinin birlikte bulunması, cerrahi ihtiyacı olasılığını belirgin biçimde artırmaktadır. Cerrahi tedavi teknikleri arasında laparotomi (rezeksiyon ± primer anastomoz veya enterostomi) ve primer peritoneal drenaj yer almakta olup, doğum ağırlığı 1000 gramın altında olan ve laparotomiye uygun olmayan bebeklerde primer peritoneal drenaj ilk tercih olabilmektedir.

3.7. Prognoz

Modifiye Bell evre II ve üzeri NEK tanısı alan hastalarda kısa ve uzun dönem komplikasyon riski belirgin şekilde artmaktadır. Prognoza ilişkin güncel oranlar Tablo 3'te özetlenmiştir. Mortaliteyi belirleyen başlıca faktörler arasında küçük gestasyon yaşı, gebelik haftasına göre düşük doğum ağırlığı, inotrop ihtiyacı, kalp dışı konjenital anomali varlığı ve tanı anında karın duvarında renk değişikliği sayılabilir.

Tablo 3. Nekrotizan Enterokolitte Cerrahi Gereksinimi ve Mortalite Oranları

Parametre	Oran (%)
Cerrahi tedavi gereksinimi	30–50
– Multifokal tutulum (cerrahiye giden olgularda)	55
– Panintestinal tutulum (cerrahiye giden olgularda)	15
Mortalite – medikal tedavi	20–30
Mortalite – cerrahi tedavi	30–40
Mortalite – doğum ağırlığı <1000 g	38–64

Kaynak: Türk Neonatoloji Derneği Nekrotizan Enterokolit Rehberi 2025.

4. SONUÇ

Bu derlemede özetlenen bulgular, NEK evrelemesinde direkt grafinin klinik ve laboratuvar verilerle bütünleşik şekilde değerlendirilmesi gerektiğini ortaya koymaktadır. Evreye göre bulgu akışı şu şekilde özetlenebilir: normal görünüm veya hafif dilatasyon (Evre I) → pnömatozis intestinalis ± portal venöz gaz (Evre IIA–IIB) → belirgin asit (Evre IIIA) → pnömoperitonyum ve mutlak cerrahi endikasyon (Evre IIIB).

Kongreye taşınması hedeflenen temel klinik mesaj şu şekilde özetlenebilir: pnömatozis intestinalis NEK için tanı koydurucudur; portal venöz gaz ilerlemiş hastalığın önemli bir göstergesi olmakla birlikte tek başına ameliyat kararı verdirmez; pnömoperitonyum ise tek başına mutlak cerrahi endikasyondur. Radyoloğun erken evrede saptayabileceği subtil bulgular (sebat eden asimetrik dilatasyon, mozaik gaz paterninin kaybolması) klinik kötüleşmeden önce uyarıcı olabilir; bu nedenle NEK yönetiminde radyolog, neonatolog ve çocuk cerrahından oluşan multidisipliner bir yaklaşım, doğru evreleme ve zamanında cerrahi karar için vazgeçilmezdir. Klinik seyir ile örtüşmeyen direkt grafi bulguları olan ya da klinik olarak kötüleşmesine rağmen direkt grafide pnömoperitonyum saptanmayan olgularda, tamamlayıcı abdominal USG incelemesi tanısal sürece anlamlı katkı sağlamaktadır.

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ACUTE HEMORRHAGİC EDEMA OF INFANCY: AN EİGHTEEN-MONTH-OLD CASE DİAGNOSED WİTH TYPİCAL CLİNİCAL FİNDİNGS

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INTRODUCTION

Acute hemorrhagic edema of infancy (AHEI) is a rare, self-limiting leukocytoclastic vasculitis involving small vessels in early childhood. First described by Snow in 1913, the condition has also been referred to as Seidlmayer purpura, Finkelstein disease, and cockade purpura with edema (Fiore et al.; Krause et al.; Snow). AHEI is now widely recognized as a distinct clinical entity with clinical characteristics that differ from those of IgA vasculitis, formerly known as Henoch–Schönlein purpura (Fiore et al.; Smitt et al.).

The disease primarily affects children between 4 and 24 months of age and has a slight male predominance (Fiore et al.). Although its etiopathogenesis remains incompletely understood, upper respiratory tract infections, acute otitis media, medications—particularly beta-lactam antibiotics—and vaccinations have frequently been reported as potential triggers (Fiore et al.; McDougall et al.). Clinically, AHEI is characterized by the classic triad of fever, purpuric rash, and edema. The lesions typically begin on the lower extremities and rapidly spread to the face, ears, and upper extremities. Cockade-shaped or targetoid purpuric plaques are considered characteristic cutaneous manifestations of the disease (Fiore et al.; Krause et al.).

Despite its dramatic clinical appearance, the general condition of affected patients is usually well preserved, and systemic organ involvement is rare. No laboratory marker is specific to AHEI. Mild leukocytosis or limited elevations in acute-phase reactants may occur, although laboratory findings remain normal in many patients (Fiore et al.; Roh et al.). The diagnosis is primarily clinical, and skin biopsy is generally unnecessary in patients with a typical presentation. AHEI may be confused with meningococcemia, IgA vasculitis, urticarial vasculitis, erythema multiforme, and sepsis; however, its characteristic lesion distribution, preserved general condition, and self-limiting course facilitate differentiation from these conditions.

CASE REPORT

An 18-month-old male patient presented to the pediatric emergency clinic with a two-day history of fever and a progressively spreading rash. His medical history revealed that the rash began approximately 10 days earlier on the legs, spread to the trunk, face, and ears over the last two days, and that the family had administered antihistamines and antibiotics under preliminary diagnoses of urticaria and otitis.

Upon admission, the patient’s general condition was good and vital signs were stable. Dermatological examination revealed blanchable, targetoid erythematous plaques on the face, ears, trunk, and extremities. Laboratory investigations—including complete blood count, CRP, renal/liver function tests, urinalysis, and fecal occult blood test—were within normal limits.

During follow-up, the lesions evolved into edematous, palpable purpuric plaques and a cockade appearance. Given the preserved general condition and absence of laboratory findings in favor of systemic involvement, the patient was diagnosed with Acute Hemorrhagic Edema of Infancy (AHEI) based on clinical and morphological findings. Managed on an outpatient basis without undergoing a biopsy, the patient's skin lesions regressed spontaneously within one week without leaving any trace; no organ or joint involvement developed during follow-up.



Figure 1. Widespread targetoid, edematous purpuric plaques with a cockade-like pattern on the lower extremities and trunk.

DISCUSSION

AHEI is a benign leukocytoclastic vasculitis that predominantly affects children between 4 and 24 months of age (Krause et al.; Saraclar et al.; Snow). The age and sex of the present patient—an 18-month-old boy—were consistent with the typical demographic characteristics reported in the literature (Fiore et al.; Smitt et al.).

An immune complex-mediated hypersensitivity reaction following an infection, medication exposure, or vaccination has been implicated in the pathogenesis of AHEI (Fiore et al.; Roh et al.). In the present case, antibiotic treatment was initiated approximately 10 days after the onset of the rash. Therefore, antibiotic exposure was considered a concurrent treatment rather than the primary trigger, while a preceding infection was regarded as a more likely precipitating factor.

One of the most characteristic features of AHEI is the rapid evolution of initially urticarial lesions into edematous, targetoid, or cockade-shaped purpuric plaques over several hours or days (Fiore et al.; Smitt et al.). Laboratory investigations are primarily used to exclude systemic organ involvement and alternative diagnoses rather than to confirm AHEI (Fiore et al.; Smitt et al.).

IgA vasculitis is among the most important differential diagnoses. Compared with AHEI, IgA vasculitis generally occurs in older children and is more frequently associated with gastrointestinal, renal, and articular involvement. Conversely, involvement of the face and ears is more characteristic of AHEI, while systemic organ involvement is uncommon (Krause et al.; Saraclar et al.). Life-threatening conditions such as meningococcemia and sepsis are typically associated

with toxic appearance, circulatory compromise, and markedly elevated inflammatory markers, which are generally absent in AHEI (Fiore et al.; Millard et al.).

Skin biopsy is not routinely required when the clinical presentation is typical (Fiore et al.; McDougall et al.; Saraclar et al.). Management is primarily supportive because the disease generally resolves spontaneously within one to three weeks, and there is insufficient evidence that pharmacological treatment alters its natural course (Fiore et al.; Smitt et al.). Accordingly, clinicians should reassure the family and avoid unnecessary medications, invasive procedures, and extensive diagnostic investigations. The long-term prognosis is excellent, with complete resolution expected in most patients (Fiore et al.; Smitt et al.).

CONCLUSION

Acute hemorrhagic edema of infancy is a rare childhood vasculitis with a benign and self-limiting course despite its dramatic clinical presentation. AHEI should be kept in mind in children within the typical age group who present in good general condition with purpuric rashes on the ears, face, and extremities. Recognizing the characteristic clinical features of the disease will contribute to preventing unnecessary antibiotic treatments, invasive procedures, and advanced diagnostic workups. The presented case is instructive in demonstrating the classic clinical course of AHEI due to the rapid evolution of initial urticarial skin lesions into typical purpuric morphology and its spontaneous resolution without any systemic involvement.

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M4465-Tam Metin

OTOLARYNGOLOGIC PATHOLOGIES IN PEDIATRIC TRAUMA PATIENTS: CLINICAL FINDINGS AND OUTCOMES

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Introduction / Aim

Childhood trauma is a major cause of emergency department admissions and may result in significant functional and cosmetic consequences. The evaluation of pediatric facial trauma presents unique challenges because anatomical and physiological characteristics differ substantially from those of adults (Ryan et al.; Haug and Foss). The relatively large head-to-body ratio, prominent forehead, and incompletely pneumatized paranasal sinuses influence the pattern and severity of injuries in children (Morales et al.). Among facial injuries, the nasal region is particularly vulnerable because of its prominent and delicate structure, and nasal fractures represent a substantial proportion of pediatric facial fractures (Pandher et al.).

This study aimed to evaluate the distribution, clinical characteristics, management strategies, and outcomes of otolaryngologic injuries in pediatric trauma patients referred for otolaryngology consultation at a tertiary care center.

Materials and Methods

This retrospective observational study was conducted at Malatya Training and Research Hospital, a tertiary referral center. Ethical approval was obtained from the Malatya Turgut Özal University Health Sciences Scientific Research Ethics Committee (Application No. 2026/327, July 16, 2026), and the study was conducted in accordance with the Declaration of Helsinki.

Medical records of pediatric patients presenting to the Pediatric Emergency Department with trauma-related injuries who subsequently underwent otolaryngology consultation were retrospectively reviewed. Patients aged 0–18 years were included, while cases with incomplete medical records or insufficient clinical data were excluded.

Demographic and clinical data, including age, sex, injury type, reason for otolaryngology consultation, examination findings, final diagnosis, treatment modality, need for intervention, hospitalization status, and clinical outcomes, were obtained from electronic medical records. Traumatic injuries were categorized according to the affected anatomical region and clinical diagnosis. Descriptive statistical analyses were performed to evaluate injury patterns, management strategies, and patient outcomes.

Results

Among 530 pediatric otolaryngology consultations, 267 trauma-related cases were included in the study. The mean age was 9.72 ± 5.05 years, with a median age of 10 years (range, 1–17 years). Of the patients, 174 (65.2%) were male and 93 (34.8%) were female.

Nasal trauma was the predominant injury, accounting for 222 cases (83.1%). Nasal fractures were identified in 78 patients, corresponding to 35.1% of patients with nasal trauma. Of these fractures, 52 were displaced and 26 were non-displaced.

Ear trauma was observed in 22 patients (8.2%). Specific otologic injuries included auricular lacerations in eight patients, hemotympanum in three, tympanic membrane perforation in three, and temporal bone fracture in one. Other traumatic otolaryngologic injuries were less frequent and included lip injuries in nine patients (3.4%), oral cavity injuries in eight (3.0%), and tongue injuries in six (2.3%).

Regarding clinical management and outcomes, 58 patients (21.7%) underwent an intervention, whereas 184 (68.9%) were managed conservatively with follow-up. Following otolaryngologic evaluation and management, 241 patients (90.3%) were discharged from the emergency department, while 19 patients (7.1%) required hospitalization.

Conclusion

Pediatric otolaryngologic trauma was predominantly characterized by nasal injuries, which accounted for more than four-fifths of trauma-related consultations. Nasal fractures were identified in approximately one-third of patients with nasal trauma, with displaced fractures being more frequent than non-displaced fractures. Ear and oral cavity injuries were considerably less common. Most patients were managed conservatively and discharged following otolaryngologic evaluation, whereas only a minority required intervention or hospitalization. These findings highlight the predominance of nasal trauma among pediatric otolaryngologic injuries and the importance of appropriate specialist assessment for identifying patients who require intervention or inpatient management.

Keywords: Pediatric trauma; Otolaryngologic injuries; Nasal trauma; Pediatric emergency department; Nasal fracture.

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Table 1. Patient Characteristics and Clinical Outcomes	
Variable	**Value**
Number of patients	267
Age, mean ± SD (years)	9.72 ± 5.05
Median age (range), years	10 (1-17)
Male, n (%)	174 (65.2)
Female, n (%)	93 (34.8)
Discharged, n (%)	241 (90.3)
Hospitalized, n (%)	19 (7.1)
Underwent intervention, n (%)	58 (21.7)
Managed conservatively with follow-up, n (%)	184 (68.9)

Table 2. Distribution of Traumatic Otolaryngologic Injuries		
Injury Type	**n**	**%**
Nasal travma	222	83.15
Displaced nasal fracture	52	19,48
Non-displaced nasal fracture	26	9,74
Ear travması	22	8.24
Hemotympanum	3	1,12
Tympanic membrane perforation	3	1,12
Auricular laceration	8	3
Temporal bone fracture	1	0,37
Lip injury	9	3.37
Tongue injury	6	2.25
Oral kavite yaralanması	8	3
Total	267	100

M4624-Tam Metin

THE ROLE OF EMERGENCY ECHOCARDIOGRAPHY IN SUSPECTED PEDIATRIC MYOCARDITIS

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ABSTRACT

Background: Pediatric myocarditis ranges from mild disease to fulminant heart failure, cardiogenic shock, severe arrhythmias, and sudden cardiac death. Nonspecific, age-dependent symptoms may delay diagnosis.

Objective: To summarize the role of early transthoracic echocardiography (TTE) in emergency evaluation, risk stratification, and management of suspected pediatric myocarditis.

Methods: This narrative review was based on consensus documents, scientific statements, echocardiographic recommendations, and peer-reviewed literature.

Results: Myocarditis should be considered in children with chest pain, unexplained tachycardia, hypotension, syncope, arrhythmias, heart-failure findings, or elevated cardiac biomarkers. Normal ECG, troponin, or left ventricular ejection fraction (LVEF) does not exclude myocarditis. Early TTE rapidly assesses left and right ventricular function, chamber dimensions, regional wall motion, diastolic function, pericardial effusion, valvular regurgitation, pulmonary pressures, intracardiac thrombus, and coronary arteries when indicated. Global longitudinal strain (GLS) may reveal subclinical dysfunction despite preserved LVEF. Serial echocardiography is valuable because ventricular function may change rapidly.

Conclusion: Timely and systematic echocardiography supports hemodynamic assessment, risk stratification, treatment planning, and early recognition of life-threatening complications.

Keywords: pediatric myocarditis; echocardiography; ventricular function; global longitudinal strain

1. INTRODUCTION

Myocarditis is an inflammatory myocardial disease caused by infectious or noninfectious triggers. In children, presentation ranges from mild illness to acute heart failure, cardiogenic shock, malignant arrhythmias, and sudden cardiac death [1–3]. Infants may present with feeding difficulty, pallor, tachycardia, cyanosis, or a sepsis-like picture, whereas older children more often have chest pain, dyspnea, palpitations, exercise intolerance, or syncope [1].

Because fulminant myocarditis may deteriorate rapidly, early recognition is essential. ECG, cardiac biomarkers, and imaging should be interpreted together. TTE is rapid, noninvasive, radiation-free, repeatable, and feasible at the bedside [1,4].

2. METHODS

This narrative review focuses on clinical suspicion, biomarkers and ECG findings, emergency echocardiography, high-risk features, serial imaging, and complementary cardiac magnetic resonance (CMR).

3. REVIEW FINDINGS

No single symptom, laboratory test, ECG finding, or imaging parameter can reliably confirm or exclude pediatric myocarditis. Troponin may be normal early in the disease course, while BNP and NT-proBNP reflect ventricular wall stress but are not specific. A normal ECG also does not exclude myocarditis [1].

Emergency TTE provides immediate information on ventricular performance and hemodynamic status. Evaluation should include LVEF, ventricular dimensions, regional wall-motion abnormalities, right ventricular function, diastolic indices, pericardial effusion, valvular regurgitation, pulmonary pressures, and intracardiac thrombus. Coronary arteries should be assessed when clinically indicated [1,4].

Right ventricular assessment should include age-appropriate parameters such as tricuspid annular plane systolic excursion (TAPSE), fractional area change, tissue Doppler S′ velocity, and strain when feasible. GLS can detect myocardial dysfunction despite preserved LVEF [5]. Thus, preserved LVEF should not be equated with normal myocardial function.

Pericardial effusion should be evaluated for tamponade physiology, and severe ventricular dysfunction should prompt assessment for valvular regurgitation and intracardiac thrombus. Decisions regarding intensive care or mechanical circulatory support should not rely on a single LVEF threshold. Perfusion, blood pressure, lactate, urine output, vasoactive requirements, biventricular function, rhythm stability, and multiorgan involvement should be considered together.

Serial echocardiography is important because ventricular function may improve or deteriorate rapidly. CMR is complementary in stable patients when tissue characterization is required or clinical suspicion remains high despite preserved LVEF [2].

4. CONCLUSION

Pediatric myocarditis should remain in the differential diagnosis of children with chest pain, unexplained tachycardia, syncope, arrhythmias, elevated cardiac biomarkers, or heart-failure findings. Normal ECG, biomarkers, or preserved LVEF do not independently exclude the diagnosis. Early and systematic TTE should assess both ventricles, global and regional function, diastolic function, strain when feasible, pericardial disease, valvular abnormalities, pulmonary pressures, intracardiac thrombus, and coronary arteries when appropriate. Timely and repeated echocardiography supports diagnosis, risk stratification, treatment planning, and recognition of life-threatening complications.

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M4487-Tam Metin

RETROSPECTIVE ANALYSIS OF TRAUMA PATIENTS UNDER 18 YEARS OF AGE PRESENTING TO THE EMERGENCY DEPARTMENT DUE TO ELECTRICAL INJURY

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INTRODUCTION

Electrical injuries, although relatively uncommon in childhood, are among the important traumatic injuries carrying a high potential for morbidity and mortality (Demir et al.). The severity of the injury varies with the voltage, duration and type of the current and its pathway through the body (Adalı et al.). Owing to developmental characteristics and environmental risk factors, the mechanisms and outcomes of electrical injuries in children may differ from those in adults (Hu et al.). Early diagnosis and a systematic trauma approach are critical for preventing life-threatening complications (Schissler and Pruden). This study aimed to describe the demographic and clinical characteristics, ECG findings and emergency department outcomes of children presenting with electrical injury.

METHODS

This study was designed as a single-center case series comprising a one-year retrospective analysis of pediatric trauma patients; patients under 18 years of age who presented to the emergency department of a tertiary hospital due to electrical injury between 20 July 2025 and 20 July 2026 were included. Demographic data (age, sex), clinical findings (trauma site, electrical entry–exit injury sites, burn areas, electrocardiography (ECG) findings, voltage type, mechanism of accident) and clinical outcome data (ward and intensive care admissions, discharge and referral rates, number of deaths) were recorded. Categorical data are presented as numbers and percentages.

RESULTS

Nine patients under 18 years of age who presented to the emergency department due to electrical injury were included in the study. The mean age was 15.4 years; six patients (66.7%) were male and three (33.3%) were female. Four presentations (44.4%) occurred in summer, four (44.4%) in autumn and one (11.1%) in spring. Six cases (66.7%) resulted from home accidents and three (33.3%) from occupational accidents (Table 1).

Regarding the localization of the injury, six patients (66.7%) had upper-extremity involvement and one patient (11.1%) had generalized trauma involving the whole body, while no traumatic lesion was detected in two patients (22.2%). Eight patients (88.9%) had been exposed to 220-V low-voltage electrical current and one patient (11.1%) to high-voltage (>1000 V) industrial current. Electrical entry and exit burn marks were identified in only two patients (22.2%).

On electrocardiographic evaluation, sinus tachycardia was detected in two patients (22.2%), while seven patients (77.8%) showed no rhythm abnormality.

Eight of the nine patients (88.9%) were discharged after evaluation and observation in the emergency department, while one patient (11.1%) with extensive body burns due to high-voltage electrical injury was referred to a center with a burn unit for advanced treatment and admitted to the intensive care unit (ICU) (Table 2).

Table 1. Demographic characteristics (n=9)

Variable	**n (%) / Value**
Number of patients	9
Age, mean (years)	15.4
Sex	
Male	6 (66.7)
Female	3 (33.3)
Season of presentation	
Spring	1 (11.1)
Summer	4 (44.4)
Autumn	4 (44.4)
Winter	0 (0)
Place of injury	
Home accident	6 (66.7)
Occupational accident	3 (33.3)

Table 2. Clinical findings and outcomes (n=9)

Variable	**n (%)**
Voltage exposure	

220 V (low voltage)	8 (88.9)
≥1000 V (high voltage)	1 (11.1)
Injury localization	
Upper extremity	6 (66.7)
Generalized trauma	1 (11.1)
No traumatic lesion	2 (22.2)
Entry–exit burn marks	
Present	2 (22.2)
Absent	7 (77.8)
ECG findings	
Sinus tachycardia	2 (22.2)
No arrhythmia	7 (77.8)
Clinical outcome	
Discharged	8 (88.9)
Referral to burn center + ICU admission	1 (11.1)

DISCUSSION

In this retrospective study, the great majority of electrical injuries in the pediatric age group resulted from low-voltage home accidents; a substantial proportion of the patients showed a mild clinical course and could be safely discharged after a short period of observation. In contrast, high-voltage electrical injury caused severe burns and required intensive care treatment at an advanced center.

The absence of electrocardiographic abnormalities in most patients and the detection of sinus tachycardia in only two cases support the observation that serious cardiac complications are rare

in low-voltage electrical injuries (Karray et al.; Corrall et al.). Nevertheless, the need for close monitoring persists in patients with high-voltage exposure or clinical risk factors.

The main limitations of this study are its single-center, retrospective design and the small number of cases, which limit the generalizability of the findings. Nonetheless, given the limited data reported from our country on childhood electrical injuries, this case series is expected to contribute to the literature.

CONCLUSION

Although low-voltage electrical injuries mostly have a good prognosis, high-voltage injuries can cause serious morbidity. Larger, multicenter studies are needed to confirm these findings and to better characterize the clinical features of electrical injuries in childhood.

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KEYWORDS: Electrical Injuries, Child, Adolescent, Emergency Department

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M4625-Özet Metin

AKUT AĞIR ASTIM ATAĞINDA BASAMAKLI ILAÇ TEDAVISI

Rıdvan Selen

Malatya Eğitim ve Araştırma Hastanesi, Çocuk İmmünoloji ve Alerji Hastalıkları Uzmanı

Astım genellikle kronik hava yolu inflamasyonu ile karakterize heterojen bir hastalıktır. Astım farklı ülkelerde nüfusun %1–29’unu, dünya çapında yaklaşık 300 milyon kişiyi etkileyen oldukça

yaygın bir küresel hastalıktır. Çocukluk çağının en sık görülen kronik hastalığı olan astım, okul devamsızlığı ve hastane yatışlarının önemli bir nedenidir. Astım; hışıltı, nefes darlığı, göğüste sıkışma ve/veya öksürük gibi solunum semptomları ve zamana ve yoğunluğa göre değişen ekspiratuvar hava akımı kısıtlılığı ile tanımlanmaktadır.

Astım tanısı, karakteristik semptom öyküsü ile değişken ekspiratuvar hava akımı kısıtlanmasının gösterilmesine dayanır. Semptomlar ve hava akımı kısıtlanması kendiliğinden veya tedaviyle düzelebilmekle birlikte; viral solunum yolu enfeksiyonları, alerjen veya irritan maruziyeti, egzersiz ve soğuk hava gibi tetikleyicilerle belirginleşebilir. Bazı hastalarda, özellikle viral enfeksiyonlar gibi tetikleyicilerin ardından, semptomlarda ve hava akımı kısıtlanmasında belirgin kötüleşmeyle seyreden astım atakları (alevlenmeler) ortaya çıkabilir.

Astım alevlenmesi; nefes darlığı, öksürük, hışıltı veya göğüste sıkışma gibi semptomlarda progresif artış ve akciğer fonksiyonlarında bozulma ile karakterize klinik bir durumdur. Semptomlar akut olarak aniden başlayabileceği gibi saatler veya günler içerisinde subakut olarak da gelişebilir ve nadiren astımın ilk bulgusu olarak ortaya çıkabilir.

Astım alevlenmeleri; başta rinovirüs, influenza, adenovirüs, boğmaca, respiratuvar sinsityal virüs (RSV) ve bocavirüs olmak üzere solunum yolu enfeksiyonları, polen, ev tozu akarı ve mantar gibi alerjenlere veya mesleki etkenlere maruziyet, sigara dumanı, ağır kokular, hava kirliliği ve soğuk-kuru hava gibi solunum yolu irritanları, besin alerjileri, fiziksel aktivite ve inhale kortikosteroid tedavisine uyumsuzluk gibi çeşitli faktörlerle tetiklenebilir.

Tanı anında, izlemde ve özellikle atak geçiren hastalarda düzenli olarak risk faktörleri değerlendirilmelidir. Her kontrolde astım tanısı doğrulanmalı, inhaler teknik ve tedavi uyumu değerlendirilmeli, tetikleyiciler ve komorbiditeler belirlenmeli ve gerekli durumlarda ileri testler uygulanmalıdır.

Astım atağının ayırıcı tanısında akut epiglottit, laringotrakeobronşit, bakteriyel trakeit, vokal kord disfonksiyonu, yabancı cisim aspirasyonu, akut bronşit/bronşiolit, pnömoni, pnömotoraks, pulmoner ödem, pulmoner emboli, kronik solunum yolu hastalıklarının alevlenmesi, sol kalp yetmezliği, hiperventilasyon sendromu ve anafilaksi göz önünde bulundurulmalıdır.

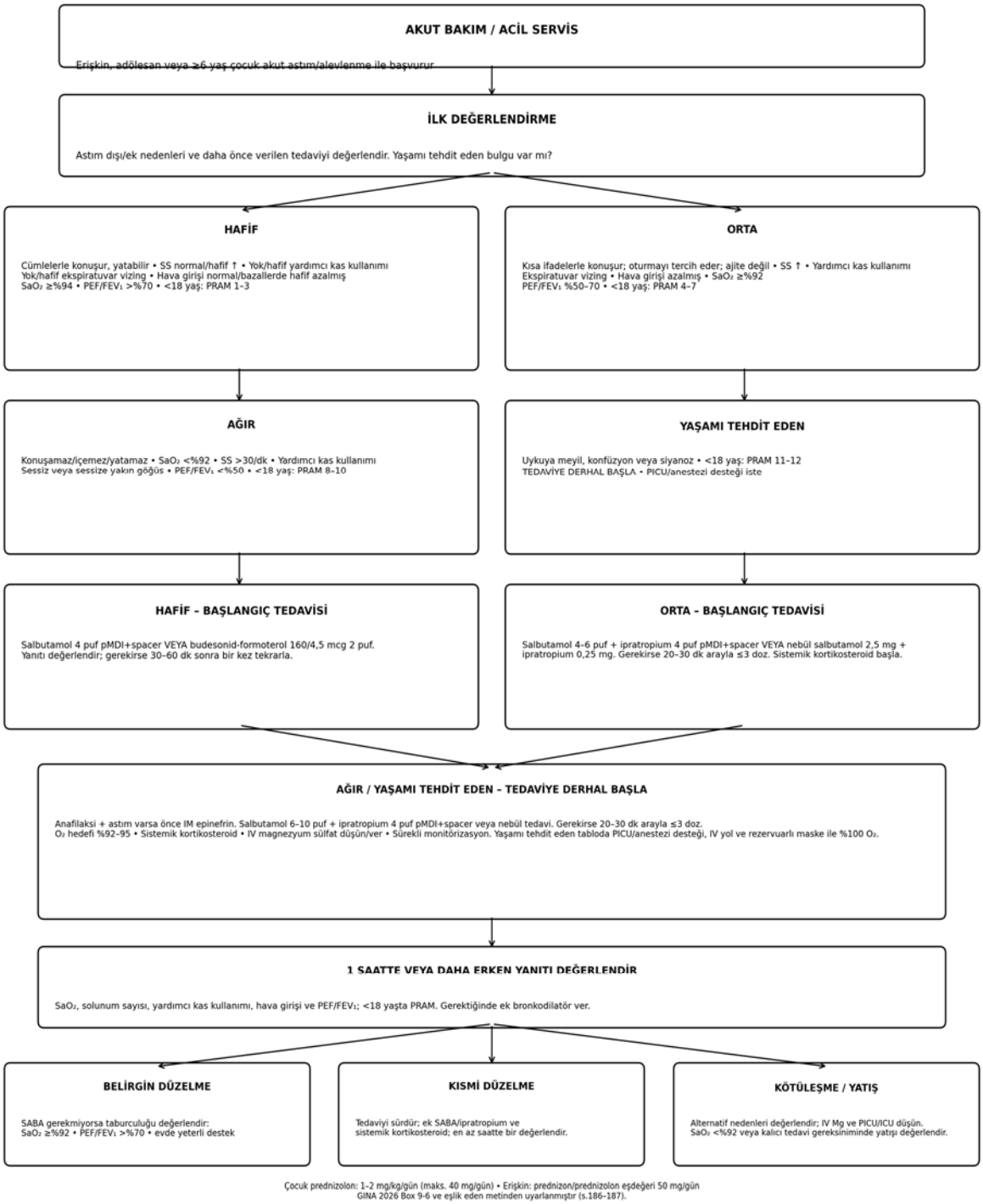
Astım tanısını doğrulamak ve atak şiddetini belirlemek için hasta, hedefe yönelik öykü ve fizik muayene ile hızlı bir şekilde değerlendirilmeli; atak tedavisinin başlanması geciktirilmemelidir. Atak şiddetinin belirlenmesinde öykü ve fizik muayeneye ek olarak oksijen satürasyonu (SaO_2), beş yaş üzerindeki çocuklarda tepe ekspiratuvar akım (PEF) ölçümü ve solunum fonksiyon testlerinden yararlanılmalıdır.

Astım atağının şiddeti klinik bulgular, oksijen satürasyonu ve solunum fonksiyonları birlikte değerlendirilerek belirlenmelidir (Tablo 1).

Tablo 1. Okul çağı çocukları (6–11 yaş), adölesan ve erişkinlerde astım atak şiddeti sınıflaması

Hafif-orta atak	**Ağır atak**	**Hayatı tehdit eden atak**
Oturmayı tercih eder	Öne eğilerek oturmayı tercih eder	Öne eğilerek oturmayı tercih eder
Ajite değildir	Ajitedir	Uykuya meyilli, konfüze
Kısa cümlelerle konuşur	Kelimelerle konuşur	Konuşamaz
Solunum sayısı artar; yardımcı solunum kaslarını kullanmaz	Solunum sayısı >30/dk; yardımcı solunum kaslarını kullanır	Solunum sayısı >30/dk; solunum yetmezliği bulguları
Kalp hızı 100–120/dk	Kalp hızı >120/dk	Kalp hızı >120/dk; hipotansiyon, aritmi, bradikardi
SaO_2 %90–95	SaO_2 <%90	SaO_2 <%90, siyanoz
Vizing +/-; PEF >%50	Vizing; PEF <%50	Sessiz akciğer; PEF yapamaz

Ağır astım atağı potansiyel olarak yaşamı tehdit eden ve hızlı müdahale gerektiren bir durumdur. Astıma bağlı ölüm riskinde artışla ilişkili özellikler klinik olarak hızla belirlenmeli ve bu risk faktörlerini taşıyan hastalar, atak sırasında erken tıbbi yardım almaları konusunda yönlendirilmelidir.
Astım atak yönetimi; yazılı eylem planı eşliğinde hastanın kendisi tarafından yönetim, birinci basamakta tedavi ve acil servis/hastanede tedavi olmak üzere üç aşamada ele alınabilir.
Akut veya subakut astım atağı ile başvuran hastada değerlendirme, atak şiddetinin belirlenmesi ve basamaklı tedavi yaklaşımı Şekil 1'de özetlenmiştir.



Şekil 1. 6–11 yaş çocuklarda, adölesanlarda ve erişkinlerde acil serviste astım atak yönetimi
Astım atağı sonrası taburculukta semptomlar, oksijen satürasyonu ve solunum fonksiyonlarındaki düzelme değerlendirilmeli; kontrol edici tedavi düzenlenerek inhaler teknik, tedavi uyumu ve

değiştirilebilir risk faktörleri gözden geçirilmeli, kurtarıcı ilaç gereksinime göre azaltılmalı ve hastanın yazılı astım eylem planı yeniden değerlendirilmelidir.
İntramüsküler epinefrin, anafilaksi ve anjiyoödem ile ilişkili astım atağında standart tedaviye ek olarak endike olup rutin astım atak tedavisinde önerilmez; standart tedaviye yanıt vermeyen hastalarda helyum-oksijen tedavisi düşünülebilir ancak erişilebilirlik, maliyet ve teknik olanaklar göz önünde bulundurulmalıdır.
Astım atak tedavisinde akciğer enfeksiyonu bulguları yoksa antibiyotik önerilmemeli; anksiyolitik ve hipnotik ilaçların solunum depresyonuna yol açabilmesi nedeniyle sedasyondan kesinlikle kaçınılmalıdır.
Sonuç olarak, astım atağında hastanın atak şiddeti hızla değerlendirilmeli, gerekli oksijen ve bronkodilatör tedavi gecikmeden başlanmalı ve atağın şiddetine göre ek tedaviler uygulanmalıdır. Taburculuk öncesinde tedavi yeniden düzenlenmeli, hasta kontrole çağrılmalı ve mutlaka yazılı astım eylem planı verilmelidir.

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M4626-Özet Metin

ACIL SERVISTE PEDIATRIK EKG'NIN DOĞRU YORUMLANMASI: SISTEMATIK YAKLAŞIM VE KIRMIZI BAYRAKLAR

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Amaç

Pediatrik elektrokardiyografinin (EKG) yorumlanması, yaşa bağlı fizyolojik değişkenlik nedeniyle erişkin EKG değerlendirmesinden farklıdır. Kalp hızı, elektriksel aks, PR ve QRS süreleri, R/S progresyonu ve T dalgası polaritesi yaşla değişebilir; bu nedenle erişkin referanslarının çocuklara doğrudan uygulanması fizyolojik bulguların patolojik kabul edilmesine veya önemli anormalliklerin gözden kaçırılmasına yol açabilir. Acil serviste ise EKG'nin kısa sürede, tekrarlanabilir ve klinik bağlamla uyumlu değerlendirilmesi gerekir. Bu konuşmanın amacı, pediatrik EKG yorumunda kullanılabilecek sistematik bir yaklaşımı özetlemek; normal yaşa bağlı varyantları önemli patolojilerden ayırmak ve acil değerlendirmede gözden kaçırılmaması gereken kırmızı bayrakları vurgulamaktır.

Yöntem

Konuşma, pediatrik acil serviste sık karşılaşılan EKG sorunları temelinde olgu odaklı ve basamaklı bir eğitim modeli şeklinde yapılandırıldı. Her EKG için aynı sıranın kullanılması önerildi: kalp hızı, ritim, aks, intervaller, QRS kompleksi ve ST-T değişiklikleri. Değerlendirme; yaşa özgü normal değerler, klinik bulgular ve EKG paternlerinin birlikte yorumlanması üzerine kuruldu. Royal Children's Hospital pediatrik EKG kaynakları ile güncel Avrupa Kardiyoloji Derneği (ESC) miyokardit/perikardit ve QT değerlendirme önerilerindeki temel ilkeler sunuma

dahil edildi. Senkop, göğüs ağrısı, taşikardi, bradikardi ve elektrolit bozuklukları gibi acil servis senaryoları üzerinden kritik EKG bulguları ele alındı.

Bulgular

Sistematik değerlendirmede ilk basamak kalp hızının yaşa uygunluğunun belirlenmesidir. Taşikardi saptandığında yalnızca hızın değil, ritmin sinüs kökenli olup olmadığının değerlendirilmesi gerekir. Sinüs ritmi için her QRS öncesinde P dalgasının bulunması, her P dalgasını QRS'nin izlemesi, P dalgasının DII'de pozitif olması ve PR ilişkisinin sabitliği birlikte değerlendirilmelidir. Elektriksel aks yaşa bağımlıdır; örneğin yenidoğanda sağ aks fizyolojik olabilir.

İntervaller değerlendirilirken kısa PR varlığında delta dalgası ve QRS genişliği pre-eksitasyon açısından incelenmelidir. Uzun PR veya bradikardide ise P-QRS ilişkisi değerlendirilerek birinci derece atriyoventriküler (AV) blok, Mobitz tip I, Mobitz tip II ve tam AV blok ayrımı yapılmalıdır. Mobitz tip II ve tam AV blok acil değerlendirmede önemli kırmızı bayraklardır. QRS genişliği tek başına tanı değildir; dal bloğu, ventriküler ektopi veya ventriküler taşikardi yanında hiperkalemi ve sodyum kanal blokajı gibi metabolik/toksik nedenler de düşünülmelidir.

Düzeltilmiş QT (QTc) özellikle senkoplu çocukta manuel olarak kontrol edilmelidir. QT ölçümünde T dalgasının sonu doğru belirlenmeli ve U dalgası QT'ye dahil edilmemelidir. Eforla senkop ve belirgin QTc uzaması uzun QT sendromu açısından ileri değerlendirme gerektirir. ST-T değişiklikleri de yaş ve klinik bağlamdan bağımsız yorumlanmamalıdır. Sağ prekordiyal derivasyonlarda juvenil T dalga inversiyonu fizyolojik olabilirken; senkop, eforla semptom, göğüs ağrısı, ailede ani ölüm veya ventriküler aritmi eşlik etmesi patoloji olasılığını artırır.

ST yükselmesinde erken repolarizasyon ile perikardit/miyoperikardit ayrımı yalnızca EKG ile yapılmamalı; klinik bulgular, troponin ve gerektiğinde ekokardiyografi birlikte değerlendirilmelidir. Benzer şekilde normal EKG miyokarditi dışlamaz. Hiperkalemide sivri T dalgalarından PR uzaması, P dalgasında azalma ve QRS genişlemesine ilerleyen değişiklikler görülebilir; ancak normal EKG ciddi hiperkalemide aritmi riskini dışlamaz. Hipokalemide T dalgasında düzleşme, ST depresyonu ve belirgin U dalgası görülebilir; T-U füzyonu yanlışlıkla QT uzaması olarak değerlendirilebilir. Geniş QRS taşikardide ise ritmin kesin adını koyma çabası hemodinamik değerlendirmeyi geciktirmemeli; instabil hastada resüsitasyon basamakları ve senkronize kardiyoversiyon öncelenmelidir.

Sonuç

Pediatrik EKG'nin güvenli yorumlanmasında temel yaklaşım, her kaydı aynı sistematik sırayla değerlendirmek ve her bulguyu çocuğun yaşı ile klinik tablosu içinde yorumlamaktır. Normal varyant ile patolojiyi ayırmada tek bir derivasyon veya tek bir ölçüm yerine hız, ritim, aks, intervaller, QRS ve ST-T bütünlüğü dikkate alınmalıdır. Özellikle senkopla birlikte uzun QT, Mobitz tip II veya tam AV blok, geniş QRS taşikardi, klinikle uyumsuz ST-T değişiklikleri ve elektrolit bozukluğunu düşündüren EKG bulguları acil serviste ileri değerlendirme gerektiren başlıca kırmızı bayraklardır. Otomatik EKG ölçümleri klinik değerlendirmeyi destekleyebilir ancak özellikle QTc gibi kritik parametrelerde manuel doğrulamanın yerini almamalıdır. Sonuç olarak pediatrik EKG yorumunda "yaşı bil, sistematik oku, kırmızı bayrağı kaçırma" yaklaşımı; fizyolojik varyantların gereksiz ileri incelemeye yönlendirilmesini azaltırken, yaşamı tehdit edebilecek aritmi ve kardiyak hastalıkların erken fark edilmesine katkı sağlayabilir.

Destek: Bu konuşma için herhangi bir proje veya araştırma desteği alınmamıştır.
Finansal bağlantı: Yazarın bildirdiği herhangi bir finansal bağlantı bulunmamaktadır.

M4627-Tam Metin

BIPHASIC ANAPHYLACTIC REACTIONS AND OBSERVATION PERIOD

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Aim

Anaphylaxis is a rapidly developing, potentially life-threatening systemic hypersensitivity reaction. Diagnosis is clinical, and the absence of skin manifestations does not exclude anaphylaxis. In infants and young children, nonspecific findings such as vomiting, irritability, behavioral or voice changes, and increased salivation may complicate diagnosis. Intramuscular epinephrine is the first-line treatment. Biphasic anaphylaxis is the recurrence of symptoms after complete resolution of the initial reaction without allergen re-exposure. This presentation aims to evaluate the incidence, timing, and risk factors of biphasic anaphylaxis in pediatric and adult patients and summarize risk-based observation and safe discharge (1–5).

Methods

Current international guidelines and pediatric and adult studies on anaphylaxis and biphasic anaphylaxis were reviewed. The incidence and timing of biphasic reactions, initial reaction severity, repeated epinephrine requirement, and factors affecting observation duration were evaluated. Particular consideration was given to pediatric studies published in 2024–2025 and the 2026 risk-based observation recommendations of the National Institute for Health and Care Excellence (NICE) (1,2,5–10).

Results

The reported incidence of biphasic anaphylaxis varies by definition and population, ranging from 0.4% to 20%, while clinically severe reactions are less common (5). In an adult study, any biphasic reaction occurred in 8.9%, reactions meeting anaphylaxis criteria in 3.0%, and reactions causing severe vital sign abnormalities in 1.0% (6). In a Japanese pediatric cohort, six of 353 hospitalized patients (1.7%) developed biphasic reactions (7).

Major risk factors include severe initial reaction, hypotension or hypoxia, severe respiratory or cardiovascular involvement, multiple epinephrine doses, delayed epinephrine administration, persistent symptoms, and previous biphasic reactions (5).

A 2025 multicenter study evaluated 5,641 children aged 6 months–17 years across 31 emergency departments. Repeat epinephrine was required in 4.7% at two hours, 1.9% at four hours, 1.1% at six hours, and 0.8% at eight hours. The threshold at which incremental risk fell below 2% was 105 minutes without respiratory or cardiovascular involvement, 109 minutes with respiratory involvement only, and 161 minutes with cardiovascular involvement. Overall, 95.3% of patients met the safe discharge threshold at two hours and 98.1% at four hours (8).

These findings support risk-based rather than uniform observation. NICE 2026 assesses observation from clinical resolution. Two-hour observation may be considered in low-risk patients with complete response within 5–10 minutes to a single intramuscular epinephrine dose administered within 30 minutes of symptom onset, complete symptom resolution, and safe discharge conditions. At least six hours is recommended when two epinephrine doses are required or there is a history of biphasic reaction. At least 12 hours is recommended for severe anaphylaxis

requiring more than two doses, severe asthma, severe respiratory compromise, possible ongoing allergen absorption, or when prompt return to emergency care cannot be ensured (10).

Conclusion

Observation after anaphylaxis should not be standardized for all patients. Safe discharge should consider clinical resolution, initial reaction severity and biphasic risk, epinephrine requirement, appropriate observation, access to and knowledge of epinephrine auto-injector use, and social and geographical circumstances. Greater caution is warranted in children with cardiovascular involvement. Unnecessarily prolonged observation may be avoided in low-risk patients, while extended observation or hospitalization should be considered in high-risk patients. The fundamental approach should be **risk-based, individualized observation rather than "the same duration for every patient."**

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M4628-Özet Metin

FASİYAL TRAVMALARDA MULTİDİSİPLİNER YAKLAŞIM: NE ZAMAN HANGİ BRANŞ?

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Amaç

Pediatrik fasiyal travmalar; değişen kraniyofasiyal oranlar, kemik elastikiyeti, paranazal sinüslerin gelişimi ve diş germlerinin varlığı nedeniyle erişkin travmalarından farklı özellikler gösterir. Yönetimde yalnızca kırığın anatomik redüksiyonu değil; havayolu, görme, oklüzyon ve nörolojik fonksiyonların korunması ile yüz iskeletinin büyüme ve gelişiminin sürdürülmesi de önemlidir. Bu derlemenin amacı, pediatrik fasiyal travmalarda yaşa bağlı anatomik ve klinik özellikleri özetlemek ve yaralanmanın lokalizasyonu ile tehdit altındaki fonksiyona göre hangi uzmanlık alanlarının ne zaman sürece dahil edilmesi gerektiğini vurgulamaktır.

Yöntem

Pediatrik fasiyal travmanın anatomik özellikleri, epidemiyolojisi, acil değerlendirmesi, görüntüleme yaklaşımı ve nazal, orbital, mandibular, frontal sinüs ve kafa tabanı yaralanmalarına ilişkin klinik noktalar başlıklar halinde ele alındı. Multidisipliner yaklaşım; acil, kulak burun boğaz, göz hastalıkları, beyin cerrahisi, plastik/kraniyofasiyal cerrahi ve ağız-yüz-çene cerrahisinin rolü üzerinden değerlendirildi.

Bulgular

Pediatrik fasiyal kırıklar erişkinlere göre daha nadirdir ve özellikle beş yaş altında seyrek görülür; yaş ilerledikçe sıklık artar. Çocuklarda yüzün kafatasına göre daha küçük ve retrüde olması nedeniyle küçük yaşlarda kraniyal yaralanmalar görece daha ön plandadır. Yaş ilerledikçe yüz iskeleti ve paranazal sinüsler gelişir ve kırık paterni erişkin tipine yaklaşır. Çocuk kemiklerinin elastik yapısı minimal deplase ve yeşil ağaç benzeri kırıklara yol açabildiği gibi, orbital trapdoor kırıklarında ekstraoküler kasın kırık hattında sıkışmasına da neden olabilir. Bu olgularda dışarıdan belirgin ekimoz veya şişlik bulunmayabilir; diplopi, göz hareketlerinde kısıtlılık, bulantı, kusma ve bradikardi uyarıcı bulgulardır. Özellikle kusma ve bradikardi okulokardiyak refleksi düşündürmelidir.

İlk değerlendirme havayolu, solunum ve dolaşımın stabilizasyonuyla başlamalı; eşlik eden kafa, servikal omurga ve diğer sistem yaralanmaları gözden kaçırılmamalıdır. Kraniyofasiyal kırıkların temel görüntüleme yöntemi bilgisayarlı tomografidir; ancak görüntüleme klinik muayenenin yerini almamalıdır. Nazal travmada kırığın kendisinden çok septal hematom acil önem taşır ve saptandığında kıkırdak nekrozu ile ileride gelişebilecek deformiteyi önlemek amacıyla drenaj gerekir. Mandibula travmasında maloklüzyon, ağız açmada kısıtlılık, ağrı, asimetri ve dental yaralanmalar değerlendirilmelidir. Frontal sinüs posterior duvar yaralanması, beyin omurilik sıvısı kaçağı veya intrakraniyal yaralanma varlığında beyin cerrahisi ile birlikte değerlendirme gerekir.

Branş seçimi yaralanan anatomik yapı ve tehdit altındaki fonksiyona göre yapılmalıdır. Havayolu, burun, septum, frontal sinüs ve ön kafa tabanı yaralanmalarında kulak burun boğaz; görme, glob bütünlüğü, ekstraoküler hareket bozukluğu ve entrapment şüphesinde göz hastalıkları; kafa tabanı, intrakraniyal yaralanma, beyin omurilik sıvısı kaçağı ve frontal sinüs posterior duvar yaralanmalarında beyin cerrahisi; mandibula, maloklüzyon ve dentoalveolar yaralanmalarda ağız-yüz-çene ekibi; kompleks yüz iskeleti ve rekonstrüksiyon gerektiren yaralanmalarda plastik/kraniyofasiyal cerrahi sürece dahil olabilir. Pediatrik hastalarda yüksek iyileşme ve yeniden şekillenme kapasitesi, büyüme merkezleri ve diş germlerinin korunması gereksinimi nedeniyle mümkün olduğunca büyümeyi koruyan ve gereksiz implantasyondan kaçınan yaklaşımlar önemlidir. Konservatif tedavi seçilen hastalarda da büyüme bozukluğu, nazal veya orbital deformite, mandibular asimetri ve dental gelişim sorunları açısından uzun dönem takip önem taşır.

Sonuç

Pediatrik fasiyal travmalar, çocukluk dönemine özgü anatomik ve gelişimsel özellikler nedeniyle erişkin fasiyal travmalarından farklı değerlendirilmelidir. Çocuklarda yüksek kemik elastikiyeti,

devam eden kraniyofasiyal büyüme, gelişmekte olan paranazal sinüsler ve diş germlerinin varlığı hem kırık paternini hem de tedavi yaklaşımını etkilemektedir. Bu nedenle tedavinin amacı yalnızca kırığın anatomik olarak düzeltilmesi değil; havayolu, görme, oküler hareketler, oklüzyon ve nörolojik fonksiyonların korunması, aynı zamanda yüz iskeletinin normal büyüme ve gelişiminin sürdürülmesi olmalıdır.
İlk değerlendirmede yaşamı tehdit eden yaralanmalar önceliklendirilmeli, ardından fasiyal travmaya özgü acil durumlar sistematik olarak araştırılmalıdır. Özellikle septal hematom, orbital trapdoor kırığı ve ekstraoküler kas entrapmanı, görme tehdidi, beyin omurilik sıvısı kaçağı ve intrakraniyal yaralanmaların erken tanınması kalıcı fonksiyon kayıplarının önlenmesi açısından önem taşır. Pediatrik hastalarda dış görünümün nispeten normal olması ciddi yaralanmayı dışlamaz; white-eyed blowout fracture bunun önemli örneklerinden biridir.
Branş seçimi yalnızca kırığın lokalizasyonuna göre değil, yaralanan anatomik yapı ve tehdit altındaki fonksiyona göre yapılmalıdır. Bu nedenle kompleks pediatrik fasiyal travmaların yönetiminde acil, kulak burun boğaz, göz hastalıkları, beyin cerrahisi, ağız-yüz-çene cerrahisi ve plastik/kraniyofasiyal cerrahinin gerektiğinde eş zamanlı katkısı önemlidir. Çocuklarda yüksek iyileşme ve yeniden şekillenme kapasitesi göz önünde bulundurularak mümkün olduğunca konservatif, büyüme merkezlerini ve diş germlerini koruyan, gereksiz implantasyondan kaçınan yaklaşımlar tercih edilmelidir. Başarılı yönetimin temelini, doğru hastada gerekli uzmanlık alanlarının doğru zamanda sürece dahil edilmesi oluşturmaktadır.

Destek
Bu çalışma için herhangi bir destek alınmamıştır.

Finansal bağlantı
Yazarların bildireceği herhangi bir finansal bağlantı bulunmamaktadır.

M4629-Tam Metin

STEP-BY-STEP MEDICAL TREATMENT PROTOCOLS IN PEDIATRIC STATUS EPILEPTICUS

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Objective

Pediatric Status Epilepticus (SE) is one of the most common neurological emergencies in childhood. The aim of this review/report is to present step-by-step medical treatment protocols aimed at preventing neuronal damage and refractoriness in children in light of the International League Against Epilepsy (ILAE) seizure intervention timing limits (t1 and t2), pharmacodrug-resistance mechanisms at the receptor level, and early management strategies in line with current literature data.

Method

Evidence-based step-by-step medical treatment algorithms regarding pediatric SE management were synthesized by examining ILAE SE Diagnosis and Classification Committee guidelines, American Epilepsy Society (AES) algorithms, Italian Pediatric Status Epilepticus Group (IPSE)

2025 data, and recently published international guidelines (Lancet Neurology, Continuum, Epilepsia).

Findings

Operational diagnosis in pediatric status epilepticus begins at the t1 time point (5th minute for generalized convulsive seizures), where the seizure's self-terminating mechanisms fail. If the seizure prolongs up to the t2 time point (30th minute), the risk of long-term neuronal damage, neuronal death, and resistance increases significantly.

As the seizure prolongs, inhibitory mechanisms in the brain weaken (endocytosis of GABA-A receptors into the cytosol via clathrin-coated vesicles and intracellular chloride accumulation resulting from KCC2 inactivation), while excitatory mechanisms (increase of AMPA and NMDA receptors on the cell surface) strengthen. This situation causes pharmacoresistance to develop against benzodiazepines within minutes. Therefore, actions must be taken with the principle of "Time is Brain".

The step-by-step treatment protocol consists of three main phases:

- **First Step (0–10 Minutes - Benzodiazepines):** The first dose of benzodiazepine must be administered immediately. If vascular access is present, IV Lorazepam (0.1 mg/kg, max 4 mg) or IV Diazepam (0.2 mg/kg, max 10 mg); if vascular access is absent, buccal/intranasal Midazolam (0.2–0.5 mg/kg, max 10 mg) or IM Midazolam is preferred. Underdosing should not be done out of fear of respiratory depression. If the seizure does not stop within 5–10 minutes, the second dose can be repeated.
- **Second Step (10–30 Minutes - Non-Benzodiazepine Antiseizure Medications - ASM):** Secondary drug loading is performed in patients who do not respond to the first step. The ESETT, ConSEPT, and EcLIPSE studies have shown that the efficacies of Levetiracetam (40–60mg/kg, max 4500 mg), Sodium Valproate (20–40mg/kg, max 3000 mg), and Fosphenytoin/Phenytoin (20 mg/kg PE, max 1500 mg) agents are equivalent.

Table 1. Second Step Non-Benzodiazepine Antiseizure Medications (ASMs)

Medication	**Loading Dose**	**Maximum Dose**	**Critical Side Effect and Features**
Levetiracetam	40–60 mg/kg	4500mg	Lowest risk of sedation and hypotension; ideal for limited resources.
Sodium Valproate	20–40 mg/kg	3000 mg	Risk of hepatotoxicity and thrombocytopenia. CONTRAINDICATED in suspected mitochondrial disease.
Phenytoin / Fosphenytoin	20 mg/kg	1500 mg	Arrhythmia, hypotension, injection site reaction. May

			worsen seizures in Dravet syndrome.

- **Third Step and Early Infusion Strategy (30+ Minutes - Refractory SE):** Failure of the second step puts the patient into the Refractory SE category. IPSE 2025 (Rosati et al.) data revealed the importance of the "Early Low-Dose Midazolam Infusion" (<0.2 mg/kg/hour) bridge before subjecting the patient to high-dose anesthetics, endotracheal intubation, and the Pediatric Intensive Care Unit (PICU) process. While low-dose midazolam infusion started at an early stage after a single ASM provides 59% success, success drops to 37% despite high doses in delayed/rescue interventions. In true refractory cases, anesthetic infusions such as Ketamine (0.5–3 mg/kg IV loading, 1.5–10 mg/kg/hour infusion) and Propofol (paying attention to the risk of PRIS) are administered with continuous EEG monitoring.

Table 2. Third Step Continuous Infusion Anesthetics

Medication	Loading Dose	Infusion Dose	Critical Clinical Notes
Midazolam	0.2 mg/kg IV	0.05–2 mg/kg/hour	Starting low-dose (<0.2 mg/kg/hour) in the early phase reduces the need for intubation.
Ketamine	0.5 - 3 mg/kg IV	1.5–10 mg/kg/hour	NMDA receptor antagonist. Does not cause respiratory depression and hypotension.
Thiopental	3–5 mg/kg IV	3–5mg/kg/hour	Respiratory suppression and hypotension.
Propofol	1–2mg/kg IV	20–200 mcg/kg/min	**CAUTION:** Risk of Propofol Infusion Syndrome (PRIS)! Use in children >24–48 hours is limited.

Alternative treatments for SE include inhalation anesthetics (isoflurane and desflurane), hypothermia, pyridoxine, immunotherapy, ketogenic diet, emergency surgical resection, deep brain stimulation, and electroconvulsive therapy.

In cases developing following a febrile infection and showing resistance, 1st step immunotherapy (Pulse IV Methylprednisolone / IVIG) should be started within the first 72 hours without losing time, under suspicion of NORSE/FIRES.

Conclusion

Adhering step-by-step and timely to guidelines in Pediatric Status Epilepticus management largely reduces the risk of developing Refractory Status Epilepticus. Making an early diagnosis,

administering the first dose of benzodiazepines at a sufficient dose without delay, and establishing the early midazolam infusion bridge immediately in cases showing no response to the 2nd step are of vital importance.

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M4630-Tam Metin

CLİNİCAL APPROACH TO SUPRAVENTRİCULAR TACHYCARDİA

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Aim

Supraventricular tachycardia (SVT) encompasses tachyarrhythmias originating above or involving the His bundle. The most common re-entrant mechanisms are atrioventricular nodal re-entrant tachycardia (AVNRT) and atrioventricular re-entrant tachycardia (AVRT). Clinical manifestations and hemodynamic tolerance vary with age, tachycardia duration, ventricular function, and associated heart disease. This review aims to summarize an age-specific approach to diagnosis, acute management, follow-up, and selection of patients for electrophysiological study and catheter ablation, with particular attention to pediatric emergency practice. [1,2]

Method

This narrative clinical review integrates adult and pediatric guideline recommendations, expert consensus, and selected primary evidence on vagal maneuvers. It is organized around hemodynamic status, rhythm regularity, QRS duration and morphology, P-wave timing, atrioventricular relationships, pre-excitation, and response to vagal stimulation or adenosine. It is a clinical synthesis rather than a systematic review or an original patient-based study. Acute management is informed by the 2025 AHA/AAP pediatric and AHA adult resuscitation guidance. [3,4] Longer-term management incorporates the ESC SVT guideline and the PACES/HRS pediatric ablation consensus.

Findings

Mechanisms and age related presentation

Among re-entrant SVTs, AVRT predominates in neonates and infants, whereas AVNRT becomes more frequent with increasing age. Accessory pathways may conduct antegradely, producing ventricular pre-excitation during sinus rhythm, or conduct only retrogradely and remain concealed on the resting electrocardiogram (ECG). Consequently, the absence of a delta wave does not exclude accessory pathway-mediated tachycardia. Focal atrial tachycardia, atrial flutter, and junctional ectopic tachycardia (JET) require recognition because their mechanisms and responses to treatment differ from AV node-dependent re-entry. [5]

Infants may present with poor feeding, irritability, pallor, tachypnea, diaphoresis, or lethargy rather than recognizable palpitations. Prolonged episodes may lead to heart failure. Older children and adults more often describe abrupt-onset and abrupt-offset palpitations, sometimes accompanied by chest discomfort, dyspnea, dizziness, presyncope, or syncope. The clinical assessment should therefore establish both symptom severity and the probable duration of tachycardia. Major mechanisms and their distinguishing characteristics are summarized in Table 1.

Table 1. Major SVT mechanisms and distinguishing clinical features

AVNRT	AV nodal and perinodal re-entry; regular, usually narrow QRS; P waves often hidden or immediately after QRS	Increasing frequency in older children, adolescents, and adults
AVRT	AV node and accessory pathway circuit; orthodromic AVRT usually narrow; retrograde P waves may be visible	Predominant re-entrant mechanism in infants; resting pre-excitation may be absent
Focal atrial tachycardia	Focal automaticity or triggered activity; abnormal P-wave morphology; variable AV conduction may occur	Any age; incessant forms may cause ventricular dysfunction
Atrial flutter	Atrial macrore-entry; organized flutter activity with fixed or variable AV conduction	May occur in neonates or with congenital heart disease and prior surgery
JET	Automatic rhythm from the AV junction or His region; usually narrow QRS, sometimes AV dissociation	Especially relevant after congenital heart surgery

Initial assessment and electrocardiographic diagnosis

Initial evaluation should prioritize airway, breathing, circulation, mental status, and peripheral perfusion. Cardiorespiratory monitoring, vascular access, and a 12-lead ECG should be obtained when they do not delay urgent treatment. Hypotension, altered mental status, shock, ischemic chest discomfort in adults, or acute heart failure indicate a poorly tolerated tachycardia and require immediate escalation.

The ECG should be assessed systematically for regularity, QRS width, P-wave morphology and timing, and the atrial-to-ventricular relationship. A short RP interval may suggest typical AVNRT or orthodromic AVRT, whereas a long RP interval broadens the differential to atrial tachycardia and other re-entrant mechanisms. These patterns guide the differential diagnosis but do not independently establish the mechanism. A wide-complex tachycardia should be regarded as potentially ventricular until clarified.

Sinus tachycardia must be distinguished from SVT, particularly in febrile, dehydrated, distressed, or septic children. The 2025 pediatric algorithm describes rates usually at least 220 beats/min in infants and 180 beats/min in children as suggestive of SVT, together with abrupt rate change, little RR variability, and absent or abnormal P waves. These rate thresholds are clinical clues rather than stand-alone diagnostic criteria. Pediatric QRS interpretation must also be age appropriate; the PALS algorithm uses 0.09 seconds to separate narrow from wide complexes. [6]

When ventricular pre-excitation is identified, the absence of symptoms does not by itself establish a low-risk accessory pathway. Young patients require individualized risk assessment, taking account of noninvasive findings and, when indicated, electrophysiological measurements of pathway conduction. This assessment addresses a different clinical question from terminating an acute SVT episode. [7]

Acute treatment according to hemodynamic status

When tachycardia causes cardiopulmonary compromise, synchronized cardioversion should not be delayed. In children, the initial synchronized energy is 0.5–1 J/kg, increasing to 2 J/kg if the first attempt fails. Sedation may be provided when feasible, without delaying treatment. Adenosine may be given for regular narrow-complex SVT if vascular access is already available, provided this does not postpone cardioversion.

In stable regular narrow-complex SVT, age-appropriate vagal maneuvers are the first intervention. Cooperative older patients may perform a Valsalva maneuver. In the adult REVERT randomized trial, a modified Valsalva maneuver incorporating supine repositioning and passive leg elevation restored sinus rhythm in 43% of participants, compared with 17% after the standard maneuver. These results support its use in suitable adults; direct extrapolation of the effect size to infants and young children is inappropriate. [8]

If vagal maneuvers fail, adenosine should be administered rapidly through IV/IO access, followed immediately by a flush, with continuous ECG recording. The pediatric initial dose is 0.1 mg/kg, maximum 6 mg; a subsequent dose of 0.2 mg/kg, maximum 12 mg, may be considered. The adult algorithm specifies 6 mg IV initially and 12 mg if required. Rapid delivery and a functioning vascular line are essential because adenosine has a very short duration of action

Adenosine terminates many AV node-dependent tachycardias, including AVNRT and orthodromic AVRT. If transient AV block occurs while atrial activity continues, atrial flutter or atrial tachycardia may become apparent. Failure to terminate the rhythm should prompt reassessment of delivery, rhythm mechanism, and the possibility of immediate recurrence. The ECG during treatment should be retained whenever possible because the response can clarify the diagnosis.

Difficult rhythms and treatment pitfalls

Adenosine may be considered in selected stable patients with regular monomorphic wide-complex tachycardia, with monitoring and expert input. It should not be used indiscriminately in an uncertain wide-complex rhythm. Irregular pre-excited atrial fibrillation is a particularly important exception: AV nodal blocking drugs can favor rapid accessory pathway conduction and precipitate

ventricular fibrillation. Prompt electrical treatment is required if the patient is unstable; stable cases require pathway-directed specialist management.
Persistent pediatric SVT despite vagal maneuvers and adenosine warrants expert consultation. For cardiopulmonary compromise that persists despite these measures and synchronized cardioversion, the 2025 AHA/AAP guidance allows consideration of IV procainamide, amiodarone, or sotalol when expert consultation is unavailable. Drug selection requires attention to ventricular function, blood pressure, conduction intervals, and proarrhythmia. Repeated empiric drug administration should not replace rhythm reassessment or timely cardioversion.

Recurrence prevention in infancy
Preventive medication in infants should be individualized according to the documented mechanism, pre-excitation, recurrence burden, and treatment tolerance. In the randomized SAMIS trial, 61 infants completed a comparison of digoxin and propranolol; SVT recurrence did not differ significantly between groups. Infants with Wolff-Parkinson-White syndrome were excluded, so these findings should not be generalized to that subgroup or interpreted as proving therapeutic equivalence. [9]
Electrophysiological study ablation and follow up
Electrophysiological study establishes the tachycardia mechanism and can localize an accessory pathway. Catheter ablation provides definitive treatment for appropriately selected patients with recurrent symptomatic SVT, substantial impairment of daily activities, ineffective or poorly tolerated drug therapy, or clinically important accessory pathway properties. The decision should incorporate the patient's preferences, procedural risks, and the likelihood of recurrence without intervention.
In children, body size, arrhythmia burden, ventricular dysfunction, congenital heart disease, pathway location, and center experience influence the balance between medical treatment and ablation. The PACES/HRS consensus uses approximately 15 kg as a practical distinction between smaller and larger children, rather than an absolute eligibility threshold. In the smallest infants, ablation is generally reserved for life-threatening or medically refractory arrhythmias. Septal substrates require particular attention to the risk of AV block.
Prospective multicenter pediatric ablation data demonstrate the importance of reporting both procedural efficacy and adverse events. In the 2004 prospective cohort, acute radiofrequency ablation success was 95.7%, while AV block was concentrated in AVNRT and septal accessory pathway ablation. These historical results illustrate substrate-dependent risk; they should not be presented as contemporary performance estimates for every center or for very small infants. [10]
After termination, a sinus-rhythm ECG should be reviewed for pre-excitation and conduction abnormalities. Subsequent evaluation should be guided by the clinical presentation; echocardiography is especially relevant when structural disease or ventricular dysfunction is suspected, and ambulatory ECG recording may help document intermittent symptoms. Follow-up should include a recurrence plan and age-appropriate education about recognizing symptoms and seeking care.

Conclusion

An age-sensitive, mechanism-oriented approach supports safe SVT care. Hemodynamic assessment determines urgency, while rhythm regularity, QRS width, atrioventricular relationships, and pre-excitation guide treatment. Unstable tachycardia requires prompt synchronized cardioversion. Stable regular narrow-complex SVT is usually approached with vagal maneuvers followed by adenosine. Irregular pre-excited rhythms require avoidance of AV nodal blockade. Electrophysiological evaluation and catheter ablation offer definitive management when the expected benefit outweighs procedural risk, with particular caution in small children.

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Keywords: supraventricular tachycardia; AVNRT; AVRT; pediatric emergency; adenosine; vagal maneuvers; catheter ablation

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M4631-Özet Metin

TRAKEOBRONŞİYAL YARALANMALARDA CERRAHİ ONARIM

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Özet

Giriş ve Amaç: Pediatrik trakeobronşiyal yaralanmalar, nadir görülen ancak yüksek mortalite ve morbidite potansiyeline sahip hava yolu acilleridir. Bu bildiride yaralanmaların etiyolojisi, tanısal

yaklaşımı, cerrahi endikasyonları ve rekonstrüksiyon prensiplerinin değerlendirilmesi amaçlanmıştır.
Genel Bilgiler: Yaralanmalar sıklıkla künt travmalar sonucunda gelişir. Klinik bulgular arasında dispne, pnömotoraks, cilt altı amfizemi ve persistan hava kaçağı bulunmaktadır. Bronkoskopi temel tanısal yöntemdir.
Tedavi: Stabil ve sınırlı yaralanmalarda konservatif takip uygulanabilirken komplet rüptür, ventilasyon yetersizliği ve kontrol edilemeyen hava kaçağında cerrahi onarım gereklidir.
Sonuç: Erken tanı, güvenli hava yolu kontrolü, anatomik rekonstrüksiyon ve multidisipliner takip başarılı tedavinin temelini oluşturmaktadır.
Anahtar Kelimeler: Trakeobronşiyal yaralanma, pediatrik travma, bronkoskopi, cerrahi onarım, hava yolu rekonstrüksiyonu.

GİRİŞ
Trakeobronşiyal yaralanmalar (TBY), çocukluk çağında nadir görülmesine rağmen yaşamı tehdit eden ciddi patolojilerdir. Pediatrik göğüs duvarının esnekliği nedeniyle travma enerjisi, belirgin kemik hasarı oluşturmadan mediastinal yapılara iletilebilir. Ayrıca hava yolu çapının küçük olması, ödem veya hematomun ciddi obstrüksiyona neden olmasını kolaylaştırmaktadır. Bu anatomik özellikler nedeniyle çocuklarda belirgin dış travma bulguları bulunmasa bile ciddi hava yolu yaralanmaları gelişebilmektedir.
Cheng ve arkadaşlarının 66 pediatrik olguyu değerlendirdikleri sistematik derlemede, tanısal güçlükler ve tedavi yaklaşımlarındaki farklılıklar vurgulanmıştır [1].

ETİYOLOJİ VE YARALANMA MEKANİZMALARI
Pediatrik TBY'lerin başlıca nedenleri trafik kazaları, yüksekten düşmeler, bisiklet kazaları ve yüksek enerjili spor yaralanmalarıdır. Künt travmalarda ani toraks kompresyonu ve deselerasyon kuvvetleri, özellikle distal trakea ve ana bronşlarda rüptüre neden olmaktadır.
Kiser ve arkadaşlarının 265 olguluk analizinde, yaralanmaların %76'sının karinanın 2 cm yakınında meydana geldiği bildirilmiştir [2].
Penetran yaralanmalar daha nadir olup servikal trakea ve çevre vasküler yapıları etkileyebilir. İatrojenik yaralanmalar ise entübasyon, tüp değişimi ve bronkoskopik işlemler sırasında gelişebilir. Özellikle posterior membranöz duvarda longitudinal laserasyonlar görülebilmektedir. Ayrıca çocuklarda özofagusa yerleşen düğme pillerin neden olduğu doku nekrozu, trakeal erozyon ve trakeoözofageal fistül gibi kompleks yaralanmalarla sonuçlanabilmektedir.

KLİNİK BULGULAR VE TANI
En sık klinik bulgular dispne, pnömotoraks, pnömomediastinum, cilt altı amfizemi ve hemoptizidir. Toraks tüpüne rağmen akciğerin ekspanse olmaması ve persistan masif hava kaçağı, majör hava yolu yaralanmasını düşündürmelidir.
Bilgisayarlı tomografi anatomik değerlendirmede yararlı olmakla birlikte yaralanmaları dışlamak için tek başına yeterli değildir. Cheng ve arkadaşları, pediatrik künt laringotrakeal travmalarda bilgisayarlı tomografinin yalancı negatiflik oranını %29,5 olarak bildirmiştir [1].
Bronkoskopi, yaralanmanın lokalizasyonunu, derinliğini ve yaygınlığını belirlemede temel yöntemdir. Ayrıca güvenli entübasyon, sekresyon temizliği ve cerrahi planlamaya olanak sağlar. Ballouhey ve arkadaşları, 27 pediatrik olguluk çalışmalarında bronkoskopinin tanı ve hava yolu yönetimindeki önemini vurgulamıştır [3]. Özellikle komplet rüptür şüphesinde bronkoskopi eşliğinde entübasyon, tüpün yalancı pasajdan ilerlemesini önleyerek hava yolu güvenliğini artırabilir.

TEDAVİ YAKLAŞIMI
Tedavi seçimi yaralanmanın boyutu, anatomik lokalizasyonu ve hastanın klinik stabilitesine göre yapılmalıdır.

Hemodinamik ve solunumsal olarak stabil, sınırlı laserasyonu bulunan ve ilerleyici hava kaçağı gelişmeyen hastalarda konservatif takip uygulanabilir. Slimane ve arkadaşlarının 16 pediatrik olguluk serisinde, seçilmiş hastalarda toraks drenajı ve hava yolunun entübasyon tüpüyle köprülenmesi gibi konservatif yöntemlerle başarılı sonuçlar bildirilmiştir [4].
Cardillo ve arkadaşlarının 62 postentübasyon trakeal laserasyonunu değerlendirdikleri çalışmada, yüzeyel ve seçilmiş tam kat yaralanmalarda konservatif yaklaşımın etkili olabileceği gösterilmiştir [5].
Komplet rüptür, ventilasyon yetersizliği, persistan masif hava kaçağı, ilerleyici mediastinal amfizem, doku kaybı veya özofagus yaralanması varlığında cerrahi tedavi önceliklidir. Konservatif izlenen hastalarda klinik kötüleşme, hava kaçağında artış veya enfeksiyon gelişmesi durumunda cerrahi gereksinimi yeniden değerlendirilmelidir.

CERRAHİ ONARIM VE REKONSTRÜKSİYON

Cerrahi yaklaşım yaralanmanın lokalizasyonuna, yaygınlığına ve hastanın klinik stabilitesine göre belirlenir. Servikal trakea yaralanmalarında alçak transvers collar insizyonu tercih edilirken distal erişim gerektiğinde parsiyel sternotomi eklenebilir. Distal trakea, karina ve sağ ana bronş yaralanmalarında genellikle 4–5. interkostal aralıktan sağ posterolateral torakotomi uygulanır. Sol ana bronş yaralanmalarında ise sol posterolateral torakotomi tercih edilir. Bilateral ana bronş yaralanmaları ve kompleks karinal rekonstrüksiyonlarda median sternotomi, gerektiğinde kardiyopulmoner bypass veya ECMO desteğiyle uygulanabilir. VATS, hemodinamik açıdan stabil, yaralanması iyi lokalize edilmiş ve güvenli tek akciğer ventilasyonu sağlanabilen seçilmiş hastalarda deneyimli merkezlerde tercih edilebilir.
Cerrahi onarımda devitalize dokular sınırlı olarak debride edilir, segmental kanlanma korunur ve anatomik hizalama sağlanarak gerilimsiz primer anastomoz gerçekleştirilir. Posterior membranöz duvar devamlı, kartilajinöz bölüm ise tek tek emilebilir monofilaman sütürlerle onarılabilir. Komplet avülsiyonlarda askı sütürleri kullanılabilir. Geniş doku kayıplarında pediküllü perikard flebi veya seçilmiş olgularda slide trakeoplasti değerlendirilebilir. Eşlik eden özofagus yaralanmalarında vaskülarize kas flebiyle onarım hatlarının ayrılması önerilir. Anastomoz tamamlandıktan sonra bronkoskopi ve hava kaçağı testiyle onarımın bütünlüğü doğrulanır.
Kompleks karinal yaralanmalarda intraoperatif ventilasyon güçlüğü gelişebilir. Seçilmiş olgularda ekstrakorporeal membran oksijenasyonu (ECMO) veya kardiyopulmoner bypass kullanılabilir [3].

POSTOPERATİF TAKİP VE KOMPLİKASYONLAR

Postoperatif dönemde anastomoz bütünlüğünün korunması, yeterli ventilasyon, sekresyon kontrolü ve enfeksiyonların önlenmesi önemlidir. Erken komplikasyonlar arasında hava kaçağı ve anastomotik dehisans; geç komplikasyonlar arasında stenoz ve granülasyon gelişimi bulunmaktadır.
Wood ve arkadaşlarının sekiz pediatrik hastayı değerlendirdikleri seride, başlangıçta konservatif tedavi uygulanan hastaların beşinde (%62,5) trakeal stenoz gelişmiş ve üçünde ek cerrahi girişim gerekmiştir [6].
Bu nedenle uzun dönem klinik ve gerektiğinde bronkoskopik takip önem taşımaktadır. Anastomotik granülasyon veya stenoz gelişen seçilmiş olgularda bronkoskopik dilatasyon ve diğer endobronşiyal girişimler değerlendirilebilir.

SONUÇ

Pediatrik trakeobronşiyal yaralanmaların başarılı yönetiminde erken tanı, bronkoskopi eşliğinde güvenli hava yolu kontrolü ve uygun tedavi seçimi belirleyicidir. Cerrahi onarımda kanlanmanın korunması, gerilimsiz anastomoz ve akciğer parankiminin mümkün olduğunca korunması temel hedeflerdir. Multidisipliner yaklaşım ve uzun dönem takip, komplikasyonların azaltılması ve fonksiyonel hava yolu açıklığının sürdürülmesi açısından önemlidir.

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M4632-Özet Metin
TRAVMA EKIBI LIDERLIĞI: KARAR VERME SÜREÇLERI VE ETKILI İLETIŞIM

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Amaç

Bu çalışmanın amacı, pediatrik travma yönetiminde ekip liderliğinin karar verme süreçleri ve iletişim etkinliği üzerindeki etkisini açıklamaktır. Travma ekibinin başarısı, bireysel becerilerden çok ekip senkronizasyonuna bağlıdır. Bu bağlamda, Formula 1 pit stop modeli ile sağlık ekibi koordinasyonu arasındaki benzerlik incelenmiştir. Çalışma, kriz anlarında liderin rolünü teknik beceriden ziyade sistemsel uyumun sağlanması açısından değerlendirmeyi hedeflemektedir.

Yöntem

Sunum, Great Ormond Street Hospital (GOSH) ve Ferrari pit ekibi arasındaki işbirliğinden esinlenen bir liderlik modelini temel alır. Model, “Zero-Point Briefing” yaklaşımıyla hasta gelmeden önce ortak zihinsel modelin kurulmasını, rollerin netleştirilmesini ve kapalı döngü iletişimin kullanılmasını içerir. Literatürde (PMID: 30241992) pediatrik travma ekiplerinde liderin

işbirlikçi, kararlı ve kısa-öz iletişim kuran özelliklerinin başarıyı artırdığı belirtilmiştir. Bu model, travma ekibinde görev dağılımının önceden belirlenmesi, bilgi akışının açık ve doğrulanabilir biçimde sağlanması, liderin "Hands-off, Heads-up" yaklaşımıyla süreci yönetmesi üzerine kuruludur.

Bulgular

Gözlemler, liderin işlem yapmadan ekibi yönlendirmesinin hata oranını azalttığını göstermektedir. Oda koreografisi ve psikolojik güvenlik unsurları, ekip üyelerinin "Speaking Up" davranışını desteklemekte; bu da bilgi paylaşımını artırarak karar kalitesini yükseltmektedir. Kapalı döngü iletişim ("Ali, kan gazı gönder." / "Kan gazı gönderiyorum." / "Tamam.") uygulandığında görev sahipliği netleşmekte ve zaman kaybı önlenmektedir. Ayrıca "Sıcak Debrief" yöntemiyle vaka sonrası ekip öğrenmesi güçlenmektedir.

İyi iletişim ve işbirliği yoksa, liderin yalnızca tecrübeli olması ekip tarafından en az önemsenen özellik olarak değerlendirilmiştir. Bu bulgu, liderliğin deneyimden çok ekip içi güven ve açık iletişimle güçlendiğini göstermektedir.

Travma odasında liderin konumu (ayak ucu), tüm ekibi ve monitörü görebileceği şekilde düzenlenmelidir. Havayolu, sağ/sol kanatlar ve gözlem koordinatörü arasındaki görev paylaşımı, Formula 1 pit stopundaki koreografiyle benzerlik göstermektedir. Bu düzen, karmaşayı azaltarak müdahale hızını artırır.

Ekip üyelerinin rollerini önceden bilmesi, ortak zihinsel modelin kurulmasını sağlar. Bu model, hasta kapıdan girmeden önce telsiz anonsuyla başlayan "T-60" brifingi sırasında oluşturulur. Brifingde rol dağıtımı, tahmini kilo ve doz hesaplaması, ekipman hazırlığı ve ilk hedefler netleştirilir. Bu uygulama, travma yönetiminde zamanın en kritik faktör olduğunu vurgular.

Sonuç

Etkili travma liderliği, teknik beceriden çok ekip uyumunu orkestre etme yeteneğidir. İyi lider, "Lolipop Adam" gibi süreci izler, zamanlamayı yönetir ve ekibin senkronizasyonunu sağlar. Kriz anlarında başarı, doğaçlamadan değil, eğitimli reflekslerden doğar. Bu nedenle travma ekiplerinin düzenli simülasyonlarla iletişim ve karar verme becerilerini pekiştirmesi önerilmektedir.

Sonuç olarak, travma liderliği bir "orkestra yönetimi"dir; amaç, kaosu net iletişime dönüştürmektir. İyi bir travma ekibi lideri, en iyi tüp takan veya damar yolu açan kişi değildir; ekibinin yeteneklerini F1 pit stop uyumunda birleştirebilen kişidir.

Kriz anlarında, "umduğumuz seviyeye çıkmayız; eğitimini yaptığımız seviyeye düşeriz." Bu ifade, travma liderliğinde hazırlığın ve sistematik eğitimin önemini özetlemektedir.

Bu çalışma, travma ekiplerinin performansını artırmak için liderlik eğitimlerinin iletişim, karar verme ve psikolojik güvenlik odaklı olarak yeniden yapılandırılması gerektiğini önermektedir.

Destek

Bu çalışma herhangi bir proje veya araştırma desteği almamıştır.

Finansal
Yazarın finansal çıkar çatışması bulunmamaktadır.

M4449-Tam Metin

PEDİATRİC FOREİGN BODY ASPİRATİON: A RETROSPECTİVE SİNGLE-CENTER EXPERİENCE OF 13 CASES

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Aim

Foreign body aspiration is a common pediatric emergency and an important cause of respiratory morbidity and mortality in young children [1,2]. Pooled data show that organic objects, particularly nuts, are the most frequently reported aspirated materials and that boys are affected more often [1], while delayed diagnosis may lead to long-term complications such as bronchiectasis [3]. However, the type of aspirated material varies with local dietary habits, and single-center data from our region are limited. We aimed to describe the demographic and clinical characteristics of children who underwent rigid bronchoscopy for suspected foreign body aspiration at our center and to report the outcomes.

Method

The records of 13 patients younger than 18 years who underwent rigid bronchoscopy for foreign body aspiration between May 2004 and July 2023 were reviewed retrospectively. Age, sex, the nature and location of the aspirated material, procedural findings, extraction outcome, and complications were analyzed. Descriptive statistics were used; continuous variables are presented as mean, median, and range, and categorical variables as number and percentage.

Results

Of the 13 children, eight (61.5%) were male and five (38.5%) were female. The mean age was 4.3 years and the median age was 2 years (range, 1-17 years); more than half of the patients (n=8, 61.5%) were 2 years old or younger (Table 1).

Table 1. Summary of demographic and clinical findings

Variable	Value
Total patients	13
Age, mean / median (range), years	4.3 / 2 (1-17)
Age 2 years or younger	8 (61.5%)
Male sex	8 (61.5%)
Organic foreign body	11 (84.6%)
Successful rigid bronchoscopic extraction	13 (100%)
Major complication or mortality	0

Eleven foreign bodies (84.6%) were organic and two (15.4%) were inorganic. Food fragments were the most common (n=6, 46.2%), followed by walnut pieces (n=2, 15.4%); a pumpkin seed, a peanut, an apricot kernel, aluminum foil, and a pen-tip cap were each found once. Complete extraction was achieved with rigid bronchoscopy in all cases, and no deaths or major complications occurred. A representative case of apricot kernel aspiration is shown in Figure 1.

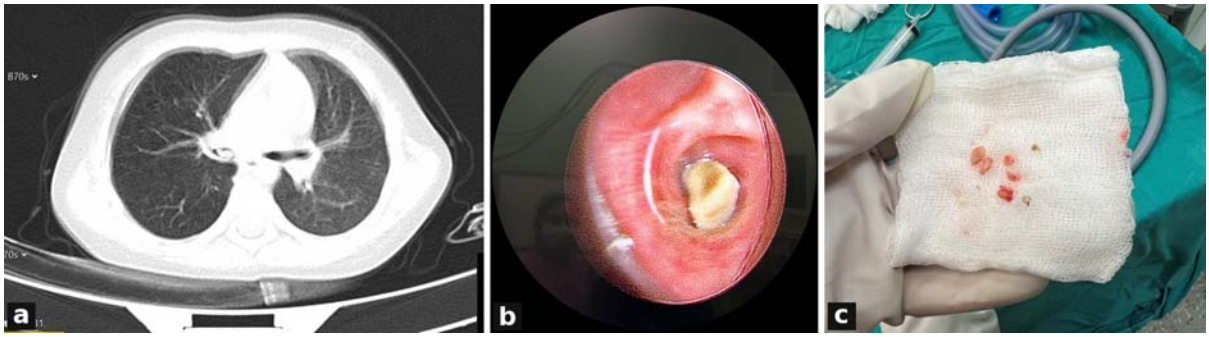


Figure 1. Representative case of apricot kernel aspiration: (a) axial chest CT (computed tomography) demonstrating obstruction of the right main bronchus; (b) bronchoscopic appearance of the foreign body in the right main bronchus; (c) extracted apricot kernel fragments.

Conclusion

In our series, foreign body aspiration was most frequent in children aged 2 years or younger and typically involved organic material, with a male predominance consistent with pooled data [1] and findings comparable to a large series of 1160 children, in which seeds were the most frequently aspirated objects and bronchoscopic removal was successful in 92% of children [4]. Rigid bronchoscopy, the preferred method for retrieving inhaled objects [2], provided safe and effective airway clearance in all cases. Because delayed diagnosis increases the risk of long-term complications [3], early clinical suspicion, prompt intervention, and caregiver education are essential.

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M4462-Tam Metin

FIREARM INJURY WITH AN ATYPICAL MECHANISM IN A CHILD: SMALL BOWEL PERFORATION PRESENTING WITH SUBTLE RADIOLOGICAL FINDINGS

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ABSTRACT

Hollow viscus perforation in pediatric firearm injuries is typically marked by overt CT (computed tomography) findings such as significant extravasation, massive free fluid, or free air. We report a case of small bowel perforation from an atypical explosion-type mechanism, in which the only radiological clues were minimal pneumoperitoneum and ileus, highlighting the diagnostic value of subtle imaging findings. An 8-year-old boy presented with a fragment injury to the left inguinal region after a bullet cartridge he had found exploded when struck with a stone. CT showed no vascular injury or overt extravasation; however, millimetric free air foci, pelvic free fluid, and ileus-like bowel dilation were noted. Emergency laparotomy revealed and repaired two separate ileal perforations. Even in the absence of overt findings, subtle CT signs may guide the diagnosis of perforation.

INTRODUCTION

Pediatric firearm injuries are typically associated with direct discharge, and hollow viscus perforation is usually expected to show overt extravasation, massive free fluid, and free air on imaging. However, the literature indicates these classic findings may not always be prominent, particularly in children, and diagnosis sometimes relies solely on secondary, subtle findings. We present a case of bowel perforation following an atypical explosion mechanism, characterized by easily overlooked findings such as pneumoperitoneum and ileus.

CASE PRESENTATION

An 8-year-old boy presented after a bullet cartridge, found while playing with his sibling, exploded when struck with a stone, causing a fragment injury to the left inguinal region. He was

hemodynamically stable, with one episode of vomiting during emergency follow-up. Examination revealed an entry wound in the left inguinal region, with no other complaints.

Contrast-enhanced thoracoabdominal CT showed no dissection or overt extravasation of the thoracoabdominal aorta or its branches. However, a hyperdense foreign body measuring 12×8 mm superior to the bladder, free fluid up to 3.5 cm in the pelvis, several millimetric free air densities adjacent to the anterior liver, and air-fluid levels at the ileal-jejunal level with bowel dilation up to 33 mm (suggestive of ileus) were noted.

Emergency surgical exploration was performed; fluoroscopy-guided contrast bladder imaging confirmed bladder wall integrity. On entry, particulate purulent fluid was aspirated and cleared. Exploration of the entire bowel revealed two perforations 2 cm apart in the same small bowel segment, approximately 80 cm proximal to the cecum, along with an incidental mesenteric diverticulum 40 cm proximal to the cecum. No other bowel or gastric pathology was found. The perforated segment was excised with primary repair and segmental resection, and passage patency was confirmed. The pelvic entry defect was confirmed unrelated to the bladder.

Postoperatively, he was transferred to the ward after intensive care follow-up, in favorable condition without fever or respiratory distress. Oral intake resumed well, with no significant hemogram decline. The nasogastric tube was removed on postoperative day 3 and the drain on day 5. He was discharged without complications.

DISCUSSION

Although free intraperitoneal air is a classic sign of bowel perforation in pediatric blunt abdominal trauma, its sensitivity is limited. Bulas et al. found free air detected preoperatively by CT in only a portion of surgically confirmed perforations, with secondary findings such as bowel wall thickening and unexplained free fluid guiding diagnosis in the remainder (1). Similarly, Jamieson et al. reported a limited rate of extraluminal air, emphasizing that its absence does not exclude perforation (2). In our case, despite the absence of overt extravasation, millimetric free air foci combined with ileus-like bowel dilation and clinical suspicion supported surgical exploration.

Imaging in penetrating trauma can be more complex and subtle than in blunt trauma; radiologists' awareness of projectile kinetics and tissue interaction is important for recognizing occult injuries (4). Here, the atypical explosion mechanism may have contributed to a more insidious radiological presentation than typical firearm injuries.

Finally, this case is a reminder that unsafe ammunition/firearm access is a preventable cause of pediatric injury. Current literature indicates that unsafe storage and children's access to firearms/ammunition are a significant public health concern, and that preventive strategies such as safe storage and parental education are critical to reducing such injuries (3).

CONCLUSION

In pediatric firearm injuries, even without overt extravasation or massive free fluid, subtle CT findings such as minimal free air and ileus may be the sole clues to hollow viscus perforation. This case also underscores environmental ammunition exposure as a preventable cause of pediatric trauma.

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M4463-Tam Metin
RAPID ULTRASONOGRAPHIC ASSESSMENT IN PEDIATRIC SHOCK: GUIDANCE FROM DIAGNOSIS TO FLUID AND VASOACTIVE AGENT THERAPY

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ABSTRACT

Introduction: Early recognition and determination of the type of shock in critically ill pediatric patients presenting to the emergency department are among the most important factors determining survival. [3] Due to their strong compensatory mechanisms, hypotension is a late finding in children. At this point, Point-of-Care Ultrasound (POCUS), as an extension of the physical examination, provides an opportunity to assess the hemodynamic status in real time. [1,5]

Development: Traditionally, shock management based on invasive parameters such as central venous pressure has been replaced by non-invasive and dynamic POCUS assessments. [1,5] Pediatric adaptations of the RUSH (Rapid Ultrasound in Shock) protocol allow rapid assessment of the pump (heart), fluid status (vascular compartment), and leaks (pleura/peritoneum). Particularly in crying or agitated children, inferior vena cava (IVC) diameter and respiratory variation may be misleading; therefore, more objective parameters such as the Aortic Velocity Time Integral (VTI) have gained prominence. [2,5] POCUS not only predicts fluid responsiveness but also enables visual estimation of left ventricular contractility (LVEF), allowing clinicians within seconds to determine whether the patient requires fluid resuscitation or early inotropic/vasopressor support (e.g., epinephrine vs. norepinephrine). [3,5]

Conclusion: Blindly administered standard fluid boluses (20 cc/kg) in pediatric shock may be harmful in children with heart failure or significant capillary leak. [3] POCUS-guided individualized hemodynamic management is the most rational approach for optimizing tissue perfusion while preventing excessive fluid loading. [3,5]

Keywords: Pediatric shock, POCUS, fluid responsiveness, vasoactive agents, hemodynamic monitoring, emergency medicine.

INTRODUCTION

The management of a critically ill child in the emergency department is a dynamic process in which clinicians race against time to prevent irreversible organ damage within minutes. Compared

with adults, pediatric patients can maintain cardiac output for much longer through myocardial function, vascular tone, and heart rate. Therefore, signs of compensated shock, such as tachycardia, prolonged capillary refill time, and altered mental status, frequently appear well before hypotension develops. [3] Waiting for hypotension is a potentially fatal clinical error that may result in decompensation and cardiac arrest.

The etiology of shock (hypovolemic, cardiogenic, distributive, or obstructive) may not always be clearly determined from the history or physical examination. For example, myocardial depression (a cardiogenic component) may accompany severe sepsis in a child. In the traditional approach, aggressive fluid loading is administered empirically; however, current evidence indicates that fluid overload is directly associated with a prolonged need for mechanical ventilation and increased mortality. At precisely this point, POCUS serves as a tool that prevents the clinician from "feeling their way through the darkness" and immediately illuminates the patient's hemodynamic profile. [1,3,5]

POCUS IN PEDIATRIC SHOCK: "PUMP, VASCULAR FILLING, AND LEAK"

The RUSH protocol, frequently used in adults for the differential diagnosis of shock, focuses on three main components when integrated into pediatric emergency practice: Pump (cardiac function), Vascular filling, and Leak (free fluid/pneumothorax). [1,5]

1. Assessment of the Pump (Cardiac Examination)

In a critically ill child, a targeted visual assessment ("eyeballing") is performed rather than a detailed echocardiographic examination. [1,4] Left ventricular (LV) contractility is assessed from the parasternal long-axis, parasternal short-axis, or apical four-chamber views. The inward contraction of the myocardium during systole and the extent to which the anterior mitral leaflet approaches the interventricular septum (EPSS) are rapidly evaluated. In suspected cardiogenic shock or myocarditis (e.g., viral or MIS-C-related), the heart's "lazy" contraction can be clearly visualized. In contrast, in hypovolemic or early septic shock, the left ventricle is hyperdynamic and the walls come into contact with each other at the end of systole ("kissing ventricles"). This distinction is vital before empiric fluid loading, as administration of 20 cc/kg of fluid to a child with cardiogenic shock may result in acute pulmonary edema. [3]

2. Vascular Filling (Fluid Responsiveness)

Determining whether a patient who is to receive fluid therapy will benefit from that fluid (i.e., whether cardiac output can be increased) is one of the most challenging issues in emergency medicine. [1,5] Although inferior vena cava (IVC) assessment is widely used in pediatric patients, intrathoracic pressure fluctuations in crying, agitated, or spontaneously breathing children may make respiratory collapsibility of the IVC misleading. [2]

Therefore, in recent years, the Aortic Velocity Time Integral (VTI), measured from the apical five-chamber view, has emerged as a leading objective parameter in pediatric hemodynamic POCUS. [5] Reflecting stroke volume through the aortic valve, VTI can be measured before and after fluid administration to determine where the patient lies on the Frank-Starling curve. Although the Passive Leg Raise maneuver may not always be practical in children because of anatomical difficulties (increased intra-abdominal pressure), a 10–15% increase in VTI after mini-fluid boluses (5–10 cc/kg) provides definitive evidence that the patient is fluid responsive.

GUIDANCE FOR VASOACTIVE AGENT SELECTION

In the past, vasoactive agent selection based on the clinical distinction between “cold shock” and “warm shock” (dopamine vs. epinephrine/norepinephrine) has been placed on a much more objective basis with POCUS. [3,5] Although clinical examination reflects the state of the microcirculation, it cannot always accurately predict the macroscopic condition of the heart. [1,4] For example, in a child presenting with septic shock and prolonged central capillary refill (cold shock phenotype), if POCUS demonstrates a hyperdynamic heart and vasoplegia (low systemic vascular resistance), norepinephrine should be the primary choice. [3] However, if POCUS identifies poor contractility and a dilated left ventricle, the patient has significant myocardial depression, and agents with strong inotropic support, such as epinephrine or milrinone, should be initiated promptly. In hypotensive shock unresponsive to fluid resuscitation, POCUS-guided agent selection serves as a critical bridge to reversing refractory shock. [3,5]

OBSTRUCTIVE SHOCK AND LUNG ULTRASONOGRAPHY

Although non-traumatic obstructive shock is rare in pediatric patients, cardiac tamponade or massive pulmonary embolism can be ruled out within seconds using POCUS. [1,5] In addition, monitoring B-lines with lung ultrasonography during fluid resuscitation (an early sign of pulmonary edema) provides one of the most reliable safety signals to the clinician that it is time to “stop further fluids and switch to vasopressors/inotropes.” Increasing B-lines indicate an increase in extravascular lung water and the onset of capillary leakage.

CONCLUSION

Management of pediatric shock in the emergency department is moving away from blind fluid loading and medication initiation algorithms based solely on clinical response. POCUS should be incorporated into the process as an integral component of the physical examination from the first minutes after the child with shock is brought to the resuscitation area. Assessment of left ventricular function, measurement of fluid responsiveness using dynamic parameters such as VTI, and selection of vasoactive agents according to the hemodynamic phenotype represent powerful tools of modern medicine that improve patient safety and survival while avoiding unnecessary radiation exposure and invasive procedures. [1,5]

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M4464-Tam Metin

PEDİATRİK HASTADA DÜŞÜK ENERJİLİ TRAVMA SONRASI GRADE IV RENAL LASERASYON: OLGU SUNUMU

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Amaç

Künt abdominal travma, pediatrik popülasyonda morbidite ve mortalitenin önde gelen nedenlerinden biridir. Böbrek, çocuklarda en sık yaralanan solid abdominal organ olup tüm abdominal travma vakalarının yaklaşık %10-20'sini oluşturmaktadır. Amerikan Travma Cerrahisi Derneği (AAST) sınıflamasına göre yüksek dereceli renal yaralanmalar (Grade III-V) tipik olarak yüksek enerjili mekanizmalarla ilişkilendirilmekte; düşük enerjili travma ise ciddi renal hasar nedeni olarak nadiren değerlendirilmektedir. Non-operatif yönetim (NOM) ise hemodinamik olarak stabil pediatrik hastalarda altın standart olup literatürde %90'ı aşan başarı oranları bildirilmektedir. Bu olguda; düşük enerjili flank travmasının çocuklarda hafife alınmaması gerektiğini ve flank darbesi sonrası gelişen gross hematürinin acil değerlendirme gerektirdiğini vurgulamayı amaçladık.

Yöntem

13 Temmuz 2026'da aynı seviyeden düşme sırasında sağ yanını kaldırım taşına çarptığı bildirilen 7 yaşında (33 kg) erkek hastanın retrospektif olgu sunumunu hazırladık. Başlangıçtaki hafif ağrı aile tarafından göz ardı edildi; travmadan 3 saat sonra gelişen gross hematüri üzerine hasta harici bir merkeze başvurdu, yaralanmadan 8,5 saat sonra üçüncü basamak merkezimize sevk edildi. Başvuruda; anamnez, fizik muayene, seri tam kan sayımı, kapsamlı metabolik panel, idrar analizi, C-reaktif protein (CRP), renal ultrasonografi ve renal anjiyografi içeren kontrastlı abdominopelvik bilgisayarlı tomografi (BT) uygulandı. Hasta Çocuk Cerrahisi Yoğun Bakım Ünitesi'ne yatırılarak tam oral kısıtlama, üriner kateterizasyon ve profilaktik intravenöz ampisilin-sulbaktam ile yönetildi.

Bulgular

Başvuruda vital bulgular stabaldi (Nabız: 98/dk, kan basıncı [KB]: 115/67 mmHg, SpO_2: %98). Fizik muayenede sağ flank hassasiyeti ve hafif ekimoz saptandı; peritoneal irritasyon bulgusu yoktu. Seri tam kan sayımlarında hemoglobin 12,9'dan 12,2 g/dL'ye geriledi. İdrar analizinde gross hematüri (eritrosit [RBC]: 86,7/büyük büyütme alanı [BBA]; bulanık, turuncu görünümlü; protein 3+) saptandı. Kreatinin (0,59 mg/dL), tahmini glomerüler filtrasyon hızı (eGFR: 93 mL/dak/1,73 m^2), amilaz (65 U/L), lipaz (24 U/L) ve CRP (1,31 mg/L) normal sınırlardaydı.

Başlangıç renal ultrasonografisinde sağ böbrek alt polünde heterojen ekojenite ve subkapsüler sıvı koleksiyonu izlendi. Kontrastlı BT'de sağ renal orta-alt polde korteksten hiler bölgeye uzanan düzensiz hipodens lezyonlar, 15 mm perirenal koleksiyon ve laterokonal fasya kalınlaşması saptandı; aktif kontrast ekstravazasyonu yoktu — AAST Grade IV laserasyon ile uyumlu.

Üçüncü günde oral alım başlandı. 5. gündeki kontrol idrar analizinde hematüri tamamen geriledi; seri ultrasonografide perirenal koleksiyonun genel olarak küçüldüğü doğrulandı (15 mm → 5. günde 5 mm → 8. günde 6,5 mm; Doppler'de aktif ekstravazasyon yok). Girişimsel işlem gerekmedi. Hasta 5. günde Çocuk Ürolojisi servisine devredildi ve 11. günde poliklinik kontrolü önerisiyle taburcu edildi.

Tartışma ve Sonuç

Pediatrik böbrek, yetişkinlere kıyasla orantısal olarak daha büyük, retroperitoneal perirenal yağ dokusu tarafından daha az korunan ve retroperitoneum içinde daha hareketli bir yapıya sahip olduğundan travmaya karşı daha savunmasızdır. Buna karşın yüksek dereceli renal yaralanmalar büyük ölçüde yüksek enerjili mekanizmalarla ilişkilendirilmektedir. Aynı seviyeden düşme gibi düşük enerjili bir travma sonrasında Grade IV renal laserasyon gelişmesi son derece nadir olup bu olguyu literatür açısından dikkat çekici kılmaktadır.

Ailenin başlangıç semptomlarını göz ardı etmesiyle oluşan 8,5 saatlik tanısal gecikme önemli bir farkındalık eksikliğini gözler önüne sermektedir: Çocuklarda flank travması sonrası gelişen her türlü hematüri, mekanizmanın algılanan ciddiyetinden bağımsız olarak acil değerlendirmeyi zorunlu kılmaktadır. Olgumuzda cerrahi veya radyolojik girişim gerekmeksizin hematürinin tam gerilemesi ve hematomun küçülmesiyle sonuçlanması, NOM'un etkinliğini desteklemektedir. Düşük enerjili travma çocuklarda yüksek dereceli renal yaralanmaya yol açabilir; uygun seçilmiş vakalarda NOM güvenli ve etkili ilk tedavi seçeneği olmalıdır.

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M4468-Tam Metin

IMAGİNG DECİSİON MAKİNG IN MİLD TRAUMATİC BRAİN INJURY: INTERNATİONAL VALİDİTY AND CURRENT LİMİTATİONS OF THE PECARN RULES

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Abstract

Introduction

Mild head trauma is among the most common clinical conditions encountered in pediatric emergency departments and frequently presents a diagnostic dilemma. Although cranial computed

tomography (CT) remains the gold standard for detecting intracranial injuries, the increased risk of radiation induced malignancies in children necessitates a selective approach to imaging.

Review

The Pediatric Emergency Care Applied Research Network (PECARN) clinical decision rules, developed in 2006, have become the most robust evidence-based guideline in the literature, having been derived from a cohort of more than 42,000 patients. Stratified according to age (<2 years and ≥2 years), the algorithm enables clinicians to safely avoid CT imaging in children classified as low risk owing to its exceptionally high sensitivity. Nevertheless, international validation studies have demonstrated that the rule has not completely eliminated unnecessary CT utilization across different healthcare systems and pediatric populations, particularly among younger children. Furthermore, CT scans performed outside the recommendations of the rule continue to occur because of physicians' defensive medical practices. Additional contemporary limitations include the gray areas within the definition of mild head trauma, the management of scalp hematomas, and the assessment of minor injury mechanisms.

Conclusion

The PECARN decision rules have revolutionized the management of mild pediatric head trauma by substantially reducing unnecessary radiation exposure. However, several limitations related to clinical practice patterns and physician perception continue to challenge their implementation in international healthcare settings.

Keywords: Pediatric head trauma; PECARN; Computed tomography indication; Radiation protection

Introduction

Blunt head trauma in childhood accounts for a substantial proportion of pediatric emergency department visits. More than 90% of these presentations are classified as mild traumatic brain injury (mTBI) or minor head trauma. The primary responsibility of the emergency physician is to identify clinically important traumatic brain injury (ciTBI) requiring potential neurosurgical intervention while simultaneously protecting the developing brain and other organs from unnecessary exposure to ionizing radiation.

In previous decades, routine cranial CT was commonly performed for virtually all cases of minor head trauma because of medicolegal concerns and parental expectations. However, evidence demonstrating that ionizing radiation significantly increases the risk of malignancies, including leukemia and brain tumors, in children has fundamentally changed this approach. Consequently, the need for evidence-based clinical decision tools with a high negative predictive value led to the development of the PECARN algorithm.

Structure of the PECARN Rules and Risk Stratification

The PECARN decision rule, developed by Kuppermann and colleagues, is based on a large prospective multicenter study that stratifies patients into two age groups (<2 years and ≥2 years). One of the greatest strengths of the rule is its near-perfect negative predictive value, indicating that withholding CT in children who meet low-risk criteria virtually eliminates the likelihood of missing a clinically important traumatic brain injury.

For children younger than 2 years, the high-risk criteria include a Glasgow Coma Scale (GCS) score of ≤14, suspected palpable skull fracture, and altered mental status, including agitation,

somnolence, repetitive vomiting, or inappropriate responses. In children aged 2 years and older, similar high-risk variables include a GCS score of ≤14, altered mental status, signs of basilar skull fracture, severe headache, and vomiting. Patients who do not meet any of these criteria are classified as low risk, and the PECARN rule recommends that routine cranial CT is not indicated in this group.

International Validity and Challenges in Implementation

Because the original PECARN rule was developed in a North American population, its applicability in emergency departments across different geographic regions, including Europe and Asia, has been extensively evaluated through external validation studies. These studies have consistently demonstrated that the rule maintains its high sensitivity and provides a safe diagnostic strategy, with reported sensitivities ranging from 99% to 100%.

Despite these favorable findings, several practical challenges have emerged during international implementation. In healthcare systems where observation unit capacity is limited, physicians may prefer early CT imaging rather than prolonged clinical observation because of medicolegal concerns and parental pressure. Furthermore, parental anxiety regarding seemingly minor findings, such as a small scalp swelling or mild vomiting, may encourage defensive medical practice, thereby reducing adherence to the PECARN recommendations.

Current Limitations and Clinical Gray Areas

Although the PECARN decision rules are widely regarded as the gold standard for the evaluation of pediatric minor head trauma, several limitations remain in routine emergency department practice. One of the most important challenges is the subjective nature of the definition of **altered mental status**. The clinical assessment of a mildly agitated or fatigued child may vary considerably among physicians, potentially affecting risk stratification and subsequent management decisions.

Another important limitation involves **scalp soft tissue swellings**, particularly occipital or parietal hematomas in children younger than two years of age. Large subgaleal hematomas may obscure an underlying linear skull fracture or intracranial hemorrhage and may even hinder an adequate physical examination. Likewise, in cases where the details of high-energy injury mechanisms such as falls from significant heights or motor vehicle collisions cannot be accurately determined, physicians may be inclined to deviate from the PECARN recommendations in favor of CT imaging.

Conclusion

The PECARN decision rules represent the most reliable clinical guideline for reducing unnecessary cranial CT examinations in children with mild traumatic brain injury worldwide. Appropriate implementation of these rules not only protects children from the harmful effects of ionizing radiation but also contributes to the optimization of emergency department resource utilization and workflow. Nevertheless, clinicians should remain vigilant when interpreting subjective clinical findings, effectively address parental concerns, and recognize the limitations of the decision rule. Integrating the PECARN algorithm with individualized clinical judgment remains the most appropriate approach to the management of pediatric minor head trauma.

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M4470-Özet Metin

A NEUROSURGİCAL SHUNT PRESENTİNG AS A RESPİRATORY EMERGENCY: VENTRİCULOPLEURAL SHUNT-RELATED PLEURAL EFFUSİON İN A 16-YEAR-OLD GİRL

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ABSTRACT

Introduction / Aim: Ventriculopleural (VPL) shunting is a second-line option for cerebrospinal fluid (CSF) diversion when the peritoneal cavity is unsuitable [1]. Pleural effusion is its characteristic complication, affecting 16% of patients overall and 26% of paediatric series, usually within the first year [2,3,4]. Children are disproportionately affected, as the smaller pleural surface cannot absorb the CSF load [5,6].

Methods: Retrospective single-patient case report. Clinical records, chest radiographs, cranial computed tomography (CT) and operative notes were reviewed. Written informed consent was obtained from the patient's parent.

Results: A 16-year-old girl with hydrocephalus and chronic kidney disease had a ventriculoperitoneal shunt converted to a VPL shunt after peritoneal catheter obstruction. She presented to the emergency department with respiratory distress; chest radiography showed a large left pleural effusion. Cranial CT showed the ventricular catheter in situ with dilated lateral ventricles. Tube thoracostomy was performed and the shunt was externalised as an external ventricular drain (EVD), diverting CSF from the pleural space. The follow-up radiograph showed re-expansion of the left lung; she remains on EVD pending selection of a definitive distal site.

Conclusion: New respiratory symptoms in a child with a VPL shunt should raise immediate suspicion of shunt-related pleural effusion. Symptomatic effusions almost always require the distal catheter to be relocated out of the pleural space [6]. Because chest tube suction can siphon CSF through a VPL shunt, early externalisation to an EVD protects the brain while the chest is drained [7].

Keywords: ventriculopleural shunt; pleural effusion; hydrocephalus; external ventricular drain; tube thoracostomy; paediatric emergency; case report

Abstract word count: 240 words (limit: 250). Figures/tables: 2 (limit: 2).



FİGURES

Figure 1. Cranial computed tomography. Axial non-contrast image showing the ventricular catheter within the right lateral ventricle and dilated lateral ventricles.

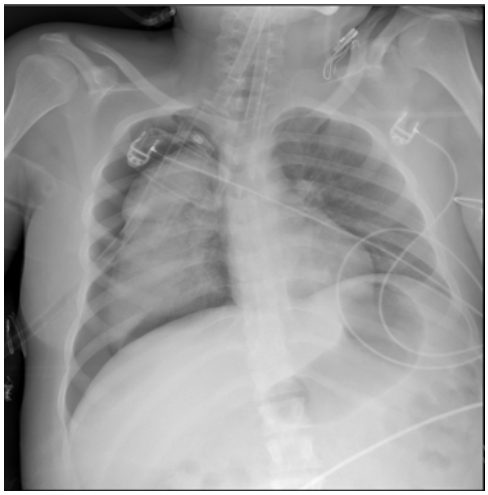


Figure 2. Chest radiograph after tube thoracostomy. Anteroposterior film obtained after chest tube insertion and externalisation of the ventriculopleural shunt, showing re-expansion of the left lung.

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M4471-Tam Metin

CERVİCAL İNTRADURAL ARTERİOVENOUS FİSTULA PRESENTİNG WİTH İNTRAVENTRİCULAR HAEMORRHAGE İN A 4-YEAR-OLD GİRL

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Aim: Headache and vomiting are everyday presentations in the paediatric emergency department, and the bleeding source in a child found to have atraumatic intraventricular haemorrhage (IVH) is almost always assumed to be intracranial, so emergency imaging stops at the head. Spinal arteriovenous fistulas (AVFs) typically cause progressive myelopathy; presentation with intracranial haemorrhage is exceptional and described only in isolated reports [1,2]. Such lesions are also still frequently mislabelled dural, although the accepted classification separates extradural from intradural fistulas [3,4]. In a systematic review of these fistulas presenting with intracranial subarachnoid haemorrhage, the fistula was cervical in 57.5% of

patients and at the craniocervical junction in 35% [3]. In children, perimedullary fistulas are increasingly managed endovascularly, a route that carries its own risks [5]. In a paediatric series of 51 perimedullary fistulas the mean age at presentation was 5.6 years, and 21 of the 33 children who deteriorated acutely (63.6%) had bled [5]. In the emergency department the distinction matters before it becomes obvious, because the imaging decision is usually made while the child still looks well. We report a previously healthy child in whom a head-limited emergency work-up would have missed a treatable spinal bleeding source, and in whom neurological deterioration immediately after embolisation proved surgically reversible. Our aim is to define the decision points this case creates for the emergency team: how far to image an atraumatic paediatric IVH, and how to read a new deficit after endovascular treatment.

Methods: Retrospective single-patient case report. Paediatric emergency department records, serial non-contrast cranial computed tomography (CT), CT angiography and digital subtraction angiography (DSA) studies, operative notes and sequential neurological examinations were reviewed. Motor strength was graded with the Medical Research Council (MRC) scale. Written informed consent was obtained from the parents; ethics committee approval was not required for a single retrospective case report.

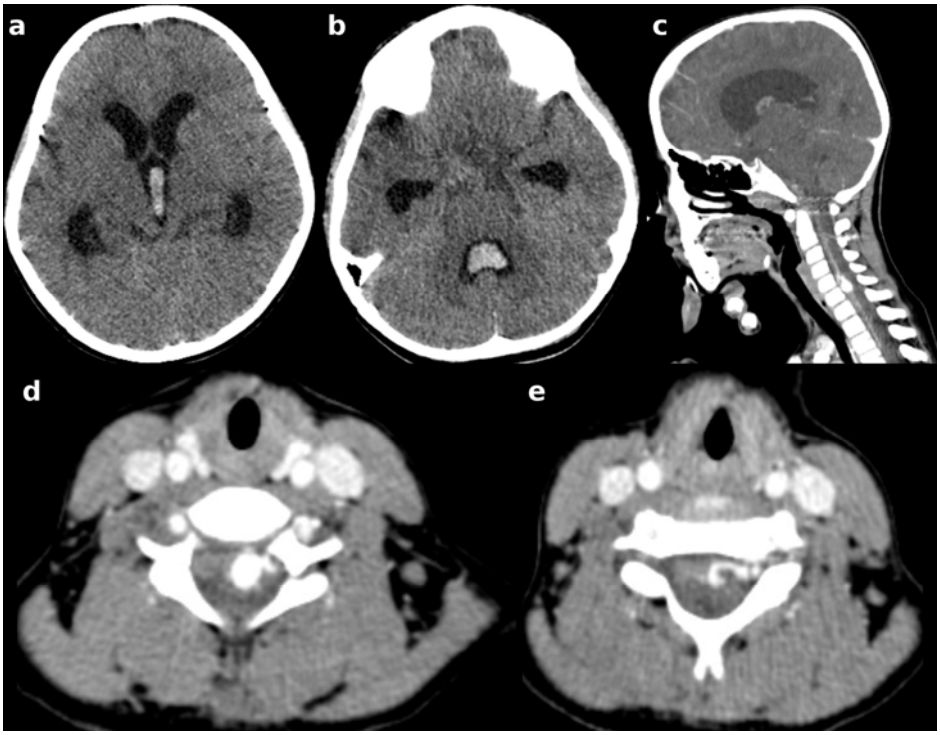
Results: A previously healthy 4-year-old girl was brought to the paediatric emergency department with headache and vomiting that had been worsening for three days. There was no history of trauma and she was neurologically intact at presentation. Non-contrast cranial CT showed haemorrhage filling the third and the fourth ventricle with dilated lateral ventricles and acute obstructive hydrocephalus, and no subarachnoid blood. An external ventricular drain (EVD) was placed emergently. No intracranial bleeding source was found, so imaging was extended beyond the head: CT angiography showed an aneurysmal vascular dilatation inside the spinal canal ventral to the cord at the C5–6 level, and DSA confirmed an intradural arteriovenous fistula there. By the modified classification of spinal cord vascular lesions the lesion was an intradural arteriovenous fistula; the dorsal versus ventral subtype has not been determined. The fistula was occluded with endovascular coil embolisation. Angiography at the end of the procedure showed the fistula occluded. Left-sided plegia and subarachnoid haemorrhage followed immediately after the procedure; the deficit was attributed to cord compression by the coil mass and treated with emergency anterior decompression, C5–C7 corpectomy and fusion. Postoperative cervical CT showed the coil mass at C5–6 lying immediately behind the corpectomy defect, which had been reconstructed with an interbody graft and an anterior cervical plate. Motor strength then recovered to MRC 4/5 in the left lower limb and to MRC 1+/5, isolated wrist movement, in the left upper limb. Hydrocephalus persisted after the EVD and a ventriculoperitoneal shunt was required; cranial CT confirmed the position of the intraventricular catheter. Inpatient rehabilitation is ongoing.

Conclusion: In a child with atraumatic intraventricular haemorrhage the emergency work-up should cover the whole neuraxis, because a treatable spinal source can bleed intracranially. A normal neurological examination does not argue against a spinal lesion: this child had no deficit at triage, and the fistula sat in the cervical canal. Deterioration after embolisation is time-critical, and coil-mass cord compression is surgically reversible when it is decompressed without delay. The features that make this case worth presenting are a cervical fistula that announced itself as an isolated intraventricular haemorrhage with no myelopathy and no deficit, and a dense hemiplegia that recovered after the coil mass was decompressed. What makes it worth presenting

to this audience is that both lessons belong to the emergency team rather than to the operating room: how far the initial imaging goes, and how quickly a new deficit is escalated.

Keywords: Hydrocephalus, intraventricular hemorrhage, pediatric emergency, spinal arteriovenous fistul

FIGURES **Figure 1. Presentation and diagnostic imaging.** (a) Axial non-contrast cranial computed tomography (CT) on admission: haemorrhage filling the third ventricle, with dilated



lateral ventricles. (b) Axial non-contrast cranial CT at a lower level: haemorrhage within the fourth ventricle, with acute obstructive hydrocephalus. (c) Sagittal reformatted CT angiography of the head and neck: the dilated ventricular system and the craniocervical vasculature, the study that extended imaging beyond the head. (d) Axial cervical CT angiography at the C5–6 level: a rounded, densely opacified vascular structure lies within the spinal canal ventral to the cord — the aneurysmal venous dilatation of the malformation, and the finding that placed the bleeding source in the spine rather than the head. (e) Axial cervical CT angiography on the adjacent slice: opacified fistulous vessels abut the ventral surface of the cord, with the vertebral arteries seen in the transverse foramina.



Figure 2. Angiographic confirmation, endovascular treatment and definitive management. (a) Digital subtraction angiography (DSA): the arteriovenous fistula, with its aneurysmal venous pouch. (b) DSA during endovascular coil embolisation, with the coil mass and the microcatheter in place. (c) DSA after the coil embolisation procedure. (d) Sagittal cervical CT after decompressive corpectomy: the coil mass at the C5–6 level, immediately behind the C5–C7 corpectomy defect reconstructed with an interbody graft and an anterior cervical plate. (e) Axial cranial CT after ventriculoperitoneal shunt placement: position of the intraventricular catheter.

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M4472-Özet Metin

CHARACTERİSTİCS AND OUTCOMES OF PEDİATRİC EAR, NOSE AND THROAT FOREİGN BODY CONSULTATİONS İN A TERTİARY EMERGENCY DEPARTMENT: A TWO-YEAR SİNGLE-CENTER EXPERİENCE

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Abstract

Introduction / Aim

Foreign body (FB) incidents involving the ear, nose, and upper aerodigestive tract are common pediatric emergencies requiring prompt otorhinolaryngological evaluation. This study aimed to investigate the demographic characteristics, anatomical distribution, management, and clinical outcomes of pediatric patients consulted to the otorhinolaryngology department for suspected foreign bodies in a tertiary emergency department.

Methods

This retrospective study included pediatric patients who were consulted to the otorhinolaryngology department for suspected foreign bodies between January 2024 and December 2025 at a tertiary referral center. Demographic characteristics, foreign body location, examination findings, treatment approach, requirement for general anesthesia, and hospitalization were obtained from electronic medical records and analyzed descriptively.

Results

A total of 474 pediatric patients were included. The mean age was 5.6 years, and 257 (54.2%) were male. A foreign body was confirmed in 338 (71.3%) patients, whereas no foreign body was identified in 136 (28.7%) despite emergency consultation. Nasal and external auditory canal foreign bodies constituted the majority of confirmed cases. Most foreign bodies were successfully removed under outpatient conditions. General anesthesia was required in 10 patients (2.1%), while 27 patients (5.7%) required hospitalization. Serious complications were uncommon.

Conclusion

Most pediatric ENT foreign body consultations can be managed successfully without hospitalization or general anesthesia. However, more than one-quarter of children referred with suspected foreign bodies had no detectable foreign body on otorhinolaryngological examination. Careful initial assessment and timely specialist consultation may help optimize patient management and reduce unnecessary interventions.

Keywords: Pediatric emergency, foreign body, otorhinolaryngology, emergency consultation, child.

M4473-Özet Metin

PEDİATRİC BLUNT ABDOMİNAL TRAUMA FROM BİCYCLE HANDLEBAR INJURY: SPLENİC RUPTURE

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Background: Pediatric splenic rupture from blunt trauma is a critical emergency. Non-operative management (NOM) is the gold standard for hemodynamically stable children to preserve immunity and prevent post-splenectomy sepsis.
Case Presentation: A 9-year-old boy presented one hour post-bicycle handlebar impact with left upper quadrant tenderness, guarding, localized ecchymosis, and positive Kehr's sign. Initial vitals were 95/60 mmHg and 128 bpm. Bedside FAST revealed splenorenal fluid. Following crystalloid resuscitation, hemodynamics stabilized. Contrast-enhanced CT confirmed an AAST Grade III splenic laceration (>3 cm deep) with minimal hemoperitoneum. The patient was admitted to the pediatric intensive care unit for NOM.
Conclusion: NOM is the standard for stable pediatric solid organ injuries (Grades I-IV); thicker splenic capsules and effective vasospasm promote hemostasis. FAST-detected free fluid does not mandate surgery; management relies primarily on hemodynamic stability.
Keywords: Bicycle handlebar, trauma, splenic laceration.

M4474-Tam Metin

APPROACH TO ACUTE CHOLECYSTİTİS IN THE PEDİATRİC EMERGENCY DEPARTMENT

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Abstract

Acute cholecystitis is inflammation of the gallbladder wall, characterized by right upper quadrant pain, fever, and leukocytosis. Although rare in children, it must be considered in the differential diagnosis of pediatric abdominal pain. It is classified as calculous or acalculous according to the presence of gallstones. In children, the acalculous form is mainly linked to critical illness, the postoperative state, infection, and prolonged fasting. Ultrasonography is central to diagnosis, and the Tokyo Guidelines provide a structured framework for diagnosis and severity grading. Treatment includes fluid support, analgesia, antibiotics, and surgery when

indicated. This presentation addresses the mechanisms, clinical findings, diagnostic evaluation, and basic management of acute cholecystitis in children.

Keywords: Acute cholecystitis, child, right upper quadrant pain, ultrasonography, acalculous cholecystitis

Introduction

Acute cholecystitis is the acute inflammation of the gallbladder, presenting with right upper quadrant pain, fever, and leukocytosis (1,2). It is less common in children than in adults but is often detected during evaluations for abdominal pain (3). A distinction is made between calculous and acalculous cholecystitis based on the presence of stones within the gallbladder (3,4).

Age and clinical setting are key determinants of etiology. In older children and adolescents, calculous cholecystitis associated with gallstones predominates, whereas the acalculous form is associated more with critical illness, sepsis, surgical stress, trauma, and prolonged fasting (4,5). Hemolytic diseases and long-term total parenteral nutrition predispose to gallstone formation (1,4).

Etiology and Pathophysiology

In calculous cholecystitis, the gallstone obstructs bile outflow, raising intracholecystic pressure and triggering wall ischemia and inflammation (1,6). Persistent obstruction may worsen inflammation and lead to complications, with bacterial superinfection contributing to the purulent form (6,7).

In acalculous cholecystitis, no stone is present; risk factors include vasoconstriction, bile stasis, and ischemia (3,4). It arises particularly in intensive care, postoperative, or infected patients, and cases associated with Shigella, Salmonella, and Streptococcus have been reported (3,4). Inflammation causes edema, wall thickening, and pericholecystic fluid accumulation; advanced cases may develop gangrene, perforation, and biliary peritonitis (6,7).

Clinical Findings and Evaluation in the Pediatric Emergency Department

Clinical findings may be nonspecific and vary with age (1,3). Right upper quadrant pain, tenderness, nausea, vomiting, and fever are most common. Although Murphy's sign is typical in adults, its reliability is limited in children (1,3). Jaundice should suggest biliary tract involvement (6).

Initial evaluation should follow the ABCDE approach, including airway, breathing, circulation, neurological status, and environmental factors (5). Vital signs, hydration status, and peritoneal findings must be assessed, and acute cholecystitis should be considered when right upper quadrant tenderness is present (1,3).

Laboratory evaluation includes leukocytosis, elevated liver enzymes, and bilirubin levels (1,6). Ultrasonography is the first-line imaging method (1,2,3); increased wall thickness, pericholecystic fluid, gallbladder distension, and stones aid diagnosis (2,3). Point-of-care

ultrasonography may help prevent diagnostic delay in children (2,8). The Tokyo Guidelines combine clinical, laboratory, and imaging criteria for diagnosis and severity grading; the grade (mild, moderate, severe) guides treatment, and organ failure must be carefully screened for in severe cases (6,7).

Emergency Treatment and Management

Basic management includes bowel rest, intravenous fluids, correction of electrolyte imbalances, analgesia, and antibiotics (1,6). NSAIDs are effective for pain control (3,6), and broad-spectrum antibiotics should be started for biliary tract infections (6,7).

Patients with hemodynamic compromise, sepsis, or organ failure may require intensive care and early surgery (5,7). In stable patients, cholecystectomy may be planned early or delayed; current approaches suggest that early laparoscopic cholecystectomy after diagnosis may reduce hospital stay and complications (1,4).

In children with acalculous cholecystitis managed conservatively, close monitoring of pain, fever, and clinical status is essential (3,4). When acalculous cholecystitis develops on a background of critical illness, the surgical decision should be individualized according to the underlying disease (4,5). Suspected perforation or gangrene requires emergency surgical evaluation (6,7).

Conclusion

Acute cholecystitis, although rarely seen in children, is a diagnosis that should not be overlooked in patients presenting with abdominal pain. Findings such as right upper quadrant pain, fever, and vomiting should be carefully evaluated. In the pediatric emergency department, early clinical evaluation and ultrasonography are important in the diagnostic process. Treatment includes fluid support, analgesia, antibiotics, and, when necessary, a surgical approach. The Tokyo Guidelines are guiding in diagnosis and severity grading. In suspected cases, joint evaluation by surgery and pediatric gastroenterology is recommended.

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M4478-Özet Metin

ISOLATED TRAUMATİC KNEE DİSLOCATİON WİTHOUT FRACTURE OR VASCULAR INJURY FOLLOWİNG A MOTORCYCLE ACCİDENT İN AN ADOLESCENT MALE: A CASE REPORT

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Case Presentation: A 17-year-old male presented to the emergency department after falling from a motorcycle, with deformity and restricted range of motion of the right knee. Clinical examination confirmed a knee joint dislocation. Closed reduction was performed emergently. Post-reduction imaging showed no associated fracture. Distal pulses were palpable with normal capillary refill, and neurovascular examination revealed no evidence of significant arterial injury. The patient was admitted to the orthopedic and traumatology service for further evaluation of ligamentous stability.
Discussion: Knee dislocations are rare but potentially limb-threatening injuries that carry a substantial risk of popliteal artery injury, requiring prompt recognition and management. Reported rates of associated vascular injury vary widely, with older series citing rates as high as 16-64%, attributed to tethering of the popliteal artery between the adductor hiatus and the gastrocnemius-soleus arch. More recent large database analyses, however, have estimated the overall risk of vascular injury at 3.3% (95% CI 2.9-3.7%) among 8,050 knee dislocations, with 13% of these requiring vascular repair. This discrepancy has been attributed partly to a rise in reported low-velocity dislocations, which carry a lower likelihood of vascular injury, and it has been noted that male patients aged 20-39 are at the highest risk for vascular injury after knee dislocation, underscoring the need for a low threshold to exclude arterial injury even in young patients. Concomitant peroneal nerve injury is also commonly reported. In our patient, early reduction, close neurovascular monitoring, and the absence of a fracture were associated with a favorable early course; however, the risk of delayed vascular complications warrants continued close follow-up.
Conclusion: Traumatic knee dislocation should be treated as a limb-threatening emergency even in young patients. Neurovascular status must be carefully assessed regardless of fracture

presence, with adjunctive tools such as the ankle-brachial index or advanced imaging used when clinically indicated.

M4480-Tam Metin

SEREBRAL PALSİLİ ÇOCUKLARDA TRAVMATİK AYAK BİLEĞİ BURKULMALARINDA SAĞLAM EKSTREMİTENİN DEĞERLENDİRİLMESİ

Semih Kaya

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Giriş

Serebral palsi, çocukluk çağında hareket ve postür bozukluklarına neden olan, bireyin günlük yaşam aktivitelerini ve yürüme fonksiyonlarını etkileyebilen nörolojik bir durumdur. Hemiplejik serebral palsili çocuklarda motor defisit nedeniyle vücut ağırlığının ve mekanik yükün karşı sağlam ekstremiteye daha fazla aktarılması söz konusu olabilir. Bu durum, travma sonrasında yalnızca etkilenen ekstremitenin değil, karşı sağlam ekstremitenin de dikkatli şekilde değerlendirilmesini önemli hale getirmektedir. Özellikle ayak bileği burkulmaları sonrasında bağ yaralanmaları ve Aşil tendon hasarı açısından sağlam ekstremitenin değerlendirilmesi, olası fonksiyonel kayıpların önlenmesi açısından önem taşımaktadır.

Amaç

Serebral palsili çocuklarda ayak bileği burkulması sonrasında sağlam ekstremitenin değerlendirilmesinin önemini vurgulamak amaçlanmıştır.

Yöntem

Turgut Özal Üniversitesi Tıp Fakültesi Acil Servisi'ne başvuran hemiplejik serebral palsili çocuklarda, ayak bileği burkulması sonrasında sağlam ekstremitenin değerlendirilmesi ele alınmıştır. Travma sonrası yalnızca etkilenen ekstremitenin değil, karşı sağlam ekstremitenin de değerlendirilmesinin gerekliliği üzerinde durulmuştur.

Bulgular

Acil serviste özellikle travma hastalarında ayak bileği burkulmaları sık karşılaşılan başvuru nedenleri arasındadır. Nörolojik defisiti bulunan hemiplejik serebral palsili çocuklarda ise travma sonrası karşı sağlam ekstremitenin de değerlendirilmesi önem taşımaktadır. Hemiplejik serebral palsili çocuklarda yük aktarımının artmasına bağlı olarak sağlam ekstremitede ayak

bileği burkulması sonrasında travmatik bağ hasarı gelişme riskinin artabileceği düşünülmektedir.

Ayak bileği burkulmalarında en sık inversiyon mekanizması sonucunda lateral ligament yaralanmaları ve eversiyon mekanizması sonucunda medial ligament yaralanmaları görülmektedir. Bunun yanında, önemli yürüme bozukluklarına neden olabilen Aşil tendon yaralanmaları da dikkate alınmalıdır.

Aşil tendonu (kalkaneal tendon), gastroknemius ve soleus kaslarının ortak tendonudur. Bu tendon iki kas grubundan başlayarak kalkaneal kemiğe bağlanmaktadır. Tendon topuk bölgesine yaklaşık 90 derecelik açıyla yapışmaktadır. Gastroknemius lateralden, soleus ise medialden tendona katkıda bulunmaktadır. Subkutan kalkaneal bursa, cildin fleksiyonu sırasında tendonun hareket etmesine olanak sağlarken, Aşil tendonunun derin bursası tendon ile kemik arasındaki sürtünmeyi azaltarak tendonun kemik üzerinde serbestçe hareket etmesini sağlamaktadır. Plantaris tendonu da bağlanma bölgesinin proksimalinde Aşil tendonunun medial tarafıyla birleşmektedir.

Sonuç

Ayak bileği burkulması ile başvuran serebral palsili çocuklarda ilk değerlendirme sırasında sağlam ekstremite de mutlaka göz önünde bulundurulmalıdır. Hemiplejik serebral palsili çocuklarda artmış yük aktarımı nedeniyle sağlam ekstremitede travmatik bağ hasarı görülme olasılığı artabilmektedir. Bu nedenle yalnızca kemik yapıların değil, bağ yapılarının da değerlendirilmesi önemlidir. Uygun hastalarda ortopedi konsültasyonu yapılması ve gerekli durumlarda ortopedi poliklinik takibinin planlanması önerilmektedir.

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M4491-Tam Metin

ASSESSMENT OF PERİPHERAL AİRWAY FUNCTİON BY IMPULSE OSCİLLOMETRY İN CHİLDREN WİTH ADRENAL INSUFFİCİENCY

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Objective

Respiratory involvement in children with adrenal insufficiency (AI) is poorly characterized, and conventional spirometry may not detect early peripheral airway abnormalities. We aimed to describe impulse oscillometry (IOS) findings in a heterogeneous pediatric AI cohort, quantify measurements outside published parameter-specific reference limits, and compare children with congenital adrenal hyperplasia (CAH) with those with non-CAH AI.

Methods

This single-center cross-sectional study included clinically stable children followed for AI at İnönü University Faculty of Medicine. Children with acute adrenal crisis, recent respiratory infection, prematurity, congenital heart disease, neuromuscular disease, or chronic pulmonary disease expected to independently affect respiratory mechanics were excluded. Asthma was recorded but was not an exclusion criterion if clinically stable. IOS was performed during tidal breathing according to European Respiratory Society technical standards using a Vyntus IOS device. At least three technically acceptable recordings were obtained, with coherence ≥0.80 at 5 Hz and ≥0.90 at higher frequencies. Published reference equations were used; abnormality was defined as $z > +1.645$ for R5, R20, R5–R20, AX, and Fres, and $z < -1.645$ for X5 and X20. Groups were compared using the Mann–Whitney U, chi-square, or Fisher exact tests. A sensitivity analysis excluded children with asthma. The study was approved by the İnönü University Non-Invasive Clinical Research Ethics Committee (30 June 2026; approval no. 10471), and written informed consent was obtained.

Results

Fifty-two children were included; 28 (53.8%) were male, and the median age was 16 years (IQR, 6). CAH was the most frequent etiology (24/52, 46.1%). All participants received hydrocortisone, with a mean dose of 11.51 ± 5.00 mg/m²/day. Asthma, allergic rhinitis, and

eczema were reported in 5 (9.6%), 5 (9.6%), and 6 (11.5%) children, respectively (Table 1). The median IOS values were 0.49 (0.32) kPa·L^{-1}·s for R5, 0.29 (0.13) kPa·L^{-1}·s for R20, 0.20 (0.16) kPa·L^{-1}·s for R5–R20, −0.13 (0.11) kPa·L^{-1}·s for X5, −0.01 (0.08) kPa·L^{-1}·s for X20, 1.74 (1.30) kPa·L^{-1} for AX, and 20.8 (5.32) Hz for Fres. The most frequent abnormality was low X5 (11/52, 21.2%), followed by high R5 and high R5–R20 (10/52 each, 19.2%). Low X20 and high AX occurred in 8 (15.4%) children each; high R20 in 7 (13.5%) and high Fres in 4 (7.7%) (Table 2). No IOS parameter differed significantly between the CAH and non-CAH groups (all $p \geq 0.199$). After excluding five children with asthma, abnormality frequencies remained similar and all between-group comparisons remained nonsignificant (all $p > 0.20$).

Table 1. Baseline characteristics of the study population.

Characteristic	Overall (n = 52)
Male sex, n (%)	28 (53.8)
Age, years, median (IQR)	16 (6)
Height z-score, mean ± SD	−0.53 ± 1.59
Body mass index z-score, mean ± SD	0.66 ± 1.61
Congenital adrenal hyperplasia, n (%)	24 (46.1)
Asthma / allergic rhinitis / eczema, n (%)	5 (9.6) / 5 (9.6) / 6 (11.5)
Previous adrenal crisis, n (%)	4 (7.7)
Hydrocortisone treatment, n (%)	52 (100)
Hydrocortisone dose, mg/m²/day, mean ± SD	11.51 ± 5.00

Table 2. IOS findings and comparison of CAH with non-CAH AI.

Parameter	Overall median (IQR)	Abnormal, n (%)	CAH vs non-CAH p
R5 (kPa·L^{-1}·s)	0.49 (0.32)	10 (19.2)	0.927
R20 (kPa·L^{-1}·s)	0.29 (0.13)	7 (13.5)	0.514
R5–R20 (kPa·L^{-1}·s)	0.20 (0.16)	10 (19.2)	0.544
X5 (kPa·L^{-1}·s)	−0.13 (0.11)	11 (21.2)	0.232
X20 (kPa·L^{-1}·s)	−0.01 (0.08)	8 (15.4)	0.804
AX (kPa·L^{-1})	1.74 (1.30)	8 (15.4)	0.202
Fres (Hz)	20.8 (5.32)	4 (7.7)	0.199

Abbreviations: AI, adrenal insufficiency; AX, area of reactance; CAH, congenital adrenal hyperplasia; Fres, resonance frequency; IOS, impulse oscillometry; IQR, interquartile range;

R5, respiratory resistance at 5 Hz; R20, respiratory resistance at 20 Hz; X5 and X20, reactance at 5 and 20 Hz.

Conclusion

A subset of children with AI had IOS measurements outside published parameter-specific reference limits, particularly for X5, R5, and R5–R20. However, because a concurrently recruited healthy control group was not included, these findings are descriptive and cannot establish that peripheral airway dysfunction is more prevalent in AI or attributable to cortisol deficiency. IOS parameters were similar in CAH and non-CAH AI. Prospective controlled studies incorporating matched healthy participants, spirometry, treatment exposure, hormonal control, and clinical respiratory outcomes are needed.

Funding and conflicts of interest

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M4493-Tam Metin

IMPULSE OSCİLLOMETRY REVEALS PREDOMİNANTLY MECHANİCAL DRİVERS OF SMALL AİRWAY DYSFUNCTİON İN OBESE CHİLDREN

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Objective

Obesity may impair peripheral airway function before conventional spirometry becomes abnormal. The relative contributions of excess adiposity and insulin resistance in children remain uncertain. We assessed impulse oscillometry (IOS) in obese children and normal-weight controls and examined whether small airway indices differed according to metabolic status.

Methods

This prospective, cross-sectional, case-control study included children aged 8–17 years. Obesity was defined as a body mass index (BMI) z-score >+2 using World Health Organization references; children between the 5th and 85th BMI percentiles served as controls. Children with chronic lung or atopic disease, major cardiopulmonary or neuromuscular disease, prematurity, or recent infection were excluded. Fasting glucose, insulin, and glycated hemoglobin (HbA1c) were measured. Insulin resistance was estimated using the Homeostasis Model Assessment of Insulin Resistance (HOMA-IR), with thresholds >2.5 in prepubertal and >3.16 in pubertal participants. Obese participants were classified as HOMA-IR-positive or HOMA-IR-negative.

IOS was performed during tidal breathing according to European Respiratory Society standards; R5, R20, R5–R20, X5, X20, area of reactance (AX), and resonance frequency (Fres) were analyzed. Groups were compared using t-test or Mann–Whitney U test, and associations using Spearman correlation. Ethics approval was obtained from the İnönü University Non-Invasive Clinical Research Ethics Committee (24 February 2026; no. 2026/9511); parental consent and participant assent were obtained.

Results

Among 135 participants, 70 had obesity and 65 controls; 76 (56.3%) were female and mean age was 13.2 ± 2.9 years. Age, sex, and smoking exposure were comparable. Obese participants had higher R5 and R20 (p=0.010 and p=0.030), R5–R20 (0.215 ± 0.127 vs 0.136 ± 0.096 kPa·s/L; p<0.001), and AX (1.660 ± 1.149 vs 1.150 ± 0.958 kPa/L; p=0.020). X5, X20, and Fres were not different (all p>0.05) (Table 1). In the obese group, 42 were HOMA-IR-positive and 28 HOMA-IR-negative. No IOS parameter differed significantly, including R5–R20 (0.245 ± 0.142 vs 0.195 ± 0.112; p=0.157) and AX (1.962 ± 1.313 vs 1.483 ± 0.993; p=0.394) (Table 2). HOMA-IR correlated weakly with R5–R20 (r=0.257, p=0.031) and AX (r=0.290, p=0.015). BMI z-score showed stronger correlations with R5–R20 (r=0.424, p<0.001) and AX (r=0.383, p=0.010). HbA1c was not correlated with R5–R20 (r=0.066, p=0.584).

Table 1. Demographic characteristics and IOS measurements in obese and control groups.

Variable	Obese (n = 70)	Control (n = 65)	p value
Female sex, n (%)	43 (61.4)	33 (50.8)	0.212
Age, years, mean ± SD	12.88 ± 2.92	13.58 ± 3.05	0.093
Cigarette-smoke exposure, n (%)	48 (68.6)	38 (58.5)	0.298
R5, kPa·s/L, mean ± SD	0.517 ± 0.185	0.420 ± 0.181	0.010
R20, kPa·s/L, mean ± SD	0.312 ± 0.095	0.284 ± 0.106	0.030
R5–R20, kPa·s/L, mean ± SD	0.215 ± 0.127	0.136 ± 0.096	<0.001
X5, kPa·s/L, mean ± SD	−0.121 ± 0.111	−0.088 ± 0.075	0.159
X20, kPa·s/L, mean ± SD	−0.016 ± 0.058	−0.013 ± 0.067	0.484
AX, kPa/L, mean ± SD	1.660 ± 1.149	1.150 ± 0.958	0.020

Variable	Obese (n = 70)	Control (n = 65)	p value
Fres, Hz, mean ± SD	19.949 ± 5.522	20.203 ± 6.640	0.890

Table 2. IOS measurements according to HOMA-IR status among obese participants.

Variable	HOMA-IR positive (n = 42)	HOMA-IR negative (n = 28)	p value
Female sex, n (%)	29 (69.0)	14 (50.0)	0.176
Age, years, mean ± SD	13.35 ± 2.77	12.17 ± 3.04	0.118
BMI z-score, mean ± SD	2.723 ± 0.702	2.335 ± 0.447	0.016
R5, kPa·s/L, mean ± SD	0.556 ± 0.226	0.491 ± 0.150	0.160
R20, kPa·s/L, mean ± SD	0.313 ± 0.104	0.311 ± 0.090	0.688
R5–R20, kPa·s/L, mean ± SD	0.245 ± 0.142	0.195 ± 0.112	0.157
X5, kPa·s/L, mean ± SD	−0.115 ± 0.124	−0.131 ± 0.090	0.325
X20, kPa·s/L, mean ± SD	−0.006 ± 0.056	−0.032 ± 0.059	0.510
AX, kPa/L, mean ± SD	1.962 ± 1.313	1.483 ± 0.993	0.394
Fres, Hz, mean ± SD	19.362 ± 5.237	20.830 ± 5.910	0.281

Abbreviations: AX, area of reactance; BMI, body mass index; Fres, resonance frequency; HOMA-IR, Homeostasis Model Assessment of Insulin Resistance; IOS, impulse oscillometry; R5, resistance at 5 Hz; R20, resistance at 20 Hz; R5–R20, frequency dependence of resistance; X5 and X20, reactance at 5 and 20 Hz.

Conclusion

Obese children had higher total and peripheral airway resistance and AX than controls, indicating IOS-detectable small airway dysfunction. HOMA-IR correlated weakly with peripheral airway indices, but metabolic subgrouping did not distinguish IOS findings. Stronger BMI z-score associations suggest that mechanical effects may be more prominent than insulin resistance. Prospective studies with lung volumes, inflammatory biomarkers, and follow-up are needed.

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M4494-Tam Metin

AİRWAY RESİSTANCE AND REACTANCE ASSESSED BY İMPULSE OSCİLLOMETRY İN CHİLDREN WİTH OSTEOGENESİS İMPERFECTA: A CASE-CONTROL STUDY

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Objective

Respiratory impairment in osteogenesis imperfecta (OI) is usually attributed to thoracic deformity and skeletal restriction, whereas intrinsic pulmonary and peripheral airway involvement may be overlooked. Evidence on oscillometric airway function in children with clinically stable OI is scarce. We compared impulse oscillometry (IOS) findings between children with OI and healthy controls and assessed the frequency of abnormal IOS parameters.

Methods

This single-center case-control study included 20 children with OI and 20 age- and sex-matched healthy controls. Demographic, clinical, anthropometric, treatment, and laboratory data were recorded. Airway resistance and reactance were measured during tidal breathing using a Jaeger MasterScreen IOS system according to European Respiratory Society technical standards. At least three acceptable recordings were obtained; coherence was required to be ≥0.80 at 5 Hz and ≥0.90 at higher frequencies, and R5 coefficient of variation had to be <15%. R5, R20, R5–R20, X5, X20, area of reactance (AX), and resonance frequency (Fres) were analyzed. Z-scores were interpreted using the device reference equations; abnormality was defined as $z>+1.645$ for R5, R20, R5–R20, AX, and Fres and $z<-1.645$ for X5 and X20. The study was approved by the İnönü University Non-Invasive Clinical Research Ethics Committee (14 July 2026; approval no. 2026/10695), and informed consent was obtained.

Results

Among children with OI, 11 (55%) were male; 15 (75%) had type I, 2 (10%) type III, and 3 (15%) type IV disease. Pectus deformity and scoliosis were present in 4 (20%) and 5 (25%) children, respectively; 17 (85%) had a history of long-bone deformity, 8 (40%) vertebral

compression fractures, and 12 (60%) previous orthopedic surgery. All patients received bisphosphonate therapy, including pamidronate in 19 (95%). OI and control groups were comparable for sex (55% vs 50%, p=0.752), age (p=0.620), passive-smoking exposure (20% vs 25%, p=1.000), and asthma (5% vs 10%, p=1.000). Height and weight z-scores were lower in the OI group (−1.70 vs 0.87 and −1.45 vs 0.75, respectively; both p<0.001). AX was higher in children with OI than controls (1.62 vs 1.10 kPa/L, p=0.031). R5–R20 tended to be higher in OI (0.18 vs 0.12 kPa·L^{-1}·s; p=0.060), whereas R5, R20, X5, X20, and Fres did not differ significantly (Table 2). Abnormal findings were uncommon: Fres was abnormal in 3 (15%), AX and X20 in 2 (10%) each, and R5, R5–R20, and X5 in 1 (5%) each; no child had abnormal R20.

Table 1. Selected clinical and treatment characteristics of children with OI (n=20).

Characteristic	OI group (n = 20)
Male sex, n (%)	11 (55)
Age, median (IQR), years	12 (7.5)
Height z-score, median (IQR)	−1.70 (1.35)
Weight z-score, median (IQR)	−1.45 (1.33)
OI type I / III / IV, n (%)	15 (75) / 2 (10) / 3 (15)
Pectus deformity / scoliosis, n (%)	4 (20) / 5 (25)
Long-bone deformity / vertebral fracture, n (%)	17 (85) / 8 (40)
Previous orthopedic surgery, n (%)	12 (60)
Lumbar spine BMD z-score, median (IQR)	−1.30 (1.00)
Bisphosphonate therapy, n (%)	20 (100) [pamidronate 19; zoledronic acid 1]

Table 2. IOS measurements and abnormal findings in children with OI compared with healthy controls.

Parameter	OI (n=20)	Control (n=20)	p value	Abnormal OI, n (%)
Height z-score, median (IQR)	−1.70 (1.35)	0.87 (1.47)	<0.001	—
Weight z-score, median (IQR)	−1.45 (1.33)	0.75 (1.27)	<0.001	—
R5, kPa·L^{-1}·s, median (IQR)	0.51 (0.30)	0.44 (0.12)	0.142	1 (5)

Parameter	OI (n=20)	Control (n=20)	p value	Abnormal OI, n (%)
R20, kPa·L^{-1}·s, median (IQR)	0.30 (0.15)	0.31 (0.18)	0.738	0
R5–R20, kPa·L^{-1}·s, median (IQR)	0.18 (0.20)	0.12 (0.11)	0.060	1 (5)
X5, kPa·L^{-1}·s, median (IQR)	−0.09 (0.19)	−0.09 (0.06)	0.512	1 (5)
X20, kPa·L^{-1}·s, median (IQR)	−0.04 (0.08)	0.02 (0.06)	0.253	2 (10)
AX, kPa·L^{-1}, median (IQR)	1.62 (1.68)	1.10 (0.52)	0.031	2 (10)
Fres, Hz, median (IQR)	21.3 (8.91)	21.91 (9.24)	0.183	3 (15)

Abbreviations: AX, area of reactance; BMD, bone mineral density; Fres, resonance frequency; IOS, impulse oscillometry; IQR, interquartile range; OI, osteogenesis imperfecta; R5 and R20, resistance at 5 and 20 Hz; R5–R20, frequency dependence of resistance; X5 and X20, reactance at 5 and 20 Hz.

Conclusion

In clinically stable, predominantly mild and bisphosphonate-treated children with OI, airway resistance and most reactance parameters were preserved compared with healthy controls. The isolated increase in AX may indicate subtle changes in respiratory system elastance before measurable airway resistance abnormalities emerge. IOS, particularly AX, may complement conventional respiratory assessment, but larger prospective studies incorporating spirometry, lung volumes, imaging, and longitudinal outcomes are required.

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M4495-Tam Metin

SMALL AİRWAY DYSFUNCTİON ASSESSED BY İMPULSE OSCİLLOMETRY İN CHİLDREN WİTH CONGENİTAL ADRENAL HYPERPLASİA: A PRELİMİNARY CASE-CONTROL STUDY

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Objective

Children with congenital adrenal hyperplasia (CAH) may develop respiratory changes related to hormonal imbalance and glucocorticoid exposure. Conventional spirometry may not detect early peripheral airway changes. We evaluated small airway function using impulse oscillometry (IOS) in children with CAH and age- and sex-matched healthy controls.

Methods

This cross-sectional case-control study included 27 children aged 3–18 years with CAH and 27 healthy controls. Children with acute adrenal crisis, chronic lung disease, major cardiopulmonary or neuromuscular disease, prematurity, or recent infection were excluded. Demographic, atopic, laboratory, and treatment characteristics were recorded. All CAH participants received hydrocortisone; additional therapies and dose were documented. IOS was performed during tidal breathing with a Jaeger MasterScreen IOS system according to European Respiratory Society standards. At least three acceptable recordings were obtained; coherence was required to be ≥0.80 at 5 Hz and ≥0.90 at higher frequencies, with R5 coefficient of variation <15%. R5, R20, R5–R20, X5, X20, area of reactance (AX), and resonance frequency (Fres) were analyzed. Z-scores used device reference equations; abnormality was defined as $z>+1.645$ for R5, R20, R5–R20, AX, and Fres and $z<-1.645$ for X5 and X20. Ethics approval was obtained from the İnönü University Non-Invasive Clinical Research Ethics Committee (18 May 2026; no. 10176), and informed consent was obtained.

Results

The median age was 14 years (range, 3–18), and 18 participants (66.7%) were female. The most common enzyme deficiencies were 21-hydroxylase (12/27, 44.4%) and 11β-hydroxylase (9/27, 33.3%). Twenty-six children (96.3%) were clinically stable. Asthma, allergic rhinitis, eczema, and urticaria were present in 4 (14.8%), 3 (11.1%), 5 (18.5%), and 6 (22.2%), respectively. All received hydrocortisone; the median dose was 12 mg/m²/day (range, 8–20), and 9 (33.3%) also received fludrocortisone (Table 1). CAH and control groups were comparable for sex (66.7% vs 59.3%, p=0.778), age (p=0.578), smoking exposure (22.2% vs 18.5%, p=1.000), and asthma (14.8% vs 7.4%, p=0.669). Compared with controls, CAH participants had higher R5 [0.55 (0.31) vs 0.38 (0.17) kPa·s/L; p=0.031], R5–R20 [0.21 (0.16) vs 0.12 (0.05); p=0.009], and AX [2.05 (1.82) vs 1.02 (0.65) kPa·s/L; p=0.001], and more negative X5 [−0.16 (0.09) vs −0.10 (0.06); p=0.001]. R20, X20, and Fres did not differ significantly (Table 2). Abnormal findings were most frequent for X5 (8/27, 29.6%), followed by R5–R20 (7/27, 25.9%) and R5 (6/27, 22.2%).

Table 1. Selected clinical, atopic, and treatment characteristics of children with CAH (n=27).

Characteristic	CAH group (n = 27)
Female sex, n (%)	18 (66.7)
Age, median (range), years	14 (3–18)
Height z-score, median (range)	−0.38 (−4.10 to 2.49)
Body mass index z-score, median (range)	0.64 (−3.55 to 3.73)
21-hydroxylase / 11β-hydroxylase deficiency, n (%)	12 (44.4) / 9 (33.3)
Clinically stable, n (%)	26 (96.3)
Previous adrenal crisis / consanguinity, n (%)	2 (7.4) / 16 (59.3)
Asthma / allergic rhinitis / eczema, n (%)	4 (14.8) / 3 (11.1) / 5 (18.5)
Hydrocortisone treatment, n (%)	27 (100)
Hydrocortisone dose, mg/m²/day, median (range)	12 (8–20)

Table 2. IOS measurements and abnormal findings in children with CAH compared with healthy controls.

Parameter	CAH (n=27)	Control (n=27)	p value	Abnormal CAH, n (%)
R5, kPa·s/L, median (IQR)	0.55 (0.31)	0.38 (0.17)	0.031	6 (22.2)
R20, kPa·s/L, median (IQR)	0.30 (0.12)	0.25 (0.15)	0.257	3 (11.1)
R5–R20, kPa·s/L, median (IQR)	0.21 (0.16)	0.12 (0.05)	0.009	7 (25.9)
X5, kPa·s/L, median (IQR)	−0.16 (0.09)	−0.10 (0.06)	0.001	8 (29.6)
X20, kPa·s/L, median (IQR)	−0.02 (0.09)	0.00 (0.07)	0.152	2 (7.4)
AX, kPa/L, median (IQR)	2.05 (1.82)	1.02 (0.65)	0.001	5 (18.5)

Parameter	CAH (n=27)	Control (n=27)	p value	Abnormal CAH, n (%)
Fres, Hz, median (IQR)	21.5 (7.83)	20.3 (8.64)	0.598	1 (3.7)

Abbreviations: AX, area of reactance; CAH, congenital adrenal hyperplasia; Fres, resonance frequency; IOS, impulse oscillometry; IQR, interquartile range; R5 and R20, resistance at 5 and 20 Hz; R5–R20, frequency dependence of resistance; X5 and X20, reactance at 5 and 20 Hz.

Conclusion

Children with CAH demonstrated higher total and peripheral airway resistance, greater reactance area, and more negative X5 than healthy controls, indicating preliminary evidence of subclinical small airway dysfunction. The absence of overt respiratory disease and the frequency of abnormal z-scores suggest that IOS may detect early airway involvement in this population. Larger prospective studies incorporating spirometry, hormonal control, treatment exposure, inflammatory biomarkers, and longitudinal outcomes are needed before clinical screening recommendations can be made.

Funding and conflicts of interest

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M4496-Tam Metin

CLİNİCAL PREDİCTORS OF PERSİSTENCE İN IGE-MEDİATED COW'S MİLK ALLERGY İN CHİLDREN WİTH MULTİPLE FOOD ALLERGİES

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Objective

Most children with immunoglobulin E (IgE)-mediated cow’s milk allergy (CMA) eventually develop tolerance, but persistence is more frequent in children with multiple food allergies. Laboratory markers may be unavailable or difficult to interpret in this heterogeneous group. We aimed to identify easily obtainable clinical features of the initial cow’s milk reaction that independently predict failure to develop tolerance.

Methods

This retrospective cohort study included 134 children with IgE-mediated CMA and allergies to at least two additional foods who were followed at a tertiary pediatric allergy centre between January 2017 and January 2024. Eligibility required an immediate-type clinical history and

evidence of IgE sensitization by skin-prick testing and/or food-specific serum IgE. Non-IgE-mediated allergy, mixed reactions, food protein-induced enterocolitis syndrome, eosinophilic gastrointestinal disease, and incomplete records were excluded. Demographic data, atopic comorbidities, laboratory results, initial clinical manifestations after cow's milk exposure, and oral food challenge (OFC) outcomes were recorded. Patients were classified as OFC-negative (tolerance developed) or OFC-positive (persistent allergy). OFCs were performed under physician supervision using graded doses at 15-minute intervals, followed by two hours of observation. Clinical variables associated with outcome in univariate analyses were entered into a multivariable logistic regression model; laboratory variables were not included in the predictive model. The study was approved by the İnönü University Non-Invasive Clinical Research Ethics Committee (approval no. 2025/6111), and written informed consent was obtained.

Results

The cohort comprised 96 boys (71.6%); median age was 84 months (range, 33–146), symptom onset occurred at 5 months (1–36), and median follow-up was 79 months (1–93). During follow-up, 105 children (78.4%) developed tolerance, whereas 29 (21.6%) remained allergic. Atopic eczema was present in 57 (42.5%), recurrent wheezing or asthma in 19 (14.2%), and egg allergy was the most frequent concomitant food allergy (68/134, 50.7%). Children with persistent CMA had higher median milk-specific IgE levels than those who developed tolerance (12.9 vs 5.2 kU/L; p=0.002) and larger skin-prick-test wheals (4 vs 3 mm; p=0.016). Initial reactions most commonly included pruritus (72.4%), perioral flushing (61.9%), angioedema (53.0%), and urticaria (44.8%); wheezing was the most frequent respiratory symptom (18.7%), and anaphylaxis occurred in 33 children (24.6%). In multivariable analysis restricted to clinical reaction features, anaphylaxis (adjusted OR [aOR], 4.95; 95% confidence interval [CI], 1.82–13.5), hypotension (aOR, 3.97; 95% CI, 1.19–13.2), wheezing (aOR, 2.86; 95% CI, 1.11–7.36), and lethargy (aOR, 3.53; 95% CI, 1.23–10.1) independently predicted failure to develop tolerance (Table 2).

Table 1. Selected demographic and laboratory characteristics according to tolerance development.

Characteristic	Tolerance (n=105)	Persistent CMA (n=29)	p value
Male sex, n (%)	74 (70.5)	22 (75.9)	0.570
Age, median (range), months	84 (33–146)	84 (48–120)	0.880
Symptom onset, median (range), months	5 (1–136)	4 (2–13)	0.640
Follow-up, median (range), months	80 (1–137)	79 (42–114)	0.910

Characteristic	Tolerance (n=105)	Persistent CMA (n=29)	p value
Atopic eczema, n (%)	49 (46.7)	8 (27.6)	0.080
Recurrent wheeze/asthma, n (%)	15 (14.3)	4 (13.8)	0.940
Egg allergy, n (%)	51 (48.5)	17 (58.6)	0.330
Milk-specific IgE, median (range), kU/L	5.2 (0.1–268)	12.9 (0.1–100)	0.002
Skin-prick-test wheal, median (range), mm	3 (0–15)	4 (0–10)	0.016

Table 2. Independent clinical predictors of persistent IgE-mediated CMA.

Predictor	β coefficient	Adjusted OR (95% CI)	p value
Anaphylaxis	1.60	4.95 (1.82–13.5)	0.002
Hypotension	1.38	3.97 (1.19–13.2)	0.025
Wheezing	1.05	2.86 (1.11–7.36)	0.029
Lethargy	1.26	3.53 (1.23–10.1)	0.019

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; CMA, cow's milk allergy; IgE, immunoglobulin E; OFC, oral food challenge.

Conclusion

In children with multiple food allergies, persistent IgE-mediated CMA was associated more strongly with the severity and systemic distribution of the initial reaction than with demographic features. Anaphylaxis, hypotension, wheezing, and lethargy identified a clinically recognizable high-risk phenotype. These findings may support closer follow-up and individualized planning of OFCs, although prospective validation in larger cohorts is required before routine risk stratification is recommended.

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M4497-Tam Mettin

CLİNİCAL PREDİCTORS OF ORAL FOOD CHALLENGE POSİTİVİTY İN SKİN-LİMİTED, TEST-NEGATİVE SUSPECTED IGE-MEDİATED FOOD ALLERGY

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Objective

Negative skin-prick testing (SPT) and food-specific immunoglobulin E (sIgE) do not completely exclude IgE-mediated food allergy, yet evidence is limited for children whose reported reactions are confined to the skin. Unnecessary elimination diets may impair nutrition and quality of life. We aimed to determine the rate of oral food challenge (OFC) positivity in this clinical phenotype and to identify accessible clinical and laboratory predictors that could support risk-based decision-making.

Methods

This single-center observational study retrospectively evaluated 111 children assessed at the İnönü University Pediatric Allergy Clinic between January 2015 and December 2024. Eligible patients had a history suggestive of immediate food allergy limited to urticaria, pruritus, angioedema, or flushing, together with negative food SPT and sIgE results before OFC. Patients with a positive diagnostic test, systemic symptoms, non-IgE-mediated disease, or incomplete records were excluded. Demographic characteristics, suspected food, reaction timing, recurrent reactions to the same food, atopic comorbidities, family history, total IgE, and eosinophilia were obtained from medical records. Open OFCs were performed under physician supervision with anaphylaxis precautions, 15-minute dose increments, and two hours of post-challenge observation, according to American Academy of Allergy, Asthma, and Immunology and Turkish national guidance. An objective or reproducible persistent subjective reaction was considered a positive OFC. Categorical data were compared using chi-square or Fisher's exact tests and continuous data using the Mann–Whitney U test. Variables significant in univariate analyses were entered into a binary logistic regression model. Statistical significance was set at $p<0.05$. Ethical approval and written informed consent were obtained according to institutional procedures.

Results

The median age was 66 months (range, 1–264), and 61 children (55.0%) were male. Suspected triggers were cow's milk in 53 patients (47.7%), hen's egg in 30 (27.0%), lentil in 13 (11.7%), peanut in 7 (6.3%), and fish or wheat in 4 each (3.6%). Urticaria was the most frequent reported manifestation (80/111, 72.0%), followed by pruritus (30/111, 27.0%), angioedema (24/111, 21.6%), and flushing (20/111, 18.0%). OFC was positive in 14 children (12.6%) and negative in 97 (87.4%). Reactions occurring within the first hour were more frequent in the positive group than in the negative group (85.7% vs 55.7%; odds ratio [OR], 4.78; p=0.041), as was a history of recurrent reactions to the same food (64.3% vs 26.8%; OR, 4.91; p=0.011). Parental

atopy (50.0% vs 14.4%; OR, 5.93; p=0.005), sibling atopy (57.1% vs 22.7%; OR, 4.56; p=0.020), and sibling food allergy (21.4% vs 3.1%; OR, 8.52; p=0.026) were also associated with OFC positivity. Eosinophilia was present in 71.4% of OFC-positive and 29.9% of OFC-negative children (OR, 5.88; p=0.005), whereas total IgE did not differ (p=0.936) (Table 1). In multivariable analysis, recurrent reaction to the same food (adjusted OR [aOR], 4.385; p=0.025), sibling food allergy (aOR, 9.497; p=0.027), and eosinophilia (aOR, 7.692; p=0.005) independently predicted a positive OFC (Table 2).

Table 1. Clinical and laboratory factors according to OFC outcome.

Factor	All patients	OFC positive (n=14)	OFC negative (n=97)	p value
Male sex, n (%)	61 (55.0)	7 (50.0)	54 (55.7)	0.911
Age, median (range), months	66 (1–264)	27.5 (1–228)	67 (1–264)	0.115
Reaction within first hour, n (%)	66 (59.5)	12 (85.7)	54 (55.7)	0.041
Recurrent reaction to same food, n (%)	35 (31.5)	9 (64.3)	26 (26.8)	0.011
Parental atopy, n (%)	21 (18.9)	7 (50.0)	14 (14.4)	0.005
Sibling food allergy, n (%)	6 (5.4)	3 (21.4)	3 (3.1)	0.026
Total IgE, median (range), IU/mL	34 (1–4054)	25.3 (1–2040)	34 (1–4054)	0.936
Eosinophilia, n (%)	39 (35.1)	10 (71.4)	29 (29.9)	0.005

Table 2. Independent predictors of a positive OFC in multivariable logistic regression.

Predictor	β coefficient	Adjusted OR	p value
Recurrent reaction to same food	1.478	4.385	0.025
Sibling food allergy	2.251	9.497	0.027
Eosinophilia	2.043	7.692	0.005

Abbreviations: aOR, adjusted odds ratio; OFC, oral food challenge; OR, odds ratio; sIgE, food-specific immunoglobulin E; SPT, skin-prick testing.

Conclusion

Among children with skin-limited suspected IgE-mediated food allergy and negative SPT and sIgE results, 12.6% had a positive OFC. Recurrent reactions to the same food, a sibling history of food allergy, and eosinophilia were independent predictors of OFC positivity. Detailed clinical history and selected laboratory findings may help prioritize children for supervised OFC and reduce unnecessary elimination diets. Larger prospective multicenter studies are needed to validate these predictors.

Funding and conflicts of interest

This study received no external project or research funding. The authors declare no financial or other conflicts of interest.

M4499-Tam Metin

BİOLOGİCAL THERAPY AND CLİNİCAL REMİSSİON İN PEDİATRİC SEVERE ASTHMA: REAL-LİFE EXPERİENCE

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Objective

Real-life evidence on biological therapy in children with severe asthma remains limited, particularly regarding the relationship between phenotype, lung function, symptom control, and clinically meaningful response. This study was planned to describe the characteristics of children receiving biologic treatment at a tertiary pediatric allergy center and to summarize changes in exacerbations, spirometric indices, and asthma control after treatment.

Methods

This retrospective observational case series included eight children aged 6–13 years with severe asthma who initiated biologic therapy at the İnönü University Pediatric Allergy and Immunology Department. Severe asthma was defined according to the Global Initiative for Asthma (GINA) and European Respiratory Society/American Thoracic Society (ERS/ATS) criteria, based on persistent uncontrolled disease despite high-dose inhaled corticosteroid (ICS) plus long-acting beta2-agonist (LABA) therapy, recurrent exacerbations, or systemic corticosteroid requirements. Demographic characteristics, body mass index, age at symptom onset, antibiotic use, atopic comorbidities, parental atopy, blood eosinophil count, total immunoglobulin E (IgE), inhalant allergen sensitization, biologic agent, and treatment duration were extracted from clinical records. The number of exacerbations during the year before treatment, forced expiratory volume in one second (FEV1), mid-expiratory flow at 25–75% of forced vital capacity (MEF25–75), and Childhood Asthma Control Test (cACT) scores were recorded before treatment and at the final follow-up. Lung function testing followed American Thoracic Society/European Respiratory Society standards. Treatment response was classified

as complete, good, or partial according to exacerbation burden, symptom control, and functional improvement. Because of the small sample, analyses were descriptive and no inferential comparison was performed.

Results

The mean age was 10.1±2.6 years; six children (75.0%) were female. Seven patients (87.5%) had at least one atopic comorbidity, six (75.0%) had parental atopy, and five (62.5%) had a history of frequent antibiotic use. Blood eosinophil counts ranged from 180 to 1350 cells/µL, and total IgE ranged from 16 to 584 IU/mL. The most frequent inhalant sensitization involved house-dust mites. Omalizumab was administered to five children (62.5%) and mepolizumab to three (37.5%), with treatment durations of 3–24 months. The mean number of exacerbations in the year before treatment was 7.3±1.5 (range, 5–10). At final follow-up, all patients showed improvement in the recorded lung-function measures: mean FEV1 increased from 74.6% to 86.0% predicted, and mean MEF25–75 increased from 60.8% to 71.4% predicted. The mean cACT score increased from 7.9 to 24.1. Six children (75.0%) met the predefined criteria for complete response, one (12.5%) for good response, and one (12.5%) for partial response. The child with a partial response nevertheless showed improvement in lung function and cACT score but did not achieve complete clinical control (Tables 1 and 2).

Table 1. Baseline characteristics and treatment profile of the cohort.

Characteristic	Summary	n (%) or range
Age, years	Mean ± SD	10.1 ± 2.6
Female sex	Proportion	6 (75.0)
At least one atopic comorbidity	Proportion	7 (87.5)
Parental atopy	Proportion	6 (75.0)
Frequent antibiotic use	Proportion	5 (62.5)
Blood eosinophils, cells/µL	Range	180–1350
Total IgE, IU/mL	Range	16–584
Omalizumab / mepolizumab	Treatment distribution	5 (62.5) / 3 (37.5)
Biologic treatment duration, months	Range	3–24
Pre-treatment exacerbations, previous year	Mean ± SD; range	7.3 ± 1.5; 5–10

Table 2. Treatment-related changes in lung function and asthma control.

Outcome	Before treatment	After treatment	Absolute change
FEV1, % predicted	74.6	86.0	+11.4
MEF25–75, % predicted	60.8	71.4	+10.6
cACT score	7.9	24.1	+16.2
Complete response, n (%)	—	6 (75.0)	—
Good response, n (%)	—	1 (12.5)	—
Partial response, n (%)	—	1 (12.5)	—

Abbreviations: cACT, Childhood Asthma Control Test; ERS/ATS, European Respiratory Society/American Thoracic Society; FEV1, forced expiratory volume in one second; IgE, immunoglobulin E; ICS, inhaled corticosteroid; LABA, long-acting beta2-agonist; MEF25–75, mid-expiratory flow at 25–75% of forced vital capacity.

Conclusion

In this small real-life pediatric case series, biologic therapy was accompanied by improvement in lung function and asthma control, and three-quarters of patients met the predefined criteria for complete response. The findings support phenotype-directed biologic treatment in selected children with severe asthma, while the small retrospective sample and absence of a comparator prevent causal or generalizable conclusions. Larger prospective studies should clarify predictors of sustained clinical remission.

Funding and conflicts of interest

No external project or research funding was received for this study. The authors declare no financial or other conflicts of interest.

M4520-Özet Metin

VENOUS ASYMMETRY ON SWI İN PROBABLE PEDİATRİC HEMİPLEGİC MİGRAİNE: A STROKE MİMİC

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Abstract

Introduction

Hemiplegic migraine is a rare subtype of migraine characterized by fully reversible motor weakness accompanied by visual, sensory, and/or speech-language symptoms. Because it can mimic ischemic stroke and other neurological disorders during the acute phase, imaging plays an important role in the differential diagnosis. In this report, we present a pediatric stroke-mimic case consistent with hemiplegic migraine.

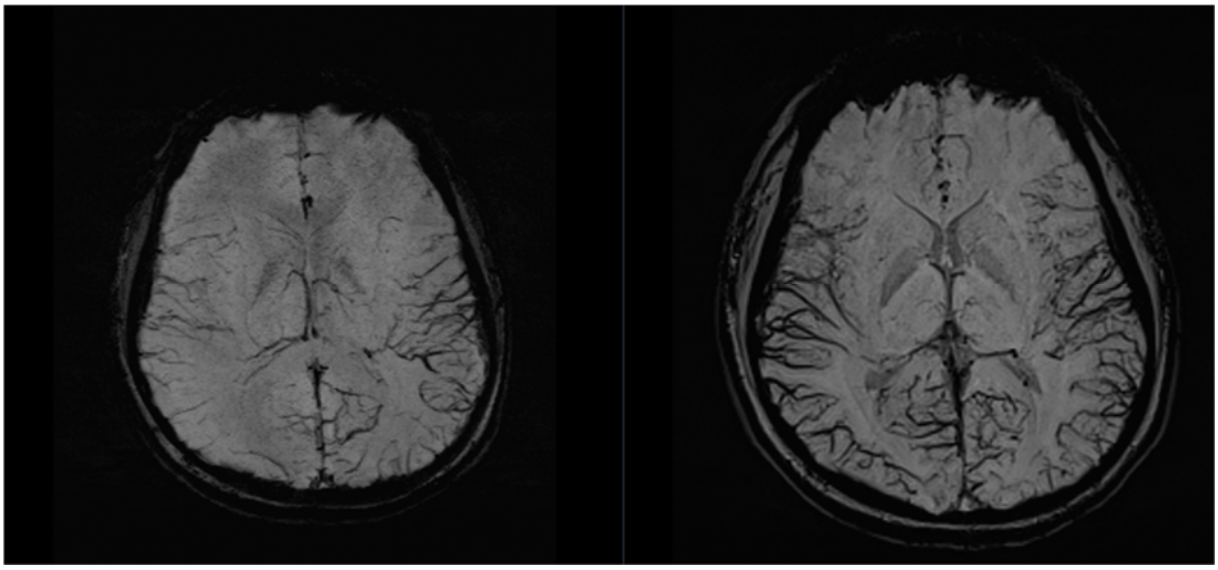
Case Presentation

A 12-year-old boy presented with dysarthria, blurred vision, numbness, and weakness in the left arm lasting approximately two minutes. His medical history included recurrent headaches, and he was being followed by pediatric nephrology for hypertension. His blood pressure at presentation was 148/92 mmHg. Conventional brain magnetic resonance imaging (MRI) and diffusion-weighted imaging revealed no evidence of acute ischemia or significant parenchymal abnormality. Susceptibility-weighted imaging (SWI) demonstrated decreased visibility of the cortical and medullary veins in the right cerebral hemisphere compared with the left hemisphere. Because the symptoms completely resolved, no diffusion restriction was detected, and the patient had a history of recurrent headaches, the clinical presentation was considered consistent with probable hemiplegic migraine. Follow-up MRI performed one year later showed resolution of the previous hemispheric venous asymmetry.

Discussion

Hemiplegic migraine can mimic serious neurological disorders in children, particularly acute ischemic stroke. In patients with normal conventional MRI and diffusion-weighted imaging findings, SWI may demonstrate transient venous changes in the hemisphere corresponding to the symptoms. However, SWI is not a direct perfusion imaging technique; therefore, its findings should be interpreted in conjunction with clinical data and other imaging modalities

Figure 1 : Vascularity of brain in SWI image



M4542-Tam Metin

PEDİATRİK KÜNT BATIN TRAVMALARINDA GÜNCEL KILAVUZLAR IŞIĞINDA YÖNETİM VE GÖRÜNTÜLEME STRATEJİLERİ

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GİRİŞ

Pediatrik travma, çocukluk çağındaki morbidite ve mortalitenin önde gelen nedenidir. Künt batın travmaları, intraabdominal yaralanmaların (İAY) büyük bir kısmını oluşturur. Çocukların anatomik farklılıkları (kaburgaların daha esnek olması, batın kaslarının daha zayıf olması ve katı organların oransal olarak daha büyük yer kaplaması) onları künt travmaya karşı daha savunmasız hale getirir. Acil tıp pratiğinde temel zorluk, çocuklarda iyonizan radyasyonun potansiyel malignite riskini minimize ederken, operatif veya yoğun bakım izlemi gerektiren majör yaralanmaları gözden kaçırmamaktır.

KLİNİK KARAR KURALLARI VE GÖRÜNTÜLEME STRATEJİLERİ

Geçmiş yıllarda sıklıkla başvurulan pan-BT (tüm vücut BT) yaklaşımı günümüzde terk edilmiştir. Mevcut Amerikan Çocuk Cerrahisi Birliği (APSA) ve İleri Travma Yaşam Desteği (ATLS) kılavuzları, hemodinamik parametrelerin ve tekrarlayan fizik muayenenin önemini vurgulamaktadır **[1, 4]**. Pediatric Emergency Care Applied Research Network (PECARN) tarafından geliştirilen klinik karar kuralı, BT endikasyonunu belirlemede en güvenilir araçlardan biridir **[2]**. PECARN kriterlerine göre aşağıdaki yedi bulgunun tamamının negatif olduğu durumlarda risk %0.1'in altındadır ve BT endikasyonu yoktur: Glasgow Koma Skoru (GKS) < 14 olmaması, Batın duvarında travma izi (emniyet kemeri izi, ekimoz vb.) bulunmaması, Batın palpasyonunda hassasiyet saptanmaması, Toraks duvarı travması bulgusu olmaması, Hastanın karın ağrısı şikayetinin olmaması, Kusma şikayetinin olmaması, Oskültasyonda nefes seslerinde azalma olmaması

Bu bulgulardan herhangi birinin varlığında, klinisyenin deneyimine ve hastanın hemodinamik stabilitesine göre BT kararı verilmeli veya laboratuvar ve ultrasonografi destekli gözlem uygulanmalıdır.

PEDİATRİK TRAVMADA POCUS (FAST) UYGULAMASININ YERİ

Erişkin travma resüsitasyonunda FAST (Focused Assessment with Sonography for Trauma) temel bir köşe taşı olmakla birlikte, pediatrik popülasyondaki tanısal değeri farklılık gösterir. Güncel meta-analizler, çocuklarda FAST'ın özgüllüğünün yüksek ancak duyarlılığının düşük (%30-50) olduğunu ortaya koymaktadır **[3]**. Pediatrik solid organ yaralanmaları (özellikle karaciğer ve dalak parankim hasarları) sıklıkla serbest sıvı oluşturmadan ortaya çıkar. Bu nedenle, pediatrik künt batın travmasında FAST'ın negatif olması, intraabdominal yaralanmayı ekarte ettirmez ve hastanın tek başına taburculuk kriteri olarak kullanılamaz. Öte yandan, hemodinamisi stabil olmayan bir hastada pozitif FAST bulgusu, acil laparotomi kararını hızlandıran kritik bir veridir.

LABORATUVAR PARAMETRELERİNİN YÖNLENDİRİCİ ETKİSİ

Görüntüleme endikasyonunun netleşmediği gri alan vakalarında laboratuvar tetkikleri karar sürecine rehberlik eder **[5]**. Literatürde öne çıkan parametreler şunlardır:

Karaciğer Transaminazları: AST > 200 U/L veya ALT > 125 U/L olması, karaciğer parankim yaralanması açısından yüksek spesifiteye sahiptir ve ileri görüntüleme endikasyonunu kuvvetlendirir.

Tam İdrar Tetkiki (TİT): Hastada şok veya başka bir majör sistem yaralanması yoksa, mikroskobik hematüri (<50 RBC/HPF) izole olarak BT endikasyonu oluşturmaz.

Ancak makroskopik hematüri saptanması, genitoüriner sistem hasarı şüphesiyle daima ileri görüntülemeyi (kontrastlı BT) gerektirir.

Pankreatik Enzimler: Emniyet kemeri izi bulunan veya inatçı kusması olan olgularda lipaz/amilaz yüksekliği, barsak veya pankreas yaralanmasının erken belirtisi olabileceğinden görüntüleme eşiği düşük tutulmalıdır.

ALTIN STANDART: NON-OPERATİF YÖNETİM (NOM)

Hemodinamik stabilitesi sağlanan pediatrik hastalarda, yaralanmanın radyolojik derecesinden bağımsız olarak dalak ve karaciğer gibi solid organ yaralanmalarında altın standart yaklaşım Non-Operatif Yönetim'dir (NOM) **[1]**. Güncel serilerde bu hastaların %90'ından fazlasının cerrahi müdahaleye gerek kalmaksızın konservatif yaklaşımla iyileştiği gösterilmiştir. Acil servis yönetiminin odak noktası; hastanın erken resüsitasyonunu sağlamak, atlanmış bir içi boş organ perforasyonunu ekarte etmek ve hastayı güvenli bir şekilde çocuk cerrahisi veya çocuk yoğun bakım ünitelerine devretmektir.

SONUÇ

Pediatrik künt batın travmalarının acil servis yönetiminde, travmanın mekanizmasından ziyade PECARN gibi valide edilmiş klinik karar kurallarına odaklanılmalıdır **[2]**. Negatif FAST ultrasonografisi intraabdominal yaralanmayı kesin olarak dışlamaz; bu nedenle seri batın muayenesi ve hedefe yönelik laboratuvar testleri (özellikle AST, ALT) tanı sürecine entegre edilmelidir **[3, 5]**. Nihai amaç, radyasyon maruziyetini akılcı düzeyde tutarken, güvenli NOM protokollerini zamanında başlatmaktır.

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M4562-Tam Metin

BUZDAĞININ GÖRÜNMEYEN YÜZÜ: DEMİR EKSİKLİĞİ ANEMİSİ ARDINDA ÇÖLYAK HASTALIĞI

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Giriş

Demir eksikliği anemisi; halsizlik, çabuk yorulma, baş dönmesi ve efor kapasitesinde azalma gibi nonspesifik semptomlarla kendini gösterebilen, birinci basamak sağlık hizmetlerinde sık karşılaşılan bir sağlık sorunudur. Demir eksikliği saptanan hastalarda semptomları gidermenin yanında eksikliğin altında yatan nedenin de araştırılması önemlidir [1].

Çölyak hastalığı, kronik gluten maruziyeti sonucunda gelişen otoimmün enteropatidir. [2,3] Klasik gastrointestinal sistem bulgularının yanı sıra demir eksikliği anemisi gibi gastrointestinal sistem dışı bulgularla da ortaya çıkabilmektedir [2,4]. Özellikle açıklanamayan veya tedaviye rağmen devam eden demir eksikliği anemisinde çölyak hastalığı düşünülmelidir [1,5].

Bu olguda, birinci basamakta demir eksikliği anemisi saptanan, tedavi yanıtının yetersiz olması üzerine etiyolojik araştırması genişletilen ve aile hekimi tarafından istenen serolojik inceleme sonucunda çölyak hastalığı tanısı konulan bir hasta sunulmuştur.

Olgu

Otuz iki yaşında kadın hasta, yaklaşık 6 aydır devam eden halsizlik, çabuk yorulma, baş dönmesi ve merdiven çıkarken nefes darlığı yakınmalarıyla aile hekimliği polikliniğine başvurdu.

Hastanın kronik ishal, belirgin karın ağrısı, kilo kaybı veya yağlı dışkılama şikâyeti yoktu. Zaman zaman yemeklerden sonra hafif karın şişkinliği olduğunu belirtti. Menstrüasyonları düzenli olup 4-5 gün sürmekte idi.

Özgeçmişinde bilinen kronik hastalık ve düzenli ilaç kullanımı öyküsü yoktu.

Fizik muayenede genel durum iyi, vital bulgular normaldi. Konjonktivalarda hafif solukluk dışında özellik saptanmadı. Batın muayenesi doğaldı.

Yapılan laboratuvar incelemesinde;

Parametre	**Sonuç**
Hb	8,9 g/dL
Hct	%29,8
MCV	68,4 fL
RDW	%17,8
Trombosit	428.000/mm³
Ferritin	3,6 ng/mL
Serum demiri	22 µg/dL
TDBK	421 µg/dL
Transferrin satürasyonu	%5,2
B12	382 pg/mL
Folat	8,6 ng/mL
CRP	1,8 mg/L

Hastanın muayene ve laboratuvar sonuçları belirgin demir eksikliği anemisi olduğunu düşündürmesi üzerine hastaya oral demir tedavisi başlandı ve hastaya tedavi uyumu, ilaç kullanımı ve beslenme konusunda danışmanlık verildi. Altı hafta sonra kontrole çağırıldı.

Altıncı haftadaki kontrolde halsizlikte kısmi düzelme olmakla birlikte hastanın yakınmalarının devam ettiği görüldü. Hastanın oral demir tedavisini düzenli kullandığı ve tedaviye uyumunun iyi olduğu öğrenildi.

Kontrol tetkiklerinde Hb 9,6 g/dL'ye yükselmiş olmakla birlikte Ferritin 4,2 ng/mL, Transferrin Satürasyonu %6,1 olarak bulundu. Tedaviye uyumun iyi olmasına rağmen düzelmenin yetersiz olması nedeniyle demir eksikliği etiyolojisi açısından yeniden değerlendirildi. Beslenme yetersizliği, menstrual kan kaybı, gastrointestinal kan kaybı, ilaç kullanımı açısından daha detaylı anamnez alındı. Aşırı menstrual kanama öyküsünün bulunmadığı, düzenli NSAİİ kullanımının olmadığı öğrenildi. Gastrointestinal kan kaybı açısından yapılan gaitada gizli kan testinin negatif olması ve kan kaybını açıklayabilecek başka bir neden saptanmaması üzerine malabsorpsiyon olasılığı değerlendirildi. Bu kapsamda çölyak hastalığı açısından serolojik testler istendi. Hastanın gluten içeren beslenmeye devam ettiği dönemde yapılan tetkiklerde aşağıdaki sonuçlar elde edildi.

Test	**Sonuç**
Anti-tTG IgA	146 U/mL (normal <15)
Total IgA	Normal
Anti-endomisyum IgA	Pozitif

Bu sonuçlar doğrultusunda hasta, gastroenteroloji polikliniğine yönlendirildi. Yapılan üst gastrointestinal sistem endoskopisinde mide ve duodenumun makroskopik görünümünün normal olduğu, ancak pozitif seroloji nedeniyle duodenal bulbus ve distal duodenumdan biyopsiler alındı. Biyopsi sonucunda; villuslarda kısalma, kript hiperplazisi ve intraepitelyal

lenfositlerde artış saptanması üzerine Marsh tip 3a çölyak enteropatisi tanısı konuldu ve glutensiz diyet başlandı.

Tanıdan üç ay sonra Hb 11,4 g/dL, ferritin 24 ng/mL; altıncı ayda ise Hb 12,7 g/dL, ferritin 46 ng/mL olarak ölçüldü. Hastanın halsizlik, baş dönmesi ve eforla nefes darlığı yakınmaları tamamen geriledi.

Takip	Laboratuvar	Klinik durum
3. ay	Hb 11,4 g/dL; Ferritin 24 ng/mL	Yakınmalar belirgin geriledi

Tartışma

Demir eksikliği anemisi birinci basamakta sık görülmesine rağmen, tedavi başlanması tanısal sürecin sonu olarak değerlendirilmemelidir [1]. Demir eksikliğinin nedeninin ortaya konulması ve tedaviye yanıtın izlenmesi önemlidir [1].

Bu olguda başlangıçta genç kadınlarda sık görülen menstrual kan kaybı ve yetersiz demir alımı olası nedenler olarak değerlendirilmiş, ancak ayrıntılı anamnez ve takip sonucunda bu faktörlerin tabloyu açıklamakta yetersiz olduğu görülmüştür.

Oral demir tedavisine rağmen ferritin düzeyinin düşük kalması ve hemoglobin düzeyindeki artışın sınırlı olması, demir eksikliğinin nedeninin yeniden değerlendirilmesini gerektirmiştir. Gastrointestinal kanama açısından yapılan değerlendirmelerin negatif olması sonrasında malabsorpsiyon olasılığı gündeme alınmıştır.

Çölyak hastalığı belirgin gastrointestinal semptomlar olmadan da ortaya çıkabilmektedir [2,3]. Demir eksikliği anemisi hastalığın önemli gastrointestinal sistem dışı bulgularından biridir [4]. Bu nedenle özellikle başka bir neden ile açıklanamayan veya uygun tedaviye rağmen devam eden demir eksikliğinde çölyak hastalığı ayırıcı tanıda düşünülmelidir [1,4].

Tanıda anti-tTG IgA ve total IgA düzeylerinin değerlendirilmesi önemli bir başlangıç testidir [2,5]. Serolojik pozitiflik sonrasında erişkin hastalarda tanının doğrulanması amacıyla duodenal biyopsi yapılması önerilmektedir [2,5].

Bu olguda endoskopinin makroskopik olarak normal olması çölyak hastalığını dışlamamış; pozitif seroloji nedeniyle alınan duodenal biyopsiler tanıyı doğrulamıştır [2].

Bu olgu, birinci basamakta demir eksikliği anemisinin yalnızca replasman tedavisi ile ele alınmaması gerektiğini göstermektedir. Tedavi yanıtının değerlendirilmesi ve beklenen düzelme sağlanmadığında etiyolojik araştırmanın genişletilmesi tanısal sürecin önemli bir parçasıdır [1,5].

Demir eksikliği anemisi olan her hastada çölyak hastalığı bulunmayacağı açıktır. Ancak açıklanamayan, tekrarlayan veya uygun tedaviye rağmen düzelmeyen demir eksikliğinde çölyak hastalığı ayırıcı tanıda düşünülmelidir [1,5].

Sonuç

Demir eksikliği anemisi birinci basamakta sık karşılaşılan bir durumdur; ancak yalnızca demir replasmanı verilerek takip edilmemelidir. Tedaviye yanıtın değerlendirilmesi ve beklenen düzelme sağlanmadığında altta yatan nedenin yeniden araştırılması önemlidir.

Bu olgu, birinci basamakta doğru anamnez, uygun laboratuvar değerlendirmesi ve tedavi yanıtının takibinin, klinik olarak sessiz seyreden çölyak hastalığının tanınmasındaki önemini göstermektedir.

Anahtar Kelimeler

Demir eksikliği anemisi, çölyak hastalığı, malabsorpsiyon, birinci basamak, aile hekimliği

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M4564-Tam Metin

GERİATRİK ACİL SERVİS BAŞVURULARINDA ÜST GASTROİNTESTİNAL SİSTEM KANAMALARI VE TANISAL YAKLAŞIM

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Özet

Demografik yaşlanma ile birlikte acil servislere başvuran geriatrik hasta popülasyonu giderek artmaktadır. İleri yaş grubunda atipik klinik prezentasyonlar, komorbiditelerin varlığı ve bilişsel/fonksiyonel kısıtlılıklar tanısal süreçleri zorlaştırabilmektedir. Geriatrik hastalar sıklıkla halsizlik, iştahsızlık veya genel durum bozukluğu gibi non-spesifik şikâyetlerle başvurabilmekte ve bu yakınmaların altında yaşamı tehdit eden akut hastalıklar bulunabilmektedir [1,2].

Bu derlemede; geriatrik hastalarda üst gastrointestinal sistem (GİS) kanamalarının atipik klinik prezentasyonu, fizik muayene ve laboratuvar değerlendirmesindeki kritik noktalar, kardiyorenal komorbiditeler eşliğinde resüsitasyon yaklaşımı ve acil servis pratiğindeki önemli noktalar literatür ışığında ele alınacaktır.

Giriş

Geriatrik acil hastaları, fizyolojik rezervlerin azalması, çoklu organ sistemlerinin etkilenmesi ve eşlik eden komorbiditeler nedeniyle genç hastalara kıyasla daha non-spesifik ve atipik klinik tablolarla başvurabilmektedir [1,2]. Halsizlik, geriatrik hastalarda sık görülen başvuru yakınmalarından biri olmakla birlikte tek başına bir tanı olmayıp altta yatan nedenin araştırılmasını gerektiren klinik bir bulgudur [1].

Semptomların yaşlılığa, psikolojik durumlara veya depresyona bağlanması, altta yatan organik hastalıkların gözden kaçmasına neden olabilir. Özellikle yaşlı hastalarda non-spesifik yakınmalar ciddi akut hastalıkların ilk prezentasyonu olabilir ve bu durum tanısal yaklaşımda güçlük oluşturabilir [1,2]. Üst GİS kanamaları da belirgin hematemez olmaksızın melena, halsizlik, senkop veya anemi gibi bulgularla ortaya çıkabilir [3,4].

Aşikar Kanama Yokluğu: Üst GİS kanaması her zaman hematemez veya belirgin kanama bulguları ile başvurmayabilir. Özellikle daha yavaş seyreden kanamalarda halsizlik, baş dönmesi, senkop veya anemiye bağlı genel durum bozukluğu ön planda olabilir. Melena varlığı ise üst GİS kanamasını destekleyen önemli bir klinik bulgudur [3,4].

Ağrı Hissinin Azalması: İleri yaşta hastalıkların klasik semptomlarla ortaya çıkmaması mümkündür. Bu nedenle yaşlı hastalarda belirgin karın veya epigastrik ağrı bulunmaması GİS patolojisini dışlamamalıdır [2,4].

Otonomik Cevap ve Vital Bulgular: İleri yaşta fizyolojik rezervlerin azalması ve beta-bloker gibi ilaçların kullanımı, kan kaybına verilen kardiyovasküler yanıtı değiştirebilir. Bu nedenle başlangıçta normal görünen vital bulgular, özellikle ciddi kanama şüphesi bulunan yaşlı hastalarda tek başına güven verici kabul edilmemeli ve seri klinik değerlendirme yapılmalıdır [1,2].

Laboratuvar ve Fizik Muayene

A. Dışkı özelliklerinin değerlendirilmesi

GİS kanaması şüphesi bulunan hastalarda dışkının melena açısından değerlendirilmesi tanısal sürece önemli katkı sağlayabilir. Melena varlığı üst GİS kanamasını destekleyen klinik bulgulardan biridir [3,4]. Srygley ve ark.nın sistematik derlemesinde, melenik dışkı üst GİS kanaması olasılığını artıran bulgular arasında bulunmuştur [3].

B. BUN / Kreatinin Oranı

Üst GİS kanamalarında gastrointestinal kan proteinlerinin sindirilmesi ve emilimi ile üre üretiminde artış meydana gelebilir. Buna ek olarak kan kaybına bağlı renal hipoperfüzyon da BUN düzeyindeki artışa katkıda bulunabilir [3,4].

BUN/kreatinin oranındaki belirgin artış üst GİS kanaması lehine bir laboratuvar bulgusu olarak değerlendirilebilir [3].

Bununla birlikte BUN/kreatinin oranı tek başına tanısal değildir ve böbrek fonksiyon bozukluğu, dehidratasyon ve diğer prerenal durumlar gibi faktörlerden etkilenebilir. Bu nedenle oran; anamnez, fizik muayene, hemoglobin düzeyi ve dışkı özellikleri gibi diğer klinik bulgularla birlikte değerlendirilmelidir [3,4].

C. Seri Vital Takibi

Başvuru anında normotansif olan hastalarda kan kaybının ilerlemesiyle hemodinamik instabilite gelişebilir. Bu nedenle özellikle ileri yaş ve komorbiditesi bulunan hastalarda tek bir normal vital bulgu ile ciddi kanama dışlanmamalı; vital bulgular ve klinik durum seri olarak değerlendirilmelidir [1,2].

D. Glasgow-Blatchford Skoru (GBS)

Üst GİS kanaması düşünülen hastalarda erken risk stratifikasyonu, acil serviste yönetimin önemli bileşenlerinden biridir. Glasgow-Blatchford Skoru (GBS); kan üre düzeyi, hemoglobin, sistolik kan basıncı, nabız, melena, senkop ve eşlik eden kalp yetmezliği gibi klinik ve laboratuvar değişkenleri kullanarak endoskopi öncesi risk değerlendirmesine olanak sağlar. Özellikle çok düşük riskli hastaların belirlenmesinde kullanılabilen GBS, hastaneye yatış ve acil endoskopik değerlendirme gereksiniminin öngörülmesine katkı sağlayabilir [5,6].

Acil Servis Resüsitasyon Yönetimi

Geriatrik hastalarda kalp yetmezliği (KY) ve kronik böbrek hastalığı (KBH) gibi komorbiditeler, akut üst GİS kanamasında resüsitasyon ve volüm yönetimini güçleştirebilmektedir. Bu hastalarda yeterli doku perfüzyonunun sağlanması ile volüm yüklenmesinden kaçınılması arasında dikkatli bir denge kurulmalı; sıvı ve kan ürünleri uygulanırken hemodinamik durum, volüm yüklenmesi bulguları ve renal fonksiyonlar yakından izlenmelidir [4].

Geriatrik hastalarda antiplatelet ve antikoagülan ilaçların yanı sıra nonsteroid antiinflamatuvar ilaçların (NSAİİ) yaygın kullanımı, üst GİS kanaması riskini ve kanamanın klinik seyrini etkileyebilmektedir. Bu nedenle başvuru sırasında aspirin, P2Y12 inhibitörleri, warfarin ve doğrudan etkili oral antikoagülanlar (DOAK) başta olmak üzere antitrombotik ilaçlar ile NSAİİ kullanımının ayrıntılı olarak sorgulanması önemlidir. Antitrombotik tedavinin kesilmesi, antidot veya reversiyon tedavisi gereksinimi ve tedavinin yeniden başlanma zamanı; kanamanın şiddeti, tromboembolik risk, endoskopik bulgular ve eşlik eden hastalıklar göz önünde bulundurularak bireyselleştirilmelidir [5,6].

1. Proton Pompa İnhibitörü (PPİ)

Akut üst GİS kanamasında uygun resüsitasyon ve erken endoskopik değerlendirme temel yönetim basamaklarıdır. 2026 ESGE kılavuzunda, akut üst GİS kanaması ile başvuran hastalarda pre-endoskopik yüksek doz intravenöz PPİ tedavisinin düşünülebileceği belirtilmektedir [6]. Başarılı endoskopik hemostaz sonrasında yüksek doz PPİ tedavisi, yeniden kanama riskini azaltmaya yönelik temel tedavi basamaklarından biridir [5,6].

2. Eritrosit Transfüzyonu

Üst GİS kanamalarında genel olarak restriktif eritrosit transfüzyon stratejisi tercih edilmekte ve hemoglobin düzeyinin 7 g/dL'nin altında olması genel transfüzyon eşiği olarak kabul edilmektedir [5]. Eşlik eden kardiyovasküler hastalık, devam eden kanama ve hastanın klinik durumu göz önünde bulundurularak transfüzyon kararı bireyselleştirilmelidir.

Kalp yetmezliği ve KBH bulunan hastalarda volüm yüklenmesi, renal fonksiyon ve elektrolitler yakından izlenmeli; diüretik tedavisi ve diğer destekleyici yaklaşımlar hastanın hemodinamik ve klinik durumuna göre bireyselleştirilmelidir. Uygun resüsitasyona rağmen devam eden hipotansiyon ve doku hipoperfüzyonu varlığında vazopresör desteği gerekebilir.

Sonuç

Geriatrik hastalarda halsizlik yakınması yeterli organik değerlendirme yapılmadan psikojenik kabul edilmemeli; solukluk, fonksiyonel kayıp, düşkünlük ve açıklanamayan anemi varlığında gizli GİS kanaması akılda tutulmalıdır. Başlangıçta normal vital bulgular ciddi kanamayı dışlamadığından seri klinik izlem şarttır. Melena açısından fizik muayene, dışkı değerlendirmesi ve BUN/kreatinin oranındaki artış tanıya erken katkı sağlayabilir. Eşlik eden kalp yetmezliği ve KBH varlığında resüsitasyonda perfüzyon-volüm dengesi gözetilmeli; erken tanı, uygun resüsitasyon ve zamanında endoskopi geriatrik hastalarda büyük önem taşımaktadır.

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M4563-Tam Metin

GÖZDEN KAÇAN ACİLİYET: PSİKİYATRİK ZANNEDİLEN HALSİZLİĞİN ARDINDAKİ GASTROİNTESTİNAL KANAMA

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Giriş

İleri yaş hastalarda semptomların değerlendirilmesi ve fizik muayene bulgularının yorumlanması, eşlik eden komorbiditeler, atipik klinik belirtiler ve iletişim güçlükleri nedeniyle genç popülasyona kıyasla daha fazla dikkat ve özen gerektirmektedir. Bu hasta grubunda halsizlik şikayeti basit bir semptom olarak değerlendirilmemeli, altında yatan neden mutlaka araştırılmalıdır. Semptomların non-spesifik olması, altta yatan ciddi hastalıkların gözden kaçmasına ve tanısal değerlendirmede güçlüğe yol açabilmektedir. [1].

Bu olgu sunumunda, bir aydır devam eden halsizlik yakınması yakınları tarafından "psikolojik" olarak değerlendirilen ve bu nedenle sadece semptomatik sıvı tedavisi talep edilen 69 yaşında

bir erkek hasta sunulmaktadır. Yapılan tetkik ve muayenede, derin anemi ve hemodinamik instabiliteye yol açan üst gastrointestinal sistem (GİS) kanaması saptanmıştır.

Olgu

69 yaşında erkek hasta, yakınları tarafından yaklaşık bir aydır devam eden belirgin halsizlik şikâyetiyle acil servise getirildi. Anamnezde hastanın son bir ay içerisinde benzer şikâyetlerle tekrarlayan şekilde acil servislere başvurduğu, her defasında kısa süreli intravenöz sıvı tedavisi sonrası taburcu edildiği öğrenildi. İlerleyen süreçte hastanın şikayetlerinin devam etmesi nedeniyle hasta yakınları durumun psikolojik olduğunu düşünerek hastaneye her girişte sadece IV sıvı desteği istedikleri öğrenildi.
Hastanın özgeçmişinde kalp yetmezliği, kronik böbrek hastalığı (KBH) ve hipertansiyon öyküsü mevcuttu. Antikoagülan kullanımı veya bilinen atriyal fibrilasyon öyküsü yoktu.
Başvuru sırasındaki triyaj değerlendirmesinde vital bulguları stabildi. Fizik muayenesinde belirgin mukokutanöz solukluk ve düşkün görünüm mevcuttu. Hasta kendi imkânlarıyla yürüyemiyor olup acil servise tekerlekli sandalye ile getirilmişti.
İleri yaş, kronik komorbiditeler, belirgin solukluk ve fonksiyonel kapasitedeki belirgin gerileme göz önüne alınarak, hastaya yalnızca semptomatik tedavi uygulanması reddedildi ve yakınları ikna edilerek ayrıntılı laboratuvar incelemesi planlandı.

Laboratuvar Bulguları

Hastanın yapılan laboratuvar tetkiklerinde;

Parametre	Sonuç	Referans Aralığı / Birim
Hemoglobin (Hb)	**5,8**	13,5 - 17,5 g/dL
Hematokrit (Hct)	**18,9**	%41,0 - %50,0
MCV	84,7	80 - 100 fL
Trombosit (PLT)	223.000	150.000 - 450.000 /mm³

Parametre	Sonuç	Referans Aralığı / Birim
BUN	**164,7**	8 - 20 mg/dL
Kreatinin	**3,66**	0,7 - 1,3 mg/dL
Sodyum (Na)	130	136 - 145 mmol/L
Potasyum (K)	**6,2**	3,5 - 5,1 mmol/L
CRP	**49**	0 - 5 mg/L
PT	12,4	11 - 13,5 sn
INR	1,08	0,8 - 1,2
aPTT	29,8	26 - 36 sn

Derin anemi (Hb: 5,8 g/dL) saptanması üzerine hasta kanama odakları açısından yeniden değerlendirildi. Yapılan rektal tuşe muayenesinde belirgin **melena** saptandı.
Hastanın detaylı anamnezi derinleştirildiğinde, eşinden yaklaşık 1 aydır siyah renkli gaita çıkışı olduğu bilgisine ulaşıldı. BUN/Kreatinin oranının 45 olması ve melena varlığı ile hastada **üst gastrointestinal sistem kanaması** düşünüldü.
Acil servisteki takibi esnasında hasta instabil hale geldi:

- **Tansiyon Arteriyel:** 80/55 mmHg
- **Nabız:** 114/dakika (Taşikardik)
- **Solunum Sayısı:** 24/dakika
- **SpO_2:** %96 (Oda havasında)

Ciddi anemi, melena, taşikardi ve hipotansiyon tablosu ile hasta "Hemodinamik Olarak İnstabil Üst GİS Kanama" ve "Akut Zeminli Kronik Böbrek Hasarı + Hiperkalemi" tanılarıyla uygun tedavi başlandı. Hasta, acil hemostaz, endoskopik müdahale ve ileri yoğun bakım ihtiyacı nedeniyle Gastroenteroloji birimlerinin bulunduğu bir üst merkeze sevk edilmek istendi [2,3]. Ancak yaklaşık 7 saatlik acil servis takibi sonrasında, hastaya ve yakınlarına mevcut hayati riskler ayrıntılı bir şekilde izah edilmesine rağmen hasta ve yakınları sevki reddetti. Resmi reddi imza altına alınan hasta kendi isteğiyle acil servisten ayrıldı. Hastanın sonraki klinik seyri ve kesin kanama odağı hakkında bilgi edinilemedi.

Tartışma

İleri yaş popülasyonda "halsizlik", çok çeşitli organik ve hayatı tehdit eden hastalıkların (kanama, sepsis, akut koroner sendrom, elektrolit bozuklukları) ilk ve bazen tek klinik bulgusu olabilir. Yaşlı hastalarda ağrı veya belirgin semptomların maskelenmesi, klinik tablonun non-spesifik halsizlik şeklinde ortaya çıkmasına neden olur [1].
Bu olguda dikkati çeken en önemli unsur, yakınlarının ve daha önceki başvurularındaki semptomatik yaklaşımların "psikolojik halsizlik" algısına dayanmasıdır. Fizik muayenedeki solukluğun fark edilmesi ve rutin laboratuvar tetkiklerinin istenmesi tanıdaki dönüm noktasıdır. BUN/kreatinin oranındaki belirgin artış ve melena varlığı, üst gastrointestinal sistem kanaması olasılığını destekleyen bulgular olarak değerlendirildi. Üst GİS kanamalarında BUN/kreatinin oranındaki artış; gastrointestinal kan proteinlerinin sindirilmesi ve emilimine bağlı üre üretimindeki artışın yanı sıra, kan kaybına bağlı renal hipoperfüzyon ile de ilişkili olabilir [4]. Ayrıca başvuru anında vital bulguları stabil olan hastanın takibinde taşikardi ve hipotansiyon geliştirmesi, geriatrik acil hastalarında tek anlık vital değerlendirmesinin yanıltıcı olabileceğini ve seri vital takibinin önemini bir kez daha göstermektedir [1].
Hastanın sevki reddetmesi nedeniyle endoskopik tanı/tedavi aşamasına geçilememiş, kesin etiyolojik odak (peptik ülser, erosif gastrit, vb.) gösterilememiştir [3].

Sonuç

Özellikle ileri yaş, komorbiditesi yüksek ve fonksiyonel kapasitesi azalmış geriatrik hastalarda halsizlik yakınması, organik nedenler ve hayati tehdit oluşturan acil tablolar dışlanmadan psikojenik olarak yorumlanmamalıdır. Fizik muayenenin ve özellikle dışkının melena açısından

değerlendirilmesinin, temel laboratuvar incelemeleriyle birlikte tanısal süreçte önemli katkı sağlayabileceği unutulmamalıdır.

Anahtar Kelimeler: Halsizlik, Melena, Gastrointestinal Kanama, Ciddi Anemi, Geriatrik Acil, Acil Servis Yönetimi

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M4566-Tam Metin

A CROSS-SECTIONAL EPIDEMIOLOGICAL REVIEW OF PEDIATRIC CASES PRESENTING TO THE EMERGENCY DEPARTMENT WITH RABIES RISK EXPOSURE

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ABSTRACT

Introduction/aim: Rabies, caused by a member of the Lyssavirus family, is an incurable and inevitably fatal zoonotic disease that kills approximately 59,000 people each year. There is no treatment once the signs or symptoms of the disease begin, and it results in death in humans and animals within 1-2 weeks of the onset of symptoms. The aim of our study is to share our experiences by providing a cross-sectional epidemiological overview of pediatric cases presenting with rabies-risky contact.
Methods: Eighty child patients who presented to the hospital with rabies-risky contact in April and May 2026 were included in the study. Rabies vaccination unit patient forms were retrospectively reviewed.
Results: The average age of the patients included in the study was 8.3 years. The vast majority of animals contacted in our region were cats(71.25%). Additionally, a very large proportion of the animals contacted were unvaccinated(97.50%) and stray(82.50%). The rate of rabies Ig administration to patients in risky contact category III was very low(23.07%). Antibiotic

prophylaxis was recommended for 41(51.25%) patients, data was unavailable for 39(48.75%) patients, and it was observed that sufficient attention was not paid to record-keeping.
Conclusion: Due to insufficient reporting of cases, cultural beliefs, inadequate or insufficient rabies diagnostic units, and lack of information about the mode of transmission and prevention of the disease; in many developing countries, human mortality rates due to rabies infection are low. In rabies, accurate and rapid diagnosis is crucial for early treatment and effective prevention and control measures.

INTRODUCTION/AIM

Rabies, a lyssavirus that infects mammals, is most commonly transmitted through saliva via a bite or scratch from an infected animal. Rabies, which kills approximately 59,000 people worldwide each year, is an incurable and inevitably fatal zoonotic disease. Rabies can be transmitted to humans through domestic and wild animals. 98% of these cases are caused by a variant of the canine rabies virus.(1)

A serious concern regarding Lyssavirus is that multiple genotypes exist in various regions of the world, and many of these genotypes cause disease in humans. Because the virus is found at low levels in accessible samples such as saliva and cerebrospinal fluid (CSF), rapid diagnosis of the disease in humans is problematic.(2)

There is no treatment once the signs or symptoms of the disease begin, and the disease becomes fatal in humans and animals within 1-2 weeks of the onset of symptoms.(3) Despite being a vaccine-preventable disease, rabies is estimated to cause 32,000 human deaths annually in Asia.(4)

Post-exposure prophylaxis (PTP) is indicated in all potential exposure situations to the rabies virus and, when administered promptly, is nearly 100% effective in preventing death.(5) The World Health Organization (WHO) recommends the simultaneous administration of both rabies immunoglobulin (RIG) and rabies vaccine for category III contacts. The WHO states that approximately 25% of those exposed in endemic countries should receive RIG, but less than 1% actually receive it.(6)

Although pediatric patients constitute the majority of cases, limited safety and efficacy data are available regarding the use of PTP in pediatric patients. The costs of rabies prevention and control vary considerably.Over the years, various efforts have been made to simplify and make rabies PTP regimens more accessible.(7)

Despite being a preventable viral zoonosis through vaccination, rabies remains a significant public health problem in developing countries; this is clearly evident from the fact that globally this devastating disease causes more than 60,000 deaths and approximately 15 million people contract PTP each year.(8)

The approach to treating rabies in animals and humans is one of the most important challenges in medicine, and the development of an effective treatment may depend on a better understanding of the fundamental mechanisms underlying the pathogenesis of rabies. The aim of our study is to share our experiences by providing a cross-sectional epidemiological overview of pediatric cases presenting with rabies-risky contact.

METHODS

This study is based on a retrospective examination of patient files and data from Malatya Training and Research Hospital between April 15, 2026, and June 1, 2026. Children aged 17

and under who presented to the emergency department with rabies-risky contact and were subsequently referred to the rabies unit were included in the study.Adult patients over 17 years of age who presented with rabies risk exposure were not included in the study.

The files of 80 patients who applied to the rabies vaccination unit were reviewed. The patient form was created and completed. Rabies information forms and rabies-risk contact case investigation forms for the cases were examined. The monthly rabies risk contact monitoring form was reviewed.

Demographic and clinical characteristics such as age, gender, animal contacted, animal's vaccination status, animal's ownership status, animal's 10-day observation status, risky contact category, time to report after contact, planned vaccine dose, completed vaccine dose, rabies immunoglobulin administration status, tetanus administration status, whether the person had previously received rabies prophylaxis, and whether they had received antibiotic prophylaxis were examined.

RESULTS

VARIABLE	AVERAGE	MEDIAN	STANDARD DEVIATION	LOWEST VALUE	HIGHEST VALUE
Age	8.3	9.0	4.76	1	17

The mean age of the patients included in the study was 8.3 (1-17).

VARIABLE	GROUP	NUMBER	PERCENTAGE
Gender	Male	43	53.75
	Female	37	46.25
Animal contacted	Cat	57	71.25
	Dog	23	28.75
Is the animal vaccinated	Yes	2	2.50
	No	78	97.50
Is the animal owned	Yes	14	17.50
	No	66	82.50
10 days of observation	Yes	25	31.25
	No	55	68.75
Post-exposure vaccination	same day	67	83.75
	1 day later	10	12,50
	2 days later	3	3.75
Planned vaccine dose	0(observation)	2	2.50
	1	4	5.00
	2	0	0.00
	3	4	5.00
	4	70	87.50
Completed vaccine dose	Completed	62	77.50
	Not completed	18	22.50
Rabies Ig	Yes	4	5.00
	No	76	95.00
Tetanus	Yes	12	15.00

	No	68	85.00
Previously, rabies prophylaxis	Evet	1	1.25
	Hayır	79	98.75
Antibiotic prophylaxis	Yes	41	51.25
	Unknown	39	48.75
Category	II	67	83.75
	III	13	16.25
VARIABLE	**GROUP**	**NUMBER OF CASES ADMINISTERED RABIES IG**	**RABIES IMMUNE APPLICATION PERCENTAGE**
Category	II	1/67	1.49
	III	3/13	23.07

Of the patients, 43 (53.75%) were male and 37 (46.25%) were female. Of the eighty patients, 57 (71.25%) had contact with a cat, and 23 (28.75%) with a dog. Of the animals that came into contact with, 2 (2.50%) were vaccinated and 78 (97.50%) were unvaccinated. Of the animals contacted, 14 (14.50%) were owned and 66 (82.50%) were stray.

Sixty-seven (83.75%) patients presented on the same day, 10 (12.50%) patients one day later, and 3 (3.75%) patients two days later. In terms of vaccination planning, 70 (87.50%) patients had completed 4 doses, 4 (5.00%) patients had completed 3 doses, 4 (5.00%) patients had completed 1 dose, and 2 (2.50%) patients were under observation without vaccination.

Of the eighty patients, 67 (83.75%) were in risky contact category II and 13 patients (16.25%) were in category III. In Category II, 1 (1.49%) case received immunoglobulin, while in Category III, 3 out of 13 cases (23.07%) received immunoglobulin.

Rabies immunoglobulin was administered to 4 (5%) patients, but not to 76 (95%) patients. Tetanus vaccine was administered to 12 (15%) patients, but not to 68 (85%) patients. 1 (1.25%) patient had previously received rabies prophylaxis, while 79 (98.75%) patients had not. Antibiotic prophylaxis was given to 41 (51.25%) patients, and data was unavailable for 39 (48.75%) patients.

CONCLUSION

In the cross-sectional study in our region, cats constituted the vast majority of animals that came into contact with the virus.The vast majority of animals that came into contact with the virus in our region were unvaccinated and stray animals.67 out of 80 patients (83.75%) presented on the same day.67 out of 80 patients (83.75%) were in risky contact category II and 13 (16.25%) were in category III.

Rabies immunoglobulin was administered to 4 out of 80 patients (5%), and to only 3 out of 13 category III cases, a number far below the WHO recommendation for simultaneous administration of both rabies immunoglobulin (RIG) and rabies vaccine for category III contacts.

Antibiotic prophylaxis is important in rabies-risk exposures. In our study, antibiotic prophylaxis was recommended for 41 (51.25%) patients, while data was unavailable for 39 (48.75%) patients. It was also observed that sufficient attention was not paid to recording this information.

In many developing countries, human mortality rates due to rabies infection are low, due to underreporting of cases, cultural beliefs, inadequate or insufficient rabies diagnostic facilities, and a lack of information about the modes of transmission and prevention of the disease. As a significant zoonotic disease, accurate and rapid diagnosis is crucial for early treatment and effective prevention and control measures.

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M4567-Tam Metin

PEDİATRİK ACİL SERVİSTE REFAKATSİZ BAŞVURULAR: AYDINLATILMIŞ ONAM, HUKUKİ SORUMLULUKLAR VE KLİNİK KARAR ALGORİTMALARI

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Özet

Pediatrik acil servislere 18 yaş altı çocuk ve adölesanların yanlarında yasal vasi ya da ebeveynleri olmaksızın (refakatsiz) başvurması, klinik pratikte hekimleri tıbbi gereklilik, özerklik ve hukuki sorumluluk üçgeninde etik-hukuki ikilemlerle karşı karşıya bırakmaktadır.

Bu çalışmanın amacı, refakatsiz çocuk olgularında aydınlatılmış onam süreçlerini, "acil hal istisnası" sınırlarını, "sezgin küçük" kavramını ve hekimin adli/cezai yükümlülüklerini ulusal ve uluslararası mevzuat çerçevesinde incelemek; acil servis işleyişine uygun klinik-hukuki bir karar algoritması sunmaktır. Yaşam hakkının ve çocuğun üstün yararının korunması ilkesi gereğince, acil müdahale gerektiren durumlarda ebeveyn rızası aranmaksızın tedaviye başlanmalıdır. Acil olmayan tablolarda ise çocuğun gelişimsel olgunluğu, müdahalenin invazivlik derecesi ve olgunun adli niteliği gözetilerek kademeli bir onam ve belgeleme süreci işletilmelidir.
Anahtar Kelimeler: Pediatrik acil, refakatsiz çocuk, aydınlatılmış onam, sezgin küçük, tıp hukuku, acil hal istisnası.

1. Giriş

Acil servisler, doğası gereği zaman baskısının yüksek olduğu ve hızlı karar almayı gerektiren dinamik klinik alanlardır. Pediatrik hasta grubunda tıbbi müdahalenin hukuki geçerliliği kural olarak yasal temsilcinin (veli veya vasi) aydınlatılmış onamına dayanır. Ancak pratikte; travmalar, okul kazaları, adölesan psikiyatrik tabloları veya sosyal ihmal gibi nedenlerle 18 yaş altı hastaların acil servise tek başlarına, arkadaşlarıyla, öğretmenleriyle veya kolluk kuvvetleri refakatinde başvurdukları sıkça görülmektedir.

Refakatsiz çocuk hastanın yönetimi; Türk Medeni Kanunu'nda düzenlenen velayet hakkı, Anayasa ve uluslararası sözleşmelerle korunan yaşam hakkı ile hasta hakları mevzuatı arasında hassas bir dengede yer alır. Hekimlerin yasal sorumluluk korkusuyla müdahaleyi geciktirmesi malpraktis ve görevi ihmal suçlarını doğurabileceği gibi; veli rızası olmaksızın yapılan elektif müdahaleler de vücut bütünlüğünün ihlali iddiasına zemin hazırlayabilmektedir. Bu metinde, refakatsiz çocuk başvurularında uygulanması gereken mevzuat dayanakları ve hekimi hukuki güvenceye alan klinik basamaklar derlenmiştir.

2. Ulusal ve Uluslararası Mevzuat Çerçevesi

2.1. Yaşam Hakkı ve Çocuğun Üstün Yararı

T.C. Anayasası'nın 17. maddesi herkesin yaşama, maddi ve manevi varlığını koruma ve geliştirme hakkına sahip olduğunu ve tıbbi zorunluluklar halinde kanunda yazılı şartlarla vücut bütünlüğüne müdahale edilebileceğini amirdir.

Birleşmiş Milletler Çocuk Haklarına Dair Sözleşme'nin 3. maddesi, kamusal veya özel sosyal yardım kurumları, mahkemeler, idari makamlar veya yasama organları tarafından yapılan ve çocukları ilgilendiren bütün faaliyetlerde **"çocuğun üstün yararının"** temel düşünce olduğunu vurgular. Sözleşmenin 24. maddesi ise çocuğun elde edebileceği en yüksek sağlık standardından yararlanma hakkını güvence altına alır.

2.2. Acil Hal İstisnası ve Tıbbi Müdahale Zorunluluğu

Acil ve hayati durumlarda hekimin öncelikli görevi hastanın hayatını ve organ fonksiyonlarını korumaktır:

Tababet ve Şuabatı San'atlarının Tarzı İcrasına Dair Kanun (1219 S.K., Madde 70): Hekimlerin yapacakları her türlü ameliyat ve cerrahi müdahale için hastanın, küçük veya hacirli ise veli veya vasisinin rızasını alması gerektiğini belirtmekle birlikte, hayati tehlike arz eden acil durumları bu kuralın istisnası olarak kabul etmiştir.

Hasta Hakları Yönetmeliği (Madde 24): Kanuni temsilcinin rızasının gerektiği durumlarda, temsilcinin bulunmadığı veya rızasının alınamadığı hallerde, hastanın hayatını tehdit eden veya organ kaybına yol açabilecek acil bir durum varsa tıbbi müdahale derhal yapılır.

Türk Ceza Kanunu (5237 S.K., Madde 98 & 83/88): Yaşı veya durumu nedeniyle kendini idare edemeyecek durumda olan kimseye yardım etmemek suç sayılmıştır (m. 98). Hekimin acil müdahaleden kaçınması neticesinde ölüm veya sakatlık gelişmesi halinde "ihmali davranışla kasten/taksirle öldürme veya yaralama" hükümleri gündeme gelir.

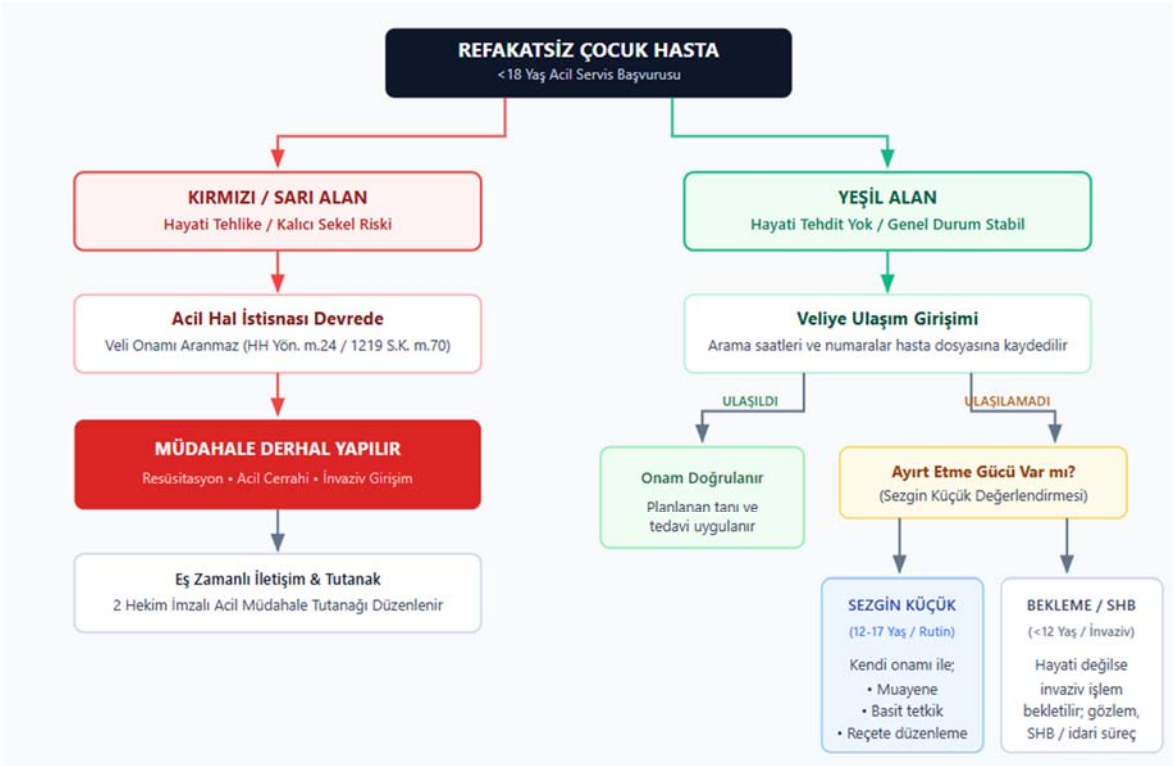
2.3. Sezgin Küçük Kavramı ve Tıbbi Özerklik

Biyotıp Sözleşmesi (Oviedo Sözleşmesi, Madde 6): Tıbbi müdahaleye rıza verme yeteneği bulunmayan bir küçüğe müdahale ancak onun doğrudan yararı için yapılabilir. Yaşı ve olgunluk derecesi arttıkça küçüğün görüşü giderek daha belirleyici bir etken olarak dikkate alınmalıdır.

Türk Medeni Kanunu (4721 S.K., Madde 16): Ayırt etme gücüne sahip küçükler ve kısıtlılar, yasal temsilcilerinin rızası olmadıkça kendi işlemleriyle borç altına giremezler; ancak **kişiye sıkı sıkıya bağlı hakları** bizzat kullanabilirler. Tıbbi müdahaleye rıza hakkı da bu kapsamdadır.

3. Klinik Aciliyet Düzeyine Göre Yönetim ve Triyaj Algoritması

Refakatsiz çocuk başvurusunda uygulanacak hukuki ve klinik prosedür triyaj kategorisine göre şekillenir:



/ İdari Süreç

3.1. Kırmızı ve Sarı Alan (Hayati Tehlike ve Kalıcı Hasar Riski)

Solunum arresti, şok, politravma, intrakraniyal kanama, akut batın veya majör kanama gibi tablolarda veli/vasi rızası aranmaz.

Müdahaleye derhal başlanır; endike olan cerrahi, resüsitatif veya invaziv işlemler gecikmeksizin uygulanır.

Mümkün olan en kısa sürede iki hekim imzalı **"Acil Tıbbi Müdahale Tutanağı"** düzenlenerek durumun aciliyeti ve gecikmenin yaratacağı hayati riskler epikrize işlenir.
Bir yandan müdahale sürerken diğer yandan hastane idaresi veya destek personeli vasıtasıyla ebeveyne ulaşma çabaları sürdürülür.

3.2. Yeşil Alan (Stabil ve Elektif Durumlar)

Basit üst solunum yolu enfeksiyonları, döküntüler, hafif travmalar gibi hayati risk taşımayan durumlarda:
İletişim Prosedürü: Kayıtlı telefon numaralarından ebeveyne ulaşılmaya çalışılır; arama saatleri ve neticeleri sisteme kaydedilir.
Adölesan Onamı: Hasta 12-17 yaş grubunda ve ayırt etme gücünü haiz ise (hastalığın mahiyetini, tedaviyi ve olası riskleri kavrayabiliyorsa); basit fizik muayene, non-invaziv tetkikler ve semptomatik tedaviler hastanın kendi aydınlatılmış onamı ile yürütülebilir.
İnvaziv İşlem Sınırı: Elektif cerrahi girişimler, genel anestezi veya kalıcı risk barındıran invaziv işlemler için veli onamı şarttır; veli gelene veya onay verene kadar hasta güvenli alanda semptomatik olarak takip edilir.

4. Özellikli Klinik-Adli Tablolar

4.1. İhmal ve İstismar Şüphesi

Refakatsiz başvuru bizatihi bir ebeveyn ihmali veya istismar bulgusu olabilir.
Yasal Dayanak: TCK Madde 280 (Sağlık mesleği mensuplarının suçu bildirmemesi) ve 5395 sayılı Çocuk Koruma Kanunu (ÇKK).
Uygulama: Aile içi şiddet, cinsel istismar veya ağır ihmal şüphesinde ebeveyne haber verilmesi çocuğun ikincil travmaya maruz kalmasına veya delillerin karartılmasına yol açabileceğinden ebeveyn bilgilendirmesi ertelenir. Derhal adli mercilere, hastane polisine, Sosyal Hizmet Birimi'ne (SHB) ve varsa Çocuk İzlem Merkezi'ne (ÇİM) bildirim yapılır.

4.2. Adölesan Mahremiyeti ve Cinsel Sağlık

Adölesanın cinsel sağlık danışmanlığı, kontrasepsiyon talebi veya madde kullanımı şüphesi gibi hassas konularda hekime başvurması durumunda:
Tıbbi Gizlilik ve Sır Saklama: TCK Madde 136 ve Tıbbi Deontoloji Tüzüğü gereği hekim sır saklamakla yükümlüdür. Bilgilendirmenin hastayı şiddete veya dışlanmaya maruz bırakacağı açık olan hallerde, çocuğun üstün yararı gözetilerek veli bilgilendirmesi yapılmayabilir. Ancak hayati risk (intihar girişimi, ağır toksisite vb.) varlığında gizlilik sınırı kalkar ve koruyucu bildirimler yapılır.

4.3. Üçüncü Kişilerin Refakati

Öğretmen, antrenör, servis şoförü, komşu veya kolluk kuvveti yasal veli/vasi değildir; bu kişilerin tıbbi müdahaleye onam verme yetkisi hukuken yoktur. Bu kişilerin imzası yalnızca çocuğun teslim alındığına ve olay örgüsüne dair **bilgi/teslim tutanağı** niteliğindedir.

5. Hukuki Riskler ve Tıbbi Belgeleme Standartları

Refakatsiz olgularda açılabilecek malpraktis veya tazminat davalarında hekimin en önemli savunma aracı usulüne uygun tutulmuş tıbbi kayıtlardır.

Süreç Aşaması	Hukuki Risk	Standart Kayıt ve Belgeleme Kuralı
Geliş Anı	Kimlik tespiti yetersizliği, kayıp çocuk	Getiren kişinin TC kimlik, iletişim bilgisi, geliş vasıtası ve saati kaydedilmelidir.
İletişim	"Haber verilmedi" iddiası	Aranan telefon numaraları, arama saatleri ve görüşme içeriği dosyaya işlenmelidir.
Müdahale	Rızasız müdahale iddiası	Müdahalenin aciliyeti, gecikmenin tehlikeleri 2 hekim imzalı tutanakla belgelenmelidir.
Taburculuk	Çocuğun kaybolması, istismara açıklık	Çocuk asla tek başına servisten çıkarılmamalı; yalnızca resmi veliye veya resmi koruma birimine (SHB/Kolluk) tutanakla teslim edilmelidir.

6. Sonuç

Pediatrik acil servislerde refakatsiz çocuk hastaların yönetimi, tıp etiği ve sağlık hukukunun en hassas kesişim noktalarından biridir. Hekimler için temel kılavuz ilke "yaşam hakkı ve çocuğun üstün yararı"dır.

Hayati tehlike ve kalıcı hasar riski taşıyan acil durumlarda ebeveyn rızası aranmaksızın müdahale yapılması yasal bir zorunluluktur ve hekimi cezai sorumluluktan korur. Acil olmayan stabil durumlarda ise ayırt etme gücüne sahip adölesanların karara katılımı sağlanmalı, invaziv işlemler için veli iletişimi aranmalı ve tüm süreç ayrıntılı tutanaklarla kayıt altına alınmalıdır.

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M4633-Tam Metin

ÇOCUKLUK ÇAĞINDA TETANOZ AŞILAMALARI VE TEMAS SONRASI KUDUZ PROFİLAKSİSİ

Azize Yetişgen

Malatya Eğitim ve Araştırma Hastanesi, Klinik Mikrobiyoloji ve Enfeksiyon Hastalıkları, Malatya, Türkiye

Özet

Tetanoz ve kuduz, uygun bağışıklama ve temas sonrası profilaksi ile önlenebilen ancak gelişmeleri halinde ciddi mortaliteye neden olabilen enfeksiyon hastalıklarıdır. Çocukluk çağında travmatik yaralanmalar ve hayvan ısırıkları nedeniyle acil servise başvuran hastalarda yara özelliklerinin değerlendirilmesi, aşılama geçmişinin sorgulanması ve gerekli profilaksinin zamanında uygulanması önem taşımaktadır. Bu yazıda çocukluk çağında tetanoz ve kuduzun temel klinik özellikleri, bağışıklama uygulamaları, yaralanma sonrası tetanoz profilaksisi ve kuduz riskli temas sonrası yaklaşım güncel bilimsel bilgiler doğrultusunda ele alınmıştır.

Anahtar Kelimeler: Tetanoz, kuduz, çocukluk çağı bağışıklama, temas sonrası profilaksi

Giriş

Tetanoz ve kuduz, koruyucu sağlık hizmetlerinin etkin uygulanmasıyla önlenebilen ancak klinik hastalık geliştiğinde ciddi sonuçlara yol açabilen enfeksiyonlardır. Özellikle çocukluk çağında travmatik yaralanmalar, kontamine yaralar ve hayvan ısırıkları nedeniyle acil servislere yapılan başvurular, bu hastalıkların önlenmesi açısından önemli fırsatlar sunmaktadır. Her iki hastalıkta da doğru yara bakımı, bağışıklama durumunun değerlendirilmesi ve gerekli durumlarda immünoglobulin uygulanması temel koruyucu yaklaşımlardır (1,2).

1. Tetanoz

Mikrobiyoloji ve Patogenez

Clostridium tetani, gram-pozitif, anaerob, hareketli ve spor oluşturabilen bir basildir. Sporları karakteristik olarak davul tokmağı veya tenis raketi görünümündedir. Bu sporlar toprakta, tozda ve hayvan dışkısında uzun süre canlı kalabilmektedir (1).

Klinik Özellikler

Tetanozun en sık görülen klinik formu jeneralize tetanozdur. Trismus, risus sardonicus, opistotonus ve yaygın ağrılı kas spazmları ile karakterizedir. Lokalize tetanozda yaralanma bölgesine komşu kaslarda rijidite ve spazmlar görülürken, sefalik tetanozda kranial sinir tutulumları ön plandadır. Neonatal tetanoz ise özellikle annelerin yeterli bağışıklığının bulunmadığı ve hijyenik olmayan doğum koşullarının söz konusu olduğu durumlarda gelişmektedir (1). Tetanozdan korunmanın temelini tetanoz toksoidi içeren aşılar oluşturmaktadır. Çocukluk çağında primer bağışıklama ve pekiştirme dozları ulusal bağışıklama programı doğrultusunda uygulanmaktadır (1,3).

Yaralanma Sonrası Tetanoz Profilaksisi

Yaralanma sonrası tetanoz profilaksisinde yaranın temiz veya yüksek riskli olarak sınıflandırılması ve hastanın bağışıklama geçmişinin değerlendirilmesi gerekmektedir. Primer aşı serisini tamamlamamış veya bağışıklama durumu bilinmeyen hastalarda tetanoz içeren aşı uygulanmalıdır. Kirli veya yüksek riskli yaralarda bu hastalara ayrıca tetanoz immünoglobulini (TIG) verilmelidir. HIV enfeksiyonu veya ağır immün yetmezliği bulunan hastalarda kirli yaralanmalar sonrası TIG gereksinimi ayrıca değerlendirilmelidir. Etkin yara temizliği, yabancı cisimlerin uzaklaştırılması ve gerektiğinde debridman yapılması profilaksinin önemli bileşenleridir (3).

2. Kuduz

Tanım ve Epidemiyoloji

Kuduz, Rhabdoviridae ailesinin Lyssavirus cinsine ait nörotrop RNA virüslerinin neden olduğu, akut ve ilerleyici viral ensefalomiyelittir. Hastalık çoğunlukla enfekte hayvanların ısırması veya tükürüğünün bütünlüğü bozulmuş deri ve mukozalarla teması sonucu bulaşmaktadır (2,4). İnsan kuduz vakalarının büyük çoğunluğu enfekte köpeklerle temas sonucu ortaya çıkmaktadır (2).

Patogenez ve Klinik Özellikler

Kuduz virüsü vücuda girdikten sonra periferik sinir sistemine ulaşarak retrograd aksonal taşınma yoluyla santral sinir sistemine ilerlemektedir. İnkübasyon süresi genellikle haftalar ile aylar arasında değişmekte olup virüs miktarı, yaranın lokalizasyonu, derinliği ve santral sinir sistemine yakınlığı gibi faktörlerden etkilenmektedir (4,5).

Klinik hastalık başlangıcında ateş, halsizlik ve yara bölgesinde parestezi gibi özgül olmayan belirtiler görülebilir. Hastalığın ilerleyen dönemlerinde ajitasyon, hidrofobi, aerofobi, yutma güçlüğü, ensefalit veya paralitik bulgular gelişebilir. Klinik belirtiler ortaya çıktıktan sonra

hastalık neredeyse daima ölümcüldür. Bu nedenle temas sonrası profilaksinin zamanında uygulanması hayati önem taşımaktadır (2,5).

3. Kuduz Riskli Temas Sonrası Profilaksi

Kuduz riskli temas sonrası yaklaşım; etkin yara temizliği, temasın risk düzeyinin değerlendirilmesi, gerekli durumlarda kuduz aşısı ve kuduz immünoglobulini uygulanmasını kapsamaktadır (2,6). Kuduz şüpheli temaslarda ilk ve en önemli basamak yaranın bol su ve sabunla en az 15 dakika yıkanmasıdır. Uygun antiseptiklerle yara temizliği desteklenebilir. Gereksiz sütür uygulamalarından kaçınılmalı, sütür zorunluysa immünoglobulin endikasyonu olan hastalarda öncelikle yara içerisine ve çevresine immünoglobulin infiltrasyonu yapılmalıdır (2,6). Temas sonrası profilaksi kararı hayvanın türüne, temasın niteliğine, yaranın özelliklerine, hayvanın gözlem altında tutulabilmesine ve bölgesel kuduz epidemiyolojisine göre verilmelidir (6).

Kuduz Aşısı Uygulaması

Sağlık Bakanlığı Kuduz Profilaksi Rehberi'nde dört dozlu intramüsküler aşı şeması ve 2-1-1 şeması tanımlanmaktadır. Dört dozlu şema 0, 3, 7 ve 14–28. günlerde; 2-1-1 şeması ise 0. gün iki ayrı anatomik bölgeye birer doz, 7. ve 21. günlerde birer doz şeklinde uygulanmaktadır. Uygun şema hastanın bağışıklık durumu ve güncel ulusal rehber doğrultusunda seçilmelidir (6). Kuduz aşısı çocuklarda erişkinlerle aynı dozda uygulanmaktadır. Büyük çocuklarda deltoid kas, küçük çocuklarda ise uyluğun anterolateral bölgesi tercih edilebilir. Gluteal bölgeye aşı uygulanmamalıdır.

Kuduz İmmünoglobulini Uygulaması

Kuduz immünoglobulini, endikasyonu bulunan yüksek riskli temaslarda pasif bağışıklama amacıyla kullanılmaktadır. İnsan kaynaklı kuduz immünoglobulini için maksimum doz 20 IU/kg, at kaynaklı immünoglobulin için ise 40 IU/kg'dır. İmmünoglobulin anatomik olarak mümkün olduğu ölçüde yara içine ve çevresine infiltre edilmelidir. Uygulamanın temel amacı, virüsün yara bölgesinde nötralize edilmesidir (6). İmmünoglobulin, mümkün olduğunca ilk aşı dozuyla birlikte uygulanmalı; gecikme durumunda ilk aşı dozundan sonraki yedinci güne kadar verilebilmelidir.

Özel Durumlar

Kuduz riskli temas sonrasında geç başvuran hastalarda da yine profilaksi yapılmalıdır. Çocuklarda aşı dozu azaltılmamalı ve aşılama şemasının tamamlanması sağlanmalıdır. Kedi ve köpek gibi gözlem altında tutulabilen hayvanlarda 10 günlük gözlem süresi, profilaksi kararının yeniden değerlendirilmesinde önemlidir. Hayvanın gözlem süresince sağlıklı kalması durumunda, ulusal rehber doğrultusunda profilaksinin sonlandırılması değerlendirilebilir (6).

4. Pediatrik Acil Serviste Klinik Yaklaşım

Çocukluk çağında hayvan ısırıkları ve travmatik yaralanmalar nedeniyle acil servise başvuran hastalarda tetanoz ve kuduz riskleri birlikte değerlendirilmelidir. Yaralanmanın lokalizasyonu, derinliği, kontaminasyon durumu, hayvanın türü ve hastanın bağışıklama geçmişi profilaksi kararını etkileyen temel faktörlerdir

Sonuç

Pediatrik acil servislerde her travmatik yaralanma ve hayvan teması, tetanoz ve kuduz riski açısından değerlendirilmelidir. Güncel rehberlere uygun, zamanında ve doğru profilaksi uygulamaları, önlenebilir enfeksiyonlara bağlı morbidite ve mortalitenin azaltılmasında temel yaklaşımdır.

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M4634-Tam Metin

PEDİATRİK KAFA TRAVMASINDA CERRAHİ KRİTERLER

Ferhat ARSLAN

Malatya Eğitim ve Araştırma Hastanesi

Özet

Kafa travması, çocukluk çağında travmaya bağlı ölümlerin başlıca nedenidir ve travma ölümlerinin %40–50'sinden sorumludur. Ağır kafa travmalı çocuklarda mortalite %20–30 düzeyine ulaşmaktadır. Açık sütürler ve fontanel, orantısal olarak büyük kafa ve gelişmekte olan beyin dokusu nedeniyle pediatrik hastalar travmaya erişkinlerden farklı yanıt verir; özellikle 2 yaş altında klinik değerlendirme güçtür ve bulgular silik olabilir. Tedavinin temel amacı, geri dönüşümsüz primer hasar üzerine eklenen hipoksi, hipotansiyon, intrakraniyal basınç (İKB) artışı ve herniasyon gibi sekonder hasar mekanizmalarını önlemektir.

Bu derlemede pediatrik minör ve majör kafa travmalarında cerrahi karar sürecini belirleyen parametreler ele alınmıştır. Bilinç düzeyi (Glasgow Koma Skalası/Pediatrik GKS), pupil bulguları, fokal nörolojik defisit, bilgisayarlı tomografide (BT) lezyonun tipi ve hacmi, orta hat şifti ve İKB birlikte değerlendirilmelidir. Görüntüleme kararında PECARN kuralları yol göstericidir. Hacmi 30 cm^3'ü aşan epidural hematom ile kalınlığı 10 mm'yi veya orta hat şifti 5 mm'yi aşan subdural hematom, GKS'den bağımsız olarak cerrahi endikasyon oluşturur; GKS < 9, anizokori ve herniasyon bulguları acil cerrahi gerektirir. Deprese kafatası kırıkları, parankimal lezyonlar, posterior fossa travmaları ve medikal tedaviye dirençli intrakraniyal hipertansiyonda dekompresif kraniektomi endikasyonları da özetlenmiştir.

Sonuç olarak, pediatrik kafa travmasında cerrahi karar tek bir parametreye dayanmamalı; klinik ve radyolojik bulgular birlikte yorumlanmalı ve pediatrik acil, çocuk nöroşirürjisi, anestezi ve yoğun bakım ekipleri arasında erken ve koordineli bir yaklaşım benimsenmelidir.

Anahtar kelimeler: Pediatrik kafa travması, epidural hematom, subdural hematom, dekompresif kraniektomi, PECARN, Glasgow Koma Skalası

Abstract

Head injury is the leading cause of trauma-related death in childhood, accounting for 40–50% of paediatric trauma deaths, and mortality reaches 20–30% in severe cases. Open sutures and fontanelles, a proportionally larger head and a developing brain make children respond to trauma differently from adults; clinical assessment is particularly difficult under 2 years of age. The main goal of management is to prevent secondary brain injury—hypoxia, hypotension, raised intracranial pressure (ICP) and herniation—superimposed on irreversible primary injury.

This review summarises the parameters guiding surgical decision-making in paediatric minor and major head injury: level of consciousness (GCS/paediatric GCS), pupillary findings, focal deficits, lesion type and volume on computed tomography (CT), midline shift and ICP. The PECARN rules guide imaging decisions. An epidural haematoma >30 cm^3, or a subdural

haematoma >10 mm thick or causing >5 mm midline shift, warrants evacuation regardless of GCS; GCS <9, anisocoria and signs of herniation require emergency surgery. Indications for surgery in depressed skull fractures, parenchymal lesions, posterior fossa injuries and decompressive craniectomy for refractory intracranial hypertension are also outlined.

Surgical decisions should not rely on a single parameter; clinical and radiological findings must be interpreted together, with early, coordinated input from paediatric emergency, neurosurgery, anaesthesia and intensive care teams.

Keywords: Paediatric head injury, epidural haematoma, subdural haematoma, decompressive craniectomy, PECARN, Glasgow Coma Scale

1. Giriş

Travma, çocukluk çağının birinci ölüm nedenidir ve bu ölümlerin %40–50'si kafa travmasına bağlıdır. Ağır kafa travması geçiren çocuklarda mortalite %20–30 arasında bildirilmektedir [1,5]. Hayatta kalan olgularda ise uzun dönem bilişsel, motor ve davranışsal sekeller önemli bir morbidite yükü oluşturur. Erken tanı, uygun görüntüleme ve zamanında cerrahi müdahale mortaliteyi azaltırken uzun dönem nörolojik sonuçları da belirgin şekilde iyileştirmektedir [1–3].

Tablo 1. Pediatrik kafa travmasının önemi

Gösterge	Açıklama
Travma ölümleri: %40–50	Çocukluk çağı travma ölümlerinin kafa travmasına bağlı oranı
Ağır travma mortalitesi: %20–30	Ağır kafa travmalı çocuklarda mortalite oranı
Travma: birinci neden	Çocukluk çağının birinci ölüm nedenidir

2. Pediatrik Hastalarda Anatomik ve Fizyolojik Farklılıklar

Çocukların kafatası ve beyni erişkinlerden belirgin farklılıklar gösterir. Özellikle 2 yaş altındaki çocuklarda kafa/beden oranı daha büyüktür; kranial sütürler ve fontanel açıktır, beyin ve kranium gelişim sürecindedir. Açık sütürler ve fontanel, intrakraniyal hacim artışını bir süre kompanse edebildiğinden klinik kötüleşme geç ortaya çıkabilir. Bu yaş grubunda klinik nörolojik değerlendirme daha güçtür; ayrıca travma mekanizması ve olay öyküsü her zaman güvenilir olmayabilir. Bu nedenle küçük çocuklarda değerlendirme, öyküden çok objektif bulgulara ve yakın izleme dayanmalıdır [2,3].

3. Tedavinin Hedefi: Primer ve Sekonder Beyin Hasarının Önlenmesi

Primer hasar, travma anında oluşan ve geri döndürülmesi büyük ölçüde mümkün olmayan yapısal hasardır; kontüzyon, laserasyon ve diffüz aksonal hasar bu gruptadır. **Sekonder hasar** ise travmayı izleyen saatler ve günler içinde gelişen; hipoksi, hipotansiyon, hiperkapni, beyin

ödemi, intrakraniyal basınç (İKB) artışı, iskemi ve herniasyon gibi önlenebilir süreçlerden oluşur. Medikal ve cerrahi tedavinin temel hedefi sekonder hasarı önlemek veya sınırlamaktır [1,4].

4. Klinik Değerlendirme

4.1. Glasgow Koma Skalası ve Pediatrik GKS

Bilinç düzeyi, 2 yaş ve üzerindeki çocuklarda standart Glasgow Koma Skalası (GKS), 2 yaş altında ise sözel yanıt bileşeni yaşa uyarlanmış Pediatrik GKS ile değerlendirilir [9]. Ancak cerrahi karar yalnızca GKS'ye göre verilmemeli; klinik durum, BT bulguları, pupil muayenesi ve İKB birlikte değerlendirilmelidir.

Göz açma (her iki skala için)

- 4 – Spontan
- 3 – Sese/sözel uyarana
- 2 – Ağrılı uyarana
- 1 – Yanıt yok

Sözel yanıt – Standart GKS (≥2 yaş)

- 5 – Oryante
- 4 – Konfüze
- 3 – Uygunsuz kelimeler
- 2 – Anlamsız sesler
- 1 – Yanıt yok

Sözel yanıt – Pediatrik GKS (<2 yaş)

- 5 – Agulama, ses çıkarma (normal)
- 4 – Huzursuz, teselli edilebilir ağlama
- 3 – Ağrıyla ağlama
- 2 – Ağrıyla inleme
- 1 – Yanıt yok

Motor yanıt

- 6 – Emirlere uyar / normal spontan hareket (<2 yaş)
- 5 – Ağrıyı lokalize eder / dokunmaya çekme (<2 yaş)
- 4 – Ağrıya çekme
- 3 – Anormal fleksiyon (dekortike)
- 2 – Ekstansiyon (deserebre)
- 1 – Yanıt yok

4.2. PECARN Kuralları

Minör kafa travmalı çocuklarda (GKS 14–15) klinik olarak önemli travmatik beyin hasarı (ciTBH) riskini belirlemek ve gereksiz BT'den kaçınmak amacıyla PECARN (Pediatric Emergency Care Applied Research Network) kuralları geliştirilmiştir [8]. Kurallar iki yaş grubu için ayrı ayrı uygulanır.

2 yaş altı

- **Yüksek risk (BT önerilir):** GKS 14 veya diğer mental durum değişikliği bulguları; palpe edilebilen kafatası kırığı
- **Orta risk (izlem veya BT; klinik karar):** Oksipital, paryetal veya temporal skalp hematomu; ≥5 saniye bilinç kaybı; ciddi travma mekanizması; ebeveyne göre çocuğun olağan davranışında olmaması
- **Düşük risk (BT önerilmez):** Yukarıdaki bulguların hiçbiri yok

2 yaş ve üzeri

- **Yüksek risk (BT önerilir):** GKS 14 veya diğer mental durum değişikliği bulguları; kafa tabanı kırığı bulguları
- **Orta risk (izlem veya BT; klinik karar):** Herhangi bir bilinç kaybı; kusma; ciddi travma mekanizması; şiddetli baş ağrısı
- **Düşük risk (BT önerilmez):** Yukarıdaki bulguların hiçbiri yok

Ciddi travma mekanizması

- Araçtan fırlama, araçtaki başka bir yolcunun ölümü veya araç devrilmesi ile seyreden trafik kazası
- Kasksız bisikletli ya da yayaya motorlu araç çarpması
- <2 yaşta 0,9 m'den (3 ft), ≥2 yaşta 1,5 m'den (5 ft) yüksekten düşme
- Başa yüksek enerjili bir cisimle darbe

Orta risk grubunda BT kararında hekim deneyimi, birden fazla bulgunun birlikteliği, izlem sırasında kötüleşme ve 3 ay altındaki yaş gibi etkenler göz önüne alınır [8].

4.3. Muayene ve İzlem Kriterleri

Acil serviste değerlendirilen çocukta aşağıdaki bulgular, yakın nörolojik izlem ve görüntüleme gereksinimine işaret eder. 2 yaş altında beslenme bozukluğu, irritabilite ve bombe fontanel gibi yaşa özgü bulgular öne çıkarken, daha büyük çocuklarda baş ağrısı, amnezi ve kafa tabanı kırığı bulguları değerlendirmede önemli yer tutar [2,3].

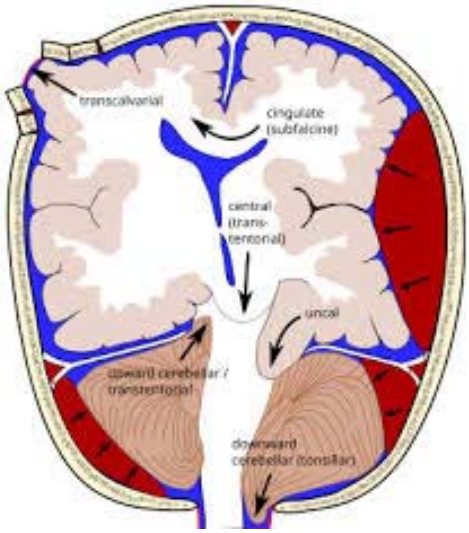
Tablo 2. Yaş gruplarına göre muayene ve izlem kriterleri

<2 Yaş	≥2 Yaş
Bilinç değişikliği / Letarji / İrritabilite	GKS düşüklüğü / Bilinç kaybı / Amnezi
Tekrarlayan kusma / Nöbet	Şiddetli/progresif baş ağrısı
Emmede/beslenmede bozulma	Tekrarlayan kusma / Nöbet
Bombe fontanel / Anizokori	Fokal nörolojik defisit / Anizokori

<2 Yaş	≥2 Yaş
Fokal nörolojik bulgu	Kafa tabanı fraktürü bulguları
Deprese kafatası fraktürü	Deprese kafatası fraktürü
Büyük/non-frontal skalp hematomu	Travma sonrası klinik kötüleşme

5. Serebral Herniasyon Sendromları

İntrakraniyal hacim artışı kompanzasyon sınırlarını aştığında beyin dokusu dural yapılar ve kemik açıklıklar boyunca yer değiştirir. Herniasyon bulgularının erken tanınması, acil cerrahi kararı açısından kritik önemdedir (Şekil 1).



Şekil 1. Serebral herniasyon tipleri

Subfalksin (singulat) herniasyon, en sık görülen tiplerden biridir; singulat girus falx cerebri altından karşı tarafa itilir ve a. cerebri anterior basısına bağlı iskemi gelişebilir. **Unkal (transtentoryal) herniasyonda** temporal lobun uncus kısmı tentoryum kenarından herniye olur. İlk bulgu, n. okülomotoryus basısına bağlı olarak aynı tarafta genişlemiş ve ışığa yanıtsız pupildir; ilerleyen evrede bilinç bozulur ve karşı tarafta hemiparezi gelişir, beyin sapı basısıyla birlikte solunum ve dolaşım bozuklukları ortaya çıkar.

Santral transtentoryal herniasyonda diensefalon ve beyin sapı aşağı doğru yer değiştirir; tablo progresif bilinç kaybı ve dekortike postürden deserebre postüre geçişle karakterizedir. **Tonsiller herniasyonda** serebellar tonsiller foramen magnumdan herniye olarak medulla oblongataya bası yapar ve özellikle tehlikelidir. Posterior fossa kitlelerinde görülebilen **yukarı doğru serebellar herniasyonda** ise beyin sapı ve derin venöz yapılar bası altında kalır.

6. Cerrahi Karar Vermede Temel Parametreler

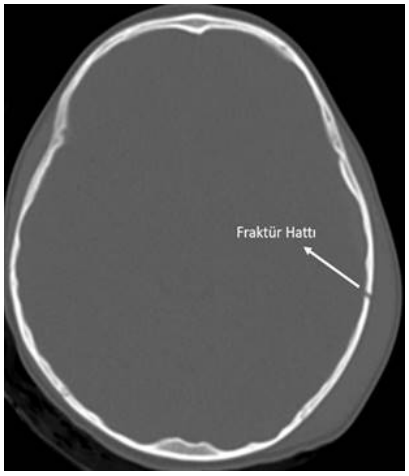
Cerrahi endikasyon belirlenirken bilinç düzeyi (GKS veya Pediatrik GKS), pupil bulguları (özellikle anizokori), fokal nörolojik defisit, BT'de hematomun tipi ve boyutu, orta hat şifti ve sisternal kompresyon ile İKB ve klinik kötüleşme birlikte değerlendirilmelidir [1,4]. Bu

parametrelerden hiçbiri tek başına yeterli değildir; özellikle küçük çocuklarda klinik bulgular radyolojik tabloyu geriden izleyebilir.

7. Minör Kafa Travmaları ve Kafatası Kırıkları

7.1. Lineer Kırıklar

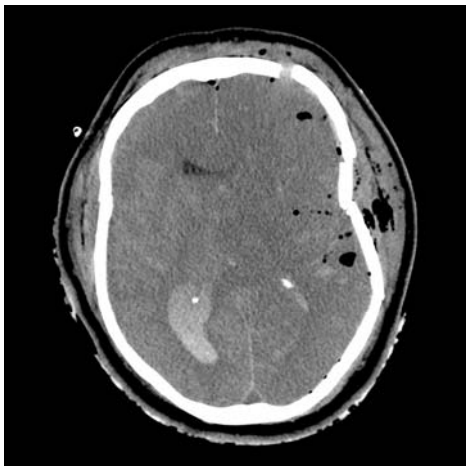
İzole lineer kafatası kırıkları genellikle konservatif olarak izlenir (Şekil 2). Ancak 1 yaş altındaki çocuklarda, altta yatan dural yırtığa bağlı leptomeningeal kist (büyüyen kafatası kırığı) gelişme riski nedeniyle 4–6 hafta sonra radyolojik kontrol yapılması zorunludur.



Şekil 2. Lineer kafatası kırığı (BT)

7.2. Deplase (Çökme) Kırıkları

Deprese kafatası kırıklarında cerrahi endikasyonlar; açık (kompound) deprese fraktür, kranial kalınlıktan daha fazla veya 1 cm'yi aşan depresyon, dural penetrasyon ya da altta intrakraniyal hematom varlığı, frontal sinüs tutulumu, belirgin kozmetik deformite ile pnömosefali, yara kontaminasyonu veya enfeksiyon bulgularıdır (Şekil 3) [1,6].



Şekil 3. Deprese kafatası kırığı (BT)

8. Epidural Hematom

Epidural hematom (EDH) çocuklarda küçük bir travma ile gelişebilir ve klinik bulgular başlangıçta silik olabilir; bu nedenle normal görünen bir çocukta dahi kötüleşme riski akılda tutulmalıdır. Hacmi 30 cm^3'ü aşan EDH'de GKS'den bağımsız olarak cerrahi boşaltım önerilir. GKS < 9, anizokori veya herniasyon bulguları varlığında ve hızlı nörolojik kötüleşmede hasta en kısa sürede ameliyata alınmalıdır (Şekil 4) [1,6].



Şekil 4. Epidural hematom (BT)

9. Subdural Hematom

Akut subdural hematomda (SDH) kalınlığın 10 mm'yi veya orta hat şiftinin 5 mm'yi aşması, GKS'den bağımsız olarak cerrahi boşaltım endikasyonudur. Daha küçük SDH'de ise GKS'nin 9'un altında olması veya izlemde 2 puan ya da daha fazla düşmesi, anizokori veya fikse dilate pupil gelişmesi ve İKB'nin 20 mmHg'yi aşması cerrahi gerektirir (Şekil 5) [1]. Çocuklarda SDH bilateral olabilir ve klinik bulgular silik seyredebilir; GKS düşüklüğü önemli bir prognostik belirleyicidir.



Şekil 5. Subdural hematom (BT)

10. Travmatik Parankimal Lezyonlar

Parankimal kontüzyon ve hematomlarda cerrahi; progresif nörolojik kötüleşme, medikal tedaviye dirençli intrakraniyal hipertansiyon ve BT'de belirgin kitle etkisi veya herniasyon bulguları varlığında düşünülür. GKS 6–8 olan hastada 20 cm^3'ü aşan frontal veya temporal kontüzyon ile birlikte orta hat şiftinin 5 mm veya üzerinde olması ve hacmi 50 cm^3'ü aşan herhangi bir parankimal lezyon da cerrahi endikasyon oluşturur [1].

11. Posterior Fossa Travmaları

Posterior fossanın dar hacmi nedeniyle bu bölgedeki lezyonlar çocuklarda hızla beyin sapı kompresyonuna yol açabilir. Dördüncü ventrikül obstrüksiyonuna bağlı akut hidrosefali, sisternal kompresyon ve progresif nörolojik kötüleşme cerrahi açısından belirleyici bulgulardır. Temel cerrahi yöntemler suboksipital kraniektomi veya kraniyotomidir (Şekil 6) [1].



Şekil 6. Posterior fossa travması (BT)

12. Diffüz Beyin Ödemi ve Refrakter İntrakraniyal Basınç

Diffüz beyin ödeminde tedavide İKB'nin 20 mmHg'nin altında tutulması hedeflenir. Medikal tedaviye dirençli intrakraniyal hipertansiyon varlığında, herniasyon veya nörolojik kötüleşme durumunda dekompresif kraniektomi düşünülmelidir [1,4]. Pediatrik popülasyonda bu konudaki kanıt düzeyi düşüktür; bu nedenle karar multidisipliner olarak verilmelidir.

13. Multidisipliner Koordinasyon

Pediatrik kafa travmasında sonuç, yalnızca cerrahi tekniğe değil, acil serviste başlayan ve yoğun bakımda süren koordineli bakıma bağlıdır. Zamanında karar verme ve ekipler arası iş birliği mortalite ve morbiditeyi azaltır (Tablo 3).

Tablo 3. Multidisipliner ekipte görev dağılımı

Ekip	Görev
Pediatrik Acil Hekimi	Hava yolu, dolaşım, nörolojik değerlendirme; sekonder hasarı önleme
Çocuk Nöroşirürjisi	Erken konsültasyon; cerrahi zamanlaması ve yaklaşım planlaması
Pediatrik Anestezi	İKB yönetimi, hemodinamik stabilizasyon, perioperatif koruma
Pediatrik Yoğun Bakım	Ameliyat sonrası sürekli monitörizasyon ve komplikasyon takibi

14. Sonuç

Pediatrik kafa travmasında cerrahi karar; klinik bulgular, BT bulguları ve İKB'nin birlikte yorumlanmasına dayanmalıdır. Büyük hacimli hematomlar ve belirgin orta hat şifti her yaşta cerrahi endikasyon oluştururken, GKS < 9, anizokori ve herniasyon bulguları acil cerrahi gerektirir. Minör travmada PECARN kuralları gereksiz görüntülemeyi azaltırken riskli hastaların atlanmamasına yardımcı olur. Cerrahi kriterlerin özeti Tablo 4'te sunulmuştur.

Tablo 4. Cerrahi kriterler özet tablosu

Kategori	Kriter	Yaklaşım
Hematomlar	EDH > 30 cm^3 / SDH > 10 mm	Cerrahi (her yaşta)
Hematomlar	Orta hat şift > 5 mm	Cerrahi (her yaşta)
Klinik bulgular	GKS < 9	Acil cerrahi
Klinik bulgular	Anizokori	Acil cerrahi
Klinik bulgular	Herniasyon	Acil cerrahi
Klinik bulgular	Nörolojik kötüleşme	Cerrahi değerlendir
Kırıklar	Açık/deprese	Cerrahi değerlendir
Kırıklar	İzole lineer	Genellikle konservatif

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M4429-Tam Metin

ACUTE HYDROCEPHALUS SECONDARY TO LISTERIA MONOCYTOGENES MENINGITIS: SURGICAL MANAGEMENT OF A RARE COMPLICATION

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Aim: *Listeria monocytogenes* meningitis is uncommon in children but may cause serious neurological complications. In a series of 20 pediatric patients, hydrocephalus occurred in two; this proportion should not be interpreted as population incidence [1]. Etiological diagnosis, appropriate antimicrobial management, and recognition of complications are complementary priorities in bacterial meningitis [2,3]. We present the surgical management of a one-year-old girl with acute hydrocephalus during culture-confirmed Listeria meningitis. The aim is to describe imaging after clinical deterioration and the clinical course leading from temporary drainage to permanent shunting. The case is noteworthy because hydrocephalus required emergency intervention and intracranial pressure symptoms recurred when drainage was stopped.

Methods: This descriptive case report used the supplied clinical document and images. Presenting symptoms, CSF (cerebrospinal fluid) culture obtained by lumbar puncture, cranial imaging after deterioration, EVD (external ventricular drainage), and subsequent VP (ventriculoperitoneal) shunting were assessed. The key decision point was recurrence of raised intracranial pressure signs during drain closure. Initial and post-shunt images were arranged into one composite figure. Relevant PubMed publications were reviewed, and bibliographic

details and DOI records were verified for five references. No comparative or statistical analysis was performed.

Results: A one-year-old girl presented with fever, poor general condition, feeding difficulty, nausea, and vomiting. CSF culture yielded *Listeria monocytogenes*, confirming meningitis. Subsequent clinical deterioration prompted cranial imaging, which demonstrated marked ventricular enlargement consistent with acute hydrocephalus. Emergency EVD was performed to control raised intracranial pressure and provide CSF diversion. The initial MRI (magnetic resonance imaging) is shown in Figure 1a. During drain closure, clinical signs of raised intracranial pressure recurred. Because hydrocephalus persisted and withdrawal of temporary drainage was unsuccessful, a VP shunt was inserted for permanent diversion. Post-shunt imaging is presented in Figure 1b. The patient improved clinically after surgery and was discharged with a stable neurological status. The supplied document did not specify operative dates, drainage duration, measured intracranial pressures, antimicrobial regimens, or culture sterilization before shunting. These details were not inferred. Long-term neurodevelopmental and shunt outcomes were unavailable.

Conclusion: Clinical deterioration during Listeria meningitis warrants assessment for surgically manageable complications such as hydrocephalus alongside reassessment of infection. A published pediatric case described hydrocephalus and tonsillar herniation requiring ventricular drainage and posterior fossa decompression [4]. That observation supports recognition of severe neurological complications; neither herniation nor decompression was reported in the present patient. Emergency EVD provided acute CSF diversion, while recurrence of symptoms during closure was the principal observation supporting permanent diversion. Shunt decisions should integrate the clinical course and infection status rather than ventricular enlargement alone. However, the available documentation cannot establish how infection control informed shunt timing. Improvement in one patient does not demonstrate superiority over alternative management strategies. A multicenter prospective study of pediatric shunting documented substantial shunt failure, emphasizing the need for continued surveillance [5]. Accordingly, neurological stability at discharge does not establish durable recovery or exclude later complications. Imaging after deterioration, appropriate infection treatment, timely neurosurgical assessment, and ongoing follow-up should be considered together.

Keywords: Listeria monocytogenes; meningitis; hydrocephalus; external ventricular drainage; ventriculoperitoneal shunt

FIGURES

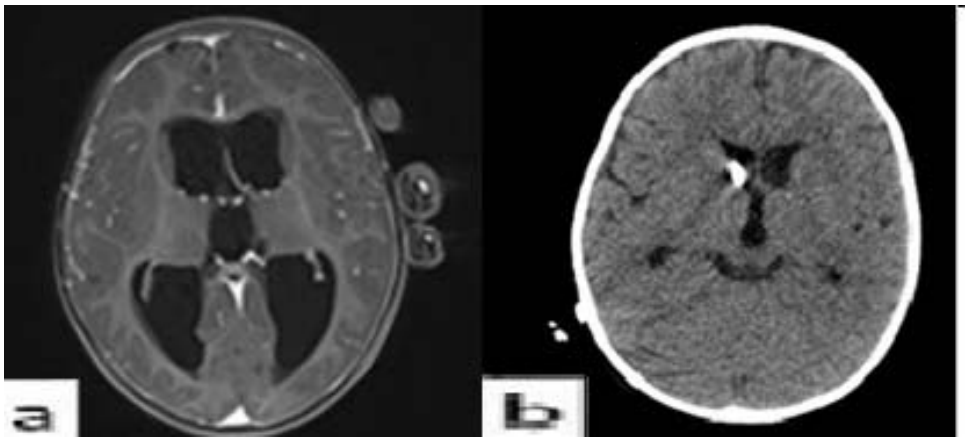


Figure 1. (a) Cranial MRI demonstrating hydrocephalus after clinical deterioration. (b) Cranial CT (computed tomography) after VP shunt placement following recurrence of raised intracranial pressure signs during drain closure.

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M4645- Tam Metin

AŞILAMA DURUMUNUN ÇOCUK ACİLİN KLİNİK SEYRİNE ETKİSİ

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Giriş

Aşı ile önlenebilir hastalıklar (akut gastroenterit, pnömoni, menenjit, sepsis, boğmaca ve döküntülü ateşli tablolar) çocuk acil servisi (ÇAS) başvuru ve yatışlarının önemli bir bölümünü oluşturmayı sürdürmektedir (1). Pandemi sonrası küresel kapsayıcılık gerilemesi ve ülkemizde artan aşı reddi, bir dönem ender görülen bu tabloları yeniden acil hekiminin gündemine taşımıştır. Acil serviste çoğu zaman tek satırlık bir öykü bilgisi olarak kaydedilen aşı karnesi; ayırıcı tanıyı, risk değerlendirmesini, tetkik ve tedavi kararlarını doğrudan etkileyen klinik bir değişkendir. Bu metinde aşılama durumunun ÇAS'taki klinik seyre etkisi toplum, birey ve Türkiye düzeyinde ele alınmakta; bir aile hekimi gözüyle değerlendirme ve pratik öneriler sunulmaktadır. Değerlendirilen çalışmalar Tablo 1'de özetlenmiştir.

Aşıların Çocuk Acil Yükü Üzerindeki Etkisi

Yirmi yedi ülkeyi kapsayan derlemede rotavirüs aşısı, beş yaş altı çocuklarda rotavirüs gastroenteritine bağlı yatış ve acil başvurularını ortanca yüzde 67 azaltmıştır (2). Konjuge pnömokok aşıları Amerika Birleşik Devletleri'nde beş yaş altı invaziv pnömokok hastalığını yılda 15.707 olgudan 1.382'ye (yüzde 91) indirmiş, pnömoni yatışlarını yüzde 66 ile 79 arasında azaltmıştır (3). Sekiz merkezli test-negatif olgu-kontrol çalışmasında (n=15.728) influenza aşısı etkililiği tüm şiddet düzeylerinde en az yüzde 50 bulunmuştur (4). İskoçya ulusal verisinde (n=3.982 boğmaca olgusu) yaşına göre tam aşılı çocuklarda yatış için düzeltilmiş olasılık oranı 0,31 (yüzde 95 güven aralığı 0,21–0,46) iken kısmi aşılama anlamlı koruma sağlamamıştır; koruma için takvimin tamamlanması gerekmektedir (5). Kızamıkta, 2025 Batı Teksas salgınının ilk üç ayında bildirilen 325 olgunun yüzde 18,5'i yatırılmış; kayıtlarına ulaşılan yatan hastaların tamamı aşısız veya aşı durumu bilinmeyendir (6).

Aşılama Durumu ve Klinik Karar

Akut solunum yolu hastalığıyla hastane bakımına başvuran çocukların geriye dönük kohortunda, aşılama durumu güncel olmayanlarda tam kan sayımı (1,7), kan kültürü (1,7), C-reaktif protein (3,1) ve influenza testi (1,6) daha sık istenmiş; tedavi yoğunluğunda paralel bir artış saptanmamıştır (1). Eksik aşılı çocukta artan tanısal belirsizlik, özgül olmayan testlerle değil, aşı ile önlenebilir etkenlere yönelik hedefe yönelik tetkikle yönetilmelidir. Sekiz kuruluşta 323.247 çocuğu kapsayan eşleştirilmiş kohortta eksik aşılılarda hastane yatışı için insidans hız oranı 1,21 (yüzde 95 güven aralığı 1,18–1,23), ayaktan başvuru için 0,89 bulunmuştur (7). Bu çocuklar sağlık sistemine çoğu zaman acil kapısından girmektedir.

Çocuk Acil Ünitesinden Doğrudan Kanıt

Gana'da bir çocuk acil ünitesinin prospektif kohortunda (n=306) yatan çocukların yüzde 25,5'i eksik aşılı veya aşısızdı; kaba mortalite yüzde 16,7'ye karşı yüzde 7,0 idi (çok değişkenli analizde bağımsız değil), eksik aşılama başvuruda solunum sıkıntısıyla bağımsız ilişkili

bulundu ve en sık neden ebeveyn tereddüdüydü (yüzde 48,7) (8). Eksikliğin erişimden çok tereddütten kaynaklanması, her ÇAS başvurusunu bir saptama ve yönlendirme fırsatına dönüştürmektedir.

Türkiye Verileri

Türkiye'de 2023 kızamık salgınını değerlendiren 34 merkezli ulusal kohortta (n=504) yatan çocukların yüzde 72,2'si aşısızdı, aşısızların yüzde 45,9'unda belgelenmiş aşı reddi vardı ve en sık komplikasyon pnömoniydi (yüzde 40,3). Yoğun bakım ünitesine (YBÜ) yatan tüm olgular ve tüm ölümler iki dozdan az aşı almış çocuklarda gözlenmiş; iki doz aşılı 18 çocuğun hiçbiri YBÜ'ye yatmamıştır. Yatışların yüzde 27,2'si dokuz aydan küçük bebeklerdi ve zamanında iki dozla pnömonilerin yaklaşık yarısının, YBÜ yatışlarının yaklaşık dörtte üçünün önlenebileceği hesaplanmıştır (9). Suriye'den yoğun göç alan Batman'da 2023 olgularında (n=98) aşısızlık Suriye kökenli çocuklarda yüzde 90,3, Türkiye doğumlularda yüzde 55,2 ($p<0,001$); yatış oranı sırasıyla yüzde 38,7 ve yüzde 16,4 idi ($p=0,015$) (10).

Aile Hekimliği Perspektifi

Bu metindeki aşıların tamamına yakını aile sağlığı merkezlerinde uygulanmakta; aşı tereddütlü aileyle ilk karşılaşan, gebeyi izleyen ve acilden dönen çocuğun takvimini tamamlayan hekim aile hekimidir. Kanıtlara dayanan görüşümüz, çocuk acil ile birinci basamağın iki ayrı kapı değil tek bir koridor olarak tanımlanması gerektiğidir. Aşı reddi bir güven sorunudur ve güven, süreklilik gösteren hekim-aile ilişkisinde kurulur. Koza stratejisi (gebelikte erişkin tip tetanoz-difteri-aselüler boğmaca aşısı, ev içi temaslıların aşılanması) aşı yaşına ulaşmamış bebeklerin tek korumasıdır; acil hekiminin anında erişebildiği doğru bir aşı kaydı ise en düşük maliyetli tetkik azaltıcı müdahaledir.

Sonuç

Aşılama durumu, çocuk acilin klinik seyrini belirleyen temel bir değişkendir. Bu çerçevede aşılama durumunun her başvuruda sorgulanıp kaydedilmesi; eksik aşılı çocukta hedefe yönelik tetkik kızamık ve boğmaca için erken klinik şüphe ve hızlı izolasyon; ÇAS'ta saptanan eksik aşılıların birinci basamağa yönlendirildiği bir geri bildirim döngüsü ve yüksek aşı kapsayıcılığının çocuk acil tıbbının da önceliği yapılması önerilir. Aşılama, çocuk acilin yükünü azaltan en etkili "acil öncesi" müdahaledir.

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M4647- Tam Metin

CPAP VE BİPAP: TEMEL İLKELER, KLİNİK UYGULAMALAR, AYARLAR VE FARKLAR

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Amaç

Sürekli pozitif havayolu basıncı (continuous positive airway pressure, CPAP), basınç destekli CPAP (CPAP+PSV) ve iki düzeyli pozitif havayolu basıncının (bilevel positive airway pressure, BiPAP) fizyolojik etkilerini, temel ayarlarını ve erişkin ile pediatrik hastalardaki klinik kullanım alanlarını karşılaştırmalı olarak değerlendirmek amaçlandı.

Yöntem

Bu sunumda yer alan güncel kılavuzlar, sistematik derlemeler, ağ meta-analizleri ve randomize kontrollü çalışmalar klinik fizyoloji, endikasyon, başlangıç ayarları, arayüz seçimi ve güvenlilik başlıklarında düzenlendi [1-5]. Bulgular solunum yetmezliğinin baskın mekanizmasına göre hipoksemik ve hiperkapnik tablolar açısından değerlendirildi.

Bulgular

CPAP, tüm solunum döngüsü boyunca ayarlanan düzeyde pozitif basınç uygular. Fonksiyonel rezidüel kapasiteyi artırır, alveol kollapsını sınırlar ve oksijenasyonu düzeltir; ancak doğrudan inspiratuvar basınç desteği sağlamaz. Bu nedenle izole hipoksemi ve akut kardiyojenik

pulmoner ödemde kullanılabilir [1], obstrüktif uyku apnesinde pozitif havayolu basıncı tedavisi temel tedavi seçeneklerindendir [2]. CPAP+PSV modunda bazal CPAP/pozitif ekspirasyon sonu basınç üzerine, hastanın tetiklediği her inspirasyonda basınç desteği eklenir. Böylece tidal hacim artar ve solunum işi azalır. Mod tamamen spontan solunuma bağımlıdır ve apne halinde yedek soluk sağlamaz. BiPAP, inspirasyonda yüksek basınç (IPAP) ve ekspirasyonda daha düşük basınç (EPAP) uygular. IPAP ile EPAP arasındaki fark ventilatuvar desteği belirler; EPAP ise alveollerin açık kalmasını ve oksijenasyonu destekler. Spontan/zamanlı modda yedek solunum hızı sağlanabilmesi, apne riski bulunan hastalarda ek güvenlik oluşturur.

Tablo 1. CPAP, CPAP+PSV ve BiPAP'ın temel özellikleri

Özellik	CPAP	CPAP+PSV	BiPAP
Basınç paterni	Tek düzey	PEEP + doğrudan PS	IPAP ve EPAP
İnspiratuvar destek	Yok	PS ile	IPAP−EPAP farkı ile
Başlıca etki	Rekruitman ve oksijenasyon	Rekruitman ve solunum işinde azalma	Ventilasyon, CO_2 atılımı ve oksijenasyon
Spontan solunum	Gerekli	Gerekli	S modunda gerekli; S/T modunda yedek hız vardır
Tipik kullanım	Hipoksemi, OSA, pulmoner ödem	Weaning ve spontan solunum desteği	Hiperkapni, KOAH, hipoventilasyon

Klinik seçimde baskın fizyopatoloji belirleyicidir. Karbondioksit retansiyonu ve solunumsal asidozla seyreden kronik obstrüktif akciğer hastalığı alevlenmesinde iki düzeyli noninvaziv ventilasyon önerilir [1]. Akut kardiyojenik pulmoner ödemde CPAP veya iki düzeyli noninvaziv ventilasyon önerilmektedir [1]. İzole hipoksemide CPAP yeterli olabilirken, artmış solunum işi veya hipoventilasyon eşlik ediyorsa basınç destekli bir mod gerekir.

Tablo 2. Genel başlangıç ayarları ve titrasyon hedefleri

Mod	Erişkin başlangıç	Pediatrik başlangıç	Titrasyon
CPAP	5 cmH_2O	4–6 cmH_2O	Hipoksemi sürerse basıncı kademeli artır
CPAP+PSV	PEEP 5; PS 5–15 cmH_2O	PEEP 4–5; PS 6–8 cmH_2O	Tidal hacim, solunum işi ve konfora göre PS ayarla
BiPAP	IPAP 10–12; EPAP 4–5 cmH_2O	IPAP 8–10; EPAP 4–5 cmH_2O	Hiperkapnide IPAP, hipoksemide EPAP artır

CPAP tedavisi boyunca bilinç, sekresyon kontrolü, kaçak, hasta-cihaz uyumu, solunum sayısı, gaz değişimi ve hemodinami yakından izlenmelidir. Bası yarası, nazal kuruluk, göz irritasyonu, gastrik distansiyon, aspirasyon ve hipotansiyon olası komplikasyonlardır. Pediatride mod seçimi yaşa, hastalığın fizyopatolojisine, ekstübasyon sonrası başarısızlık riskine ve tedavi toleransına göre yapılmalıdır [3,5]. Prematürelerde bubble CPAP ile diğer CPAP basınç kaynaklarını karşılaştıran kanıtlar tedavi başarısızlığı ve nazal hasar bakımından farklılıklar bulunduğunu göstermektedir [4]. Pediatrik akut hipoksemik solunum yetmezliğinde CPAP, invaziv ventilasyon gereksinimini standart oksijen tedavisine göre azaltabilir [5].

Sonuç

CPAP, CPAP+PSV ve BiPAP birbirine eş modlar değildir. CPAP öncelikle oksijenasyonu ve alveol açıklığını destekler; CPAP+PSV spontan inspirasyonu güçlendirir; BiPAP ise inspiratuvar ve ekspiratuvar basıncı ayrı ayrı düzenleyerek ventilasyonu ve oksijenasyonu birlikte destekler. Başarılı noninvaziv destek için mod ve arayüz, solunum yetmezliğinin mekanizmasına, hastanın spontan solunumuna ve apne riskine göre seçilmeli; erken klinik yanıt yoksa invaziv ventilasyon geciktirilmemelidir.

Destek: Bu çalışma için herhangi bir proje desteği veya araştırma desteği alınmamıştır.

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M4646-Özet Metin

PELVİS KIRIKLARINA EŞLİK EDEN MESANE VE ÜRETRA RÜPTÜRLERİ

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GİRİŞ

Pelvis kırıkları, mesane ve üretra gibi alt üriner sistem organlarının travmatik hasarlarıyla doğrudan ilişkilidir. Bu yaralanmalar sıklıkla yüksek enerjili travmalar (trafik kazaları, yüksekten düşmeler vb.) sonucunda gelişir ve acil multidisipliner yaklaşım gerektirir.

1.Mesane rüptürleri (yaralanmaları)

Non-iyatrojenik mesane yaralanmaları

Künt mesane yaralanmalarının en yaygın nedeni trafik kazalarıdır. Pelvik kırıklar vakaların yaklaşık %3'ünde mesane yaralanmasıyla ilişkilidir. Ekstraperitoneal mesane yaralanmaları neredeyse her zaman pelvik kırıklarla ilişkilidir. Hasar riski pelvik halkanın >1 cm yer değiştirmesi, simifizis pubisin >1 cm'lik diyastazı durumlarında ve pubik ramus kırıklarında oldukça yüksektir. Bazen mesane, keskin bir kemik parçası tarafından doğrudan delinebilir.

BULGULAR

Klinik prezentasyon

Hematüri en sık bulgudur. Bunun dışında suprapubik hassasiyet, idrar yapmakta zorlanma, idrar yapamama, abdominal distansiyon, perineal bölgede ve uyluk bölgesinde ödem görülebileceği gibi hastada kreatin yüksekliği veya şok tablosuda görülebilir.

Radyolojik tanı (mesane görüntüleme endikasyonları)

Makroskopik hematüri ve eşlik eden pelvik kırık en sık mutlak endikasyondur. Yüksek riskli pelvik kırık (pelvik halkanın 1 cm'den fazla yer değiştirmesi veya >1 cm pubik simfiz diastazı) ve mikroskopik hematürinin eşlik etmesi ve posterior üretral yaralanma diğer mutlak endikasyonlar arasında sayılabilir.

Radyolojik görüntüleme

Retrograt Sistografi ve Sistogram BT kullanılabilinir.

Retrograt sistografi

Standart-konvansiyonel (Duyarlılığı %90-95)bir yöntemdir. Çekilirken en az 350 cc kontrast madde verilmelidir. Floroskopi altında dolum ve drenaj filmleri alınalıdır. Ekstraperitoneal mesane yaralanması tipik olarak perivezikal yumuşak dokularda alev şeklinde kontrast madde sızıntısı alanlarıyla teşhis edilir(Resim1).



Resim1. Ekstraperitoneal mesane yaralanması
Sistogram BT

Retrograd dolum görüntülemesi ile değerlendirilir. En az 350 cc dilüe edilmiş kontrast madde verilmelidir. Sadece dolum filmleri çekilmesi tanı için yeterlidir. Çocukta mesane volümü = (Yaş + 2) X 30 formülü ile hesaplanmalıdır.

Tedavi

Künt travmaya bağlı kontüzyon var ise kateter drenajı ve takip yeterlidir. Ekstraperitoneal rüptür mevcut ise nonkomplike yaralanmalarında üretral kateter ile sürekli drenaj sağlanarak konservatif izlem yapılması standart tedavidir. Mesane içerisine girmiş kemik parçaları olması, mesane boynu yaralanması, mesanenin diğer dokular arasına sıkışması, rektal veya vajinal yaralanmaların eşlik etmesi durumunda ise cerrahi onarım gereklidir.

İntrapertoneal yaralanmalar sonucunda idrar ekstravazasyonuna bağlı ileus, sepsis ve hatta ölüme neden olabileceği için cerrahi onarım yapmak gerekir. Batın içinde ürinom var ise perioperatif ya da preoperatif drenaj kateter ile boşaltılmalıdır.

2. ÜRETRA YARALANMALARI

Üretra yaralanmaları acil servis başvurularının %1'nden azını oluşturan nadir görülen bir durumdur. Erkeklerde kadınlara nazaran 10 kat fazla görülmektedir. Sıklıkla genç yaşlarda (15-25 yaş) görülmektedir. Posterior üretra yaralanmaları neredeyse her zaman pelvik fraktürler ilişkilidir. Travmanın şiddetine bağlı olarak üretra hasarı riski de artar. Sıklıkla motorlu taşıt kazası (%68-84) daha nadiren de yüksekten düşmeye (%6-25) bağlı görülmektedir. En sık yaralanma membranöz üretranın distalinde, yani bulbomembranöz bileşkede olmaktadır.

Klinik prezentasyon : Meatusta kan görülmesi en temel bulgudur. Ancak kan görülmemesi üretral yaralanmayı dışlamaz. Komplet ayrılma soncu glob vezikale gelişmişse hastada idrar yapamama görülebilir. İdrarın ekstravaze olması ve travmaya bağlı kanama neticesinde skrotum, perineal bölge ve peniste ekimotik alanlar ve şişlikler görülebilir. Rektal tuşede prostatın palpe edilememesi veya yüksek yerleşimli prostat bulgusu üretra yaralanmasından şüphe ettirmelidir.

TANI

Retrograt Üretrografi ve/veya Fleksıbl Sistoskopi yardımı ile konulur.

Retrograt üretrografi

Tanıda altın standart yöntemdir. Meatustan 20-30 ml kadar seyrelitlmiş kontrast maddenin verilmesini takiben direkt grafi görüntüsü alınma prensibine dayanmaktadır. Anatomik yapıların uygun görüntülenmesi için mümkünse hastaya, değilse de cihaza 30 derece oblik açı verilir. Ekstravazasyon görülmesi üretral yaralanma için tanı koydurucudur (Resim 2).



Resim 2. Retrograt üretrografi de ekstravazasyon-Üretra rüptürü

Fleksıbl sistoskopi

Erken dönemde üretral yaralanmanın değerlendirilmesinde kullanılabilecek önemli yöntemlerden biridir. Fleksbl sistoskop ile tüm üretra retrograd değerlendirilerek, tam ve kısmi rüptür tanısı konulabilmektedr.

Tedavi

Anterior üretra yaralanması

Künt travma: Parsiyel yırtık var ise suprapubik kateter ve üretral kateterizasyon genellikle yeterlidir. Üretral luminal rekanalizasyon (%50) fayda verir. Kısa ve dar bir yaralanma varsa optik üretrotom ve dilatasyon yapılabilir. Uzun ve derin yaralanma varsa flap üretroplasti yapmak gerekir.
Açık yaralanma: Hemen veya geciktirilmiş (en az 3-6 ay) cerrahi eksplorasyon yapılmalıdır.
Posterior üretra yaralanmaları
Parsiyel üretral yaralanma var ise hemen suprapubik ve üretral kateterizsyon yapılmalıdır. Komplet yaralanma da pelvik fraktür sonucu oluşan üretra yaralanması hastalarında altın standart tedavi ertelenmiş üretroplastidir. Ertelenmiş üretroplasti travma sonrası en az 3 ay beklendikten sonra yapılmalıdır.
SONUÇ
Sonuç olarak mesane yaralanmalarında öncelikli olarak hastaların stabilizasyonu gereklidir. Eğer hastada hematüri ve eşlik eden pelvik kırık var ise sistografi çekmek gereklidir. BT yapılıyorsa BT sistografi de yapılabilir. Cerrahi eksplorasyon endikasyonu yoksa künt travmaya bağlı ekstraperitoneal mesane rüptüründe kateter drenajı yeterli iken künt travmaya bağlı intraperitoneal rüptür veya delici yaralanmalarda cerrahi onarım yapmak gerekir.
Üretra yaralanmalarında ise yine öncelikli olarak hastaların stabilizasyonu önemlidir. Üretral meada kan görülüyor ise acil üretrografi çekilmelidir. Klinik duruma göre her hasta ayrı ayrı değerlendirilmeli ve tedavi edilmelidir.
Destek : Herhangi bir proje desteği veya başka araştırma desteği alınmamıştır.
Fİnansal Bağlantı : Araştırmacı herhangi bir finansal destek almamıştır.

M4644-Tam Metin

YILAN SOKMALARINDA ANTİVENOM ENDİKASYONLARI

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Amaç

Yılan sokmaları, özellikle çocuklarda hızlı ilerleyebilen lokal ve sistemik toksisite nedeniyle acil değerlendirme gerektiren önemli bir klinik tablodur. Bu konuşmanın amacı; yılan envenomasyonunda klinik şiddetin değerlendirilmesini, antivenom tedavisinin temel endikasyonlarını, uygulama ilkelerini ve pediatrik hastalarda dikkat edilmesi gereken noktaları güncel kaynaklar doğrultusunda özetlemektir.

Yöntem

Konuşma metni; Dünya Sağlık Örgütü kılavuzları, Wilderness Medical Society 2026 klinik uygulama kılavuzu, 2024 tarihli yılan ısırığı yönetim kılavuzu ve sunumda yer verilen güncel derleme ve çalışmalar temel alınarak hazırlanmıştır. Epidemiyoloji, venom özellikleri, klinik ve laboratuvar bulguları, ilk yaklaşım, envenomasyon şiddeti, antivenom endikasyonları, doz ve uygulama özellikleri ile antivenoma bağlı reaksiyonlar birlikte değerlendirilmiştir.

Bulgular

Dünya Sağlık Örgütü verilerine göre her yıl yaklaşık 5,4 milyon yılan ısırığı meydana gelmekte, bunların 1,8–2,7 milyonunda envenomasyon bulguları gelişmektedir [1]. Türkiye’de

2015–2020 yıllarını kapsayan geniş ölçekli verilerde 38 ilden 2.486 yılan ısırığı bildirilmiştir [2]. Yılan venomu; protein, peptid ve enzimlerden oluşan kompleks bir karışımdır. Başlıca toksin aileleri PLA_2, SVMP, SVSP ve 3FTx olup hemotoksisite, nörotoksisite, sitotoksisite ve miyotoksisiteye yol açabilir [3,4]. Klinik tabloda gastrointestinal, kardiyovasküler, nörolojik, hematolojik, renal ve musküler bulgular görülebilir; trombositopeni, fibrinojen düşüklüğü, PT/INR ve aPTT uzaması, renal fonksiyon bozukluğu ve gerektiğinde CK yüksekliği saptanabilir [5].

İlk yaklaşımda hasta sakinleştirilmeli, hareketi azaltılmalı, ısırılan ekstremite immobilize edilmeli ve uygun sağlık kuruluşuna gecikmeden nakledilmelidir. Turnike, insizyon/eksizyon, emme-vakum, buz, koterizasyon ve geleneksel uygulamalardan kaçınılmalıdır [5]. Başlangıçta hemogram/trombosit, renal fonksiyonlar ve koagülasyon parametreleri değerlendirilmelidir; PT/INR ve fibrinojen hemotoksisite açısından seri izlenmelidir [6,7]. Asemptomatik kuru ısırıkta başlangıç laboratuvarları değerlendirilerek en az 12 saat gözlem önerilir [6]. Sınırlı ve progresyon göstermeyen lokal bulgular yakın izlem gerektirirken; progresif ödem, ağrı, purpura veya ekimoz, sistemik toksisite, nörotoksisite, koagülopati/kanama, organ disfonksiyonu veya hızla ilerleyen doku hasarı antivenom tedavisini gündeme getirir [5,6].

Antivenom pasif immünoterapi yöntemidir ve endikasyon varlığında mümkün olan en erken dönemde intravenöz uygulanmalıdır [8]. Başlangıç dozu kullanılan preparata ve envenomasyonun klinik şiddetine göre belirlenir; persistan veya rekürren envenomasyonda klinik yanıta göre ek doz gerekebilir [5,6,8]. Rutin intradermal veya subkutan cilt testi önerilmez. Rutin antihistaminik veya kortikosteroid premedikasyonunun erken antivenom reaksiyonlarını önlemedeki etkinliği gösterilmemiştir; düşük doz profilaktik epinefrin erken reaksiyon sıklığını azaltabilir [8,9]. Antivenom uygulanırken anafilaksi açısından yakın izlem yapılmalı ve epinefrin hazır bulundurulmalıdır. Erken hipersensitivite/anafilaksi, pirojenik reaksiyon ve gecikmiş serum hastalığı tipi reaksiyonlar görülebilir [10].

Pediatrik hastalarda antivenom endikasyonları erişkinlerle aynıdır [6]. Aynı venom miktarı daha düşük vücut ağırlığı nedeniyle çocuklarda daha yüksek venom/kg yüküne ve daha ağır envenomasyona neden olabilir. Buna karşın antivenom başlangıç dozu kiloya göre azaltılmaz; çocuk ve erişkinde aynı doz yaklaşımı uygulanır. Küçük çocuklarda sıvı yüklenmesini azaltmak amacıyla antivenom dozu değil, dilüsyon ve infüzyon hacmi ayarlanabilir [5,6].

Sonuç

Yılan envenomasyonunda antivenom kararı yalnızca ısırık öyküsüne değil, klinik progresyon ve sistemik toksisite bulgularına dayanmalıdır. Progresif lokal hasar, nörolojik veya hematolojik toksisite, hemodinamik bozukluk ve organ etkilenimi antivenom için temel endikasyonlardır. Çocuklarda daha ağır klinik seyir görülebilmesine rağmen antivenom dozu kilo bazlı azaltılmamalıdır. Erken tanı, uygun destek tedavisi, zamanında antivenom uygulaması ve tedaviye bağlı reaksiyonların yakın izlemi klinik yönetimin temelini oluşturur.

Destek

Herhangi bir proje desteği veya başka bir araştırma desteği bulunmamaktadır.

Finansal bağlantı

Araştırmacının herhangi bir finansal bağlantısı bulunmamaktadır.

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M4643-Tam Metin
PEDİATRİK SERVİKAL TRAVMALARDA GÖRÜNTÜLEME: DİREKT GRAFİ Mİ, BT Mİ?

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Amaç

Pediatrik servikal travmada klinisyenin temel hedefi, klinik açıdan önemli servikal omurga yaralanmasını gecikmeden saptarken gereksiz iyonizan radyasyon maruziyetini en aza

indirmektir [1,2]. Servikal omurga yaralanmaları çocuklarda nadir görülmekle birlikte ciddi nörolojik sonuçlara yol açabilir [1,3]. Çocuklara özgü anatomik özellikler, yaralanma paternleri ve muayenenin yaşa göre değişen güvenilirliği görüntüleme kararını güçleştirmektedir [1,5]. Bu konuşmanın amacı; direkt grafi ve bilgisayarlı tomografinin (BT) pediatrik servikal travmadaki yerini güncel kanıtlar doğrultusunda karşılaştırmak, Pediatric Emergency Care Applied Research Network (PECARN) yaklaşımını klinik karar sürecine uyarlamak, güvenli ve radyasyon duyarlı bir görüntüleme stratejisi ortaya koymaktır.

Yöntem

Pediatrik servikal omurga travmasında görüntüleme kararını destekleyen güncel kanıtlar ve klinik karar kuralları değerlendirildi. American College of Radiology (ACR) Appropriateness Criteria® [2], PECARN servikal omurga yaralanması karar kuralı [1], National Emergency X-Radiography Utilization Study (NEXUS) düşük risk kriterleri [4,5] ve Canadian C-Spine Rule (CCR) [6] karşılaştırmalı olarak ele alındı. Direkt grafi, BT ve manyetik rezonans görüntülemenin (MR) kullanım alanları; klinik risk düzeyi, tanısal yeterlilik ve radyasyon maruziyeti açısından incelendi. Ayrıca pediatrik künt travma kohortlarında karar kurallarının duyarlılık, negatif prediktif değer (NPD) ve öngörülen BT kullanımı üzerindeki etkileri gözden geçirildi.

Bulgular

Düşük riskli ve güvenilir klinik muayenesi bulunan çocuklarda rutin görüntüleme her zaman gerekli değildi. Risk faktörü bulunan ancak değerlendirilebilir çocuklarda direkt grafi, daha düşük radyasyon dozu nedeniyle uygun bir ilk basamak seçeneği olabilir [1,2]. Bununla birlikte pozisyon, hareket, anatomik örtüşme ve özellikle üst servikal bölgenin değerlendirilmesindeki teknik sınırlılıklar göz önünde bulundurulmalıdır. BT, kemik yaralanmalarında daha yüksek tanısal doğruluk ve hızlı değerlendirme sağlamakla birlikte daha yüksek iyonizan radyasyon maruziyetine neden olduğundan seçici kullanılmalıdır. MR rutin ilk basamak yöntem değildir; omurilik veya ligamentöz yaralanma şüphesinde ve nörolojik bulgular ile BT arasında uyumsuzluk olduğunda değerlidir [2].

PECARN yaklaşımında Glasgow Koma Skalası (GKS) 3–8 olması veya yanıtsızlık, anormal hava yolu-solunum-dolaşım bulguları ve fokal nörolojik defisit yüksek risk göstergeleri olup BT değerlendirmesini destekler. GKS 9–14 veya bilinç değişikliği, boyun ağrısı ya da orta hat hassasiyeti ve ciddi baş veya gövde yaralanması orta risk özellikleri olarak direkt grafiyi gündeme getirir. Bu risk faktörlerinin bulunmadığı çocuklarda görüntüleme gerekmeyebilir. PECARN doğrulama verilerinde duyarlılık %94,3, NPD %99,9 olarak bildirilmiş ve tahmini BT kullanımının %17,2'den %6,9'a düşebileceği gösterilmiştir [1].

Karar kurallarının doğrudan karşılaştırıldığı 22.430 çocukluk prospektif künt travma kohortunda PECARN için duyarlılık %93,3, NPD %99,8 ve öngörülen BT kullanımı %6,9; NEXUS için sırasıyla %85,7, %99,6 ve %10,8; CCR için %90,8, %99,7 ve %13,2 bildirilmiştir [3].

NEXUS düşük risk yaklaşımı; orta hat servikal hassasiyetinin, fokal nörolojik defisitin, bilinç değişikliğinin, intoksikasyonun ve dikkat dağıtıcı yaralanmanın bulunmamasını esas alır [4]. Beş kriterin tamamının karşılanması görüntülemeden kaçınmayı destekleyebilir; ancak pediatrik alt grupta, özellikle küçük çocuklarda kanıtların sınırlı olması nedeniyle yaşa uygun klinik değerlendirme ile birlikte kullanılmalıdır [5]. CCR ise yüksek risk faktörleri, düşük risk

özellikleri ve boynun iki yana 45° aktif rotasyonunu içeren üç basamaklı bir yaklaşımdır [6]. Bununla birlikte CCR çalışmalarında 16 yaş altı hastalar dışlandığından pediatrik servikal travmada valide değildir ve çocuklarda karar vermek için kullanılmamalıdır; yalnızca karşılaştırmalı bilgi olarak ele alınmalıdır [6]. ACR Appropriateness Criteria® yaklaşımı da görüntülemeyi yaş ve klinik risk düzeyine göre basamaklandırır [2]. Akut servikal travmalı 3–16 yaş çocuklarda PECARN veya NEXUS'a göre düşük risk kriterleri karşılanıyorsa başlangıçta servikal direkt grafi ve BT genellikle uygun değildir. En az bir risk faktörü bulunan ve klinik muayenesi güvenilir olan 3–16 yaş grubunda servikal direkt grafi genellikle uygun ilk görüntüleme yöntemidir; kontrastsız servikal BT ve MR ise seçilmiş olgularda düşünülebilir. Üç yaşından küçük çocuklarda ise karar yaşa özgü klinik risk değerlendirmesine dayanmalı; ACR, belirli risk düzeylerinde direkt grafiyi başlangıç görüntülemesi olarak uygun kabul eder. Bu yaklaşım, çocuklarda rutin BT yerine risk temelli ve radyasyon duyarlı görüntüleme seçimini desteklemektedir [2].

Sonuç

Pediatrik servikal travmada "direkt grafi mi, BT mi?" sorusunun tek bir görüntüleme yöntemiyle yanıtlanması uygun değildir. Görüntüleme seçimi klinik risk sınıflamasına dayanmalıdır. Düşük riskli çocuklarda klinik izlem ve servikal temizleme yeterli olabilir; orta riskli ve güvenilir muayenesi bulunan çocuklarda direkt grafi düşünülebilir; yüksek riskli veya güvenilir biçimde değerlendirilemeyen hastalarda BT ön plana çıkar. Nörolojik bulgu veya ligamentöz yaralanma şüphesinde, BT normal olsa dahi MR ve uzman görüşü gerekebilir. Temel yaklaşım, tanısal güvenlik ile radyasyon riskini dengeleyerek doğru hastaya, doğru zamanda, doğru görüntülemeyi uygulamaktır.

Destek

Bu çalışma için herhangi bir proje desteği veya araştırma desteği bildirilmemiştir.

Finansal bağlantı

Yazar herhangi bir finansal bağlantı bildirmemiştir.

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M4642-Özet Metin

ÇOCUKLARDA YABANCI CİSİM ASPİRASYONLARI

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Yabancı cisim aspirasyonu, ağız ya da burun yoluyla alınan bir cismin, nefes almayla birlikte istemsiz olarak alt solunum yollarına kaçmasıdır. Özellikle 1–3 yaş arası çocuklarda ölümle sonuçlanabilen acil bir durumdur. Bir yaş altındaki çocuklarda kazaya bağlı ölümler arasında birinci sıradadır. Aspire edilen yabancı cisimlerin (YC) %80'ini fındık, fıstık, ceviz, fasülye ve nohut gibi organik cisimler oluşturur [1-3].

Olguların yaklaşık %80'i 1-3 yaş arasındadır ve erkeklerde daha sık görülür. Çocukluk çağında; trakeobronşiyal yapının daha dar ve kısa olması, molar dişlerin henüz gelişmemiş olması ve farinks–larinks koordinasyonunun olgunlaşmamış olması YC aspirasyonunu kolaylaştırır. Sağ ana bronşun sola göre daha geniş olması, kısa olması ve vertikale daha yakın olması nedeniyle aspire edilen materyaller çoğunlukla sağ ana bronşa yerleşir [4].

Aspire edilen materyalin cinsi ve hava yolunda kalma süresine bağlı olarak; obstrüksiyon, atelektazi, bronşektazi, pnömoni, akciğer apsesi ve bronkokütanöz fistül gibi komplikasyonlarla karşılaşılabilir. YC'nin hava yolunda kalma süresi uzadıkça; inflamasyon, ödem, ülserasyon ve granülasyon dokusu oluşabilir. Aspirasyonun üçüncü gününden sonra histopatolojik değişiklikler, birinci ayından sonra ise kıkırdak hasarı, bronşlarda dilatasyon ve fibrozis gelişebilir [3].

Yabancı cisim aspirasyonunda semptomlar aspirasyon anında veya günler sonra ortaya çıkabilir. YC'nin şekli, boyutu, sertliği, yerleşim yeri, hava yolunda kalma süresi, YC'nin yer değiştirmesi veya şişmesi semptomlardaki farklılığa neden olabilir. Yabancı cisim aspirasyonundaki bulgular Tablo 1' de gösterilmiştir [2,5].

Tablo 1. Yabancı cisim aspirasyonunda erken ve geç dönem bulguları

Erken dönem bılgular	Geç dönem bulgular
Ani başlayan öksürük Wheezing Nefes darlığı Stridor Ses kısıklığı	Pnömoni Bronşektazi Akciğer apsesi Tekrarlayan akciğer enfeksiyonları

Siyanoz	

Yabancı cisim aspirasyonunda klasik triad; ani başlayan öksürük, wheezing ve aynı tarafta solunum seslerinde azalma olmasıdır. Ancak klasik triadın bulunmaması tanıyı dışlamaz. Olguların %30'unda fizik muayene normal olarak değerlendirilebilir. Bu nedenle tanıda klinik şüphe ön plandadır. Ani başlayan öksürük, solunum sıkıntısı, boğulma hissi ve morarma öyküsü ile olay esnasında hastanın yanında olayı gören bir kişinin olması klinik şüphede önemlidir. YC aspirasyonunda fizik muayene bulguları; solunum seslerinde azalma, wheezing, stridor, dispne, siyanoz ve asimetrik ekspansiyondur [3,4].

Rutin bakılan laboratuvar tetkiklerin YC aspirasyonu tanısında yeri yoktur. Arteriyal kan gazı bakılması hastanın fizyolojik durumunun değerlendirilmesinde önemlidir.

İlk çekilecek radyolojik görüntüleme iki yönlü akciğer grafisidir. Aspire edilen YC radyoopak ise tanı için yeterli bir tetkiktir. Akciğer grafisinde havalanma artışı, atelektazi ve konsolidasyon bulgularının görülmesi YC aspirasyon tanısını destekler. Ancak olguların %34'ünde akciğer grafisi normal olabilir. Bilgisayarlı tomografide hava yolundaki YC'in görülmesi en güvenilir bulgudur. Ayrıca bilgisayarlı tomografi ile akciğer parankimi ve eşlik eden amfizem, konsolidasyon, atelektazi, bronşektazi ve lenfadenopati gibi ek patolojilerde değerlendirilebilir [1,3].

Ayırıcı tanıda; laringotrakeit, retrofaringeal apse, bronşiyal astım, endobronşiyal tüberküloz, akciğer apsesi, epiglottit, broşit, pnömoni, lenfadenopati, tümör kaynaklı dıştan bası yapan kitleler ve kistik fibrozis düşünülebilir. Ayırıcı tanıda en önemli yöntem bronkoskopidir.

Yabancı cisim aspirasyonunun tedavisinde temel yaklaşım hava yolu güvenliğinin sağlanmasıdır. Hava yolunun tam olmayan tıkanıklıklarında; öksürük gibi solunum yolu refleksi ve nefes alıp verme devam eder. Bu olgular entübasyon uygulanabilecek şartlarda bronkoskopi yapılabilecek en yakın sağlık merkezine acil olarak yönlendirilmelidir.

Tam kınalıklıkta ise; nefes alamama, ses çıkaramama ve etkili öksürememe gibi bulgular görülür. Bu durumda;

- >1 yaş Heimlich manevrası
- <1 yaş Sırta ve göğse yapılan manevralar uygulanmalıdır. Müdahale için zamana ihtiyaç varsa; hasta entübe edilerek endotrakeal tüp ile trakeada tam tıkanmaya sebep olan YC distale doğru itilerek tek taraf ana bronşa (sağ veya sol ana bronş) yönlendirilir. Böylece diğer taraf hava yolunun açık kalmasıyla solunumun devam etmesi sağlanır (Push-down manevrası) [3,4].

YC aspirasyon şüphesi varsa tanı ve tedavide altın standart yöntem bronkoskopidir. Tecrübeli ellerde ve erken dönemde, güvenilir ve komplikasyonu azdır. Gecikmiş bronkoskopilerde morbidite ve mortalitede artış olduğu bilinmektedir. Bronkoskopi alt yapısının güncel olması komplikasyon ve prognoz açısından önemlidir. İrriversibl pulmoner hasara neden olan veya parankime gömülmüş YC'lerde; torakotomi, bronkotomi ve pulmoner rezeksiyon gibi cerrahi yöntemlerde uygulanabilir [3,4].

YC'nin hava yolunda uzun süre kaldığı hastalarda tedaviye ampirik antibiyotik eklenebilir.

Tedaviye sistemik kortikosteroid eklenmesi hava yolundaki inflamasyon ve laringeal ödemi azaltmada etkili olabilir [3].

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M4641-Özet Metin

YENİDOĞAN CANLANDIRMASINDA GÜNCEL YAKLAŞIMLAR

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Yenidoğan canlandırmasının temel amacı, fetusun sıvı dolu akciğer ortamından ve plasental dolaşımdan, akciğerler aracılığıyla gaz değişiminin sağlandığı ekstrauterin yaşama sorunsuz geçişini kolaylaştırmaktır. Tüm yenidoğan bebeklerin yaklaşık %5 ila %10'u doğum sonrası spontan solunumu başlatmak için yardıma ihtiyaç duyarken, yaklaşık %1'lik bir grup ek ileri canlandırma girişimlerine gereksinim duymaktadır. Doğum salonunda yenidoğan canlandırma sürecindeki en kritik öncelik, akciğer havalanmasının ve etkin ventilasyonun sağlanmasıdır (Şekil 1). Canlandırma ihtiyacının ne zaman doğacağı her zaman öngörülemeyebileceğinden, her doğumda sadece bebeğin bakımından sorumlu, değerlendirme ve ventilasyon becerilerine sahip eğitimli en az bir personelin hazır bulunması önerilmektedir. Yüksek riskli doğumlardan önce ise standart risk değerlendirmesi yapılması, tam canlandırma basamaklarını uygulayabilecek nitelikli personel sayısının artırılması, ekip içi görev dağılımının belirlenmesi ve malzeme kontrol listelerinin kullanılması klinik başarıyı ve hasta sağkalımını belirgin şekilde artırmaktadır. Ülkemizdeki yasal düzenlemelere göre gestasyon

haftasına bakılmaksızın yaşam belirtisi gösteren her yenidoğana uygun şekilde canlandırma işlemi uygulanmalıdır.

Doğum sonrasında acil resüsitasyon gereksinimi olmayan hem term hem de preterm bebeklerde göbek kordonunun klemplenmesinin en az 60 saniye ertelenmesi önerilmektedir. Erteleme olanağı bulunmayan ve acil canlandırma gerektirmeyen 28 ila 36 hafta arasındaki preterm bebeklerde kordon sıvazlaması bir alternatif olarak değerlendirilebilirken, 28 haftadan küçük prematüre bebeklerde intraventriküler kanama riskini artırdığı için kordon sıvazlaması yapılmamalıdır. Bebeklerin doğum odasındaki vücut sıcaklığının 36,5 °C ile 37,5 °C arasında tutulması vital fonksiyonların korunması açısından kritik öneme sahiptir. Hipotermi mortalite ve morbidite riskini artırırken, hipertermi de nörolojik hasar ve solunum depresyonu riskini yükseltmektedir. Bu nedenle doğum salonunda bebekler derhal kurulanarak radyant ısıtıcı altına alınmalı veya anne ile ten tene temas sağlanmalıdır. 32 gebelik haftasının altındaki preterm bebeklerin kurulanmadan polietilen torba veya kılıflara konulması, başlık giydirilmesi ve termal yatak kullanılması hipotermiyi önlemede etkilidir.

Hava yolunun açık tutulması için bebeğin sırtüstü pozisyonda, başının hafif ekstansiyonda ("koklama" pozisyonunda) tutulması gerekmektedir. Solunumu ve kas tonusu iyi olan sağlıklı bebeklerde rutin ağız ve burun aspirasyonu önerilmez; aspirasyon yalnızca hava yolunda belirgin obstrüksiyon veya ventilasyonu engelleyen sekresyon varlığında yapılmalıdır. Mekonyumlu amniyotik sıvı varlığında dahi bebek nonvigoröz olsa bile rutin intrapartum veya trakeal aspirasyon önerilmemekte, canlandırma adımlarına derhal başlanması vurgulanmaktadır. Doğumdan sonraki ilk 60 saniye ("altın dakika") içinde başlangıç basamaklarına yanıt vermeyen, apnesi veya iç çekme tarzı solunumu olan ya da kalp atım hızı (KAH) 100 atım/dakikanın altında kalan bebeklerde vakit kaybetmeksizin pozitif basınçlı ventilasyona (PBV) başlanmalıdır. PBV uygulanırken ventilasyon hızı dakikada 30 ila 60 soluk olmalı, başlangıç inspiratuvar tepe basıncı (PIP) 20-30 cm H2O, pozitif ekspirasyon sonu basıncı (PEEP) ise 5-6 cm H2O olarak ayarlanmalıdır. Sabit basınç sağlayabilmesi ve PEEP oluşturabilmesi nedeniyle T-parça canlandırıcı kullanımı kendi şişen balonlara kıyasla tercih edilmektedir. Oksijen desteği, sağ ele takılan nabız oksimetresi aracılığıyla hedeflenen preduktal SpO2 değerlerine göre titre edilmelidir. PBV'ye başlarken 35 gebelik haftası ve üzerindeki bebeklerde oda havası (%21), 32-35 haftalardaki pretermlerde %21-%30, 32 haftanın altındaki çok küçük pretermlerde ise %30-100 konsantrasyonda oksijen konsantrasyonu seçilmelidir.

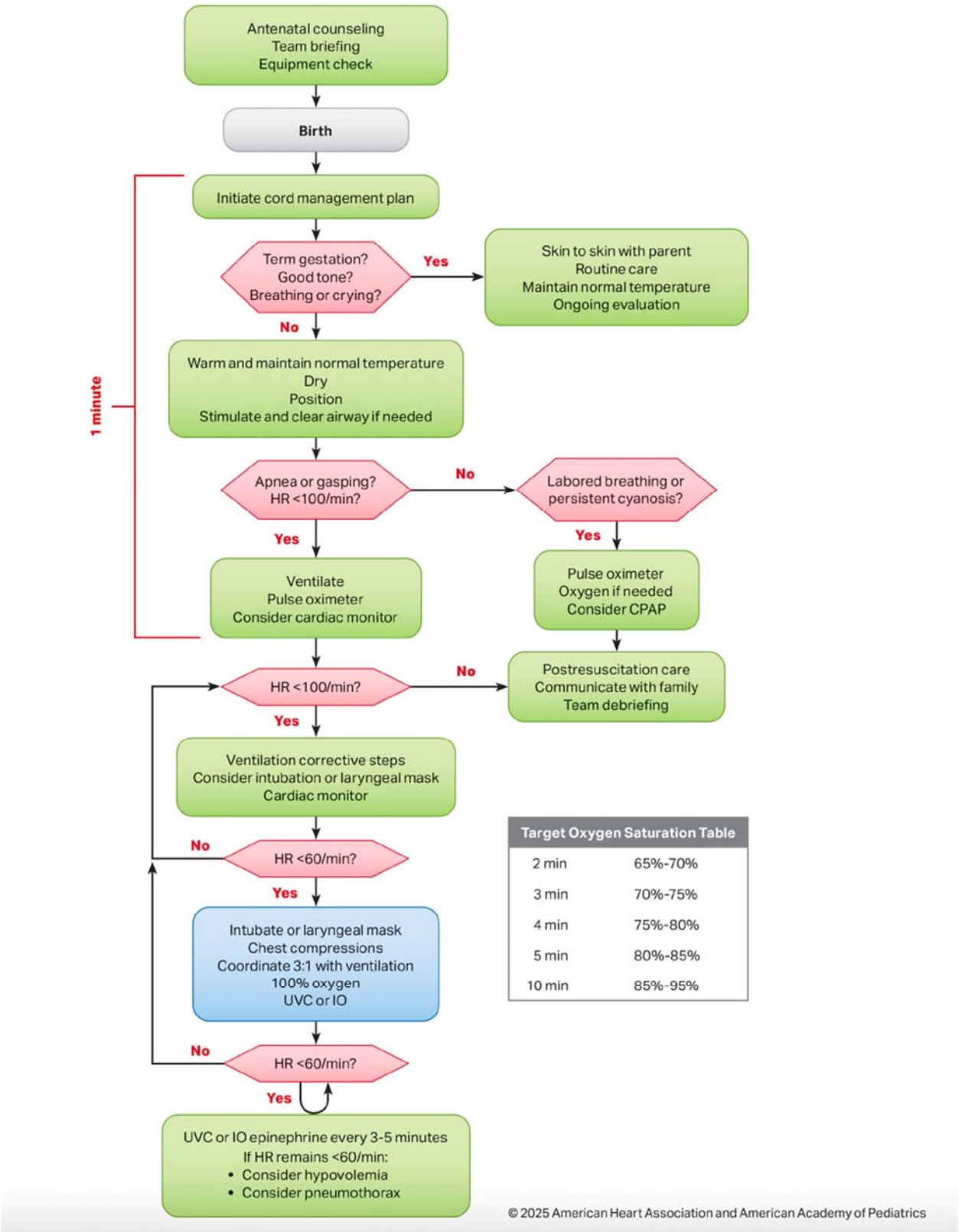
Spontan soluyan ancak solunum sıkıntısı devam eden bebeklerde ise erken nazal CPAP uygulaması invaziv ventilasyon ihtiyacını azaltmaktadır. PBV'ye rağmen KAH artmıyorsa maske ve baş pozisyonunun düzeltilmesi, aspirasyon, ağzın açılması, basıncın artırılması ve endotrakeal entübasyon yada laringeal maskeyi içeren alternatif hava yolu (MR. SOPA adımları) adımları uygulanmalıdır.

En az 30 saniye süreyle akciğerleri havalandıran etkin PBV uygulanmasına rağmen KAH 60 atım/dakikanın altında kalmaya devam ederse göğüs kompresyonuna başlanmalıdır. Kompresyon öncesinde alternatif hava yolu yerleştirilmesi ventilasyon etkinliğini garanti altına almak için önerilmektedir. Entübasyona ek olarak göğüs kompresyonu sırasında verilen oksijen konsantrasyonu %100'e çıkarılmalıdır. Kompresyonda iki başparmak tekniği tercih edilmeli, sternumun 1/3 alt kısmına göğüs ön-arka çapının 1/3'ü derinlikte bası uygulanmalıdır. Kompresyon ve ventilasyon 3:1 oranında (dakikada 90 kompresyon ve 30 soluk) eşgüdümlü

olarak yürütülmelidir. KAH değerlendirmesinde EKG monitorizasyonu en hızlı ve doğru sonuç veren yöntemdir.

Etkin ventilasyon ve kompresyona yanıt vermeyen olgularda intravenöz adrenalin (0,01-0,03 mg/kg) uygulanmalı ve ardından 3 mL serum fizyolojik ile yıkanmalıdır. Damar yolu açılana kadar endotrakeal yoldan daha yüksek dozda (0,05-0,1 mg/kg) adrenalin verilebilir. Kan kaybı şüphesi veya şok tablosunda ise 10-20 mL/kg dozunda izotonik kristaloid veya 0 Rh (-) kan 5-10 dakika içinde infüze edilmelidir. Acil damar yolu gerektiğinde ilk tercih umbilikal ven kateterizasyonudur; iv yol sağlanamadığında intraosseöz yol alternatif olarak düşünülebilir. Bütün canlandırma adımları eksiksiz ve etkin şekilde uygulanmasına rağmen 20 dakika boyunca kalp atımı saptanmayan bebeklerde resüsitasyon girişimlerinin sonlandırılması aile ve tıbbi ekip ile görüşülerek değerlendirilmelidir.

İleri canlandırma uygulanan yenidoğanlar hipoglisemi, hipotermi, nöbet ve organ disfonksiyonları açısından yenidoğan yoğun bakım ünitesinde yakın takip edilmelidir. Sonuç olarak, yenidoğan canlandırmasında başarının anahtarı kanıta dayalı kılavuz ilkelerine uyum, disiplinli ekip çalışması ve zamanında müdahaledir.



Şekil1: Yenidoğan Canlandırma Algoritması

M4640-Tam Metin

SEPSİS TANISINDA LAKTAT, CRP, PROKALSİTONİN VE YENİ BİYOBELİRTEÇLER: GÜNCEL LİTERATÜR DERLEMESİ

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Amaç

Sepsis, enfeksiyona karşı gelişen düzensiz konak yanıtının neden olduğu, yaşamı tehdit eden organ disfonksiyonu sendromudur. Klinik değerlendirme, mikrobiyolojik doğrulama ve organ disfonksiyonu göstergeleri tanının temelini oluştururken biyobelirteçler konak yanıtının farklı bileşenlerini yansıtan tamamlayıcı araçlardır. Bu derlemenin amacı, laktat, C-reaktif protein (CRP) ve prokalsitonin (PCT) gibi klasik parametreler ile son yıllarda öne çıkan yeni biyobelirteçlerin sepsis tanısı ve prognozundaki yerini güncel literatür verileriyle değerlendirmektir.

Yöntem

Sepsis tanısı ve prognozunda kullanılan klasik ve yeni biyobelirteçlere ilişkin güncel çalışmalar ve meta-analizler incelendi. Laktat, CRP, PCT, presepsin, nötrofil CD64, çözünür miyeloid hücrelerde eksprese edilen tetikleyici reseptör-1 (sTREM-1), kalprotektin, interlökin-6 (IL-6), pentraksin-3 (PTX-3), monosit dağılım genişliği (MDW), monositik insan lökosit antijeni-DR (mHLA-DR), hücre dışı DNA/nötrofil ekstraselüler tuzakları (cfDNA/NET), mikroRNA (miRNA), bioaktif adrenomedullin (bio-ADM) ve anjiyopoietin-2; tanısal doğruluk, prognostik değer, klinik kullanım ve temel sınırlılıklar açısından karşılaştırıldı.

Bulgular

Laktat enfeksiyona özgü olmamakla birlikte septik şok tanımı ve resüsitasyon takibinde önemlidir. Mortalitenin öngörülmesinde eğri altında kalan alan (AUROC) 0,740, duyarlılık 0,68 ve özgüllük 0,69 olarak bildirilmiştir; ≥4 mmol/L düzeylerinde özgüllük %91,4'e ulaşmaktadır. Tek ölçümden çok seri laktat ölçümü ve klirens değerlendirmesi klinik açıdan daha değerlidir (1). CRP yaygın ve düşük maliyetlidir ancak özgüllüğü sınırlıdır. Meta-analizlerde sepsis tanısı için eğri altında kalan alan (AUC) 0,67, duyarlılık %83 ve özgüllük %56 bildirilmiştir. PCT'nin tanısal performansı daha yüksektir; 43 çalışma ve 9.842 hastayı kapsayan meta-analizde AUC 0,87, duyarlılık 0,82 ve özgüllük 0,78 bulunmuştur. Bununla birlikte böbrek yetmezliği, travma, büyük cerrahi girişim ve yanık gibi durumlarda PCT yükselebilir (2,3).

Yeni biyobelirteçler içinde nötrofil CD64 güçlü bir tanısal adaydır. Meta-analizde duyarlılık ve özgüllük 0,88, AUC 0,94 bulunmuştur. Bayesyen ağ meta-analizinde CD64 en yüksek tanısal olabilirlik oranına (20,17) sahip olmuş; sTREM-1 (18,73) ve presepsin (10,04) bunu izlemiştir (4,5). Presepsin için farklı meta-analizlerde duyarlılık 0,78–0,84, özgüllük 0,76–0,83 aralığındadır; sepsis ile steril inflamasyonu ayırmada AUC 0,89 bildirilmiştir (11–14). sTREM-

1 için duyarlılık 0,82–0,85 ve özgüllük 0,79–0,81 olmakla birlikte kanıt kalitesi ve standardizasyon sorunları klinik kullanımını sınırlar (5).
Kalprotektin için bulgular çelişkilidir; bazı çalışmalarda bakteriyel enfeksiyon ayrımında AUC 0,90'a ulaşırken büyük yoğun bakım kohortunda AUC 0,61 bulunmuştur (6). IL-6 erken yükselmekte ve meta-analizlerde AUC yaklaşık 0,80–0,87 düzeyinde bildirilmektedir, ancak steril inflamasyonda da artabilir (7). PTX-3 daha çok prognostik değer taşımaktadır. MDW, rutin tam kan sayımından elde edilebilmesi ve ek maliyet gerektirmemesiyle dikkat çekmektedir; 39.041 hastayı kapsayan meta-analizde AUC 0,82, negatif prediktif değer Sepsis-3 için %96 bulunmuştur (8). mHLA-DR sepsis sonrası immünsüpresyonu yansıtır ve sekonder enfeksiyon riski ile ilişkilidir (9). cfDNA/NET ve miRNA temelli belirteçler halen araştırma aşamasındadır. Bio-ADM ve anjiyopoietin-2 ise tanıdan çok endotel disfonksiyonu, mortalite riski ve prognozun değerlendirilmesinde öne çıkmaktadır (10-12).

Sonuç

Tek bir biyobelirteç sepsisi kesin olarak tanımlamak için yeterli değildir. CRP, PCT ve laktat erişilebilirlikleri nedeniyle klinik pratikte önemini korurken, CD64 ve presepsin yüksek tanısal performanslarıyla; MDW ise hızlı, pratik ve düşük maliyetli bir tarama aracı olmasıyla öne çıkmaktadır. mHLA-DR, bio-ADM ve anjiyopoietin-2 farklı patofizyolojik süreçler ve prognoz hakkında tamamlayıcı bilgi sağlamaktadır. Klinik değerlendirme, mikrobiyolojik doğrulama ve organ disfonksiyonu göstergeleriyle birlikte kullanılan çoklu biyobelirteç panelleri, sepsisin heterojen biyolojisini tek bir belirteçten daha iyi yansıtabilir.

Destek

Bu çalışma için herhangi bir proje desteği alınmamıştır.

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M4439-Tam Metin

PEDİATRİK KARBONMONOKSİT ZEHİRLENMESİNDE HASTANE YATIŞINI ÖNGÖREN BİYOBELİRTEÇLER: RETROSPEKTİF BİR ÇALIŞMA

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ABSTRACT

Giriş:

Karbonmonoksit (CO) zehirlenmesi, özellikle pediatrik yaş grubunda ciddi klinik sonuçlara yol açabilen önemli bir toksikolojik acildir. Çocuklarda klinik bulguların özgül olmaması nedeniyle hastaneye yatış gereksinimini erken dönemde öngörebilecek biyobelirteçlerin belirlenmesi klinik açıdan önem taşımaktadır.

Amaç:
Bu çalışmada, CO zehirlenmesi nedeniyle acil serviste değerlendirilen 0–8 yaş arasındaki pediatrik hastalarda başvuru sırasında ölçülen laboratuvar parametrelerinin hastaneye yatışı öngörmedeki rolünün değerlendirilmesi amaçlandı. Ayrıca laktat, karboksihemoglobin (COHb), COHb/laktat oranı ve Prognostik Nutrisyonel İndeksin (PNI) hastaneye yatışı öngörmedeki ayırt edici performanslarının karşılaştırılması hedeflendi. Çalışma, 1 Ocak 2021–31 Aralık 2024 tarihleri arasında CO zehirlenmesi nedeniyle başvuran hastaların retrospektif olarak değerlendirilmesiyle gerçekleştirildi. Toplam 39 pediatrik hastanın demografik ve laboratuvar verileri incelendi ve hastaneye yatış durumu ile ilişkileri değerlendirildi. Laktat, COHb, COHb/laktat ve PNI'nin hastaneye yatışı öngörmedeki performansları ROC analizi ile değerlendirildi.

Sonuç:
Hastaların 6'sı (%15,4) hastaneye yatırılırken, 33'ü (%84,6) yatırılmadan taburcu edildi. Hastaneye yatış ile Hgb, pO_2, laktat, direkt bilirubin, COHb ve COHb/laktat oranı arasında anlamlı ilişkiler saptandı. COHb ile laktat arasında güçlü pozitif korelasyon bulundu ($r=0,718$; $p<0,001$). ROC analizinde COHb'nin hastaneye yatışı öngörmede en yüksek ayırt edici performansa sahip olduğu görüldü (AUC=0,854; %95 GA: 0,723–0,984; p=0,006). COHb için 19,75% cut-off değerinde duyarlılık %83,3 ve özgüllük %81,8 olarak bulundu. Laktat (AUC=0,801; p=0,021) ve COHb/laktat oranı (AUC=0,803; p=0,020) da anlamlı ayırt edici performans gösterirken, PNI'nin hastaneye yatışı öngörmedeki performansı anlamlı bulunmadı (AUC=0,644; p=0,267). Bu bulgular, özellikle COHb ve laktat düzeylerinin pediatrik CO zehirlenmesinde hastaneye yatış gereksiniminin değerlendirilmesinde yardımcı biyobelirteçler olarak kullanılabileceğini düşündürmektedir.
Anahtar Kelimeler:
Karbonmonoksit zehirlenmesi; pediatrik zehirlenme; karboksihemoglobin; laktat; COHb/laktat oranı; hastaneye yatış; biyobelirteç.

MATERYAL METODS

Çalışma Tasarımı ve Hasta Popülasyonu

Bu çalışma, karbonmonoksit (CO) maruziyeti nedeniyle acil serviste değerlendirilen 0-8 yaş arasındaki pediatrik hastaların klinik ve laboratuvar özelliklerinin incelendiği retrospektif gözlemsel bir çalışma olarak planlandı. Çalışmaya dahil edilme kriterlerini karşılayan toplam 39 hasta değerlendirildi. Hastaların demografik özellikleri, başvuru laboratuvar sonuçları, hastaneye yatış durumu, yatış süresi, servis ve yoğun bakım ünitesi (YBÜ) yatışı ile hiperbarik oksijen tedavisi uygulanma durumu kaydedildi.
Hastalar klinik sonlanıma göre hastaneye yatırılanlar ve yatırılmadan taburcu edilenler olmak üzere iki gruba ayrıldı. Hastaneye yatırılan hastalar ayrıca servis ve YBÜ yatışı açısından değerlendirildi.

Dahil Edilme ve Dışlanma Kriterleri

Dahil edilme kriterleri, 1 Ocak 2021–31 Aralık 2024 tarihleri arasında çocuk acil servisine başvuran, 0–8 yaş arasında olan, karbonmonoksit (CO) zehirlenmesi tanısı alan, bilinen

hematolojik, onkolojik veya diğer kronik ek hastalığı bulunmayan ve klinik ve laboratuvar verilerine eksiksiz olarak ulaşılabilen hastalar olarak belirlendi.
Dışlanma kriterleri ise 0–8 yaş aralığı dışında olmak, bilinen hematolojik, onkolojik veya diğer kronik ek hastalığa sahip olmak, başka bir sağlık kuruluşuna sevk edilmiş olmak ve klinik veya laboratuvar verilerinin eksik olması olarak belirlendi.
Belirlenen çalışma döneminde çocuk acil servisine CO zehirlenmesi nedeniyle başvuran 113 olgu retrospektif olarak tarandı ve dahil edilme kriterlerini karşılayan hastalar çalışmaya alındı.

Laboratuvar Parametreleri ve Hesaplanan İndeksler

Hastaların acil servis başvurusu sırasında elde edilen ilk laboratuvar sonuçları kullanıldı. Glikoz, üre, kreatinin, aspartat aminotransferaz (AST), alanin aminotransferaz (ALT), alkalen fosfataz (ALP), total bilirubin, direkt bilirubin, total protein, albümin, amilaz, kalsiyum, sodyum, potasyum, klor ve C-reaktif protein (CRP) düzeyleri kaydedildi. Hematolojik parametrelerden lökosit (WBC), trombosit (PLT), hemoglobin (Hgb), nötrofil, lenfosit ve monosit değerleri değerlendirildi. Kan gazı analizinden pH, pCO_2, pO_2, HCO_3, laktat ve karboksihemoglobin (COHb) düzeyleri kaydedildi.
Prognostik Nutrisyonel İndeks (PNI) aşağıdaki formül kullanılarak hesaplandı:
PNI = [10 × albümin (g/dL)] + [0,005 × total lenfosit sayısı (/mm^3)]

CO maruziyeti ile metabolik yanıt arasındaki ilişkiyi değerlendirmek amacıyla COHb/laktat oranı, COHb değerinin laktat düzeyine bölünmesiyle hesaplandı:
COHb/Laktat = COHb (%) / Laktat (mmol/L)

Sonlanım Noktaları

Çalışmanın temel klinik sonlanımı hastaneye yatış durumu olarak belirlendi. Hastaneye yatış ile demografik ve laboratuvar parametreleri arasındaki ilişkiler değerlendirildi. Ayrıca servis yatışı, YBÜ yatışı ve hiperbarik oksijen tedavisi uygulanması ile laboratuvar parametreleri arasındaki ilişkiler incelendi. Hastanede yatış süresi ile laboratuvar parametreleri arasındaki korelasyonlar değerlendirildi.
Laktat, COHb, COHb/laktat ve PNI'nin hastaneye yatışı öngörmedeki ayırt edici performansları ayrıca ROC analizi ile incelendi.

İstatistiksel Analiz

İstatistiksel analizler IBM SPSS 27.0 Statistics kullanılarak gerçekleştirildi. Sürekli değişkenlerin normal dağılıma uygunluğu Shapiro–Wilk testi ile değerlendirildi. Normal dağılım gösteren değişkenler ortalama ± standart sapma (mean ± SD), normal dağılım göstermeyen değişkenler ise medyan ve çeyrekler arası aralık [median (25.–75. persentil)] olarak sunuldu. Kategorik değişkenler sayı ve yüzde [n (%)] olarak ifade edildi.
İki bağımsız grup arasında normal dağılım gösteren sürekli değişkenlerin karşılaştırılmasında bağımsız örneklem t-testi, normal dağılım göstermeyen sürekli değişkenlerin karşılaştırılmasında Mann–Whitney U testi kullanıldı.
Sürekli değişkenler arasındaki korelasyonların değerlendirilmesinde Spearman sıra korelasyon analizi kullanıldı. Korelasyon katsayısı r ile ifade edildi.
Laktat, COHb, COHb/laktat ve PNI'nin hastaneye yatışı öngörmedeki ayırt edici performansları receiver operating characteristic (ROC) eğrisi analizi ile değerlendirildi. Eğri altında kalan alan

(AUC) ve %95 güven aralıkları hesaplandı. Optimal cut-off değerlerinin belirlenmesinde Youden indeksi (duyarlılık + özgüllük − 1) kullanıldı ve belirlenen eşik değerleri için duyarlılık ve özgüllük değerleri hesaplandı. Tüm analizlerde iki yönlü $p<0,05$ istatistiksel olarak anlamlı kabul edildi.

BULGULAR

Çalışmaya toplam 39 pediatrik hasta dahil edildi. Hastaların 12'si (%30,8) kız, 27'si (%69,2) erkekti. Hastaların 6'sında (%15,4) hastane yatışı gerçekleştirildi; bunların 4'ü (%10,3) servise, 2'si (%5,1) yoğun bakım ünitesine yatırıldı. Hastaların 33'ü (%84,6) hastaneye yatırılmadan taburcu edildi. Hiperbarik oksijen tedavisi 4 hastaya (%10,3) uygulandı. PA akciğer grafisi (PAAG) ise 6 hastada (%15,4) çekildi.

Çalışmaya dahil edilen hastaların laboratuvar parametrelerine ilişkin tanımlayıcı istatistikler değerlendirildi. Normal dağılım gösteren değişkenler ortalama ± standart sapma olarak sunuldu. Ortalama kreatinin düzeyi 0,457 ± 0,064, albümin 41,333 ± 3,428, sodyum 137,31 ± 2,13, potasyum 4,138 ± 0,496, WBC 11,042 ± 3,471, PLT 343,56 ± 84,49, Hgb 12,315 ± 1,224 ve monosit 0,751 ± 0,286 olarak saptandı. Kan gazı parametrelerinden ortalama pCO_2 39,092 ± 6,476, pO_2 40,133 ± 19,443, HCO_3 21,974 ± 3,734 ve laktat 2,356 ± 0,990 idi. Parametrik değişkenlere ilişkin tanımlayıcı istatistikler Tablo 1'de verilmiştir.

Tablo 1. Hastaların Parametrik Değişkenlerine İlişkin Tanımlayıcı İstatistikler

Değişken	Mean ±SD
Kreatinin	0,457 ±0,064
Albümin	41,333 ±3,428
Sodyum	137,31 ±2,13
Potasyum	4,138 ±0,496
WBC	11,042 ±3,471
PLT	343,56 ±84,49
Hgb	12,315 ±1,224
Monosit	0,751 ±0,286
pCO_2	39,092 ±6,476
pO_2	40,133 ±19,443
HCO_3	21,974 ±3,734
Laktat	2,356 ±0,990

Normal dağılım göstermeyen değişkenler medyan ve çeyrekler arası aralık [IQR (25.–75. persentil)] olarak değerlendirildi. Hastaların medyan yaşı 5,00 (3,00–7,00) yıl, yatılan gün

sayısı 0,00 (0,00–0,00), glikoz düzeyi 98,00 (89,00–112,00) ve üre düzeyi 28,40 (24,30–34,90) idi. Medyan AST 28,00 (25,00–36,00), ALT 12,00 (11,00–17,00), ALP 206,00 (175,00–235,00), total bilirubin 0,210 (0,160–0,320) ve direkt bilirubin 0,100 (0,100–0,140) olarak saptandı. Total protein 68,00 (65,00–70,00), amilaz 55,00 (39,00–69,00), kalsiyum 9,300 (9,100–9,800), klor 108,00 (107,00–110,00) ve CRP 5,00 (5,00–5,00) idi. Hematolojik parametrelerden nötrofil 5,400 (3,180–7,110) ve lenfosit 4,350 (2,470–5,170) olarak bulundu. Medyan pH 7,373 (7,348–7,421) ve karboksihemoglobin (COHb) düzeyi 10,400 (2,000–21,900) idi. Hesaplanan indekslerden PNI 61,30 (53,35–68,45), COHb/laktat oranı ise 5,2353 (1,2500–6,9184) olarak saptandı. Nonparametrik değişkenlere ilişkin tanımlayıcı istatistikler Tablo 2'de verilmiştir.

Tablo 2. Hastaların Nonparametrik Değişkenlerine İlişkin Tanımlayıcı İstatistikler

Değişken	Median, IQR(25-75)
Yaş	5,00 (3,00-7,00)
Yatılan gün sayısı	0,00 (0,00-0,00)
Glikoz	98,00 (89,00-112,00)
Üre	28,40 (24,30-34,90)
AST	28,00 (25,00-36,00)
ALT	12,00 (11,00-17,00)
ALP	206,00 (175,00-235,00)
Total bilirubin	0,210 (0,160-0,320)
Direkt bilirubin	0,100 (0,100-0,140)
Total protein	68,00 (65,00-70,00)
Amilaz	55,00 (39,00-69,00)
Kalsiyum	9,300 (9,100-9,800)
Klor	108,00 (107,00-110,00)
CRP	5,00 (5,00-5,00)
Nötrofil	5,400 (3,180-7,110)
Lenfosit	4,350 (2,470-5,170)
pH	7,373 (7,348-7,421)
Karboksihemoglobin (COHb)	10,400 (2,000-21,900)
PNI	61,30 (53,35-68,45)

COHb/Laktat	5,2353 (1,2500-6,9184)

Hastaneye yatış durumu ile hemoglobin (Hgb) düzeyi arasında anlamlı ilişki saptandı (p=0,004) ve hastaneye yatırılan hastalarda Hgb düzeyinin daha yüksek olduğu görüldü. Hastaneye yatış ile pO_2 düzeyi arasında da anlamlı ilişki bulundu (p=0,026); hastaneye yatırılan hastalarda pO_2 düzeyi daha düşüktü. Benzer şekilde, laktat düzeyi hastaneye yatırılan hastalarda daha yüksek olup yatış durumu ile laktat arasında anlamlı ilişki saptandı (p=0,021).
Yoğun bakım ünitesine (YBÜ) yatış ile Hgb düzeyi arasında anlamlı ilişki saptandı (p=0,005) ve YBÜ'ye yatırılan hastalarda Hgb düzeyi daha düşüktü.
Hiperbarik oksijen tedavisi uygulanması ile Hgb düzeyi arasında anlamlı ilişki saptandı (p<0,001) ve hiperbarik oksijen tedavisi uygulanan hastalarda Hgb düzeyi daha yüksekti. Ayrıca hiperbarik oksijen tedavisi uygulanan hastalarda laktat düzeyi daha yüksek olup iki grup arasındaki fark istatistiksel olarak anlamlıydı (p=0,015).
Direkt bilirubin düzeyi ile hastaneye yatış durumu arasında anlamlı ilişki saptandı (p=0,004) ve hastaneye yatırılan hastalarda direkt bilirubin düzeyi daha yüksekti. Benzer şekilde, karboksihemoglobin (COHb) düzeyi hastaneye yatırılan hastalarda daha yüksek olup gruplar arasındaki fark anlamlıydı (p=0,004). COHb/laktat oranı açısından da hastaneye yatırılan ve yatırılmayan hastalar arasında anlamlı fark saptandı (p=0,014) ve bu oran hastaneye yatırılan hastalarda daha yüksekti.
Korelasyon analizinde, hastanede yatılan gün sayısı ile direkt bilirubin arasında pozitif yönde anlamlı korelasyon saptandı (r=0,405; p=0,010). Yatılan gün sayısı ayrıca Hgb (r=0,382; p=0,016), lenfosit (r=0,372; p=0,020), karboksihemoglobin (COHb) (r=0,414; p=0,009) ve COHb/laktat (r=0,360; p=0,024) ile pozitif yönde anlamlı korelasyon gösterdi. COHb düzeyi ile yaş (r=0,380; p=0,017), laktat (r=0,718; p<0,001) ve glikoz (r=0,334; p=0,038) arasında pozitif yönde anlamlı korelasyonlar saptandı. Buna karşılık COHb ile PLT (r=−0,320; p=0,047), pH (r=−0,448; p=0,004), pO_2 (r=−0,483; p=0,002) ve HCO_3 (r=−0,329; p=0,041) arasında negatif yönde anlamlı korelasyonlar saptandı. PNI ile kalsiyum arasında ise pozitif yönde anlamlı korelasyon bulundu (r=0,491; p=0,002). Korelasyon analizine ilişkin bulgular Tablo 3'te verilmiştir.

Tablo 3. Klinik ve Laboratuvar Parametreleri Arasındaki Anlamlı Korelasyonlar

Değişken	Değişken	r	p
Yattığı gün	Direkt bilirubin	0,405	0,01
Yattığı gün	Hgb	0,382	0,016
Yattığı gün	Lym	0,372	0,02
Yattığı gün	KarboksiHgb	0,414	0,009
Yattığı gün	KarboksiHgbLaktat	0,36	0,024
KarboksiHgb	Yaş	0,38	0,017
KarboksiHgb	Laktat	0,718	<0,001

KarboksiHgb	Glikoz	0,334	0,038
KarboksiHgb	PLT	−0,320	0,047
KarboksiHgb	pH	−0,448	0,004
KarboksiHgb	pO_2	−0,483	0,002
KarboksiHgb	HCO_3	−0,329	0,041
PNI	Kalsiyum	0,491	0,002

Hastaneye yatışı öngörmedeki performanslarını değerlendirmek amacıyla laktat, karboksihemoglobin (COHb), COHb/laktat ve PNI için ROC analizi gerçekleştirildi. Laktatın hastaneye yatışı öngörmede anlamlı ayırt edici performans gösterdiği saptandı (AUC=0,801; %95 GA: 0,641–0,961; p=0,021). Laktat için 2,45 cut-off değerinde duyarlılık %83,3, özgüllük %72,7 ve Youden indeksi 0,560 olarak bulundu.

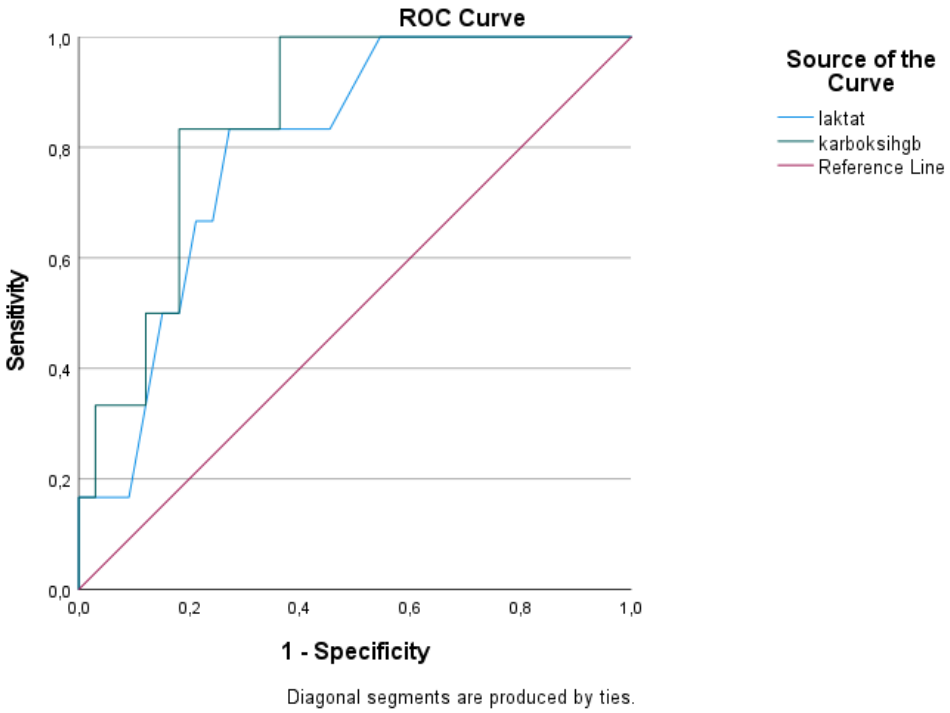
COHb, değerlendirilen parametreler arasında en yüksek AUC değerine sahipti ve hastaneye yatışı öngörmede anlamlı ayırt edici performans gösterdi (AUC=0,854; %95 GA: 0,723–0,984; p=0,006). COHb için 19,75 cut-off değerinde duyarlılık %83,3, özgüllük %81,8 ve Youden indeksi 0,651 olarak saptandı. Laktat ve COHb'ye ait ROC eğrileri Şekil 1'de gösterilmiştir.

COHb/laktat oranının da hastaneye yatışı öngörmede anlamlı ayırt edici performans gösterdiği belirlendi (AUC=0,803; %95 GA: 0,663–0,943; p=0,020). 6,1667 cut-off değerinde duyarlılık %83,3, özgüllük %72,7 ve Youden indeksi 0,560 olarak bulundu. PNI'nin ise hastaneye yatışı öngörmedeki ayırt edici performansı istatistiksel olarak anlamlı değildi (AUC=0,644; p=0,267). COHb/laktat ve PNI'ye ait ROC eğrileri Şekil 2'de gösterilmiştir. ROC analizine ilişkin tüm bulgular Tablo 4'te sunulmuştur.

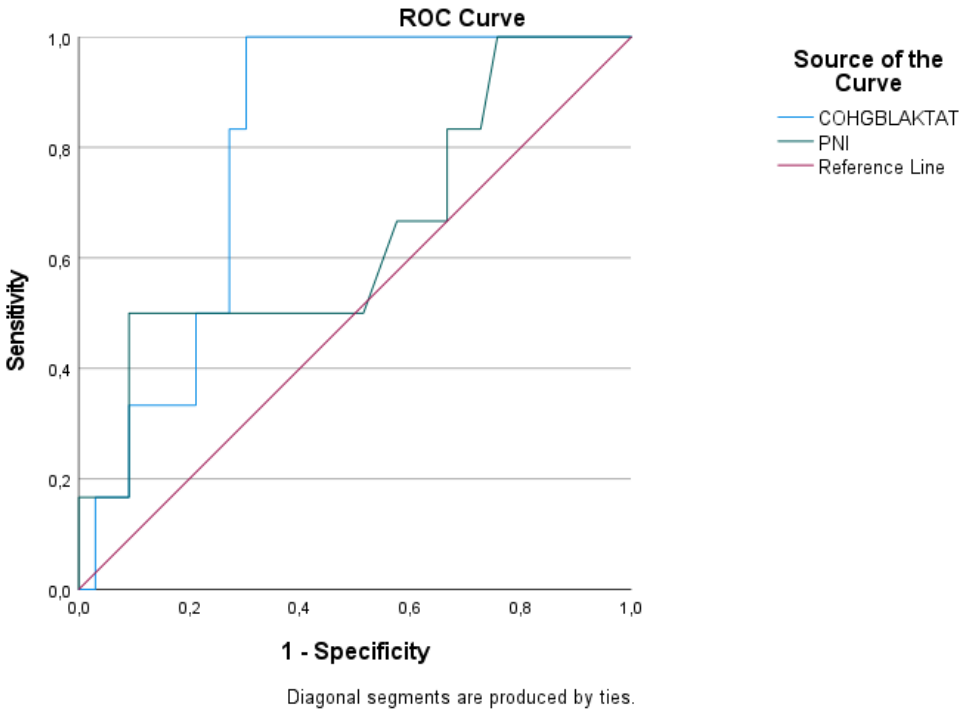
Tablo 4. Hastaneye Yatışı Öngörmede Laktat, COHb, COHb/Laktat ve PNI'nin ROC Analizi

					Asymptotic 95% Confidence Interval			
	AUC	Sensivity	Spesifity	Youden Index	Lower	Upper	Cut-Off	p Value
Laktat	0,801	0,833	0,727	0,56	0,641	0,961	2,45	0,021
COHB	0,854	0,833	0,818	0,651	0,723	0,984	19,75	0,006

COHB/Laktat	0,803	0,833	0,727	0,56	0,663	0,943	6,1667	0,02
PNI	0,644	0,5	0,909	0,409	0,684	0,904	72,9	0,267



Şekil 1. Hastaneye Yatışı Öngörmede Laktat ve Karboksihemoglobinin (COHb) ROC Eğrileri



Şekil 2. Hastaneye Yatışı Öngörmede COHb/Laktat ve PNI'nin ROC Eğrileri

DISCUSSIONS

Karbonmonoksit (CO) zehirlenmesi, özellikle çocuklarda klinik bulguların özgül olmaması ve maruziyetin çoğu zaman fark edilmeden gerçekleşebilmesi nedeniyle önemli bir acil sağlık sorunudur. Çocukların erişkinlere kıyasla daha yüksek metabolik gereksinimlere sahip olmaları ve özellikle küçük çocukların semptomlarını yeterince ifade edememeleri, CO zehirlenmesinin tanı ve şiddet değerlendirmesinde güçlük oluşturabilmektedir. Literatürde çocukların CO maruziyetine karşı daha duyarlı olabileceği ve klinik tablonun erişkinlerden farklılık gösterebileceği bildirilmiştir [1,2]. Bu nedenle pediatrik hastalarda hastaneye yatış gereksinimini erken dönemde öngörebilecek kolay uygulanabilir biyobelirteçlerin belirlenmesi klinik açıdan önem taşımaktadır.

Bu çalışmada 1 Ocak 2021–31 Aralık 2024 tarihleri arasında CO zehirlenmesi nedeniyle değerlendirilen 0–8 yaş arasındaki 39 pediatrik hasta incelenmiş ve hastaların %15,4'ünün hastaneye yatırıldığı, %10,3'ünün servise, %5,1'inin ise yoğun bakım ünitesine kabul edildiği görülmüştür. Dört hastaya (%10,3) hiperbarik oksijen tedavisi uygulanmıştır. Pediatrik CO zehirlenmesine ilişkin önceki çalışmalarda da hastaların önemli bir bölümünün hastanede takip edildiği bildirilmiş olmakla birlikte, yatış oranları maruziyetin şiddeti, başvuru özellikleri ve çalışmaya dahil edilen yaş grubuna göre değişiklik göstermektedir. Ankara'da 80 çocuk üzerinde gerçekleştirilen bir çalışmada, CO zehirlenmelerinin önemli bir bölümünün soba ve

şofben kaynaklı olduğu bildirilmiş ve pediatrik CO zehirlenmesinin özellikle ev içi maruziyetler açısından önemli bir problem olduğu vurgulanmıştır [3].

Çalışmamızın en önemli bulgularından biri, COHb düzeyinin hastaneye yatış ile anlamlı biçimde ilişkili bulunmasıdır. Hastaneye yatırılan hastalarda COHb düzeyleri daha yüksek bulunmuş ve COHb için gerçekleştirilen ROC analizinde AUC 0,854 olarak saptanmıştır. COHb için 19,75% cut-off değerinde duyarlılık %83,3 ve özgüllük %81,8 olarak bulunmuştur. Bu sonuç, COHb'nin pediatrik hastalarda yatış gereksinimini öngörmede yararlı bir biyobelirteç olabileceğini düşündürmektedir. Bununla birlikte COHb düzeyinin klinik şiddetle ilişkisinin her zaman doğrusal olmadığı bilinmektedir. COHb düzeyi, hastanın maruziyet ortamından uzaklaştırılmasından ve oksijen tedavisinin başlanmasından sonra hızla azalabildiğinden, ölçüm zamanı sonuçların yorumlanmasında kritik öneme sahiptir. CDC de COHb düzeylerinin hastalığın şiddeti ve klinik sonuçlarla her zaman iyi korelasyon göstermediğini ve klinik bulgular ile maruziyet öyküsünün birlikte değerlendirilmesi gerektiğini belirtmektedir [4].

Çalışmamızda laktat düzeyinin de hastaneye yatış ile anlamlı ilişkili olduğu görülmüştür. Hastaneye yatırılan hastalarda laktat düzeyleri daha yüksek bulunmuş ve laktat için ROC analizinde AUC 0,801 olarak hesaplanmıştır. 2,45 mmol/L cut-off değerinde duyarlılık %83,3, özgüllük ise %72,7 olarak saptanmıştır. Bu bulgu, CO zehirlenmesinde doku hipoksisinin ve hücresel düzeyde oksijen kullanım bozukluğunun göstergesi olarak laktatın klinik şiddet değerlendirmesinde kullanılabileceğini düşündürmektedir. Daha önce yapılan çalışmalarda da laktatın COHb ile ilişkili olduğu ve yüksek laktat düzeylerinin daha ağır zehirlenme ve hastane yatışı ile ilişkili olabileceği bildirilmiştir [5,6]. Doğan ve ark. tarafından gerçekleştirilen çalışmada laktat düzeyinin COHb ile güçlü pozitif korelasyon gösterdiği ve başlangıç laktat düzeyinin hiperbarik oksijen tedavisi gereksiniminin değerlendirilmesinde yardımcı olabileceği gösterilmiştir [5]. Benzer şekilde, başka bir çalışmada başlangıç laktat düzeyinin hastaneye yatışın bağımsız öngördürücüsü olduğu bildirilmiştir [6].

Çalışmamızda COHb ile laktat arasında güçlü pozitif korelasyon bulunması ($r=0,718$; $p<0,001$), bu iki biyobelirtecin CO zehirlenmesinin metabolik etkilerini farklı yönlerden yansıtabileceğini desteklemektedir. COHb, CO maruziyetinin biyokimyasal göstergesi olarak değerlendirilirken laktat doku hipoksisi ve anaerobik metabolizmadaki artışı yansıtmaktadır. Bu nedenle iki parametrenin birlikte değerlendirilmesi, yalnızca tek bir biyobelirtece göre hastanın klinik durumunun daha kapsamlı değerlendirilmesini sağlayabilir. Bununla birlikte literatürde laktatın prognostik değerine ilişkin sonuçların tamamen homojen olmadığı da belirtilmelidir. Bazı çalışmalarda laktat düzeyinin nörolojik etkilenme ve COHb ile ilişkili olduğu gösterilirken, bazı araştırmalarda özellikle hafif zehirlenmelerde laktatın klinik şiddeti ayırt etme gücünün sınırlı olduğu bildirilmiştir [7]. Bu farklılıklar hasta popülasyonlarının, maruziyet şiddetlerinin ve ölçüm zamanlarının farklı olmasından kaynaklanabilir.

COHb/laktat oranı da çalışmamızda hastaneye yatış ile anlamlı ilişki göstermiştir. Yatırılan hastalarda bu oranın daha yüksek olduğu ve ROC analizinde AUC değerinin 0,803 olduğu belirlenmiştir. 6,1667 cut-off değerinde duyarlılık %83,3 ve özgüllük %72,7 olarak bulunmuştur. COHb/laktat oranının hastaneye yatışı öngörmede anlamlı bulunması, CO

maruziyetinin biyokimyasal yükü ile buna eşlik eden metabolik yanıtın birlikte değerlendirilmesinin yararlı olabileceğini düşündürmektedir. Bununla birlikte bu oran için literatürde standartlaşmış bir eşik değerin bulunmaması nedeniyle mevcut bulgunun daha geniş pediatrik serilerde doğrulanması gerekmektedir.

Çalışmamızda COHb düzeyi ile kan gazı parametreleri arasında da anlamlı ilişkiler saptanmıştır. COHb ile pH, pO_2 ve HCO_3 arasında negatif korelasyon bulunması, CO maruziyetinin artmasıyla birlikte metabolik ve oksijenlenme ile ilişkili bozuklukların belirginleşebileceğini düşündürmektedir. Güncel çalışmalar da özellikle laktat, pH ve bikarbonat gibi kan gazı parametrelerinin CO zehirlenmesinin şiddetini değerlendirmede COHb'ye ek bilgi sağlayabileceğini göstermektedir [8]. Bu durum, CO zehirlenmesinde yalnızca COHb değerine dayalı bir risk sınıflamasının yetersiz kalabileceğini ve klinik bulgular ile metabolik parametrelerin birlikte değerlendirilmesinin daha uygun olduğunu desteklemektedir.

Hemoglobin düzeyi ile hastaneye yatış arasında da istatistiksel olarak anlamlı ilişki saptanmıştır. Hastaneye yatırılan hastalarda Hgb düzeyinin daha yüksek olduğu görülürken, YBÜ'ye yatırılan hastalarda Hgb düzeyinin daha düşük olduğu bulunmuştur. Ancak YBÜ grubunda yalnızca iki hastanın bulunması nedeniyle bu bulgunun klinik olarak genellenmesi mümkün değildir. Bu sonuç, özellikle küçük örneklemli çalışmalarda istatistiksel anlamlılığın klinik anlamlılıkla aynı olmayabileceğini göstermesi açısından önemlidir. Dolayısıyla Hgb ile YBÜ yatışı arasındaki ilişkinin daha geniş hasta gruplarında araştırılması gerekmektedir.

Hiperbarik oksijen tedavisi uygulanan hastalarda Hgb ve laktat düzeylerinin anlamlı şekilde farklı olması da dikkat çekicidir. Hiperbarik oksijen tedavisi uygulanan hastalarda Hgb düzeyi daha yüksek ve laktat düzeyi daha yüksek bulunmuştur. Çalışmamızdaki HBO uygulanan hasta sayısının yalnızca dört olması nedeniyle bu bulgular tedavi endikasyonlarının belirlenmesinde tek başına kullanılmamalıdır. Güncel klinik yaklaşımlarda HBO kararı yalnızca COHb düzeyine göre değil; nörolojik bulgular, bilinç kaybı, ciddi asidoz, kardiyak etkilenme ve hastanın genel klinik durumu gibi birçok faktör birlikte değerlendirilerek verilmektedir [4]. Pediatrik hastalarda HBO kullanımına ilişkin kanıtların erişkinlere göre daha sınırlı olması da karar verme sürecinin klinik değerlendirmeye dayanmasını gerektirmektedir [1,2].

Çalışmamızda hastanede yatış süresi ile direkt bilirubin, Hgb, lenfosit, COHb ve COHb/laktat arasında pozitif korelasyon bulunmuştur. Özellikle COHb ile yatış süresi arasındaki pozitif korelasyon ($r=0,414$; $p=0,009$), daha yüksek CO maruziyetinin daha uzun hastane izlemiyle ilişkili olabileceğini düşündürmektedir. Bununla birlikte çalışmadaki hastaların medyan yatış süresinin 0 gün olması, yatırılan ve yatırılmayan hastaların aynı değişken üzerinden değerlendirilmesi ve toplam yatış sayısının düşük olması nedeniyle bu sonuçların dikkatle yorumlanması gerekmektedir.

Çalışmamızda değerlendirilen bir diğer parametre PNI'dir. PNI esas olarak beslenme ve immünolojik durumun değerlendirilmesinde kullanılan bir indeks olduğundan, kısa süreli akut toksik maruziyetlerde klinik sonlanımı belirleme gücünün sınırlı olması beklenebilir. Bununla

birlikte PNI'nin CO zehirlenmesindeki prognostik rolüne ilişkin verilerin sınırlı olması nedeniyle farklı pediatrik popülasyonlarda ileri çalışmalar yapılması yararlı olacaktır.

Çalışmamızın bazı önemli kısıtlılıkları bulunmaktadır. Öncelikle retrospektif ve tek merkezli tasarım nedeniyle seçim ve bilgi yanlılığı ortaya çıkmış olabilir. İkinci olarak toplam örneklem büyüklüğünün 39 hasta ile sınırlı olması, özellikle YBÜ yatışı ve HBO tedavisi gibi alt gruplarda istatistiksel gücü azaltmaktadır. Çalışmada YBÜ'ye yalnızca iki hastanın yatırılmış olması, bu gruba ilişkin sonuçların genellenebilirliğini ciddi ölçüde sınırlandırmaktadır. Ayrıca çalışma yalnızca 0–8 yaş grubunu kapsadığından elde edilen sonuçların daha büyük çocuklara ve ergenlere doğrudan genellenmesi mümkün değildir. Çalışmanın retrospektif olması nedeniyle semptomların ayrıntısı, maruziyet süresi, maruziyet yoğunluğu ve tedavi öncesi laboratuvar örnekleme zamanı gibi bazı değişkenlerin standartlaştırılması mümkün olmayabilir. Benzer şekilde COHb düzeyinin maruziyetten sonra hızla azalabilmesi, tek bir başvuru ölçümünün gerçek maruziyet şiddetini tam olarak yansıtmasını engelleyebilir [4].

Sonuç:

Bu çalışma, pediatrik CO zehirlenmesinde özellikle COHb ve laktat düzeylerinin hastaneye yatış gereksiniminin değerlendirilmesinde kullanılabilecek potansiyel biyobelirteçler olduğunu göstermektedir. COHb çalışmamızda en yüksek ayırt edici performansı göstermiş (AUC=0,854), bunu COHb/laktat oranı (AUC=0,803) ve laktat (AUC=0,801) izlemiştir. PNI'nin ise hastaneye yatışı öngörmedeki performansı anlamlı bulunmamıştır. Bununla birlikte hiçbir biyobelirtecin tek başına klinik değerlendirme yerine geçmesi beklenmemelidir. Özellikle pediatrik hastalarda yaş, semptomlar, nörolojik bulgular, maruziyet öyküsü, kan gazı parametreleri ve COHb düzeyi birlikte değerlendirilmelidir. Gelecekte daha büyük örneklemli, çok merkezli ve prospektif çalışmalarla bu bulguların doğrulanması ve pediatrik CO zehirlenmesinde hastane yatışını öngören daha güvenilir bir risk sınıflama modelinin geliştirilmesi gerekmektedir.

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M4466-Tam Metin

SLEEP PHYSİOLOGY İN THE PEDİATRİC AGE GROUP: HOMEOSTATİC REGULATORY MECHANİSMS AND THEİR EFFECTS ON CHİLD HEALTH

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ABSTRACT

Introduction

Sleep is a physiological process that plays a fundamental role in growth, neurodevelopment, metabolic homeostasis, and the regulation of the immune system. Sleep requirements are greater during childhood than in adulthood, and age-related changes in sleep duration and architecture are closely associated with the stages of growth and development.

Main Body

Sleep is regulated through the interaction between the circadian rhythm and homeostatic sleep pressure. The suprachiasmatic nucleus, melatonin, adenosine, and various neuroendocrine mechanisms are involved in this process. In particular, increased growth hormone secretion, enhanced protein synthesis, and accelerated tissue repair during non-rapid eye movement (NREM) sleep are important for growth during childhood. Sleep also performs critical

physiological functions in synaptic plasticity, learning, memory consolidation, the clearance of metabolic waste through the glymphatic system, and the regulation of immune responses.

Insufficient or poor-quality sleep is associated with reduced neurocognitive performance, behavioral problems, impaired metabolic homeostasis, increased inflammatory responses, and a higher risk of cardiometabolic disease.

Conclusion

This review summarizes the fundamental regulatory mechanisms of sleep physiology in the pediatric age group, the physiological effects of sleep on growth and development, the principal causes of sleep disorders, and the consequences of sleep deprivation for child health in light of the current literature.

Keywords: Child, sleep physiology, circadian rhythm, homeostatic sleep pressure, sleep deprivation, neurodevelopment.

Introduction

Sleep is an active physiological process regulated by the central nervous system. It plays a fundamental role in maintaining organismal homeostasis. Sleep is essential for growth, neurodevelopment, energy metabolism, endocrine balance, and the maintenance of immune function (1,2).

Sleep requirements are greater in the pediatric population than in adults. Sleep duration and sleep architecture undergo physiological changes with age. These changes are closely associated with the maturation of the central nervous system and other organ systems (1,3).

During sleep, numerous neuroendocrine, metabolic, and immune mechanisms are regulated simultaneously. Hormone secretion, synaptic plasticity, metabolic homeostasis, immune responses, and cellular repair processes remain active throughout sleep (4). Therefore, adequate and high-quality sleep is essential for normal growth and healthy development (3).

Recent studies have shown that disturbances in sleep duration and quality may adversely affect growth, cognitive functions, metabolic homeostasis, and immune function in children (2,5).

Regulation of Sleep Physiology

Sleep physiology is regulated through the interaction between the circadian rhythm and homeostatic sleep pressure. These two fundamental mechanisms determine sleep timing, duration, and the physiological distribution of sleep stages (6,7).

Circadian rhythm is regulated by the suprachiasmatic nucleus located in the hypothalamus. Light signals from the retina are transmitted to the suprachiasmatic nucleus, thereby synchronizing the biological clock with the environmental light–dark cycle (8). Melatonin

secretion from the pineal gland increases in darkness, whereas light suppresses melatonin synthesis. Melatonin is one of the principal neurohormonal regulators that facilitates sleep onset (9).

Homeostatic sleep pressure gradually increases throughout the period of wakefulness. During this process, rising adenosine levels increase the drive to sleep. During sleep, adenosine levels decline, and homeostatic balance is restored (10).

Sleep consists of two principal stages: rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep (11). NREM sleep comprises the N1, N2, and N3 stages. The N3 stage, in particular, is defined as deep sleep and is considered the period during which growth hormone secretion is most pronounced (11,12). During this stage, protein synthesis increases, tissue repair is promoted, and energy expenditure decreases (13).

During REM sleep, cerebral metabolic activity increases, whereas skeletal muscle tone decreases markedly (11). This stage plays an important role in learning, memory consolidation, and the regulation of synaptic plasticity (14). The greater proportion of REM sleep in children compared with adults is physiologically important for central nervous system development and the maturation of neuronal connections (15).

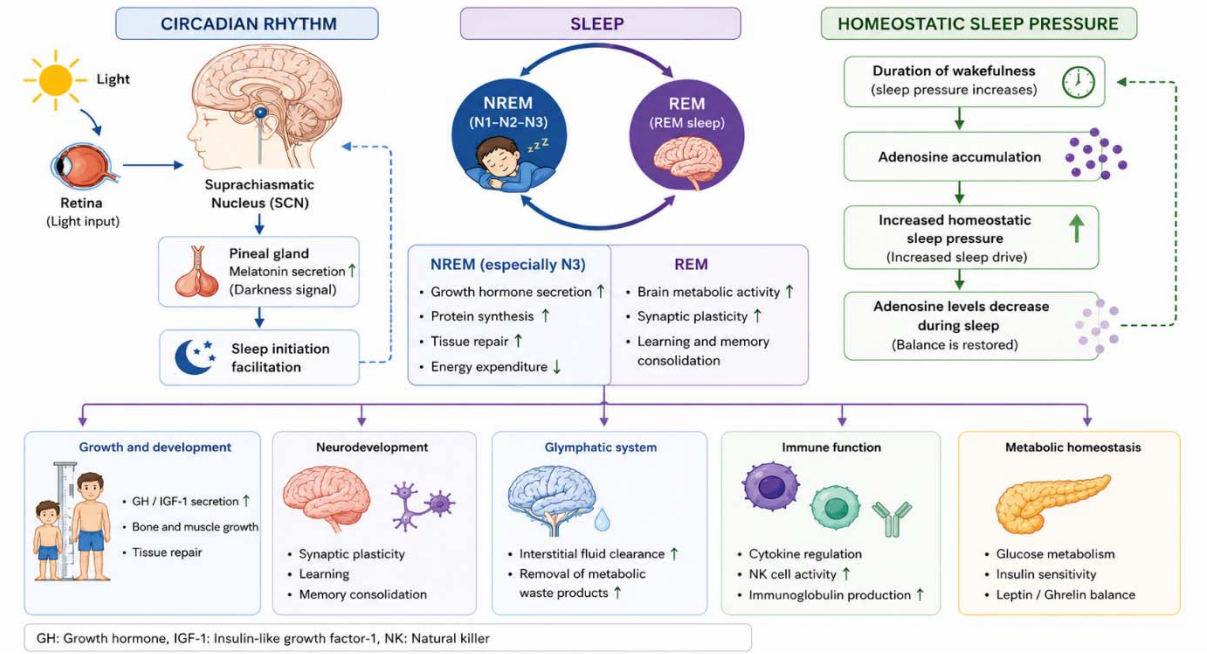


Figure 1. Regulation of sleep physiology in the pediatric age group, the REM–NREM sleep cycle, and the principal physiological effects of sleep.

Physiological Effects of Sleep

Sleep plays an important physiological role in the regulation of growth and development during childhood. Growth hormone secretion increases particularly during deep NREM sleep. Growth hormone stimulates the synthesis of insulin-like growth factor 1 (IGF-1), thereby supporting

the growth of bone, muscle, and other tissues (12,13). During the same period, protein synthesis is enhanced and tissue repair is promoted (13).

Sleep is essential for the structural and functional maturation of the central nervous system. During REM sleep, neuronal activity increases, synaptic plasticity is supported, and memory consolidation occurs. Sleep plays an important role in the transfer of information acquired during the day into long-term memory (14,15).

Glymphatic system activity increases during sleep. Interstitial fluid flow is enhanced, facilitating the clearance of metabolic waste products accumulated in the brain tissue. This mechanism contributes to the maintenance of neuronal homeostasis and the preservation of brain function (16).

Sleep also plays an important role in regulating immune system functions. During sleep, cytokine production is modulated, natural killer (NK) cell activity is supported, and the adaptive immune response is enhanced. Adequate sleep improves the effectiveness of the immune response against infections (2).

Sleep is also an important regulator of metabolic homeostasis. Adequate sleep contributes to the maintenance of glucose metabolism and insulin sensitivity. It also supports appetite regulation and energy balance by modulating leptin and ghrelin levels (17).

Principal Causes of Sleep Disorders in the Pediatric Age Group

Sleep disorders in children may develop as a result of interactions among biological, environmental, and behavioral factors (3,5). Age-inappropriate sleep duration, irregular sleep schedules, and poor sleep hygiene are among the most common contributing factors (3).

The use of electronic devices, particularly during the evening hours, may suppress melatonin secretion by increasing exposure to blue light. This may disrupt the circadian rhythm and prolong sleep-onset latency (18).

Obstructive sleep apnea, adenotonsillar hypertrophy, allergic airway diseases, and other respiratory disorders may adversely affect sleep quality during childhood (19). Neurodevelopmental disorders, chronic diseases, and certain medications may also lead to disturbances in sleep patterns (20).

Family life, school schedules, stress, and psychosocial factors are also important environmental determinants of sleep duration and sleep quality in children (3,5). The persistence of these factors may predispose children to disrupted sleep physiology and the development of associated physiological alterations (5).

Pathophysiological Effects of Sleep Deprivation

Insufficient or poor-quality sleep disrupts numerous physiological mechanisms. These effects may be particularly pronounced during childhood, a period characterized by rapid growth and development (5).

Sleep deprivation may adversely affect insulin-like growth factor 1 (IGF-1) synthesis by reducing growth hormone secretion. Consequently, protein synthesis may slow, tissue repair may decrease, and normal growth may be adversely affected (21).

Insufficient sleep also impairs synaptic plasticity and memory consolidation. The transfer of newly acquired information into long-term memory becomes more difficult, while attention and cognitive performance decline (5,14). Reduced glymphatic system activity may adversely affect neuronal homeostasis by limiting the clearance of metabolic waste products from brain tissue (16).

Reduced sleep duration also affects immune system function. While the production of proinflammatory cytokines increases, the effectiveness of the immune response decreases. These alterations may increase susceptibility to infections (2).

Sleep deprivation also contributes to the disruption of metabolic homeostasis. Insulin sensitivity decreases, leptin levels decline, and ghrelin levels increase. These hormonal alterations are associated with increased appetite, impaired energy balance, and a higher risk of obesity (17).

Prolonged sleep deprivation may activate the hypothalamic–pituitary–adrenal axis and increase cortisol levels. Elevated cortisol levels may adversely affect the regulation of metabolic and immune responses (2).

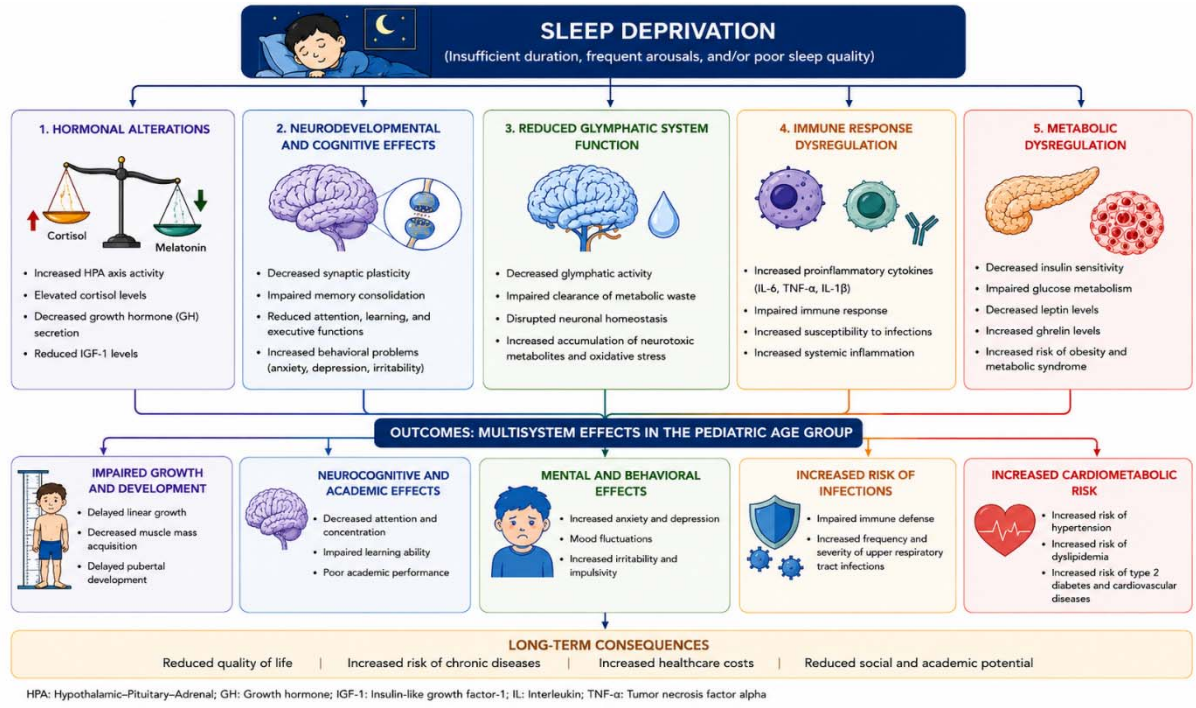


Figure 2. Pathophysiological effects of sleep deprivation in the pediatric age group.

Conclusion

During childhood, sleep is a dynamic physiological process that adapts to the growth and developmental needs of the organism. The circadian system, homeostatic sleep pressure, and sleep stages function in a coordinated manner. This coordination contributes to the regulation of hormonal secretion, energy balance, synaptic plasticity, immune responses, and cellular renewal.

Disruptions in sleep duration or quality may adversely affect the growth hormone–IGF-1 axis, glucose metabolism, appetite-regulating hormones, glymphatic clearance, and memory consolidation. If these alterations persist, they may predispose children to impaired physical growth, reduced cognitive performance, increased metabolic risk, and weakened immune responses.

Therefore, sleep should be regarded as one of the fundamental physiological indicators in the assessment of child health. Age-appropriate sleep duration should be supported, regular sleep schedules should be established, and exposure to light-emitting electronic devices during the evening should be reduced. Symptoms such as snoring, pauses in breathing during sleep, frequent awakenings, daytime sleepiness, and reduced attention should be evaluated at an early stage. Early recognition and appropriate management of sleep disorders are important for preserving physiological development and reducing long-term health risks.

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M4492-Tam Metin

PEDİATRİK ACİL SERVİSTE KAFA TRAVMASI SONRASI TRANSFONTANEL ULTRASONOGRAFİ KULLANIMININ DEĞERLENDİRİLMESİ

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Özet:

Giriş ve Amaç: Kafa travması, çocuk acil servis başvuruları arasında hızlı karar almayı gerektiren yaygın ve kritik bir durumdur. Bilgisayarlı tomografi (BT) tanıda altın standart olmaya devam etse de iyonlaştırıcı radyasyon maruziyeti çocuk hastalarda önemli bir endişe

kaynağıdır. Bu sunumun amacı, acil tanı sürecinde fontaneli açık bebeklerde kafa travması sonrası uygulanan hasta başı (POCUS) transfontanel ultrasonografinin (USG) rolünü, avantajlarını ve klinik sınırlılıklarını değerlendirmektir.

Klinik Yaklaşım: Transfontanel USG; intrakraniyal kanamaların (epidural, subdural, intraventriküler) ve hidrosefali gelişiminin saptanmasında radyasyonsuz, hızlı ve tekrarlanabilir bir görüntüleme seçeneği sunar. Acil tıp ve pediatri uzmanlarınca yapılan ilk değerlendirmede kanama bulgularının hasta başında belirlenmesi; hastanın gözlemi, yatışı ya da BT çekilme gerekliliği konusunda hızlı karar verilmesini kolaylaştırır. Klinik şüphe bulunan olgularda USG, radyasyon içeren görüntülemelere geçilmeden önce değerli bir triyaj aracı olarak hizmet eder.

Sonuç: Transfontanel USG, kafa travması geçiren bebeklerde BT ihtiyacını bütünüyle ortadan kaldırmasa da acil serviste güvenilir ve dinamik bir ilk basamak değerlendirme aracıdır. Bu yöntemin POCUS uygulamaları kapsamında yaygınlaşması, gereksiz radyasyon maruziyetini azaltacak ve erken dönem hasta güvenliğini artıracaktır.

Anahtar Kelimeler: Çocuk Acil, Kafa Travması, Transfontanel Ultrasonografi, Radyasyondan Korunma, POCUS

Giriş

Pediatrik kafa travmaları, acil servis başvurularının önemli bir bölümünü oluşturmaktadır. Hayatı tehdit eden intrakraniyal yaralanmaların tespitinde hızlı ve doğru değerlendirme kritik bir öneme sahiptir. Travmatik beyin hasarının teşhisinde kontrastsız bilgisayarlı tomografi (BT) altın standart olmaya devam etse de, pediatrik popülasyonda kullanımı, öncelikle iyonizan radyasyon maruziyeti ve sıklıkla sedasyon gereksinimi gibi önemli dezavantajlar barındırır. Bu nedenle, Yatak Başı Ultrasonografi (POCUS) pediatrik acil tıp pratiğine giderek daha fazla entegre olmaktadır. Ön fontaneli açık olan infantlarda transfontanel ultrasonografi, intrakraniyal yapıları doğrudan yatak başında değerlendirmek için hızlı, non-invaziv ve radyasyonsuz bir görüntüleme imkanı sunar.

Uygulama Tekniği ve Standart Görüntüleme Planları

Genellikle 9 aylık olana kadar açık kalan ön fontanel, nörosonografi için mükemmel bir akustik pencere görevi görür. İşlem sırasında infant sırtüstü yatar pozisyonda, ebeveyn kucağında veya sedyede sakinleştirilmiş halde olmalıdır. Ön fontanele bol miktarda (tercihen ısıtılmış) ultrason jeli uygulanır. Derin yapıları değerlendirmek için mikro-konveks veya fazlı aralıklı (phased array) problar tercih edilirken, yüzeyel ekstra-aksiyel alanları ve subdural/epidural koleksiyonları daha net dışlamak için yüksek frekanslı lineer prob ile de tarama yapılmalıdır.

Standart bir acil servis değerlendirmesi iki temel düzlemde gerçekleştirilir:

Koronal Plan: Probun yön işareti (marker) hastanın sağına bakacak şekilde ön fontanele yerleştirilir. Prob anterior'dan (frontal loblar) posterior'a (oksipital loblar) doğru yavaşça açılandırılarak süpürme (sweep) hareketi yapılır. Bu düzlemde falks serebri (orta hat), lateral

ventriküller ve bazal gangliyonlar değerlendirilir. Travma hastasında özellikle ekojeniği artmış kitle imajı (kanama), orta hat şifti ve ventrikül asimetrisi aranır.

Sagittal ve Parasagittal Plan: Prob 90 derece döndürülerek yön işareti hastanın yüzüne (anteriora) bakacak şekilde konumlandırılır. Tam orta hatta korpus kallozum, üçüncü ventrikül ve serebellar vermis izlenir. Daha sonra prob sağa ve sola doğru açılandırılarak parasagittal kesitler elde edilir; burada lateral ventriküllerin tamamı, koroid pleksus ve periventriküler alanlar incelenerek olası intraventriküler kanama veya hidrosefali bulguları taranır.

Klinik Entegrasyon ve Triyaj

Transfontanel POCUS'un ilk travma değerlendirmesine dahil edilmesi, hem acil tıp hem de çocuk hastalıkları uzmanları için anında ve eyleme dönüştürülebilir veriler sağlar. Ciddi bir yaralanma mekanizması veya bilinç değişikliği ile başvuran bir infantta, yatak başı ultrasonografi belirgin bir intrakraniyal kanamayı hızla doğrulayarak; henüz BT çekimi dahi tamamlanmadan nöroşirürji konsültasyonunu, müdahaleyi veya sevk sürecini hızlandırabilir. Orta riskli hastalarda ise normal transfontanel ultrason bulguları, sıkı bir klinik gözlemle birleştirildiğinde, BT görüntülemesini güvenle erteleme veya iptal etme yönündeki klinik kararı destekleyebilir.

Kısıtlılıklar

Güçlü faydalarına rağmen, transfontanel ultrasonografinin acil serviste belirgin kısıtlılıkları da mevcuttur. Bu yöntem uygulayıcıya bağımlıdır ve kısıtlı bir görüş alanı sunar; serebral hemisferlerin periferik konveksiteleri ve arka çukur (posterior fossa) zayıf bir şekilde görüntülenir. Ayrıca, lineer kafatası kırıklarını veya küçük, periferik parankimal kontüzyonları güvenilir bir şekilde tespit edemez. Bu nedenle, negatif bir ultrason bulgusu intrakraniyal yaralanmayı kesin olarak dışlamaz ve her zaman doğrulanmış klinik karar kuralları (örneğin PECARN kriterleri) ile birlikte yorumlanmalıdır.

Sonuç

Transfontanel ultrasonografi, infant kafa travmalarının yönetiminde pediatrik acil servis için son derece değerli ve dinamik bir yardımcı tanı aracıdır. İyonizan radyasyon riski olmadan anında anatomik veriler sağlayarak, klinisyenin travma hastalarını etkili bir şekilde triyaj etme yeteneğini artırır. Yüksek klinik şüphe taşıyan vakalarda bilgisayarlı tomografinin yerini tam olarak almasa da, ilk basamak POCUS uygulaması olarak yaygınlaşması, erken dönem hasta güvenliğini artırmakta ve acil servis kaynaklarının optimizasyonunu sağlamaktadır.

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M4498-Tam Metin

ÇOCUK ACİL SERVİSİNDE YENİDOĞAN SARILIĞINA YAKLAŞIM

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Arka Plan / Amaç: Yenidoğan sarılığı, yaşamın ilk 28 gününde çocuk acil servis başvurularının sık görülen bir nedenidir. Acil servisteki birincil amaç; güvenli taburculuğu sağlarken nörotoksisite riskini hızla değerlendirmek ve gereksiz hastane yatışlarını önlemektir.

Yöntemler / Klinik Yaklaşım: Acil servis yaklaşımı; prematürite (<38 hafta), izoimmün hemolitik hastalık ve sepsis şüphesi gibi nörotoksisite risk faktörlerinin belirlenmesine dayanır. Görsel değerlendirme güvenilir olmadığından, ilk triyajda Transkütan Bilirubin (TcB) ölçümü önerilir. TcB düzeyi >15 mg/dL olduğunda, fototerapi eşik değerinin 3 mg/dL yakınında seyrettiğinde veya sarılık ilk 24 saat içinde ortaya çıktığında Total Serum Bilirubini (TSB) ile doğrulama yapılması zorunludur.

Yönetim: Fototerapi ve kan değişimi (exchange transfüzyon) tedavi kararları, bebeğin gebelik haftasına ve risk profiline göre uyarlanmış, postnatal saate özgü nomogramlar kullanılarak verilir. Uzamış sarılık (>14 gün) durumunda, biliyer atrezi gibi kolestatik acilleri dışlamak adına fraksiyone bilirubin düzeyleri mutlaka değerlendirilmelidir.

Sonuç: Yenidoğan sarılığının acil servisteki etkin yönetimi; hassas postnatal saat hesabı, doğru risk sınıflandırması ve rasyonel TcB kullanımını gerektirir. Güvenli taburculuk; ebeveynlere

tehlike işaretlerinin anlatılması ve 24 ila 48 saat içinde sıkı poliklinik takibini kapsayan sağlam bir güvenlik ağı sağlamayı gerektirir.

Anahtar Kelimeler: Yenidoğan sarılığı, çocuk acil, nörotoksisite, transkütan bilirubin, fototerapi.

Giriş

Yenidoğan sarılığı, acil servise yaşamın ilk 28 günündeki başvuruların en sık nedenlerinden biridir. Acil servis dinamiklerinde temel amaç, hızlı risk değerlendirmesi yaparak nörotoksisite riski taşıyan bebeği saptamak ve gereksiz yatışları önleyerek güvenli taburculuğu sağlamaktır. Güncel literatürde de vurgulandığı üzere [1], fizyolojik ve patolojik sarılık ayrımının hızlı ve doğru bir triyajla yapılması kritik öneme sahiptir. Bebekler acil servise genellikle yaşamın ilk haftasında ailelerin endişesiyle getirilir. Acil servis pratiğindeki temel zorluk, kısıtlı zaman dilimi içerisinde yalnızca anne sütü sarılığı olan bebeklerle acil müdahale gerektiren patolojik bir süreci olan bebekleri ayırt etmektir.

Acil Serviste Risk Sınıflandırması ve Nörotoksisite

Acil serviste risk sınıflandırması yapılırken temel alınması gereken yaklaşım, güncel hiperbilirubinemi kılavuzlarında net bir şekilde çerçevelenmiştir [2]. Bu kılavuzlara göre, acil servise başvuran her bebekte kernikterus ve nörotoksisite risk faktörleri eksiksiz sorgulanmalıdır. Başlıca risk faktörleri şunlardır:

Gestasyonel haftanın 38'in altında olması (özellikle 35-37 hafta arası geç pretermler)

İzoimmün hemolitik hastalık şüphesi (Rh veya ABO uygunsuzluğu)

Sepsis şüphesi veya klinik instabilite

Belirgin letarji

Asfiksi öyküsü veya belirgin albümin düşüklüğü

Bu risk faktörlerinden herhangi birinin varlığı, hastanın fototerapi ve kan değişimi eşiklerini doğrudan aşağıya çekmektedir.

Klinik Değerlendirme ve Tanısal Araçlar

Fizik muayenede yaygın olarak kullanılan Kramer kuralı, acil servisin yapay ve yetersiz ışıklandırmasında, özellikle de farklı cilt tonlarına sahip bebeklerde yanıltıcı olabilmektedir. Gözle değerlendirme ile serum bilirubin seviyesini tahmin etmek klinik açıdan güvenilir değildir.

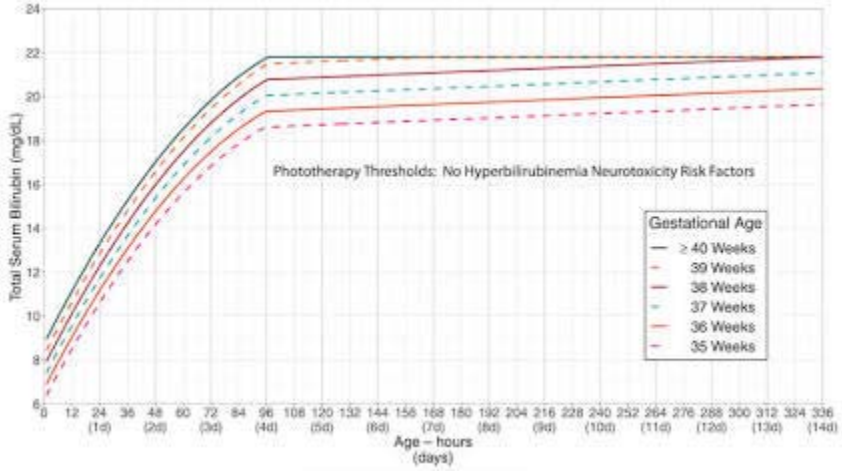
Bu bağlamda yayımlanan kapsamlı meta-analizler [3], Transkütan Bilirubin (TcB) ölçümünün triyajdaki yüksek tanısal gücünü ortaya koymaktadır. TcB, gereksiz topuk kanı alımını ve acil servis kalabalığını azaltan etkili bir tarama aracıdır. Ancak aşağıdaki durumlarda mutlaka Total Serum Bilirubin (TSB) ölçümü ile doğrulama yapılmalıdır:
TcB değerinin fototerapi sınırının 3 mg/dL veya daha yakınına gelmesi,
TcB değerinin 15 mg/dL'nin üzerinde olması,
Sarılığın yaşamın ilk 24 saatinde saptanması.

Kan grubu, direkt Coombs ve retikülosit sayımı ise hemoliz şüphesi olan veya ölçümleri doğrudan fototerapi sınırında saptanan hastalarda acil servis tetkik panelinin standart bir parçası olmalıdır.

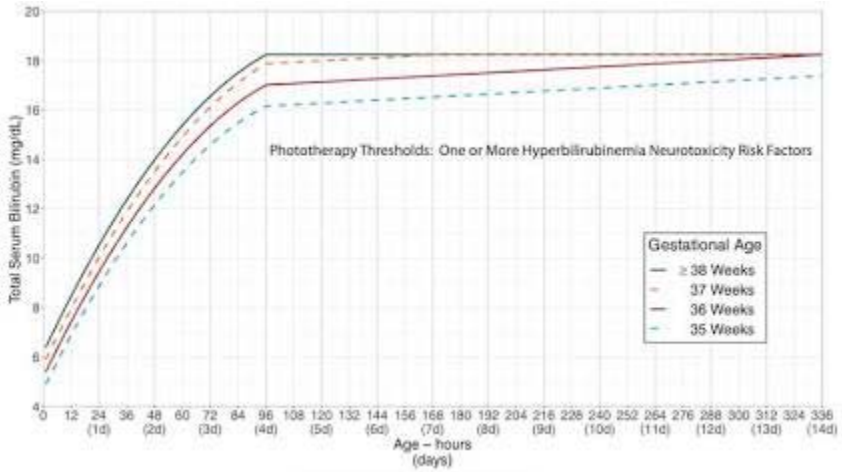
Tedavi Kararı

Tedavi kararlarında geleneksel eğriler yerini kanıta dayalı yeni yaklaşımlara bırakmıştır. Güncel teknik raporlarda detaylandırıldığı üzere [4], fototerapi ve kan değişimi (exchange transfüzyon) eşikleri güvenli bir sınır dahilinde yeniden düzenlenmiştir.

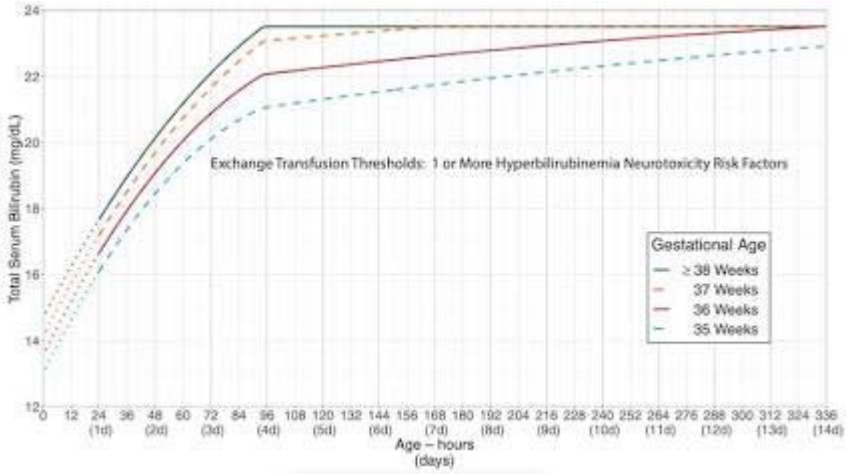
Acil servis pratiğinde nomogram kullanılırken dikkat edilmesi gereken en önemli husus, bebeğin tam postnatal saatinin (gün olarak değil, ardışık saat olarak) hesaplanması ve nörotoksisite risk faktörlerinin varlığının sisteme doğru entegre edilmesidir. Nörotoksisite risk faktörü taşımayan bebekler için fototerapi eşik değerleri gebelik haftasına göre aşağıdaki şekilde belirlenmiştir:



Risk faktörlerinin (izoimmün hemolitik hastalık, asfiksi, letarji, sepsis şüphesi vb.) varlığı ise acil servisteki tedavi kararını dramatik şekilde değiştirir ve fototerapiye başlama eşiklerini belirgin ölçüde aşağı çeker:



Yenidoğanlarda sabit bir toksik bilirubin değeri bulunmadığından, tedavi planı hastanın risk grubuna ve postnatal saatine özel hesaplanan eşik değerlere olan uzaklığa göre belirlenir. İleri düzey hiperbilirubinemilerde ve kan değişimi (exchange transfüzyon) kararlarında da yine benzer saat-spesifik grafikler kullanılmaktadır:



Tedavi eşiğine yaklaşan veya eşiği geçen bebeklerde sadece ciddi dehidratasyon varlığında intravenöz hidrasyon sağlanması, hızlıca yoğun fototerapinin başlanması ve ensefalopati tehlikesi varsa kan değişimi hazırlıkları için yenidoğan yoğun bakım ile acil konsültasyon sağlanması, "bakımın tırmandırılması" stratejisinin temelini oluşturur.

Uzamış Sarılık ve Kolestaz

Acil servise başvuran ve sarılığı 14 günden (preterm bebeklerde 21 günden) uzun süren hastalarda klinik yaklaşım tamamen farklıdır. Literatürde sıklıkla altı çizildiği gibi [5], uzamış sarılıkta ilk adım her zaman fraksiyone bilirubin (direkt ve indirekt) düzeylerinin laboratuvar ortamında değerlendirilmesidir.

Direkt bilirubin yüksekliği (kolestaz) saptanması, acil bir ayırıcı tanı sürecini zorunlu kılar. Biliyer atrezi, yenidoğan hepatiti veya erken başlangıçlı sepsis/TORCH enfeksiyonları ekarte edilmelidir. Bu hastalar acil servisten basit bir poliklinik önerisiyle taburcu edilmemeli; ilgili çocuk gastroenteroloji veya çocuk cerrahisi birimleriyle ivedilikle temasa geçilmelidir.

Taburculuk, Takip ve Güvenlik Ağı

Acil serviste yatan hastayı değerlendirmek kadar, doğru hastayı güvenle taburcu etmek de kritik bir tıbbi süreçtir. Yakın tarihli geniş çaplı epidemiyolojik çalışmalar [6], kılavuzların adaptasyonu sonrası acil servislerden gereksiz yatışların azaldığını, ancak "rebound" sarılık riski açısından taburculuk sonrası takibin öneminin arttığını göstermektedir.

Bebek fototerapi sınırının altındaysa ve oral alımı yeterliyse taburcu edilebilir. Ancak taburculuk aşamasında aileye "güvenlik ağı" kapsamında şu durumlarda acil servise acilen geri dönmeleri gerektiği mutlaka bildirilmelidir:

Bebekte emme güçlüğü veya uyanamama hali,

Tiz sesle ağlama,

Sarılığın bacaklara ve ayak tabanlarına doğru ilerlemesi.

Ayrıca, taburcu edilen bebeğin nomogramdaki risk bölgesine göre 24 ile 48 saat içinde mutlaka pediatri polikliniği kontrolüne gitmesi gerektiği epikrize işlenmeli ve aileye açıkça açıklanmalıdır.

Sonuç

Çocuk acil servisinde yenidoğan sarılığı yönetimi; postnatal saatin doğru belirlenmesi, risk faktörlerinin eksiksiz sorgulanması, TcB'nin rasyonel kullanımı ve güncel nomogramlara sadık kalınarak yürütülen dinamik bir süreçtir. Kanıta dayalı bu adımlarla bebekler kernikterus tehlikesinden korunurken, acil servis kaynakları da en verimli şekilde kullanılmış olur.

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M4469-Özet Metin

PEDIATRIC TRAUMA SCORING SYSTEMS IN THE EMERGENCY DEPARTMENT: AN EVALUATION OF CURRENT EVIDENCE FROM A CLINICAL-USE PERSPECTIVE

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Objective: Age-related physiological differences in pediatric trauma limit the direct use of scores developed for adults. This review aimed to compare the levels of evidence and the practical applicability in the emergency department of the major pediatric trauma scoring systems.

Methods: PubMed and PubMed Central databases were searched for studies published from inception to July 27, 2026. Development and validation studies, comparative cohorts, and systematic reviews related to PTS, SIPA, BIG, RTS, the ISS/NISS and TRISS families, GAP/MGAP, and rSIG were narratively evaluated in terms of target outcome, data requirements, calculation time, discriminative ability, and clinical applicability.

Results: No single superior score was found to meet all clinical purposes. PTS is a pediatric-specific tool that requires no laboratory testing, but its sensitivity is variable. SIPA provides rapid hemodynamic screening; however, a normal result does not exclude major trauma. BIG shows strong results for predicting mortality but requires blood gas analysis and INR. The ISS/NISS and TRISS families can offer high prognostic performance, but because of their need for anatomic coding and comprehensive data, they are better suited to registries, research, and quality assessment than to acute bedside decisions. rSIG is promising but requires prospective external validation.

Conclusion: Score selection in pediatric trauma should be guided by the clinical purpose and the timing of assessment. SIPA and GCS can be used at admission, PTS after the initial examination, BIG once early laboratory results are available, ISS/NISS after anatomic injuries have been defined, and TRISS derivatives for prognosis or quality assessment. These tools should not replace the ABCDE approach, serial clinical assessment, or the judgment of the trauma team.

Keywords: pediatric trauma; trauma score; emergency department

Table 1. Clinical-use stages of pediatric trauma scores

Tool	Timing of use	Main contribution	Key limitation

SIPA + GCS	Emergency department admission	Rapid physiological and neurological screening	A normal result does not exclude major trauma
PTS	After the initial examination	Pediatric-specific general risk classification	Sensitivity is variable (depending on outcome: ~96% for mortality, ~56% for hospitalization); components are partly subjective
BIG	After initial laboratory results	Early prediction of mortality and severe course	Requires blood gas analysis and INR
ISS/NISS	After definitive diagnosis and coding	Standardization of anatomic injury burden	Calculated too late for acute triage
TRISS/aTRISS	Prognosis and quality assessment	Probability of survival and center benchmarking	Complex and calibration-dependent
rSIG	Early risk assessment	Fast prediction with few variables	Requires prospective external validation

M4575-Tam Metin

16 YAŞ VE ALTINDAKİ GEBELİKLERDE ÇOCUK ACİL SERVİSİNİN ROLÜ: İKİ YILLIK RETROSPEKTİF OLGU SERİSİ

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Giriş

Adölesan gebelikler, maternal ve neonatal sağlık üzerindeki olumsuz etkileri nedeniyle önemli bir halk sağlığı sorunudur. Türkiye'de gerçekleştirilen bir meta-analizde, adölesan gebeliklerin preterm doğum, maternal anemi, düşük doğum ağırlığı ve intrauterin büyüme geriliği ile ilişkili olduğu gösterilmiştir [1]. Bu bulgular, özellikle erken yaş gebeliklerinde maternal ve fetal sağlığın kapsamlı değerlendirilmesinin önemini ortaya koymaktadır.

Çocuk acil servisleri, gebeliği bilinen veya henüz tanı almamış adölesanların başvurabildiği önemli sağlık hizmeti birimleridir. Gebelikle ilişkili başvuruların karın ağrısı, genitoüriner enfeksiyonlar ve vajinal kanama gibi farklı klinik yakınmalarla gerçekleştiği bildirilmiştir [2].

Bununla birlikte, gebelik olasılığının başvuru sırasında belirtilmemesi veya gebelik öyküsünün eksik alınması, tanının gözden kaçmasına neden olabilmektedir [3]. Bu nedenle çocuk acil servislerinde gebeliğin erken tanınması ve uygun obstetrik yönlendirme önem taşımaktadır [4].

Türkiye'de adölesan gebeliklerin acil servis başvurularını inceleyen araştırmalarda, farklı klinik yakınmalar ve antenatal bakım gereksinimleri bildirilmiştir [5]. Bununla birlikte, mevcut çalışmaların çoğu genel adölesan popülasyonuna odaklanmaktadır. Özellikle 16 yaş ve altındaki gebeliklerde ilk hastane temasının çocuk acil servisinde gerçekleşmesi, obstetrik sonuçlar ve sonraki izlem süreçlerinin birlikte değerlendirilmesi araştırılmaya değer bir alandır.

Bu çalışmanın amacı, 16 yaş ve altındaki gebeliklerde çocuk acil servisinin ilk hastane teması olarak rolünü değerlendirmektir. Ayrıca başvuru özelliklerinin, obstetrik sonuçların, antenatal takip durumunun ve adli kayıtların incelenmesi; bir yıllık izlemdeki tekrar adli kayıtların ve yeni gebeliklerin tanımlanması amaçlanmıştır.

Materyal- Metod

Bu çalışma, üçüncü basamak bir hastanenin çocuk acil servisinde gerçekleştirilen tek merkezli, retrospektif ve tanımlayıcı bir olgu serisi olarak tasarlandı. Çalışma kapsamında, iki yıllık araştırma döneminde 16 yaş ve altındaki hastaların gebelikle ilişkili ilk hastane kayıtları retrospektif olarak değerlendirildi.

Hastane kayıt sisteminde ilgili dönemde toplam 56 ilk kayıt belirlendi. Bunlardan 15'inin ilk başvuru birimi çocuk acil servisiydi. Çocuk acil servisinden kaydedilen bir hastada gebelik şüphesi bulunmasına rağmen β-hCG sonucu negatifti. Bu hasta, doğrulanmış gebelik kriterini karşılamadığından dışlandı. Sonuç olarak 14 hasta nihai çalışma grubunu oluşturdu.

Veriler, hastanenin elektronik hasta kayıt sistemi üzerinden retrospektif olarak elde edildi. Hastaların yaşları, uyrukları, medeni durumları, başvuru yakınmaları, gebelik haftaları, hemoglobin düzeyleri ve konsültasyon bilgileri kaydedildi.

Obstetrik değerlendirme kapsamında antenatal takip durumu, gebelik komplikasyonları, doğum haftası, doğum şekli ve kayıtlarda mevcut gebelik sonuçları incelendi. Gebelik komplikasyonları arasında anemi, hiperemezis, üriner sistem enfeksiyonları, abortus, ektopik gebelik ve hipertansif gebelik bozuklukları değerlendirildi.

Ayrıca adli kayıt durumu ve bir yıllık izlemdeki tekrar adli kayıtlar incelendi. Aynı izlem dönemindeki tekrar gebelik kayıtları da değerlendirildi.

İstatistiksel analizlerde IBM SPSS Statistics yazılımı kullanıldı (IBM Corp., Armonk, NY, ABD; 27.0). Sürekli değişkenler, medyan ve çeyrekler arası aralık (ÇAA) kullanılarak özetlendi. Kategorik değişkenler sayı ve yüzde olarak sunuldu. Eksik veriler değişken bazında değerlendirildi. Yüzdeler ilgili değişkenin geçerli gözlem sayısı üzerinden hesaplandı. Örneklem büyüklüğünün sınırlı olması nedeniyle analizlerde tanımlayıcı yaklaşım benimsendi. Bulgular klinik önemleri dikkate alınarak yorumlandı.

Bulgular

İki yıllık dönemde, 16 yaş ve altındaki gebeliklerle ilişkili 56 ilk hastane kaydının 15'i (%26,8) çocuk acil servisinden yapılmıştı. Gebeliği doğrulanmayan bir hasta dışlandıktan sonra 14 olgu değerlendirildi. Hastaların medyan yaşı 15 yıl (ÇAA: 13–16) olup hemoglobin düzeyi medyanı 11,0 g/dL idi. Başvuru nedenleri arasında doğum ve gebelik değerlendirmesi üçer hastada (%21,4), karın ağrısı iki hastada (%14,3); vajinal kanama, kasık ağrısı, bulantı, adet görmeme, üst solunum yolu enfeksiyonu ve idari amaçlı başvuru ise birer hastada (%7,1) kaydedildi.. Kadın doğum konsültasyonu 12 hastada (%85,7) kayıtlıydı. Antenatal takip değişkeninde 11 hasta (%78,6) takipsiz olarak kodlanmıştı. Tüm hastalarda adli kayıt mevcuttu. Bir yıllık izlemde dokuz hastada (%64,3) tekrar adli kayıt, dört hastada (%28,6) tekrar gebelik kaydı saptandı. Demografik, klinik ve obstetrik özellikler Tablo 1'de sunuldu.

Tablo 1. Hastaların demografik, klinik ve obstetrik özellikleri (n=14)

Değişken	n (%) veya medyan (ÇAA)
Yaş, yıl	15 (15–16)
Hemoglobin, g/dL	11,0 (10,0–11,6)
Gebelik sonlanma haftası*	37 (35–38), n=13
Kadın doğum konsültasyonu	12 (%85,7)
Psikiyatri konsültasyonu	1 (%7,1)
Antenatal takipli (kod 1)	3 (%21,4)
Antenatal takipsiz (kod 2)	11 (%78,6)
Adli kayıt	14 (%100)
Bir yıl içinde tekrar adli kayıt	9 (%64,3)
Bir yıl içinde tekrar gebelik kaydı	4 (%28,6)

ÇAA: Çeyrekler arası aralık.

**Gebelik sonlanma haftası, 20. haftadaki gebelik kaybını da içermektedir.*

Tartısma

Çalışmamızda, 16 yaş ve altındaki gebeliklerle ilişkili ilk hastane kayıtlarının %26,8'inin çocuk acil servisinden oluşturulduğu belirlendi. Benzer çalışmalarda, acil servislerin akut obstetrik yakınmaların yanı sıra gebelik değerlendirmesi ve diğer sağlık gereksinimleri nedeniyle de kullanıldığı bildirilmiştir [5,6]. Bu durum, çocuk acil servislerinin erken yaş gebeliklerinde

yalnızca akut tedavi sunan birimler olmadığını, obstetrik ve psikososyal gereksinimlerin belirlenmesinde de önemli bir rol üstlenebileceğini düşündürmektedir. Bununla birlikte, çalışmamızdaki oran hastane temelli ilk kayıtların dağılımını yansıtmakta olup toplum geneline ilişkin bir başvuru sıklığı olarak yorumlanmamalıdır.

Çalışmamızda doğum ve gebelik değerlendirmesi (%21,4'er), karın ağrısı (%14,3), vajinal kanama ve kasık ağrısı (%7,1'er) başvuru nedenleri arasında yer aldı. Benzer araştırmalarda abdominal ağrı, vajinal kanama ve gebelik değerlendirmesi adölesanların acil servis başvurularında öne çıkan nedenler arasında bildirilmiştir [5–7]. Gebelikle ilişkili semptomların özgül olmaması ve gebelik durumunun önceden bilinmemesi, özellikle erken adölesan dönemde tanısal gecikmelere yol açabilir. Bu nedenle çocuk acil servislerinde abdominal veya pelvik yakınmalarla başvuran adölesanlarda gebelik olasılığının değerlendirilmesi önem taşımaktadır.

Çalışmamızda hastaların %78,6'sında antenatal takip bulunmazken, bir hastada (%7,1) düşük ve iki hastada (%14,3) preterm eylem kaydedildi. Literatürde yetersiz prenatal bakımın olumsuz perinatal sonuçlarla ilişkili olduğu; adölesan gebeliklerde preterm doğum, maternal anemi ve düşük doğum ağırlığı risklerinin arttığı bildirilmiştir [1,8]. Yetersiz antenatal izlem, obstetrik komplikasyonların erken tanınmasını ve zamanında müdahaleyi güçleştirebilir. Bulgularımız, çocuk acil servisinde saptanan erken yaş gebeliklerinin düzenli obstetrik takibe yönlendirilmesinin önemini desteklemektedir.

Çalışmamızda tüm hastalarda adli kayıt bulunurken, bir yıllık izlemde dokuz hastada (%64,3) tekrar adli kayıt saptandı; bunların beşi fiziksel şiddet, dördü tekrarlayan gebeliklerle ilişkiliydi. Benzer çalışmalarda gebe adölesanlarda fiziksel ve cinsel şiddet gibi psikososyal sorunlar bildirilmiş, adli değerlendirmede multidisipliner yaklaşımın önemi vurgulanmıştır [6,9]. Tekrarlayan adli başvurular, devam eden sosyal kırılganlıkların ve karşılanmamış korunma gereksinimlerinin göstergesi olabilir. Bu bulgular, çocuk acil servislerinde adli değerlendirmenin çocuk koruma ve sosyal destek hizmetleriyle bütünleştirilmesi gerektiğini düşündürmektedir.

Çalışmamızda dört hastada (%28,6), ilk gebeliğin sonlanmasından sonraki bir yıl içinde obstetrik değerlendirmelerle doğrulanmış yeni gebelik saptandı. Benzer çalışmalarda tekrarlayan adölesan gebelikler bildirilmiş; sosyoekonomik dezavantajlar ve kontraseptif hizmetlere erişimdeki güçlükler olası ilişkili faktörler arasında gösterilmiştir [6,10]. Bu etkenler çalışmamızda doğrudan değerlendirilmemiş olmakla birlikte, tekrarlayan gebelikler doğum sonrası izlemin sürekliliğine yönelik gereksinimleri düşündürmektedir. Bulgularımız, erken yaş gebeliklerinde obstetrik bakımın üreme sağlığı danışmanlığı, psikososyal destek ve sürdürülebilir izlemle tamamlanmasının önemini vurgulamaktadır.

Sonuç

Çalışmamız, 16 yaş ve altındaki gebeliklerde çocuk acil servislerinin obstetrik, adli ve psikososyal gereksinimlerin belirlenmesinde önemli bir rol üstlendiğini göstermektedir.

Antenatal takip eksikliği, tekrarlayan adli başvurular ve yeni gebelikler, akut değerlendirme sonrasında multidisipliner yaklaşım ve sürdürülebilir izlem gereksinimini vurgulamaktadır. Bulguların daha geniş örneklemli çalışmalarla desteklenmesi gerekmektedir.

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M4639-Tam Metin

HAYATI TEHDİT EDEN HİPERKALEMİDE ACİL MEDİKAL YAKLAŞIM GÜNCEL KANITLAR VE ERİŞKİN–PEDİATRİK YÖNETİM FARKLILIKLARI

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ÖZET

Giriş ve Amaç

Hiperkalemi, serum potasyum konsantrasyonunun normal sınırların üzerine yükselmesiyle karakterize, kardiyak ileti bozuklukları, malign aritmiler ve kardiyak arrest ile sonuçlanabilen, yaşamı tehdit eden önemli bir elektrolit bozukluğudur. Özellikle akut böbrek hasarı, kronik böbrek hastalığı, metabolik asidoz, insülin eksikliği ve potasyum atılımını azaltan ilaçların kullanımı hiperkalemi gelişiminde önemli rol oynamaktadır. Serum potasyum düzeyi ile elektrokardiyografik değişiklikler arasında her zaman doğrusal bir ilişki bulunmaması, klinik değerlendirmeyi güçleştirmektedir. Bu derlemenin amacı, hayatı tehdit eden hiperkaleminin acil serviste tanınması ve yönetimini güncel kanıtlar doğrultusunda değerlendirmek, erişkin ve pediatrik hastalarda tedavi farklılıklarını ortaya koymak ve özellikle 2025 Avrupa Resüsitasyon Konseyi (ERC) ile Amerikan Kalp Derneği (AHA) kılavuzlarının önerilerini karşılaştırmaktır.

Tanı ve Klinik Değerlendirme

Hiperkaleminin kardiyak etkileri, hücre dışı potasyum konsantrasyonundaki artışın miyokard hücrelerinin membran potansiyelini değiştirmesi sonucunda ortaya çıkmaktadır. Elektrokardiyografide sivri T dalgaları, PR aralığında uzama, P dalgasında düzleşme veya kaybolma, QRS kompleksinde genişleme ve ileri olgularda sinüs dalgası görünümü gelişebilir. Ağır hiperkalemi bradikardi, ventriküler aritmiler, nabızsız elektriksel aktivite ve asistoliye neden olabilir. Bununla birlikte normal elektrokardiyografi, ağır hiperkalemiyi dışlamak için yeterli değildir. Acil değerlendirmede hava yolu, solunum ve dolaşımın değerlendirilmesi, sürekli kardiyak monitörizasyon, 12 derivasyonlu elektrokardiyografi, serum potasyumu, böbrek fonksiyonları, kan şekeri ve asit-baz durumunun birlikte incelenmesi gerekmektedir. Psödohiperkalemi olasılığı göz önünde bulundurulmalı, ancak ciddi elektrokardiyografik toksisite varlığında laboratuvar doğrulaması beklenerek tedavi geciktirilmemelidir.

Acil Tedavi Yaklaşımı

Hayatı tehdit eden hiperkaleminin tedavisi dört temel hedefe dayanmaktadır: miyokard membranının stabilizasyonu, potasyumun hücre içine geçişinin artırılması, potasyumun vücuttan uzaklaştırılması ve yeniden yükselmenin önlenmesi. Kardiyak toksisite varlığında intravenöz kalsiyum uygulanması önceliklidir. ERC 2025 kılavuzunda elektrokardiyografik değişikliklerin eşlik ettiği ağır hiperkalemide %10 kalsiyum klorür 10 mL önerilmektedir.

Kalsiyum, miyokard membranını stabilize ederek elektriksel toksisiteyi azaltırken serum potasyum konsantrasyonunu düşürmemektedir. Bu nedenle eş zamanlı potasyum düşürücü tedavi gereklidir. Potasyumun hücre içine taşınmasında insülin-glukoz kombinasyonu temel farmakolojik yaklaşımdır. ERC 2025 ve Birleşik Krallık Böbrek Derneği (UKKA) önerilerinde 10 ünite intravenöz insülin ile 25 gram glukoz uygulanması yer almaktadır. Bu tedavi serum potasyumunu hızlı biçimde azaltabilmekle birlikte özellikle böbrek yetmezliği bulunan hastalarda gecikmiş hipoglisemiye neden olabilmektedir. Bu nedenle başlangıç kan şekeri değerlendirmesi ve tedavi sonrasında uzun süreli glisemik izlem zorunludur. Nebülize salbutamol, 10–20 mg dozunda insülin-glukoz tedavisine eklenebilir. Ancak tek başına güvenilir bir tedavi yöntemi değildir. Sodyum bikarbonatın rutin hiperkalemi tedavisindeki etkinliği sınırlıdır; belirgin metabolik asidozu bulunan seçilmiş hastalarda değerlendirilmelidir. Potasyumun kalıcı uzaklaştırılmasında hemodiyaliz, yeterli idrar çıkışı bulunan hastalarda diüretikler ve gastrointestinal potasyum bağlayıcılar kullanılmaktadır. Sodyum zirkonyum siklosilikat akut tedaviye yardımcı olabilirken patiromer daha çok uzun dönem potasyum kontrolünde öne çıkmaktadır. Anüri, ileri böbrek yetmezliği, tedaviye dirençli hiperkalemi veya tekrarlayan kardiyak toksisite varlığında hemodiyaliz erken planlanmalıdır.

Kardiyak Arrestte Güncel Kanıtlar

Hiperkalemiye bağlı kardiyak arrestin yönetiminde 2025 ERC ve AHA kılavuzları arasında dikkat çekici farklılıklar bulunmaktadır. ERC 2025, standart ileri yaşam desteğine ek olarak intravenöz kalsiyum, insülin-glukoz ve sodyum bikarbonat kullanımını içeren bir algoritma sunmaktadır. Buna karşılık AHA 2025, hiperkalemik kardiyak arrestte bu tedavilerin sağkalım ve nörolojik sonuçlar üzerindeki yararını destekleyen kanıtların yetersiz olduğunu vurgulamaktadır. Ayrıca inhalasyon yoluyla beta-2 agonistlerin kardiyak arrest sırasında rutin kullanımı önerilmemektedir. Bu farklılıklar, klinik öneriler ile kanıt kesinliğinin birbirinden ayrı değerlendirilmesi gerektiğini göstermektedir.

Pediatrik Hastalarda Yönetim

Çocuklarda hiperkalemi tedavisinin temel ilkeleri erişkinlerle benzer olmakla birlikte ilaç dozları vücut ağırlığına göre hesaplanmaktadır. Elektrokardiyografik toksisite varlığında %10 kalsiyum glukonat 0,5 mL/kg, insülin 0,1 ünite/kg ve %10 glukoz 5 mL/kg uygulanabilir. Nebülize salbutamol 2,5–5 mg dozunda ek tedavi seçeneğidir. Pediatrik kardiyak arrestte 2025 ILCOR/AHA değerlendirmeleri, insülin-glukoz ve intravenöz salbutamolün potasyum düşürmek amacıyla kullanılmasını ele alırken kalsiyum ve bikarbonatın yararına ilişkin kanıtların yetersizliğini vurgulamaktadır. Pediatrik hastalarda hipoglisemi, sıvı yüklenmesi ve ilaç doz hataları açısından yakın izlem gereklidir.

Sonuç

Hayatı tehdit eden hiperkalemi, hızlı tanı ve eş zamanlı çok yönlü tedavi gerektiren kritik bir acil durumdur. Başarılı yönetim yalnızca serum potasyumunun geçici olarak düşürülmesine değil, kardiyak toksisitenin giderilmesine, potasyumun vücuttan uzaklaştırılmasına ve yeniden yükselmenin önlenmesine dayanmalıdır. Özellikle anürik ve ileri böbrek yetmezliği

bulunan hastalarda diyalizin geciktirilmemesi önemlidir. Güncel kılavuzlar arasındaki farklılıkların bilinmesi ve kanıt düzeyinin klinik karar verme sürecine yansıtılması, erişkin ve pediatrik hastalarda güvenli tedavinin temelini oluşturmaktadır.

Anahtar Kelimeler: Hiperkalemi, acil tıp, kardiyak arrest, elektrokardiyografi, hemodiyaliz, pediatrik hiperkalemi.

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M4635-Tam Metin

TANSİYON PNÖMOTORAKS VE TRAVMATİK HEMOTORAKSTA TÜP TORAKOSTOMİ ENDİKASYONLARI

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Giriş ve Amaç

Pediatrik toraks travmasında tansiyon pnömotoraks ve travmatik hemotoraks, hızla yaşamı tehdit edebilen iki önemli klinik tablodur. Bu bildiride söz konusu yaralanmalarda tüp torakostomi endikasyonlarının fizyoloji temelli değerlendirilmesi; acil dekompresyon gereksiniminin belirlenmesi; küçük ve hemodinamik olarak stabil olgularda gözlem yaklaşımının tartışılması ve pediatrik verilerin erişkin travma eşikleriyle karşılaştırılması amaçlanmaktadır.

Pediatrik Toraks Travmasında Fizyolojik Özellikler

Çocuklarda göğüs duvarının daha yüksek kompliansı nedeniyle ciddi intratorasik yaralanmalar kaburga kırığı olmaksızın gelişebilir. Fonksiyonel rezidüel kapasitenin daha düşük, oksijen tüketiminin daha yüksek olması hipokseminin ve dolaşım bozulmasının daha hızlı ortaya çıkmasına neden olabilir. Mediastinal mobilite de bu fizyolojik etkileri artırabilir. Bu nedenle klinik karar, yalnızca görüntüleme bulgularına değil, çocuğun solunum ve dolaşım fizyolojisine dayanmalıdır.

Tansiyon Pnömotoraks: Tanı ve Acil Dekompresyon

Tansiyon pnömotoraks klinik bir acildir. Ciddi solunum sıkıntısı, hipoksemi, tek taraflı belirgin azalmış veya alınamayan solunum sesleri, taşikardi, hipotansiyon ve obstrüktif şok bulguları tanıyı düşündürmelidir. Hemodinamik olarak instabil çocukta görüntüleme beklenmeden acil plevral dekompresyon uygulanmalıdır. Ardından klinik yanıt değerlendirilmeli, definitif göğüs drenajı sağlanmalı ve solunum ile dolaşım yeniden değerlendirilmelidir. Dekompresyonun başarısız olması durumunda iğne/kateter başarısızlığı, yanlış tanı, malpozisyon ve eşlik eden hemotoraks ya da kardiyak tamponad olasılıkları yeniden gözden geçirilmelidir.
İğne dekompresyonu hızlı ancak geçici bir seçenek olabilir. Eğitimli ekipler tarafından, uygun ağır travma senaryolarında açık veya parmak torakostomi tercih edilebilir. Çocuklarda iğne seçimi göğüs duvarı kalınlığına, yaşa ve vücut yapısına göre yapılmalıdır. Bir bilgisayarlı tomografi çalışmasında standart 5 cm iğnenin çocuklarda göğüs duvarı kalınlığının yaklaşık iki katına karşılık gelebildiği; 3,8 cm uzunluğundaki iğnelerin ise plevral boşluğa ulaşmak için yeterli olabildiği bildirilmiştir. Dekompresyonun başarısı klinik olarak doğrulanmalı; yöntem, yerel travma protokolü ve uygulayıcının yetkinliği doğrultusunda seçilmelidir.

Pnömotoraksta Tüp Torakostomi Endikasyonları ve Gözlem

Tüp torakostominin başlıca endikasyonları; tansiyon pnömotoraks sonrası acil dekompresyon, klinik olarak anlamlı semptomatik pnömotoraks, pnömotoraksa bağlı solunum yetmezliği, ilerleyen pnömotoraks ve hemopnömotorakstır. Pozitif basınçlı ventilasyon gereken seçilmiş hastalarda veya yakın klinik izlem olanağının sınırlı olduğu durumlarda da tüp torakostomi değerlendirilmelidir.
Hemodinamik olarak stabil, belirgin solunum sıkıntısı bulunmayan, küçük pnömotoraksı olan ve klinik/radyolojik progresyon göstermeyen çocuklarda seri klinik değerlendirme olanağı mevcutsa gözlem düşünülebilir. Stabil hastalarda 2 cm ve altındaki küçük pnömotoraksın en az 24 saatlik gözlemle konservatif yönetilebileceği bildirilmiştir. Dolayısıyla yalnızca görüntülemede pnömotoraks saptanması, tek başına tüp torakostomi endikasyonu olarak değerlendirilmemelidir.

Travmatik Hemotoraksta Değerlendirme ve Drenaj

Travmatik hemotoraksta karar sürecinde üç temel soru yanıtlanmalıdır: Hasta hemodinamik olarak stabil midir? Solunum fizyolojisi bozulmuş mudur? Hemotoraksın hacmi küçük mü, büyük mü ve ilerleyici midir? Ultrasonografi, akciğer grafisi ve bilgisayarlı tomografi

bulguları; tahmini kan hacmi, çocuğun vücut boyutu, devam eden kanama ve resüsitasyona yanıtla birlikte değerlendirilmelidir.

Hemodinamik olarak stabil, küçük hacimli hemotoraksı bulunan ve fizyolojik bozulma göstermeyen çocuklarda analjezi, seri muayene ve gerektiğinde kontrol görüntülemesiyle gözlem düşünülebilir. Hemotoraksın ilerlemesi veya fizyolojik bozulma gelişmesi durumunda drenaj uygulanmalıdır. Pediatrik seriler, özellikle bilgisayarlı tomografide saptanan küçük hacimli hemotoraksların seçilmiş stabil hastalarda izlenebileceğini göstermektedir.

Hemodinamik instabiliteyle birlikte torasik kanama şüphesi, belirgin solunum kompromisi, büyük veya progresif hemotoraks, hemopnömotoraks ya da devam eden anlamlı kan kaybı varlığında tüp torakostomi güçlü biçimde değerlendirilmelidir. İnstabil hastalarda drenaj; kan ürünü resüsitasyonu, erken cerrahi değerlendirme ve travma ekibinin aktivasyonuyla eş zamanlı yürütülmelidir. Travmaya bağlı instabilitede hemotoraks, hacminden bağımsız olarak geniş çaplı göğüs tüpüyle drene edilmelidir.

Hemotoraks Hacim Eşikleri: Erişkin ve Pediatrik Kanıtlar

Erişkinlerde kullanılan hacim eşikleri çocuklara doğrudan aktarılmamalıdır. Dünya Acil Cerrahi Derneği–Amerikan Travma Cerrahisi Derneği önerileri, stabil travmatik hemotoraksta 500 mL ve üzerindeki hacimlerde drenajı, 300 mL altındaki hacimlerde ise seçilmiş hastalarda gözlemi desteklemektedir. Erişkin kılavuzlarında da 500 mL üzerindeki hemotoraksta göğüs tüpü yerleştirilmesi önerilmektedir. Bununla birlikte, 300 mL kuralının uygulanmasının gözlem başarısızlığı veya komplikasyon oranlarını artırmadan tüp torakostomi sayısını azalttığı bildirilmiştir.

Pediatrik veriler, daha düşük hacimlerin de klinik bağlama göre drenaj gerektirebileceğine işaret etmektedir. 2025/2026 döneminde bildirilen pediatrik çok merkezli çalışmada tüp yerleştirilen grupta medyan hemotoraks hacmi 142,7 mL, gözlem grubunda ise 19,5 mL olarak raporlanmış; 55 mL üzerindeki hacim olası karar eşiği olarak araştırılmıştır. Ayrıca 2026 tarihli retrospektif bir çalışmada 74 travmatik hemotoraks olgusunun %43'ünde başarılı gözlem, %51'inde tüp torakostomi ve %12'sinde başlangıç gözleminin başarısızlığı bildirilmiştir. Mergo yöntemiyle hesaplanan 55 mL üzeri hacim, tüp yerleştirilmesini öngören bir eşik olarak tanımlanmıştır. Bu bulguların retrospektif ve Level 3 kanıta dayandığı, klinik değerlendirmenin yerini alamayacağı göz önünde bulundurulmalıdır. Hacim; fizyoloji, yaralanma şiddeti ve klinik seyirle birlikte yorumlanmalı, masif hemotoraksta cerrahi karar verilirken fizyoloji mutlak drenaj hacimlerinden önce gelmelidir.

Kateter/Tüp Seçimi ve Definitif Kanama Kontrolü

Stabil, küçük-orta hacimli hemotoraksta pigtail (kıvrık uçlu) kateter düşünülebilir. İnstabil veya masif hemotoraksta ise genellikle daha geniş lümenli göğüs tüpü tercih edilir. Pediatrik travmatik hemotoraksta perkütan pigtail kateter ile geleneksel göğüs tüpünü karşılaştıran Doğu Travma Cerrahisi Derneği çok merkezli çalışması, bu konudaki önemli kanıt kaynaklarından biridir. Seçimde pıhtı yükü, kanama hızı, çocuğun vücut boyutu, klinik aciliyet, uygulayıcı deneyimi ve kurumun travma protokolü dikkate alınmalıdır.

Her yaş için geçerli tek bir French çapı bulunmamaktadır. Tüp çapı ve yerleştirme uzunluğu; yaş, kilo, göğüs duvarı özellikleri ve altta yatan patolojiye göre belirlenmelidir. Hava ve sıvının

birlikte drene edilmesi bekleniyorsa tüpün konumu buna göre planlanmalı; güvenli üçgen ve uygun interkostal aralık kullanılmalıdır. Çocuklarda yaş ve vücut yüzey alanına dayalı tüp boyutu ve yerleştirme uzunluğu formülleri de geliştirilmiştir.
Masif veya instabil hemotoraksta göğüs tüpü resüsitatif bir girişimdir; kanama kaynağını kontrol etmez. Öncelikler plevral drenaj, kan ürünü resüsitasyonu, tüp çıkışının ve fizyolojinin seri değerlendirilmesi, erken pediatrik travma/cerrahi konsültasyonu ve devam eden kanamada definitif kanama kontrolüdür. Tüp yerleştirilmesi cerrahi değerlendirmeyi geciktirmemelidir. Retrospektif çalışmalarda erken cerrahi girişim gereksinimini öngörmek amacıyla 1500 mL drenaj veya saatte 150–200 mL süregelen kanama gibi eşikler tanımlanmıştır.

Sık Yapılan Hatalar

Başlıca hatalar; instabil tansiyon pnömotoraksında görüntüleme beklemek, hastayı değil görüntüyü tedavi etmek, erişkin hacim eşiklerini çocuklara doğrudan uygulamak, küçük ve stabil bilgisayarlı tomografi bulgusuna otomatik olarak tüp yerleştirmek, pozitif basınçlı ventilasyonu risk değiştirici bir faktör olarak göz ardı etmek, dekompresyon sonrasında klinik yanıtı yeniden değerlendirmemek ve devam eden hemorajide cerrahi ekibi geç aktive etmektir.

Sonuç

Tansiyon pnömotoraks, özellikle hemodinamik olarak instabil çocukta görüntüleme beklenmeden müdahale edilmesi gereken klinik bir acildir. Pediatrik toraks travmasında fizyolojik durum, tek başına görüntüleme ölçümlerinden daha belirleyicidir. Küçük ve stabil pnömotoraks ile hemotoraks, uygun hastalarda yakın izlem altında yönetilebilir; erişkin hacim eşikleri çocuklara doğrudan uygulanmamalıdır. Tüp torakostomi plevral boşluğu drene eder ancak kanama kaynağını kontrol etmez. Devam eden instabilite veya kanama varlığında erken ve definitif travma/cerrahi yönetim sağlanmalıdır.

Kaynakça / Kaynak Notları

1. WSES-AAST toraks travması kılavuzu (2025); Rule of 4’s (2019); MAPPAED (2022); pediatrik hemotoraks gözlemi, Injury (2015); 300 mL kuralı uygulaması (2024).
2. Doğu Travma Cerrahisi Derneği hemotoraks/pnömotoraks kılavuzu (2011); Avrupa major kanama kılavuzu (2019); pediatrik iğne torakostomi uzunluğu (2019); çocukta torakostomi deneyimi (2019); pediatrik göğüs tüpü boyutu formülü (2023); pigtail–göğüs tüpü karşılaştırması (2025).
3. Heller ve ark. J Pediatr Surg. 2026;61(1):162556; ATLS Student Course Manual, 11. baskı (2025); Pediatric Trauma Society/WTA/EAST pediatrik travma kılavuzu.

M4636-Özet Metin

SERVİKAL VE TORAKOLOMBER KIRIKLARDA KONSERVATİF VE CERRAHİ KARAR

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Tüm spinal travmaların %1-10'unu oluşturan pediatrik spinal travmalar, oldukça ender görülen ancak gelişmekte olan omurgayı etkilediği için ciddi sonuçlara yol açabilen ve pediatrik popülasyona ait spinal biyomekanik özellikler veya yaş gruplarına göre değişen farklı yaralanma mekanizmaları gibi pek çok farklı neden göz önünde bulun durulduğunda oldukça özgün travmalardır[1,2,3].

Önemli derece mortalite ve morbiditeye neden olabilen pediatrik spinal yaralanmaların derecesini ise pediatrik döneme ait farklı anatomik yapılar ve omurganın biyomekaniği gibi özellikler belirler.İlerleyen yaş ve fiziksel aktiviteler ile birlikte gelişen paraspinal kaslar da omurganın dinamik stabilitesine katkıda bulunmaktadır[4]. Çocuklarda vertebral fraktürlere, yetişkinlere oranla daha az rastlanırken, dislokasyonlar, ligamentöz hasarlar, epifizyal ayrışmalar ve ossifikasyon merkezlerinin lezyonları ise daha sık olarak görülmektedir. Pediatrik spinal travmaların nedeni yaşa ve fiziksel aktiviteye bağlı olarak değişkenlikler göstermekle birlikte, çoğunlukla motorlu taşıt kazaları, spor yaralanmaları, düşmeler veya çocuk istismarı gibi sebeplere bağlı olarak gelişebilir[2].

Nörolojik olarak intakt veya minimal semptomlu olabilen pediatrik travmalı olgularda lokal ağrı, hassasiyet veya ciltte abrazyon fraktür bulgusu olabilir. Nörolojik bulguların derecesi ise vertebral kolondaki hasarın tipi ile ilişkilidir. Bu sebeple, kırık olsun veya olmasın sublüksasyonu olan hastalarda nörolojik defisit görülme oranı sadece fraktürü olan olgulara göre daha yüksektir[4,5].

Yenidoğanlarda da her 60.000 canlı doğumda bir spinal travma görülmektedir. Küçük pelvis, obezite, diabetes insipitus, ilk doğum gibi maternal faktörler ve uzamış doğum eylemi, fetüsün anormal pozisyonu, forceps ile doğum gibi risk faktörleri sık olarak üst (C5/6) ve alt (C7/T1) kökleri etkileyerek sırası ile Erb ve Klumpke paralizisi gibi brakiyal pleksus hasarlarına yol açabilir[6].

Üst servikal travmalarda mortalite oranları daha yüksek olarak görülmekte iken alt servikal travmalarda mortalite oranlarının da daha düşük olduğu bilinmektedir[7].

Çeşitli servikal travmalar ve servikal spinal yaralanmalara bağlı olarak değişken klinik bulgu ve belirtiler görülebilir. Klinik bulgu ve belirtiler, en sık rastlanılan semptom olan boyun ağrısından, özellikle fraktür disloklasyonlarda görülen nörolojik defisitlere ve hatta solunum arrestine kadar uzanan geniş bir yelpazeye sahiptir[5,7].

C1 fraktürleri genellikle aksiyel yüklenme sonucu gelişen, genellikle dört ayrı noktadan gelişen fraktür hatları ile ortaya çıkan bir burst kırığı şeklinde olan Jefferson kırıklarıdır.Bu kırıklarda sıklıkla nörolojik defisit görülmez.Eşlik eden odontoid fraktürü veya transvers atlantal ligaman hasarı olmadığı sürece bu kırıklar stabil kabul edilebilir[7].

C2'nin en zayıf noktası yedi yaş civarında kapanan kartilajenöz yapıdaki subdental epifiz bölgesidir. Kırıklar özellikle odontoid-gövde sinkondrozunda oluşur. Odontoid fraktürlerinde ender olarak nörolojik defisit görülmektedir[6,7,8]. Fraktür durumunda boyun ağrısı ile başvuran bu olgular 6-12 hafta süre ile rijit coller ile takip edilir[5].

Travmatik tortikollis diye de adlandırılan, atlantoaksiyel eklemin subluksasyonu ve/veya malpoze bir şekilde fiksasyonu ile karakterize olan atlantoaksiyel rotatutar subluksasyon, çocukluk çağının aksiyel travmalarında en sık görülendir. Atlantoaksiyel rotatuar subluksasyon üst solunum yolu ve farenjiyal enfeksiyonlara sekonder (Grisel Sendromu) olarak ortaya çıkabileceği gibi yine travmalara veya bu bölgeye yönelik cerrahilere sekonder olarak da ortaya

çıkabilir[7]. Tanı aldığında yaralanma redükte edilebilir durumda ise redüksiyon ve dört hafta süre ile rijit bir kolor önerilebilir; ancak, tekrarlayan subluksasyon durumunda cerrahi ön planda düşünülmelidir[5].

Doğum travmaları haricinde 8 yaş altı çocuklarda daha nadir olarak görülmekte olan subaksiyel fraktürlerde; stabil fraktürlerde yumuşak veya sert collerlar tercih edilirken, instabil fraktürlerde örneğin burst fraktürlerinde cerrahi gerekmektedir.

Sonuç olarak pek çok servikal travma çocukluk çağında daha ender olarak görüldüğü için bu travmaların tanı almama veya yanlış tanı alma riski de yüksektir. Çocukluk çağında özellikle servikal travmaların tanınması ve daha da önemlisi zamanında tanı alması nörolojik defisitleri engellemek açısından son derece önemlidir.

Tüm spinal travma olgularının %0,6 ila %0,9'u pediatrik torasik ve lomber fraktürlerdir. Spinal yaralanma ile başvuran pediatrik hastaların, %5 ila %34'ü torakolomber fraktür olgularıdır[9,10]. Gelişen statik ve dinamik stabilite nedeniyle >10 yaş üstü çocuklarda fraktürler daha çok torasik ve lomber bölgelerde görülmektedir[2,5]. Günümüzde basit, tanısal olarak tekrarlanabilir, prognozu belirleyebilir ve tedavi için yönlendirici olan sınıflandırmalar tercih edilmektedir. Kuzey Amerika'da spinal cerrahlar daha çok Torakolomber Yaralanma Sınıflandırma Skorlaması (TLICS) kullanırken örneğin, Avrupa'da Magerl Sınıflandırması daha çok kullanılmaktadır. Daha güncel bir sınıflandırma olan, AOSpine Torakolomber Yaralanma Sınıflandırma Skorlaması (TLAOSIS) da yayımlanmış ve bu sınıflandırmanın da geçerliliği onaylanmıştır[3,11].

Çocuklarda kompresyon fraktürleri henüz vertebra korpusu immatür olduğundan sık görülmektedir. Hiperfleksiyon yaralanmaları daha sık olarak görülmektedir[5]. Yırtılma yaralanmaları ise kompresyon fraktürlerinden daha ağır travmalar sonucunda görülmektedir. Kartilajenöz yapıdaki son plaklarda fraktürlere sebep olan bu travmalar medulla spinalis hasarına da yol açabilmektedir[12]. Burst fraktürleri de yetişkin hastalarda görülmekte olan burst fraktürlerine benzemektedir. Adölesan çağdan önce meydana gelen medulla spinalis yaralanmalarının çoğunun skolyoz, kifoz veya lordoz gibi deformiteler ile sonuçlandığını bildiren yayınlar mevcuttur ve bu deformitelere sahip olguların %68'i cerrahiye ihtiyaç duymaktadır[5,9]. Burst fraktürleri posterior osteoligamentöz yapılar intakt olduğu zaman cerrahiye ihtiyaç duyulmadan tedavi edilebilir. Stabil bir burst fraktüründe kompresyon %40-50'den az, kanal basısı %40-50'den az ve kifotik deformite %20-25 arasındadır[9].

Nörolojik defisit ve deformite ile sonuçlanabilen, eşlik eden diğer yaralanmalar nedeniyle morbidite ve mortaliteye sebep olan pediatrik çağın spinal yaralanmaları büyüyen ve gelişen bir spinal yapı da göz önünde bulundurularak tedavi edilmelidir.

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M4637-Özet Metin
ZOR HAVA YOLU: KURTARICI MANEVRALAR VE KRİKOTİROTOMİ

Özlem Güler
Antalya Şehir Hastanesi Acil Tıp Kliniği

Zor havayolu; direk laringoskopi için faringeal ve trakeal eksenleri hizalama, balon maske ventilasyonu (BMV) uygulama, larenksi görüntüleme ve endotrakeal entübasyon, supraglottik havayolu (SGA) yerleştirme ve cerrahi havayolu açma gibi işlemlerden birinin başarısız olmasıdır. Zor entübasyon insidansı % 5,8 olup bunların 2/3'ü öngörülemeyen zor entübasyondur.

Kurtarıcı manevralar

Başa pozisyon verilmesi; çene kaldırma veya çene itme gibi manevralara ek olarak baş pozisyonunun optimize edilmesi ventilasyonu iyileştirebilir. 2 yaşından küçük çocuklarda omuz rulosu, daha büyüklerde başın altına yastık yerleştirilmesi (koklama pozisyonu), ağız, farinks ve laringeal eksenlerin doğru hizalanmasını sağlayabilir. En uygun teknik, dış kulak kanalının sternal çentik veya ön omuzla hizalanmasıdır.

İki el tekniğine geçilmesi; doğru boyuttaki maske, gözleri sıkıştırmadan burun köprüsünden çene çukuruna kadar olan bölgeyi örtmelidir. Bu yöntem, maske sızdırmazlığını korurken optimum çene itişini sağlaması açısından çok önemlidir. C-E tekniği veya tenar yaklaşım kullanılabilir.

Oral/ nazal airway kullanılması; uygun boyutta bir nazal veya öğürme refleksi artık işlevsiz olan hastalarda oral havayolu yerleştirilmesi, etkili BMV' yi kolaylaştırır.

Mide dekompresyonu; mide şişkinliği diyaframın yukarı doğru hareketine ve akciğer genişlemesinin sınırlanmasına neden olarak ventilasyonu bozabilir. Miide tüpü ile dekompresyon solunum uyumluluğunu iyileştirir.

Anestezi derinliğini artırma; maske ventilasyonu sırasında glottis seviyesinde tıkanıklık veya laringospazm ventilasyonu bozabilir. İlk tedavi, sürekli pozitif hava yolu basıncı (CPAP) uygulanmasını ve propofol ile anestezi düzeyinin derinleştirilmesini içerir. Nöromüsküler bloke edici ajan (NMBA) kullanılmadan uygun anestezi derinliğine ulaşmak zordur.

Laringoskopi tekniğinin değiştirilmesi

Videolaringoskopi; laringoskop bıçağının ucunda bulunan bir kamera aracılığıyla glottik açıklığın dolaylı olarak görüntülenmesini sağlar. Hem standart hem de hiperaçılı (Glidescope, C-MAC D-bıçakları, Airtraq, vb) sistemler mevcuttur.

Buji; glottik bölgeyi görselleştirme veya tüp geçişinin zor olduğu durumlarda entübasyonu kolaylaştırmak için açılı uca sahip bükülebilir bir cihazdır. Endotrakeal tüpün ses tellerinden geçirilmesi için Seldinger benzeri teknikle kullanılabilir.

Supraglottik havayolu; distal açıklığının etrafında şişirilebilir bir manşete sahip olup hipofarenkste yer alacak şekilde tasarlanmıştır. Hava akışını, glottis yoluyla akciğerlere yönlendirir. Mide içeriğinin aspirasyonunu önlemezler. Kesin havayolu değil, kurtarma cihazıdır. Her cihazda, amaçlanan hasta boyutu ve manşet şişirme için hava bilgisi bulunur. Perilaringeal anatomiye iyi uyum sağlayan i-gel ve gastrik drenaj kanalları ile daha yüksek sızdırmazlık basınçlarına sahip LMA supreme gibi cihazlar, birinci nesil cihazlara göre avantajlıdır. Özellikle entübasyon kanalı olarak tasarlanan Air-Q, ventilasyonu korurken fiberoptik kılavuzlu entübasyonu kolaylaştırır.

Fiberoptik bronkoskopi; bilinen zorlu havayolları, servikal omurga instabilitesi ve üst hava yolu kitleleri gibi senaryolar için paha biçilmezdir. Bronkoskop seçimi hastanın boyutuna bağlıdır. Nazal, oral veya supraglottik havayolu içerisinden uygulanabilir.

Hibrit teknik; endotrakeal tüp, esnek fiberoptik bronkoskopa önceden yüklenerek videolaringoskopi sırasında manevra kabiliyeti yüksek bir kılavuz tel olarak kullanılabilir. Üst hava yolu tıkanıklığı olan hastalarda faydalıdır. Başarısız videolaringoskopiden sonra kurtarma seçeneği olarak değerlidir.

Apneik oksijenasyon, O2 tüketimi ve CO2 üretimi arasındaki farktan yararlanarak aktif solunum olmasa bile hava yollarına sürekli oksijen akışına dayanan bir ventilasyon kütle akışı prensibidir. Laringoskopi sırasında oksijen satürasyonunun korunmasına katkıda bulunur.

(ESAIC-BJA ,1B öneri) Ağırlığa bağlı olarak dakikada 0,5 ila 4 litre arasında standart nazal kanül uygulaması, güvenli apne süresini iki katına çıkarabilir. Operatör stresini azaltarak ilk denemede entübasyon başarısını artırır.

Cerrahi Havayolu (Entübe edilemez-Ventilasyon Sağlanamaz)

İğne Krikotirotomi; 10-12 yaş altı çocuklarda tercih edilir. Trakeostomi açılana kadar bir kurtarma seçeneğidir. Steril eldiven giyilip bölge temizlendikten sonra baskın olmayan elin başparmağı ve orta parmağı trakeanın iki yanına yerleştirilerek cilt gerilir. İşaret parmağı ile krikotiroid zar palpe edilir. Yarısı SF dolu enjektöre 14G kateter yerleştirilir. Baskın elle, iğne 30°-45° açıyla negatif basınç uygulanarak kaudal yönde ilerletilir. Kan damarlarına zarar vermemek için zarın orta kısmının altından giriş yapılır. Şırınga içinde hava kabarcıkları görüldüğünde, iğne ve şırınga çıkarılırken kateter gövdeye doğru ilerletilir. Kateterin trakeada kaldığını doğrulamak için tekrar hava aspire edilir. Kateterin bükülme veya çıkma ihtimaline karşı sıkıca yerinde tutulmalıdır, Doğrudan 14G kateter gövdesine takılan 3-0 endotrakeal tüp adaptörü veya 3,0 mm'lik bir endotrakeal tüp mevcut değilse, pistonu çıkarılmış 3 mL'lik bir şırıngaya 7,0 mm'lik bir endotrakeal tüpün adaptörü yerleştirilerek hastaya ventilasyon uygulanabilir.

Seldinger tekniği; iğne takıldıktan sonra kılavuz tel geçirilerek iğne çıkarılır. Kılavuz telin yanına neşterle 1,5 cm'lik bir kesi yapılır ve dilatör/kateter ünitesi yerleştirilip sabitlenebilir.

Cerrahi krikotirotomi; krikoid kıkırdağı tamamen oluşmuş çocuklarda (≥10-12 yaş) tercih edilir. Neşter-parmak-buji tekniği, acil tıpta tercih edilen yöntemdir. Bu teknik acil serviste kolayca bulunan minimal ekipman gerektirir. İşlem için baskın olmayan elinizle trakea kıkırdağını tutarak krikoid kıkırdağa kadar palpasyon yapılir ve dikey olarak 4 cm'lik bir kesi oluşturulur. Künt diseksiyonla krikotiroid zara ilerlenir ve 1-1.2 cm'lik yatay bir kesi yapılır. Bir parmak yer tutucu olarak trakeaya sokulur. Elastik buji, kesiden içeri kaydırılarak aşağı doğru trakeaya yönlendirilir. Yalancı kanal oluşmasını önlemek için bujinin sığ bir açıyla ilerletilmesinden kaçınılmalıdır. 6.0 mm çapında manşetli bir endotrakeal tüp, buji üzerinden geçirilir. Yeri doğrulanınca ETT sabitlenir.

Eve ne götürelim?

Birden fazla tip ve boyutta yaşa uygun ekipman hazırlayın. Yedek cihazları hazır bulundurun. Çocuklarda ilk tercih videolaringoskopiyi düşünün. Entübasyon sırasında, apneik oksijenasyon uygulayın. Ek yardım için net tetikleyiciler belirleyin (2 başarısız girişim, belirgin desatürasyon veya bradikardi gibi). Yerel imkanlara göre bir acil trakeotomi seti bulundurun. Bu setin kullanımı konusunda klinisyenleri düzenli olarak eğitin.

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M4638-Tam Metin
PENETRAN BATIN TRAVMALARINDA LAPAROTOMİ ENDİKASYONLARI

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Amaç

Pediatrik penetran batın travmalı hastada laparotomi kararı geçmişte olduğu gibi sadece penetrasyon varlığına göre verilmemektedir. Günümüzde peritonit bulguları, penetrasyon varlığı, hemodinamik durum, bilgisayarlı tomografi (BT) bulguları, yaralanma mekanizması ve seri fizik muayene bulguları birlikte değerlendirilerek selektif bir yaklaşım benimsenmektedir. Bu çalışmada pediatrik penetran batın travmalarında acil laparotomi endikasyonlarının ortaya konulması ve seçici non-operatif yönetimin (Selective Non-Operative Management, SNOM) yerinin değerlendirilmesi amaçlanmıştır.

Yöntem

Penetran batın travmalarının yönetimine ilişkin ATLS 11. baskısı, Pediatric Trauma Society (PTS) önerileri, World Society of Emergency Surgery (WSES) kılavuzu ve pediatrik literatürde bildirilen çalışmalar incelendi. Laparotomi gerektiren klinik bulgular, SNOM için uygunluk kriterleri, lokal yara eksplorasyonu, BT bulguları ve diagnostik laparoskopinin olası rolü değerlendirildi. Ayrıca pediatrik penetran batın travmasına ilişkin seriler gözden geçirildi.

Bulgular

Travmatik yaralanmalar çocuk ölümlerinin en önemli nedenlerindendir. Abdominal travma, travma nedeniyle hastaneye başvuranların %8-10'unu oluşturur. Penetran travmalar çocuklarda daha az görülür ve abdominal travmaların %8-12'sini oluşturur. (1)

Çocuklarda abdominal duvarın daha ince olması nedeniyle penetran travma daha küçük bir alanda ciddi intraabdominal yaralanmaya neden olabilir. Ayrıca çocuklarda kompansatuar mekanizmalar güçlü olduğu için hipotansiyon geç ortaya çıkabilmektedir. Bundan dolayı hemodinamik değerlendirme yalnızca kan basıncına dayandırılmamalıdır. Taşikardi, periferik perfüzyon, mental durum, kapiller dolum, nabız basıncı, seri hemoglobin ve laktat değerleri klinik durumla birlikte değerlendirilmelidir (6).

Hemodinamik dekompansasyon veya devam eden kanama şüphesi, belirgin peritonit, diffüz abdominal hassasiyet, rijidite veya rebound, enterik içerik gelmesi, abdominal organ evisserasyonu ve impalement acil cerrahi değerlendirme gerektiren önemli bulgulardır. Hematemez, nazogastrik aspiratta belirgin kan veya klinik bulgularla birlikte rektal kanama da ciddi intraabdominal yaralanma açısından değerlendirme gerektirir (2).

Hemodinamik olarak kompansasyonlu, peritonit bulgusu bulunmayan, güvenilir fizik muayene yapılabilen ve seri takip olanağı bulunan seçilmiş hastalarda SNOM uygulanabilir (3). Özellikle anterior abdominal kesici-delici yaralanmalarda lokal yara eksplorasyonu ile peritoneal penetrasyon değerlendirilebilir. Peritoneal penetrasyonun saptanması tek başına laparotomi endikasyonu değildir. Lomber bölge, posterior ve ateşli silah yaralanmalarında kontrastlı BT'nin tanısal rolü daha belirgindir.

BT'de ekstraluminal hava, ekstraluminal kontrast, bağırsak duvar defekti ve batın içi yabancı cisim yüksek özgüllüklü bulgular olarak değerlendirilmelidir (8). Buna karşılık solid organ yaralanması olmaksızın serbest sıvı, anormal bağırsak duvarı kontrastlanması ve mezenterik stranding (kirlenme, ödem) tek başına laparotomi kararı için yeterli değildir (9). BT bulguları klinik değerlendirme ile birlikte yorumlanmalıdır. Hemodinamik olarak instabil hastalarda görüntüleme cerrahi tedaviyi geciktirmemelidir.

Ateşli silah yaralanmaları, kesici-delici yaralanmalara göre daha yüksek enerji ve çoklu organ veya bağırsak yaralanması riski taşımaktadır. Bununla birlikte uygun merkezlerde seçilmiş, hemodinamik olarak kompansasyonlu ve peritonit bulgusu olmayan hastalarda SNOM düşünülebilir (7). Diagnostik laparoskopi ise peritoneal penetrasyonun doğrulanması, özellikle torakoabdominal yaralanmalarda diyafragma hasarının değerlendirilmesi ve seçilmiş hastalarda tedavi amacıyla kullanılabilir.

Pediatrik kanıtlar sınırlıdır. 2009 yılında yayımlanan 90 çocukluk seride, hemodinamik instabilite veya bağırsak perforasyonu bulgusu bulunan hastalar acil laparotomiye alınmış; 51 hasta (%56,6) başlangıçta non-operatif olarak yönetilmiş ve yalnızca iki hastada sonradan cerrahi gerekmiştir (4). 2025 PTS serisinde ise seçilmiş 27 çocukta NOM sonrasında yalnızca bir hastada klinik kötüleşme nedeniyle gecikmiş eksplorasyon gerekmiştir (5). Bununla birlikte mevcut pediatrik çalışmaların örneklem büyüklükleri küçük ve çoğunlukla retrospektiftir.

Sonuç

Pediatrik penetran batın travmasında peritoneal penetrasyonun varlığı tek başına laparotomi endikasyonu değildir. Hemodinamik dekompansasyon, peritonit ve diğer ciddi klinik bulgular

varlığında cerrahi tedavi geciktirilmemelidir. Hemodinamik olarak kompansasyonlu, güvenilir seri fizik muayenesi yapılabilen seçilmiş çocuklarda SNOM uygulanabilir. Laparotomi kararı; hemodinamik durum, klinik bulgular, yaralanma mekanizması, BT sonuçları ve seri fizik muayenenin birlikte değerlendirilmesiyle verilmelidir. SNOM yalnızca uygun pediatrik travma ve acil cerrahi altyapısına sahip merkezlerde uygulanmalıdır.

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M4648-Tam Metin

PEDİATRİK ACİL SERVİSTE KONJENİTAL ADRENAL HİPERPLAZİYE YAKLAŞIM

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ÖZET

Giriş

Konjenital adrenal hiperplazi (KAH), adrenal kortekste kortizol sentezinde rol oynayan enzimlerin eksikliği sonucu gelişen, otozomal resesif geçişli bir grup kalıtsal metabolik hastalıktır. Olguların büyük çoğunluğundan 21-hidroksilaz enzim eksikliği sorumludur. Kortizol üretimindeki yetersizlik, hipofizden adrenokortikotropik hormon (ACTH) salınımını artırarak adrenal bezlerin hiperplazisine ve eksik olan enzimin öncesindeki steroid

prekürsörlerinin (özellikle 17-hidroksiprogesteron) birikmesine yol açar.
Gelişme
KAH, klinik olarak tuz kaybettiren (klasik), basit virilizan (klasik) ve klasik olmayan (geç başlangıçlı) formlar olarak sınıflandırılır. Tuz kaybettiren formda, mineralokortikoid (aldosteron) eksikliğine bağlı olarak hayatın ilk haftalarında ciddi hiponatremi, hiperkalemi, hipoglisemi, dehidratasyon ve şok tablosuyla seyreden adrenal kriz gelişebilir. Diğer taraftan, androjen fazlalığı nedeniyle kız yenidoğanlarda kuşkulu genital yapı (ambiguus genitalia) gözlenirken, erkek yenidoğanlar dış genital yapı bakımından normal görünebilir ve bu durum tanı gecikmesine yol açabilir.
Pediatrik acil serviste ilk değerlendirme hastanın klinik ve hemodinamik durumuna göre yapılmalıdır. Şüpheli olgularda sıvı-elektrolit dengesizliği ve kan şekeri hızlıca değerlendirilmeli; kardiyak monitörizasyon ve elektrokardiyografi (EKG) ile hiperkalemiye bağlı aritmi riskleri yakın takip edilmelidir. Tedavide hemodinamik stabilizasyonun sağlanması, hipovoleminin izotonik sıvılarla düzeltilmesi, hipogliseminin giderilmesi, hiperkaleminin yönetimi ve yüksek doz parenteral hidrokortizon uygulanması önem taşımaktadır.
Sonuç
Bu sunumun amacı, çocuklarda konjenital adrenal hiperplazinin patofizyolojisini, klinik formlarını, acil serviste tanısal değerlendirmesini ve adrenal kriz tablosunda temel acil tedavi yaklaşımlarını ele almaktır.

Anahtar Kelimeler: *Konjenital adrenal hiperplazi, 21-hidroksilaz eksikliği, adrenal kriz, hiponatremi, hiperkalemi, ambiguus genitalia*

GİRİŞ

Konjenital adrenal hiperplazi (KAH), adrenal korteksteki steroidogenez basamaklarında görev alan enzimlerin yetersizliği sonucu ortaya çıkan otozomal resesif geçişli bir hastalık grubudur. Enzim bloğu nedeniyle kortizol sentezi azalır. Negatif geri bildirim mekanizmasının bozulması sonucunda ön hipofizden ACTH salınımı artar. Yüksek ACTH seviyeleri adrenal korteksi uyararak adrenal hiperplaziye ve blokajın öncesinde biriken prekürsörlerin aşırı üretimine sebep olur. Olguların büyük çoğunluğundan 21-hidroksilaz (CYP21A2) enzim eksikliği sorumludur.

Klinik tablo, enzim eksikliğinin derecesine bağlı olarak değişiklik gösterir. Ağır enzim eksikliğinde hem glukokortikoid hem de mineralokortikoid sentezi bozulur. Aldosteron eksikliği renal tübüllerden sodyum emilimini azaltıp potasyum atılımını engelleyerek belirgin sıvı ve elektrolit kayıplarına yol açar. Ailesel öykü veya yenidoğan taraması olmayan bebekler, acil servise hayatı tehdit eden akut adrenal kriz ile başvurabilir.

ETİYOLOJİ VE PATOFİZYOLOJİ

Steroidogenez yolağında kortizol sentezinin azalması temel patofizyolojik mekanizmayı oluşturur. 21-hidroksilaz eksikliğinde, 17-hidroksiprogesteron 11-deoksikortizola dönüşemez. Biriken 17-hidroksiprogesteron ve diğer prekürsörler androjen yolağına kayarak androjen sentezinde belirgin artışa yol açar.

Hastalık klinik olarak üç ana formda gözlenir. Klasik tuz kaybettiren form olguların yaklaşık yüzde yetmiş beşini oluşturur. Bu formda hem kortizol hem de aldosteron sentezi ağır derecede yetersizdir ve aşırı androjen üretimi mevcuttur. Klasik basit virilizan form ise olguların yaklaşık yüzde yirmi beşinde görülür. Bu durumda kortizol sentezi yetersiz olmakla birlikte bazal aldosteron sentezi sodyum dengesini korumaya yeterlidir; şiddetli virilizasyon bulguları görülür

fakat yenidoğan döneminde belirgin tuz kaybı krizi gözlenmez. Klasik olmayan yani non-klasik formda ise enzim aktivitesi kısmen korunmuştur. Hastalar çocukluk veya adolesan dönemde hirsutizm, oligomenore veya erken adrenarş ile başvurabilir ve acil kriz tablosu oluşturmaz.

Aldosteron eksikliğine bağlı olarak böbreklerde sodyum tutulumu bozulur, potasyum ve hidrojen iyonlarının atılımı engellenir. Bu durum hiponatremi, hiperkalemi ve metabolik asidoz ile sonuçlanır. Glukokortikoid eksikliği ise vasküler tonusun korunmasını zorlaştırır, katekolaminlere olan yanıtı azaltır ve glukoneojenezi bozarak hipoglisemiye zemin hazırlar.

KLİNİK BULGULAR VE PEDİATRİK ACİL SERVİSTE DEĞERLENDİRME

Pediatrik acil servise başvuru yaşı ve semptomlar hastalığın formuna ve cinsiyete göre değişiklik gösterir. Yenidoğan kız bebeklerde aşırı androjen maruziyeti nedeniyle genital organlarda virilizasyon, klitoromegali, labial füzyon ve ürogenital sinüs gibi kuşkulu genital yapı bulguları gözlenir. Bu durum sıklıkla doğumda fark edilerek erken tanı konmasını sağlar. Yenidoğan erkek bebeklerde ise dış genital yapı tamamen normal olabilir, bazen yalnızca hafif hiperpigmentasyon veya gonad boyutlarında artış görülebilir. Erkek bebeklerde tanı gecikmesi ihtimali yüksek olduğundan hastalar genellikle yaşamın ilk iki veya üç haftasında akut adrenal kriz tablosu ile acil servise getirilirler.

Adrenal kriz tablosundaki bebeklerde emişte azalma, kusma, letarji, tartı alamama veya kilo kaybı görülebilir. Fizik muayenede dehidratasyon, zayıf nabızlar, kapiller dolum süresinde uzama, hipotansiyon ve şok tablosu saptanabilir. Klinik tabloya açıklanamayan dirençli hipoglisemi ile birlikte sodyumun litrede yüz otuz milieşdeğerin altına düştüğü hiponatremi ve potasyumun litrede altı milieşdeğerin üzerine çıktığı ciddi hiperkalemi eşlik eder.

Laboratuvar ve tanısal değerlendirmede kan gazı ve elektrolit incelemelerinde hiponatremi, hiperkalemi, hipoglisemi ve metabolik asidoz saptanır. Elektrokardiyografi ve kardiyak monitörizasyon ile hiperkalemiye bağlı gelişebilecek sivrileşmiş T dalgaları, PR aralığında uzama, QRS genişlemesi ve ventriküler aritmiler yakın takip edilmelidir. Acil tedavi öncesinde serum 17-hidroksiprogesteron, kortizol, ACTH, renin ve elektrolit düzeyleri için kan örneği alınmalıdır. Ancak hormonal test sonuçları beklenmeden, klinik şüphe durumunda tedaviye derhal başlanmalıdır.

ACİL TEDAVİ VE YÖNETİM

Adrenal kriz, pediatrik acil serviste hayatı tehdit eden tıbbi bir acildir. Tedavinin temel amaçları doku perfüzyonunun sağlanması, sıvı eksikliğinin ve elektrolit bozukluklarının düzeltilmesi, hipogliseminin giderilmesi ve eksik glukokortikoidin yerine konmasıdır.

İlk olarak hastanın havayolu, solunum ve dolaşımı değerlendirilmeli, yüksek akışlı oksijen sağlanarak damar yolu açılmalı ve kardiyak monitör bağlantısı yapılmalıdır. Hipovolemik şoktaki hastaya kilo başına on ila yirmi mililitre izotonik sodyum klorür çözeltisi bolus olarak hızla verilmeli ve ihtiyaca göre tekrarlanmalıdır. Bu süreçte potasyum içeren sıvılar kesinlikle kullanılmamalıdır. Hipoglisemi saptanması durumunda kilo başına iki ila beş mililitre yüzde onluk dekstroz IV bolus uygulanmalı, ardından uygun dekstrozlu idame sıvı tedavisine geçilmelidir.

Hormon replasmanında hidrokortizon sodyum süksinat şüphe duyulduğu anda IV bolus olarak uygulanmalıdır. Yenidoğan ve süt çocuklarında yirmi beş ila elli miligram, daha büyük çocuklarda ise metrekare başına elli ila yüz miligram IV bolus doz önerilir. Ardından günlük

stres dozunun sürekli IV infüzyonu veya bölünmüş dozlar halinde idamesi sağlanır. Akut dönemde verilen yüksek doz hidrokortizon mineralokortikoid etki de gösterdiğinden akut krizde ekstra fludrokortizon uygulanması şart değildir, hasta oral beslenmeye geçtiğinde tedaviye eklenebilir.

Hiperkalemi yönetiminde sıvı reanimasyonu ve hidrokortizon uygulaması genellikle potasyum seviyelerini düşürür. Şiddetli hiperkalemi ve EKG değişiklikleri varlığında kardiyoproteksiyon amacıyla yüzde onluk kalsiyum glukonat yavaş infüzyonla verilebilir. Potasyumu hücre içine kaydırmak amacıyla sodyum bikarbonat, insülin dekstroz infüzyonu veya salbutamol nebulizasyonu değerlendirilebilir.

SONUÇ

Pediatrik acil serviste açıklanamayan dehidratasyon, şok, dirençli hipoglisemi veya ciddi elektrolit bozukluğu ile başvuran süt çocuklarında Konjenital Adrenal Hiperplaziye bağlı adrenal kriz mutlaka akla gelmelidir. Kız bebeklerde kuşkulu genital yapı tanıya yönlendirici olabilirken, erkek bebeklerin genital muayenesinin normal olabileceği unutulmamalıdır.

Acil serviste tanısal kan örnekleri alındıktan hemen sonra, laboratuvar veya hormon sonuçları beklenmeksizin agresif sıvı reanimasyonu, hipoglisemi ve hiperkalemi kontrolü ile yüksek doz IV hidrokortizon tedavisi başlatılmalıdır. Hastanın izlemi Çocuk Endokrinolojisi ve Çocuk Yoğun Bakım birimleriyle iş birliği içinde sürdürülmelidir.

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M4521-Özet Metin

ATYPİCAL MCCLEERY SYNDROME INDUCED BY THE DEPENDENT ARM POSİTİON İN AN ADOLESCENT: DYNAMİC VENOGRAPHİC FİNDİNGS

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M4448-Tam Metin

Diagnostic Value of the AFIAS MxA/CRP Test in Children Presenting to the Pediatric Emergency Department with Acute Upper Respiratory Tract Infections: A Prospective Diagnostic Cohort Study

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INTRODUCTION/AIM:

Acute upper respiratory tract infections (URTIs) are common in children and account for a substantial proportion of pediatric emergency department visits. Although most are caused by viral pathogens, early recognition of bacterial infections is important for appropriate treatment and prevention of complications. However, the overlapping clinical features of viral and bacterial infections make differentiation based solely on clinical assessment difficult and may contribute to unnecessary antibiotic use (1,2).

Clinical scoring systems, rapid streptococcal antigen tests, and throat cultures are used in the diagnosis of bacterial pharyngitis, but each has limitations. Therefore, interest has increased in host-response biomarkers such as MxA and CRP for differentiating viral from bacterial infections (3).

This study aimed to evaluate the diagnostic performance of the AFIAS MxA/CRP test in differentiating viral and bacterial infections in children presenting to the pediatric emergency department with acute URTI symptoms.

MATERIALS and METHODS:

In this single-center, prospective study, 123 children aged 3–18 years presenting with acute URTI symptoms between October 1, 2025, and May 1, 2026, were evaluated. In addition to clinical assessment and McIsaac scoring, rapid Group A streptococcal antigen testing, throat culture, multiplex respiratory pathogen panel (RPP), and AFIAS MxA/CRP testing were performed. Bacterial infection was defined as detection of *Streptococcus pyogenes* and/or *Streptococcus pneumoniae*. Diagnostic performance was assessed using sensitivity, specificity, predictive values, and AUC; appropriate statistical methods were applied, with $p<0.05$ considered statistically significant. Post-hoc analysis showed that the sample size provided 99.3% power for the CRP model.

RESULTS:

A total of 123 children presenting with acute URTI symptoms were included in the study. The baseline demographic and clinical characteristics of the patients are presented in Table 1. The median age was 8.0 years, and 56.9% of the patients were male. According to the composite reference standard, 36 patients (29.3%) were classified as having a bacterial infection.

Table 1. Baseline Demographic and Clinical Characteristics of the Study Population (n = 123)

Variable	**Value**
Age, years, median (IQR); range	8.0 (6.0); 3–18
Sex, n (%)	
Male	70 (56.9)
Female	53 (43.1)
McIsaac score, median (IQR); range	3.0 (2.0); 2–5
Throat culture (GAS), n (%)	
Positive	30 (24.4)
Negative	93 (75.6)
Respiratory pathogen panel, n (%)	
Viral	66 (53.7)
Negative	50 (40.7)
Viral-bacterial coinfection	5 (4.1)
Bacterial (*Streptococcus pneumoniae*)	2 (1.6)
Composite reference standard, n (%)	

Variable	Value
Bacterial	36 (29.3)
Non-bacterial	87 (70.7)
MxA, ng/mL, median (IQR); range	50.0 (167.3); 10–300
CRP, mg/L, median (IQR); range	13.1 (50.3); 1–200

Abbreviations: GAS, Group A *Streptococcus*; IQR, interquartile range; MxA, myxovirus resistance protein A; CRP, C-reactive protein. Composite reference standard: positive throat culture for *Streptococcus pyogenes* and/or positive respiratory pathogen panel for *Streptococcus pneumoniae*.

According to the composite bacterial reference standard, the rapid streptococcal antigen test demonstrated the highest diagnostic performance, with a sensitivity of 83.3% and specificity of 98.9% (AUC=0.911). For McIsaac ≥3, sensitivity was 86.1% and specificity was 33.3% (AUC=0.597), while for AFIAS MxA/CRP, sensitivity was 63.9% and specificity was 59.8% (AUC=0.709) (Table 2).
Regarding biomarker distributions, the MxA/CRP ratio was significantly lower in the bacterial infection group than in the non-bacterial group (median: 1.12 vs. 6.44; $p<0.001$).

Table 2. Diagnostic performance according to the composite bacterial reference standard

Test	Sensitivity, % (95% CI)	Specificity, % (95% CI)	PPV, % (95% CI)	NPV, % (95% CI)	AUC
McIsaac ≥3	86.1 (71.3–93.9)	33.3 (24.3–43.8)	34.8 (25.7–45.2)	85.3 (69.9–93.6)	0.597
AFIAS MxA/CRP	63.9 (47.6–77.5)	59.8 (49.3–69.4)	39.7 (28.1–52.5)	80.0 (68.7–87.9)	0.709
Rapid streptococcal antigen test	83.3 (68.1–92.1)	98.9 (93.8–99.8)	96.8 (83.8–99.4)	93.5 (86.5–97.0)	0.911

Abbreviations: CI, confidence interval; PPV, positive predictive value; NPV, negative predictive value; AUC, area under the receiver operating characteristic curve.
Footnote: The reference standard was a composite bacterial reference standard defined as positivity for *Streptococcus pyogenes* on throat culture and/or positivity for *Streptococcus pneumoniae* on NP-aspirate (n=36 bacterial, n=87 non-bacterial).

DISCUSSION:

In our study, the rapid streptococcal antigen test demonstrated the highest diagnostic performance (98.9% specificity; AUC=0.911). Its sensitivity of 83.3% indicates that negative results do not completely exclude bacterial infection and that confirmation with throat culture may be required when appropriate (4,5).

The AFIAS MxA/CRP test showed higher, but not statistically significant, discriminatory performance compared with the McIsaac score. The MxA/CRP ratio was significantly lower in bacterial infections (1.12 vs. 6.44; $p<0.001$) and demonstrated moderate discriminatory ability at a cutoff of <3.50 (AUC=0.719; sensitivity 75.0%; specificity 60.9%) in ROC analysis. These findings suggest that MxA/CRP may serve as a potential biomarker for etiological differentiation, but may be more appropriate as a complementary tool to clinical and microbiological assessment rather than as a stand-alone basis for treatment decisions (4,6–8).

The strengths of the study include its prospective design, application of index tests during the same clinical encounter, and comparison of different diagnostic methods within the same population. However, the single-center design, limited sample size, and pathogen distribution within the composite reference standard may limit the generalizability of the findings. Further multicenter prospective studies in diverse populations are needed to validate these results. (9,10).

CONCLUSION:

In conclusion, the AFIAS MxA/CRP test demonstrated moderate diagnostic performance in differentiating bacterial from non-bacterial infections in children with acute URTI and showed potential as a complementary biomarker. Further large-scale, multicenter prospective studies are needed to validate the <3.50 cutoff identified by ROC analysis in different populations.

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1.ULUSLARARASI PEDİATRİK ACİLLER KONGRESİ

KONUŞMA VE SÖZLÜ BİLDİRİ ÖZET VE TAM METİN KİTABI