
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				



SALON 2 (NON-TRAVMA) 29.08.2026

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. BAŞER 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

ATUDER Acil Tıp Uzmanları Derneği

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).

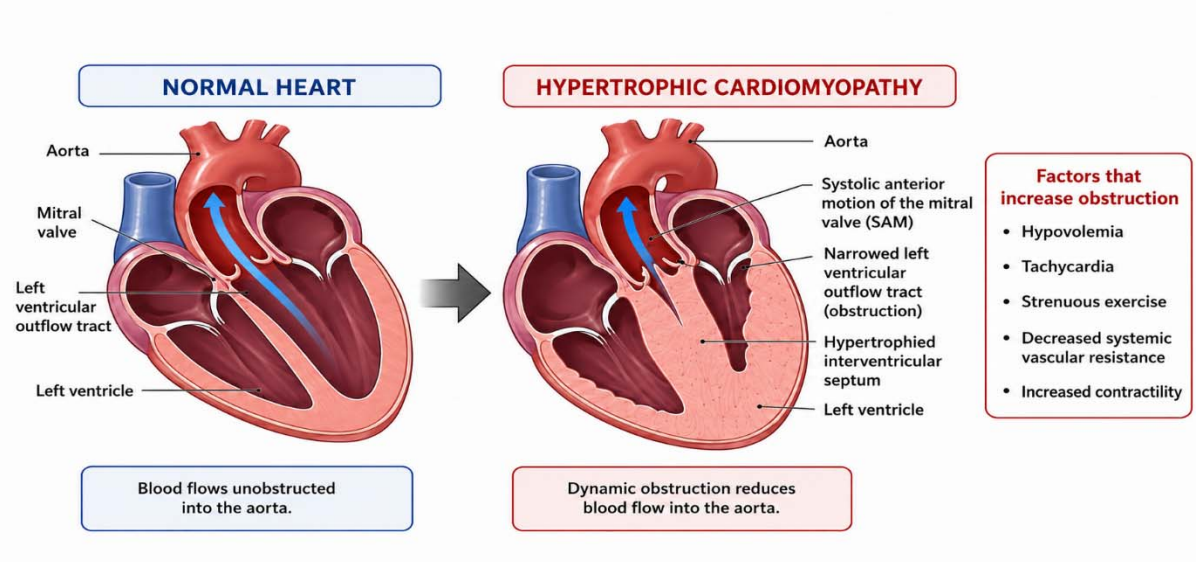


Figure 1. Schematic illustration of septal hypertrophy, systolic anterior motion of the mitral valve, and dynamic left ventricular outflow tract obstruction in children with hypertrophic cardiomyopathy.

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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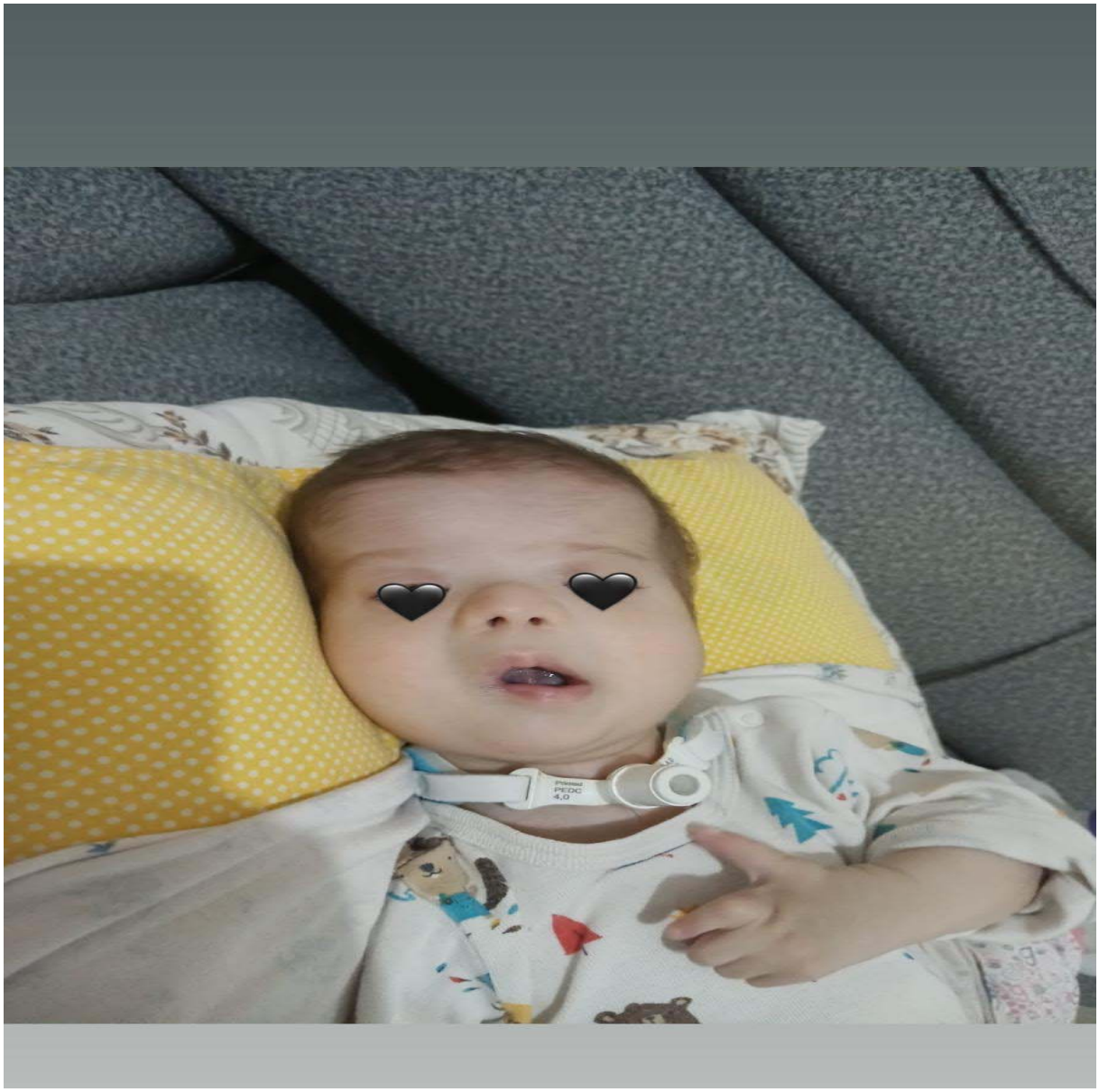
Introduction: Van Maldergem syndrome (VMS) is an ultra-rare autosomal recessive developmental disorder caused by biallelic variants in the DCHS1 or FAT4 genes. It is characterized by craniofacial dysmorphism, ear anomalies, neurodevelopmental impairment, and variable multisystem involvement. Neonatal 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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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.

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

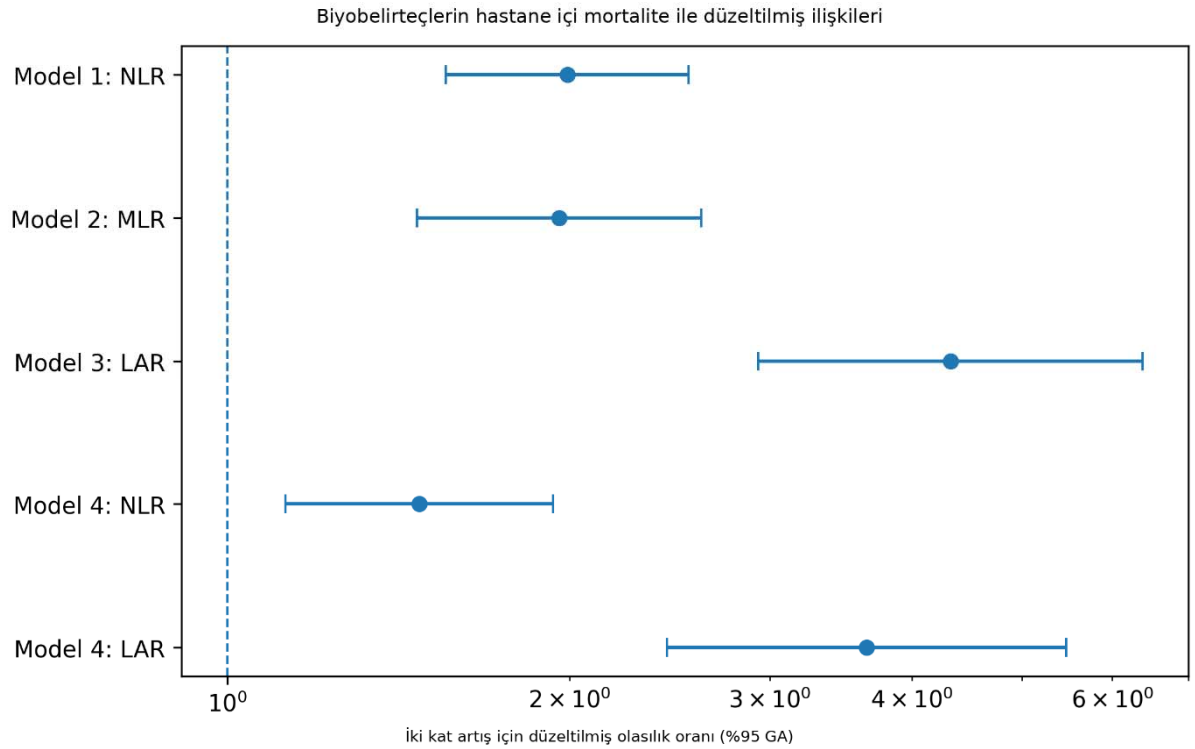
Yoğun bakımda izlenen akut inme hastalarında kabul sırasında hesaplanan NLR, MLR ve özellikle LAR hastane içi mortaliteyle ilişkili bulundu. LAR tek başına NLR ve MLR'den daha yüksek ayırt edici performans gösterirken, NLR ile birlikte kullanıldığında temel klinik modele ek prognostik katkı sağladı. 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

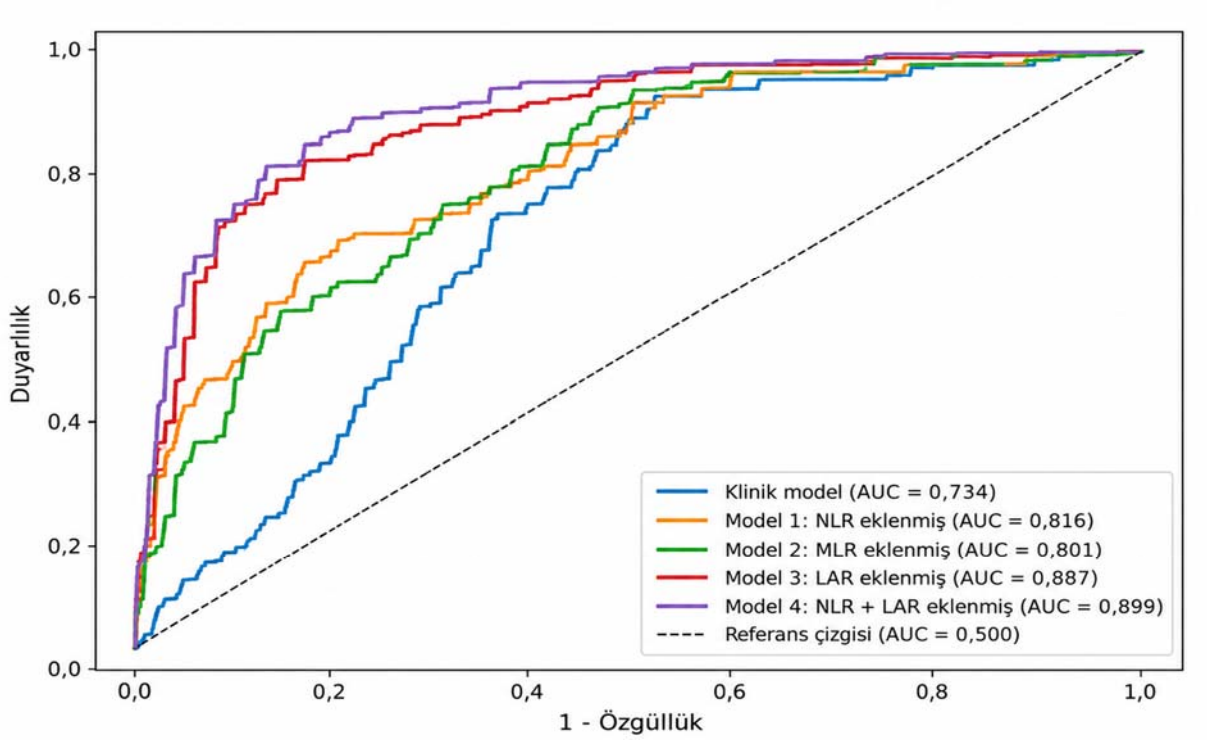


Tablo 2. Düzeltilmiş biyobelirteç ilişkileri ve mortalite modeli performansı

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

During the preparation of this work, the author utilized the Gemini 3.1 Pro AI model to assist with [e.g., text editing, language polishing, or structuring the manuscript]. After using this tool, the author reviewed and edited the content as necessary and took full responsibility for the content of the publication. The author declare no conflict of interest regarding the use of this AI model.

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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.

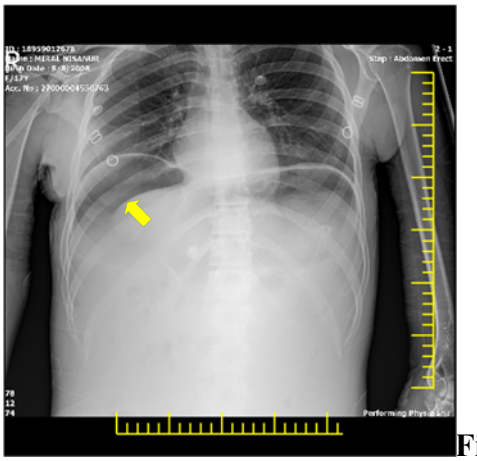


Figure 1. Upright abdominal radiograph showing free subdiaphragmatic air beneath the right hemidiaphragm (yellow arrow)

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.

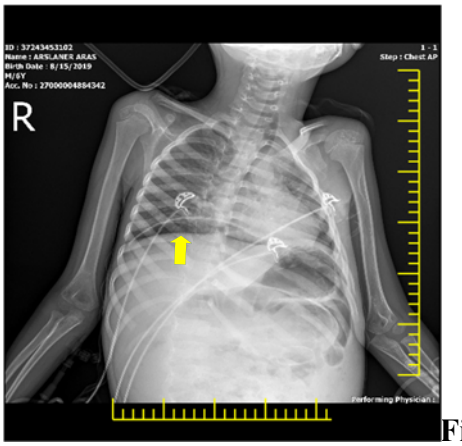


Figure 2. Upright abdominal radiograph demonstrating free intraperitoneal air beneath the right hemidiaphragm.

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.

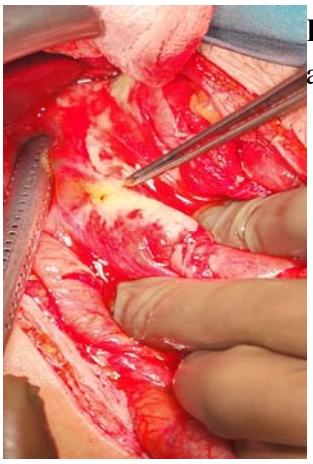


Figure 4. Intraoperative photograph demonstrating a small gastric antral perforation (indicated by the forceps).

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.

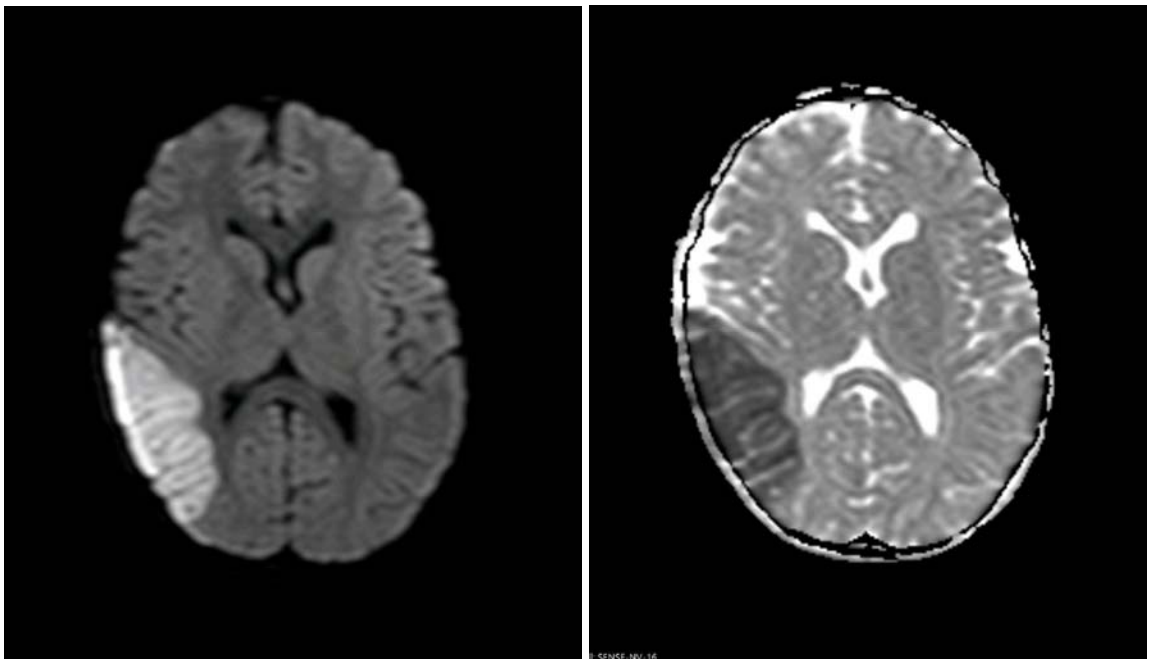
İkinci hasta 5 yaşında erkek çocuktu ve akut gelişen sağ taraflı güçsüzlük ile başvurdu. Kraniyal BT'de sağ anterior frontal lob ile bilateral frontal ve parietal loblarda hipodens parankimal alanlar izlendi ve bunun üzerine difüzyon MRG gerçekleştirildi. Difüzyon ağırlıklı görüntülerde bilateral serebral 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%

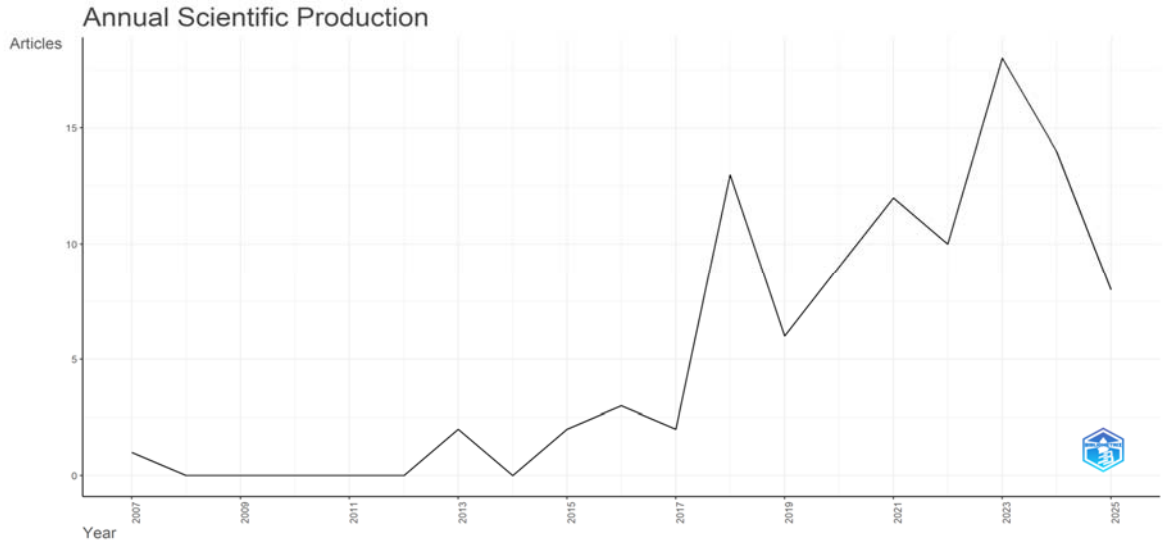


Figure 1. Annual scientific production on pediatric readiness in emergency departments, 2007–2025.

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

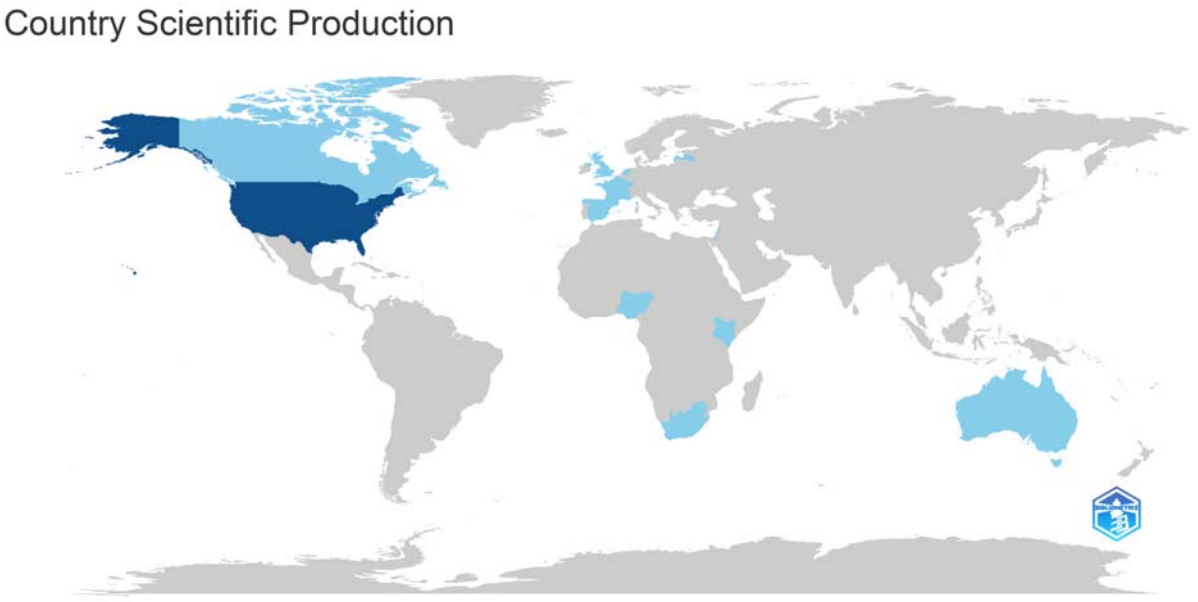


Figure 2. Geographic distribution of scientific production. Shading indicates the presence and relative frequency of country affiliations; documents with multinational authorship may be counted for more than one country.

M4420-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.

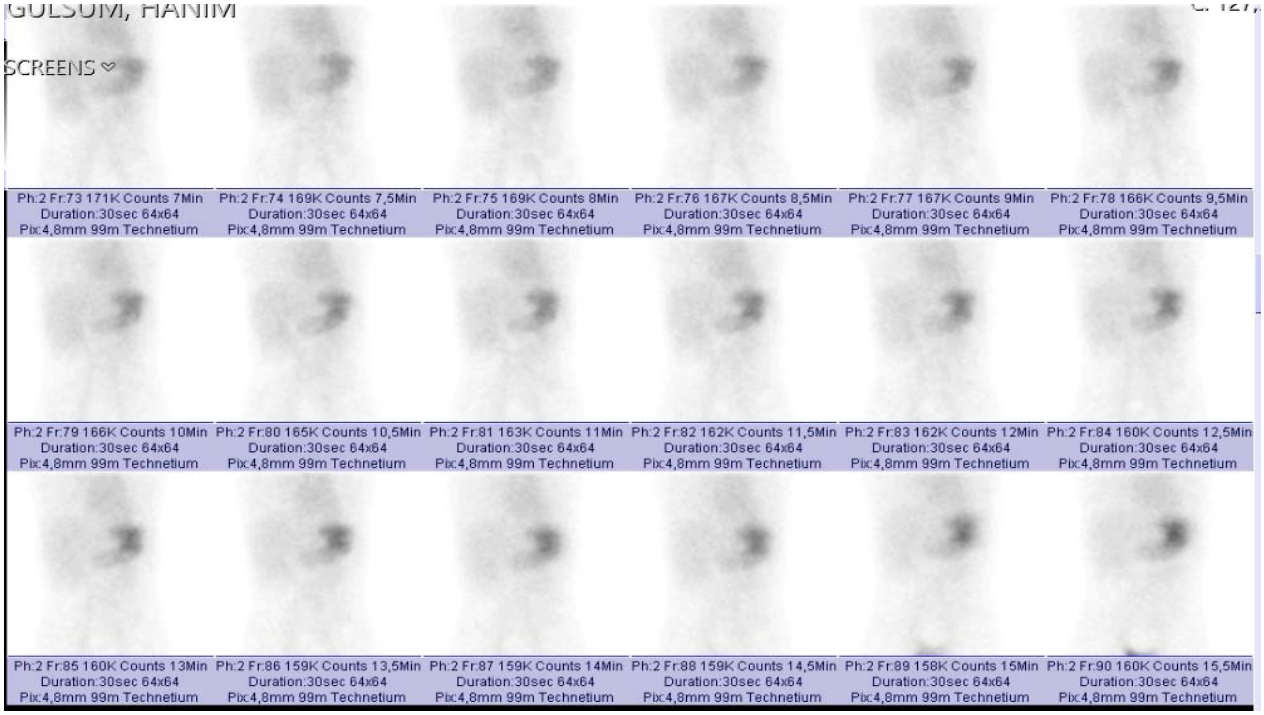
Materials and Methods: Pediatric Meckel scintigraphies performed with Tc-99m pertechnetate with a preliminary diagnosis of Meckel's diverticulum in our clinic since 2020 were retrospectively evaluated. The clinical presentation findings, scintigraphic features, and histopathological results in available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

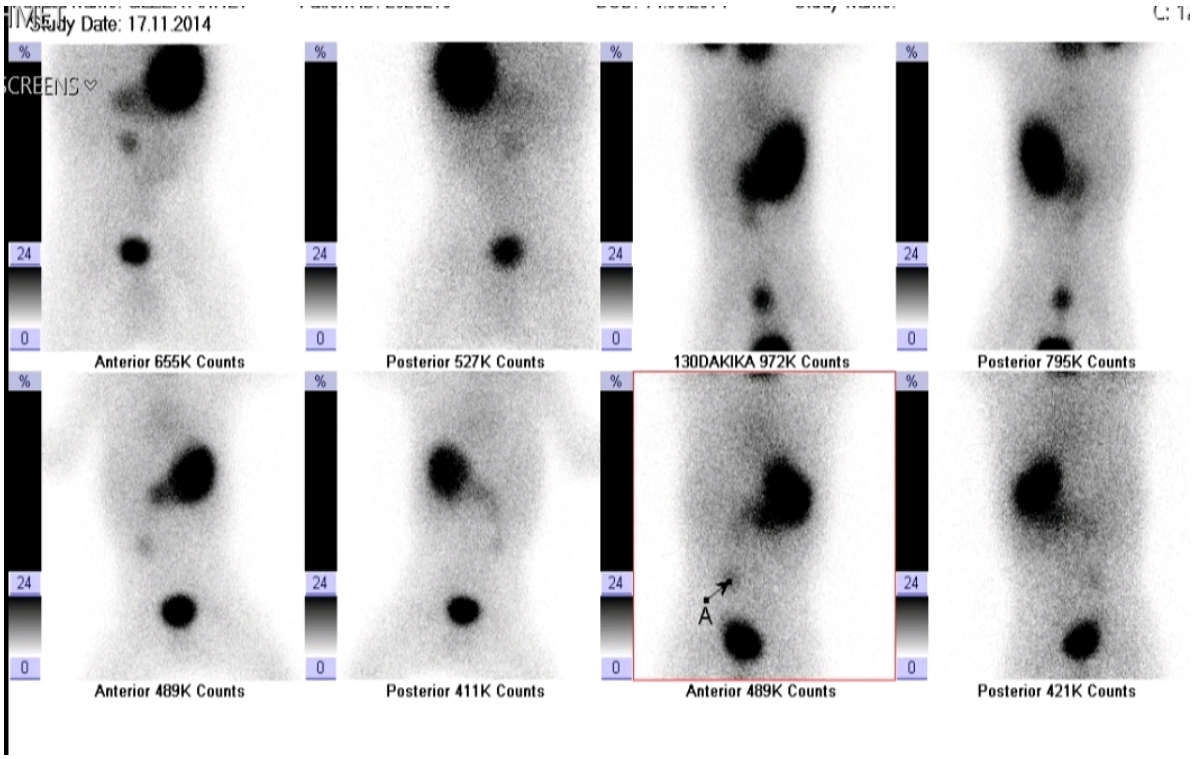
Case 1:

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

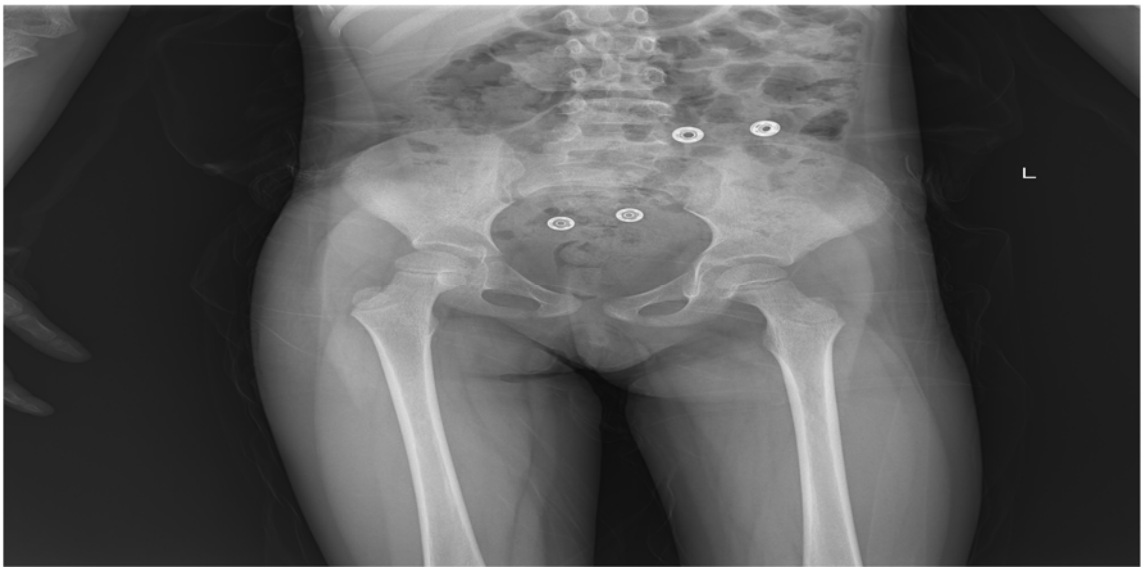
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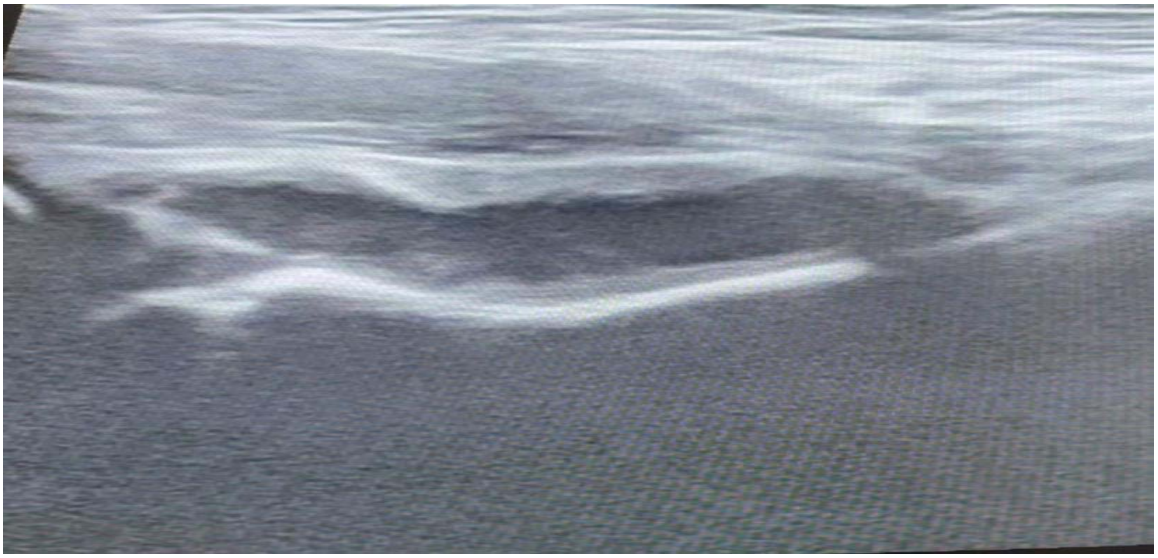
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M4426-Tam Metin

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.

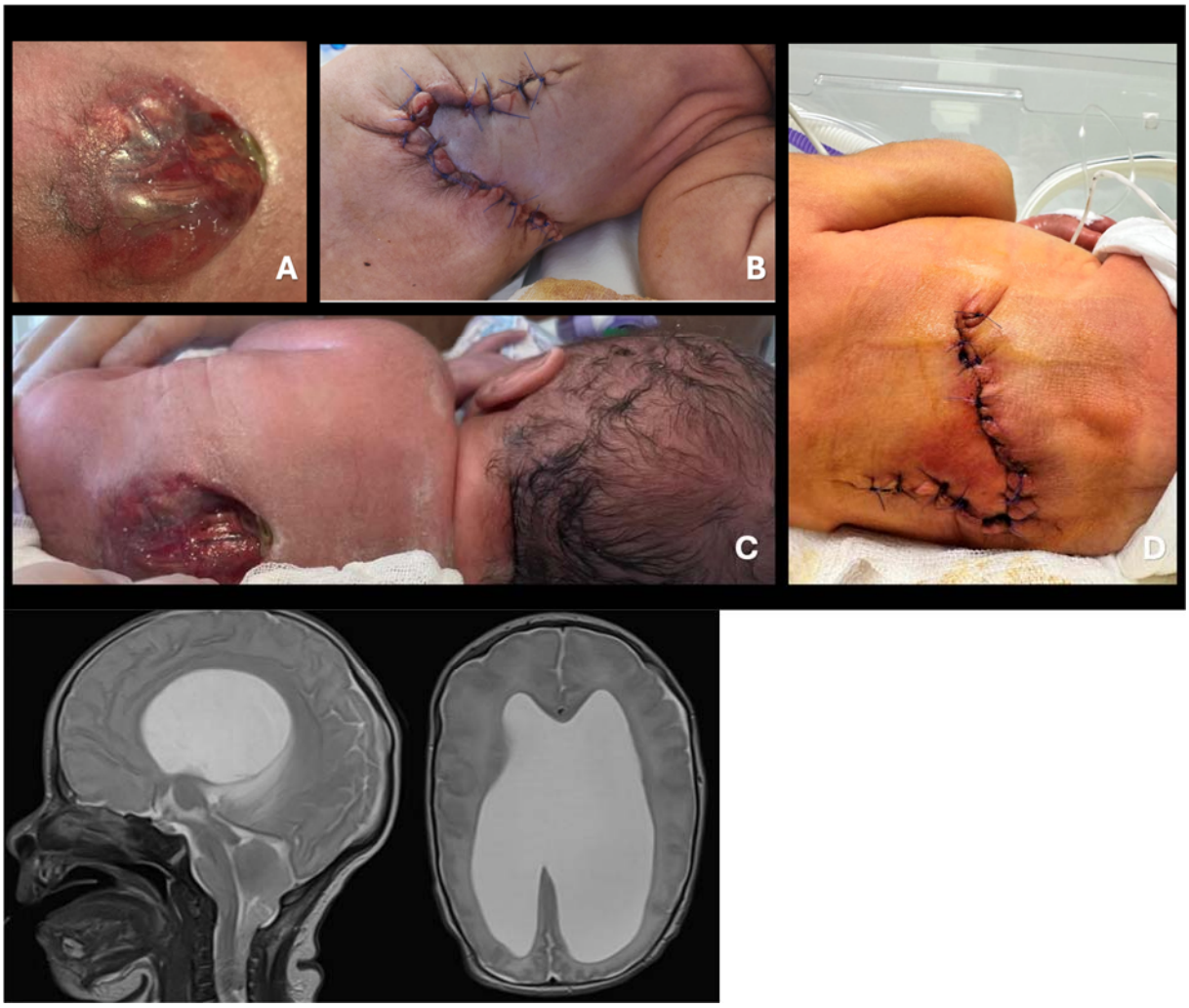
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M4427-Tam Metin

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

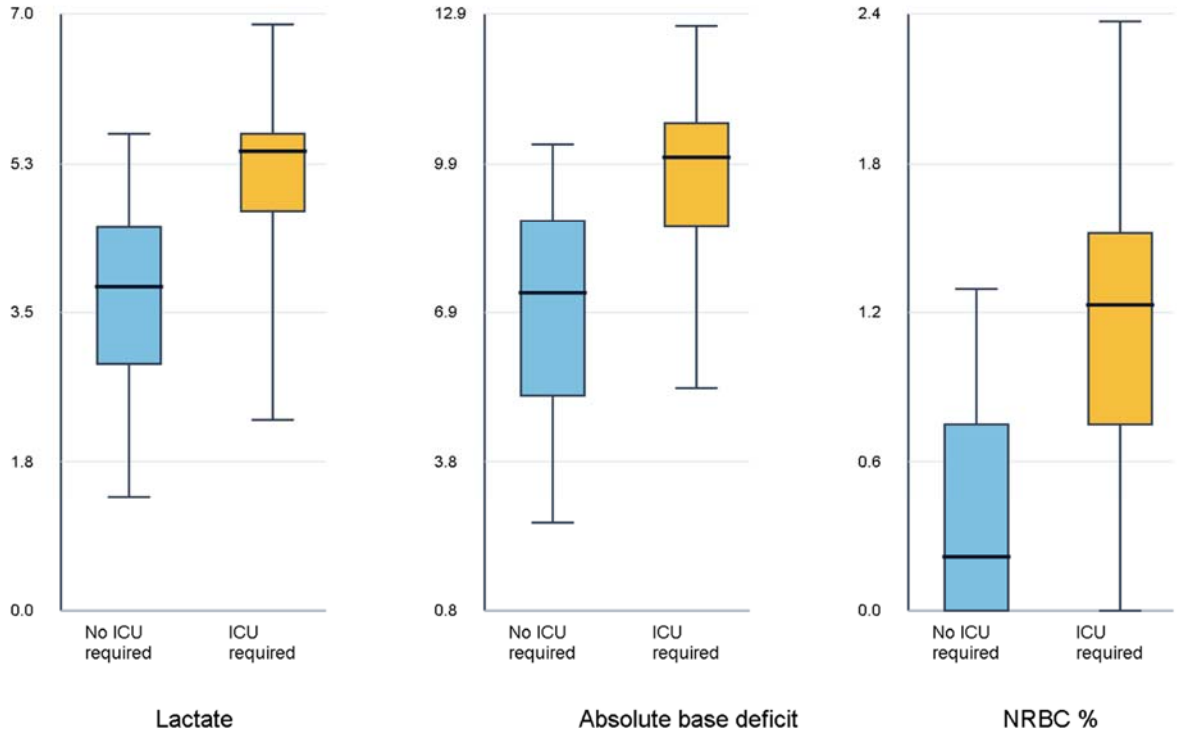
Data are median (interquartile range) unless otherwise stated. GCS: Glasgow Coma Scale; ICU: intensive care unit; NRBC: nucleated red blood cells.

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%

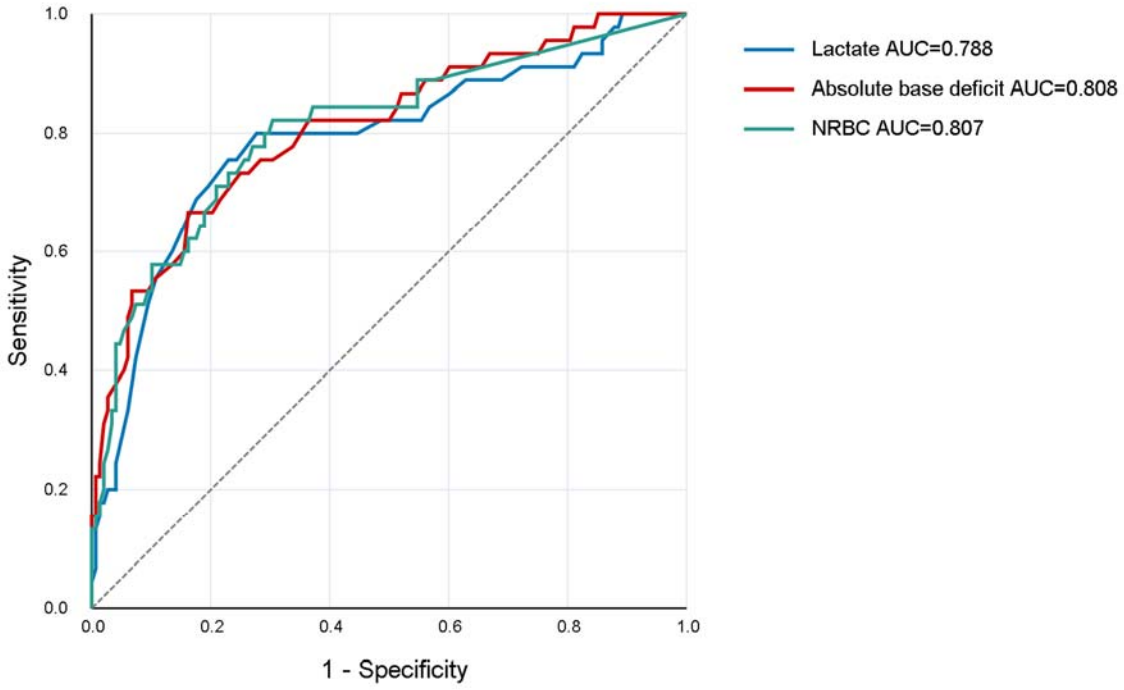
AUC: area under the curve; CI: confidence interval; ICU: intensive care unit; NRBC: nucleated red blood cells; ROC: receiver operating characteristic.

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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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

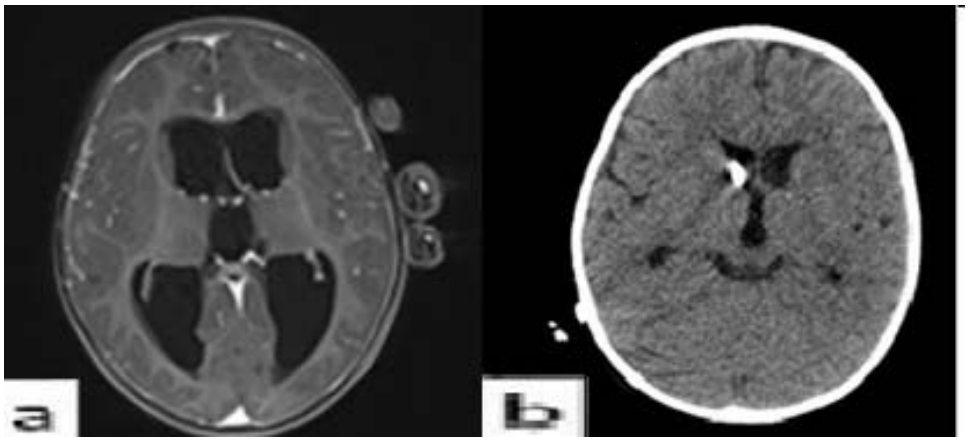


Figure 1. (a) Cranial MRI demonstrating hydrocephalus after clinical deterioration. (b) Cranial CT (computed tomography) after VP shunt placement following recurrence of raised intracranial pressure signs during drain closure.

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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

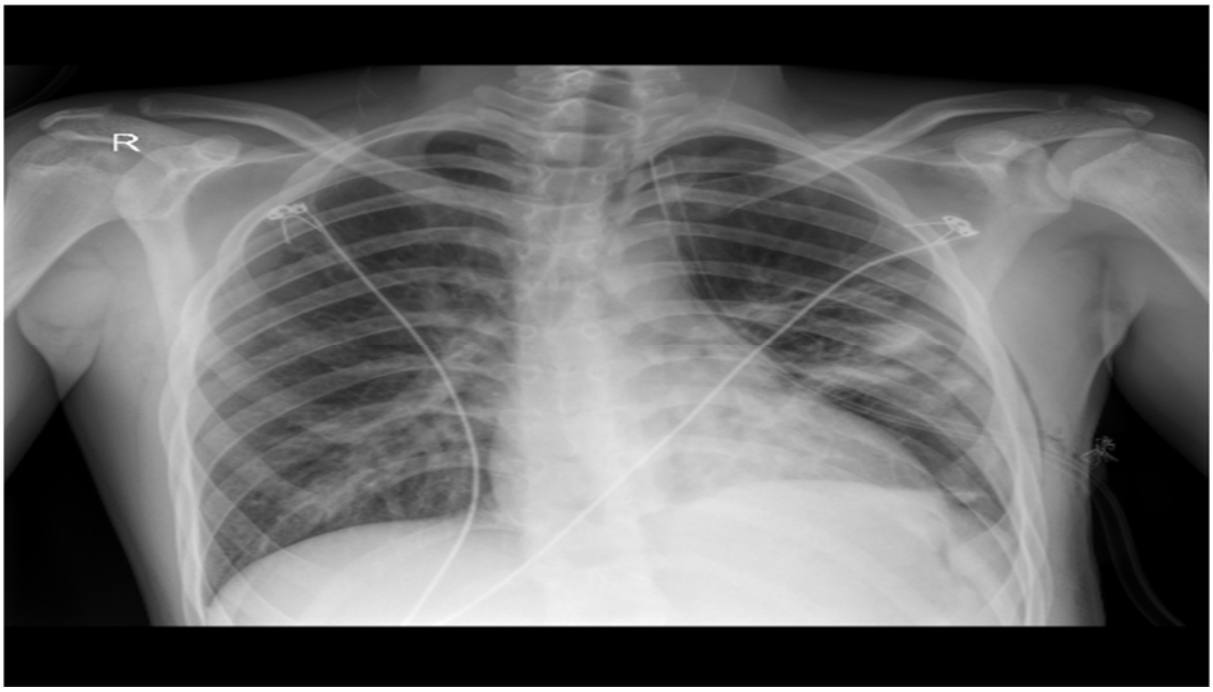
A 14-year-old male presented to the emergency department with sudden-onset severe left-sided chest pain. He reported a one-week history of severe, persistent coughing that had preceded the onset of chest pain. There was no history of trauma, no known chronic lung disease, and no history of cigarette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

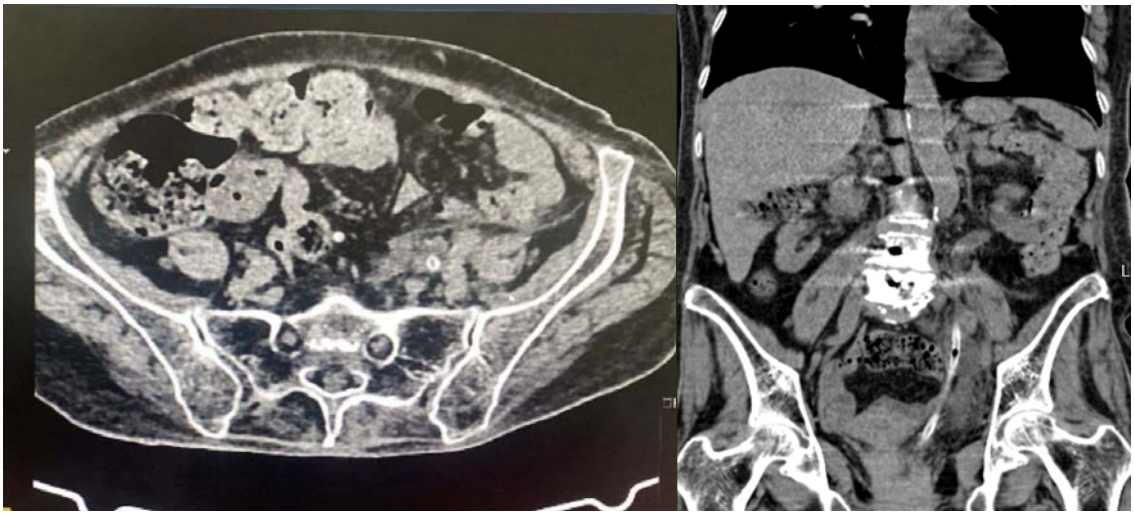
Hastanın özgeçmişinde osteoporoz,hipertansiyon, lomber çökme fraktür,nörojen mesane,böbreklerde bilateral ürostomi mevcut.

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):** 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.

Conflict of interest: The authors declare no conflict of interest.

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-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)

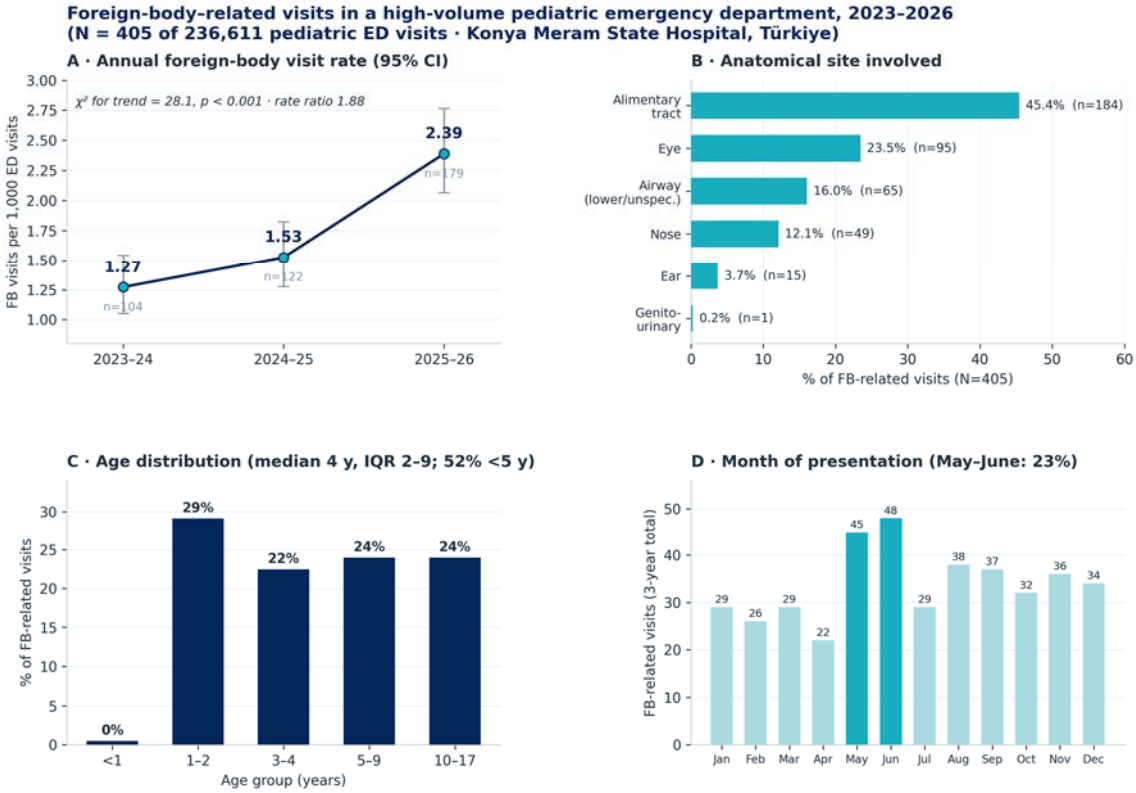


Figure 1. Foreign-body-related visits: (A) annual rate with 95% CI, (B) anatomical site, (C) age distribution, (D) month of presentation.

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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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.

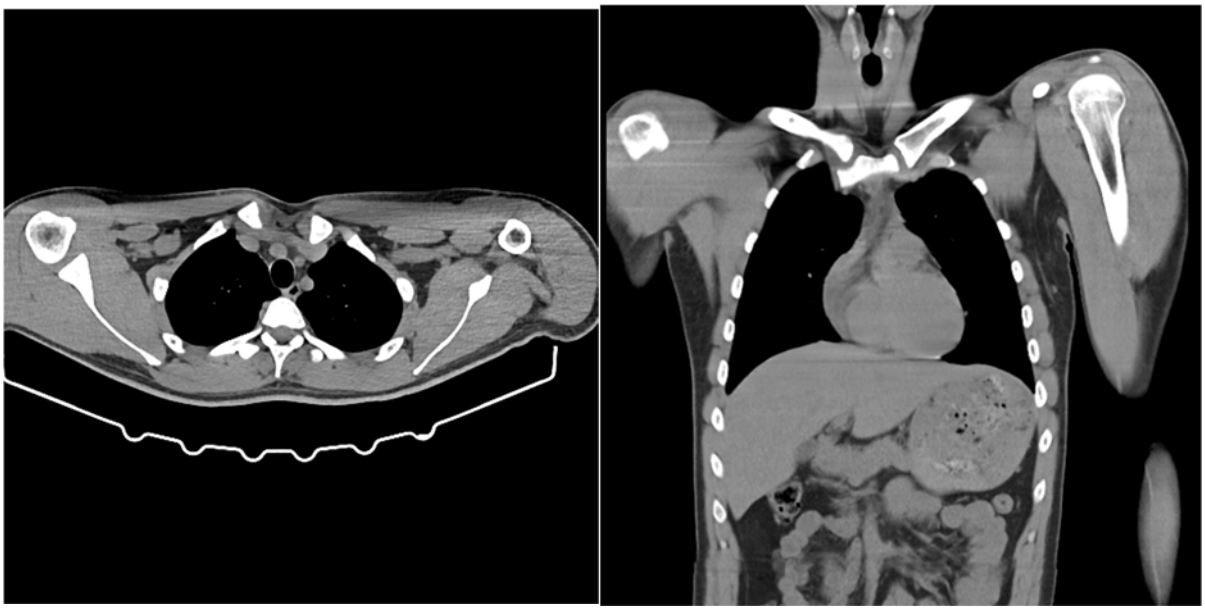
Case Presentation

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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M4548-Tam Metin

FROM APPRENTİCESHİP TO ARTİFİCİAL INTELLİGENCE: THE EVOLUTİON OF PEDİATRİC EMERGENCY CARE EDUCATİON AND THE DESKİLLİNG PARADOX

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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 laboratory 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.

3.3. 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 currentgeneration models was not found in the search of this review; closing this gap is the most concrete research proposal of the study.

3.4. 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.

3.5. 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 inhospital 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.

4. 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, problembased, 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 currentgeneration 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.

5. 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.

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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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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).

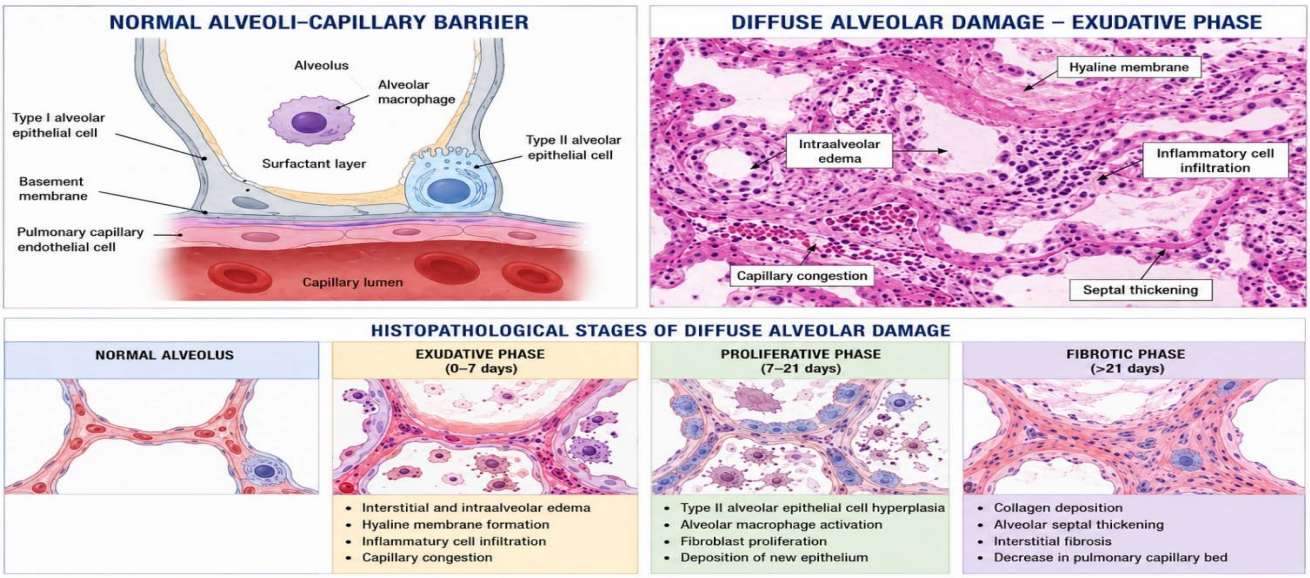


Figure 1. Principal histopathological alterations observed in the normal alveolar-capillary barrier and the exudative, proliferative, and fibrotic phases of diffuse alveolar damage.

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).

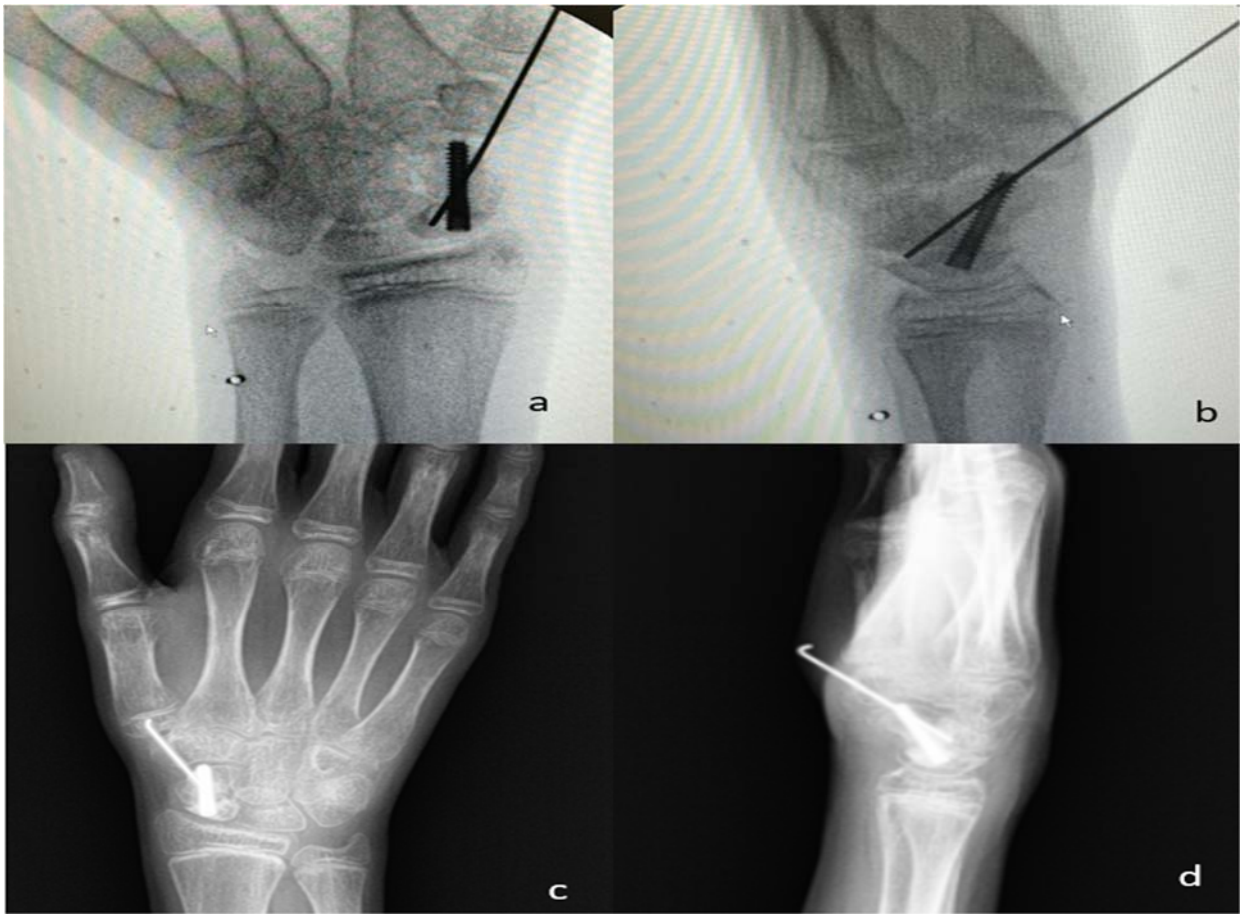


Figure 2. Intraoperative fluoroscopic images (a, b) demonstrate fixation with a headless cannulated compression screw following cancellous bone grafting harvested from the olecranon. An additional Kirschner wire was applied to augment fixation and support the dorsal cortex at the fracture site. Posteroanterior 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.

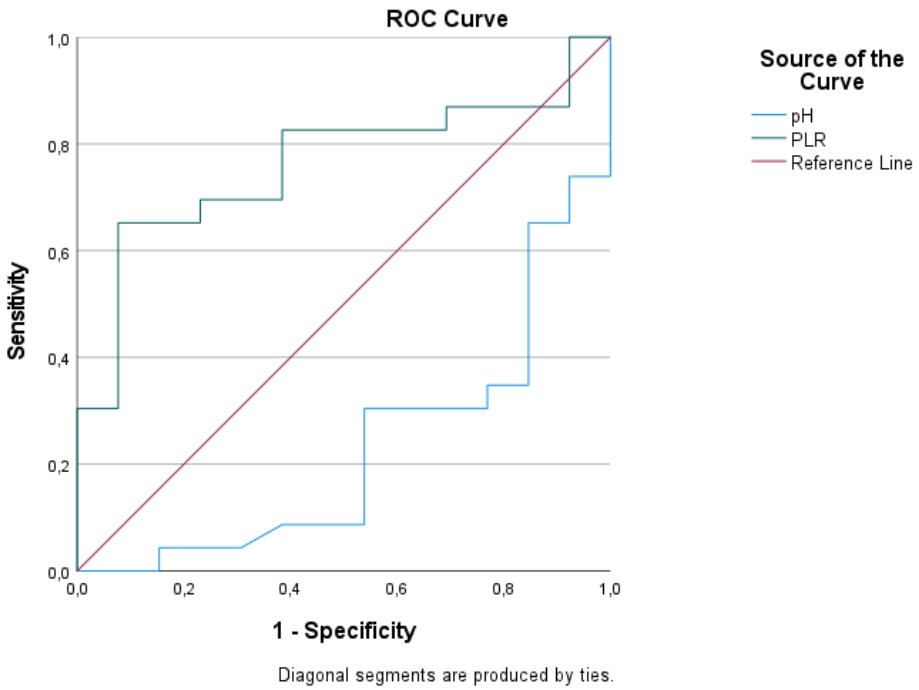


Figure 1. Receiver operating characteristic (ROC) curves of pH and platelet-to-lymphocyte ratio (PLR) for predicting pediatric intensive care unit admission in patients with diabetic ketoacidosis.

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.

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

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M4448- Özet 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 among the most common reasons for pediatric emergency department visits. Because viral and bacterial infections often present with similar clinical features, accurate etiological differentiation based solely on medical history and physical examination remains challenging. This diagnostic uncertainty may lead to unnecessary antibiotic use, antimicrobial resistance, drug-related adverse events, and increased healthcare costs. This study aimed to assess the diagnostic performance of the AFIAS MxA/CRP test for differentiating viral and bacterial infections in children presenting to the pediatric emergency department with acute URTI symptoms.

Methods: This prospective diagnostic cohort study included 123 children presenting to the Pediatric Emergency Department of Zonguldak Bülent Ecevit University Hospital. McIsaac scores were calculated for all patients, and rapid group A streptococcal antigen testing, throat culture, the AFIAS MxA/CRP test, and a multiplex respiratory pathogen panel were performed. Diagnostic performance was evaluated using sensitivity, specificity, positive and negative predictive values, and the area under the receiver operating characteristic curve (AUC). ROC curves were compared using the DeLong test. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 32.0 (IBM Corp., Armonk, NY, USA), and $p<0.05$ was considered statistically significant.

Results: A total of 123 patients were enrolled, of whom 36 (29.3%) were classified as having bacterial infection according to the composite reference standard. The rapid group A streptococcal antigen test demonstrated the highest diagnostic performance, with 83.3% sensitivity, 98.9% specificity, and an AUC of 0.911. The AFIAS MxA/CRP test demonstrated higher discriminative performance than the McIsaac score (AUC, 0.709 vs. 0.597), although the difference was not statistically significant (DeLong $p=0.128$). The AFIAS MxA/CRP test showed 63.9% sensitivity and 59.8% specificity, with inferior diagnostic performance compared with the rapid group A streptococcal antigen test.

Conclusion: The rapid group A streptococcal antigen test demonstrated the highest diagnostic accuracy for bacterial URTIs. The AFIAS MxA/CRP test may serve as a host response biomarker that complements clinical scoring. When integrated with clinical assessment, it may facilitate more appropriate antibiotic prescribing.

Keywords: Upper respiratory tract infection; Pediatric emergency department; Myxovirus resistance protein A; C-reactive protein; Host response biomarkers

M-4449 Tam Metin

PEDIATRIC FOREIGN BODY ASPIRATION: A RETROSPECTIVE SINGLE-CENTER EXPERIENCE 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.

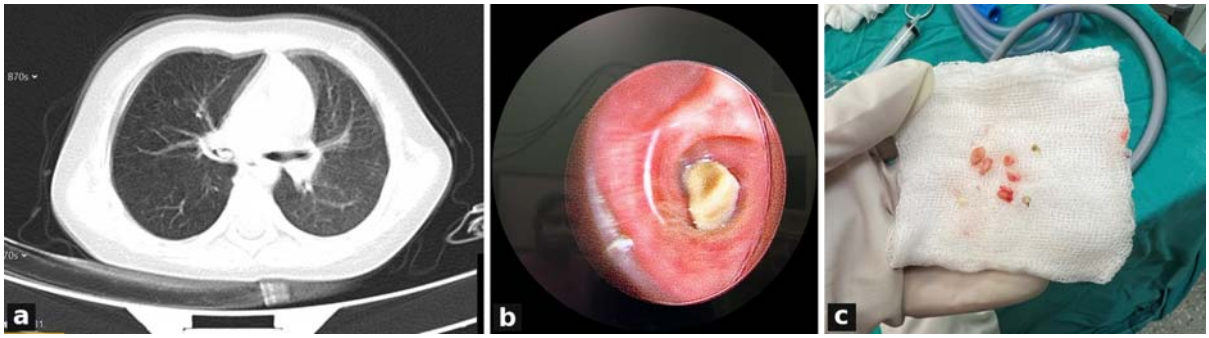


Figure 1. Representative case of apricot kernel aspiration: (a) axial chest CT (computed tomography) demonstrating obstruction of the right main bronchus; (b) bronchoscopic appearance of the foreign body in the right main bronchus; (c) extracted apricot kernel fragments.

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.

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

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

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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.

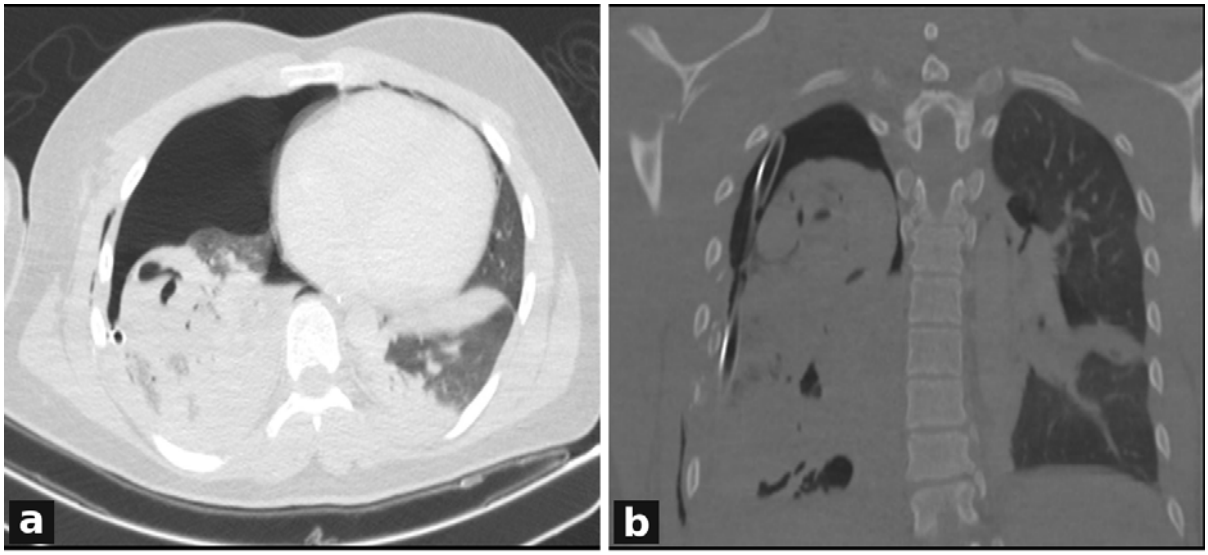


Figure 1. (a) Axial chest CT showing extensive hematoma, contusion, and hemopneumothorax in the right lower lobe; (b) coronal CT showing consolidation of the right upper and lower lobes with the chest tube and scapular fracture.

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.

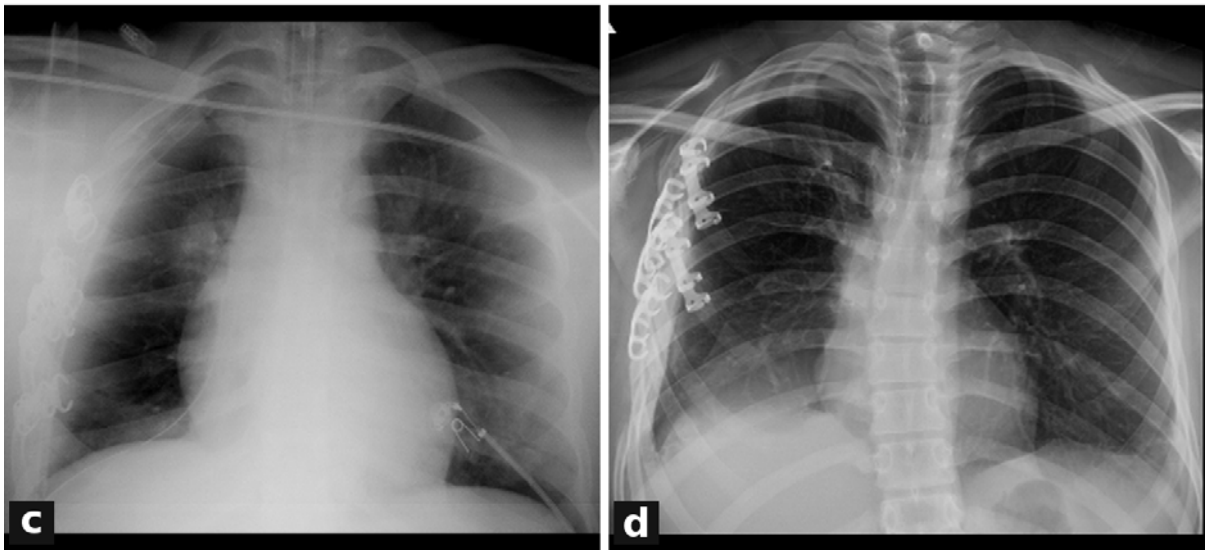


Figure 2. (c) Chest radiograph on postoperative day 1 showing lung expansion, the chest tube, and rib plates; (d) follow-up chest radiograph showing full lung expansion and rib plates.

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

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

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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.

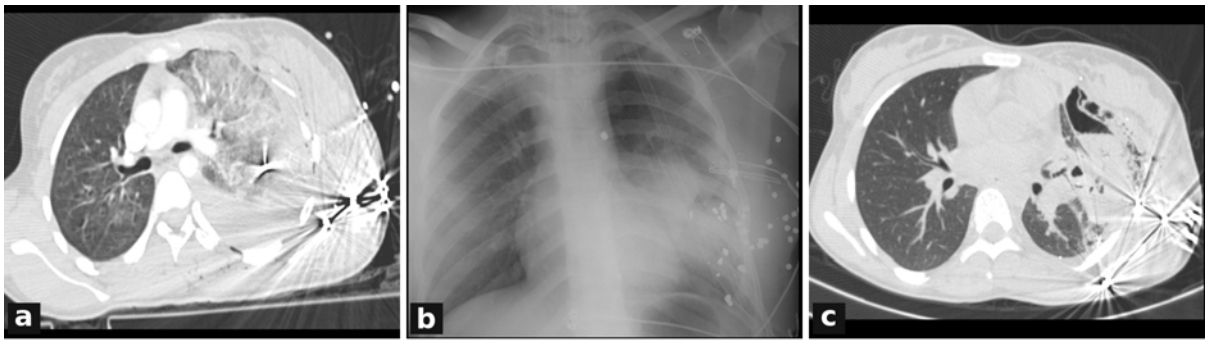


Figure 1. (a) Axial chest CT showing left lung contusion and hemothorax with multiple metallic pellets and rib fractures; (b) chest radiograph on postoperative day 1 showing left lower lobe consolidation, the chest tube, and pellets; (c) follow-up CT showing air-fluid levels (empyema) adjacent to the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

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

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.

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

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

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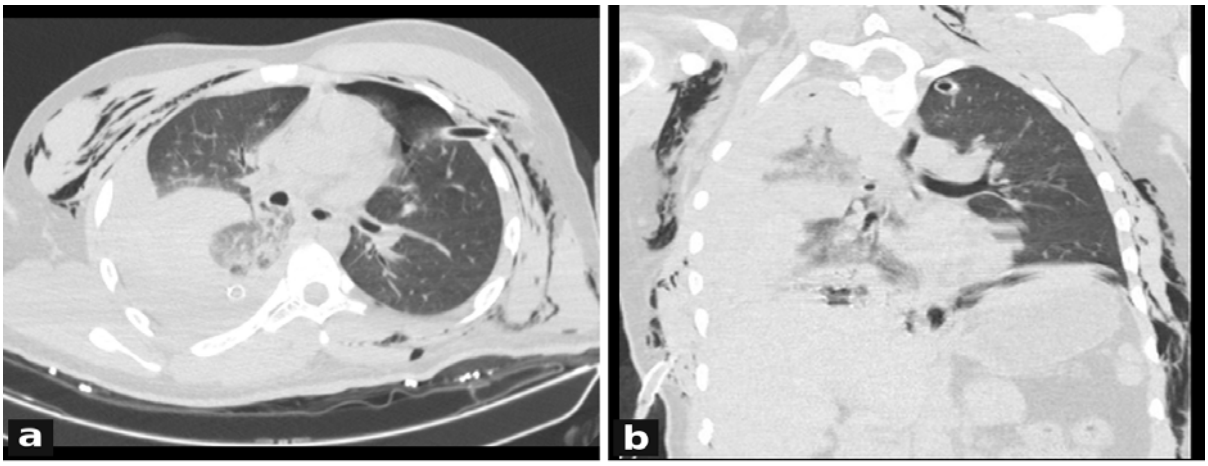


Figure 1. (a) Axial chest CT showing right hemothorax, bilateral chest tubes, lower lobe hematoma, left pneumothorax, and extensive subcutaneous emphysema; (b) coronal CT showing extensive right lung hematoma, hemothorax, and subcutaneous emphysema.

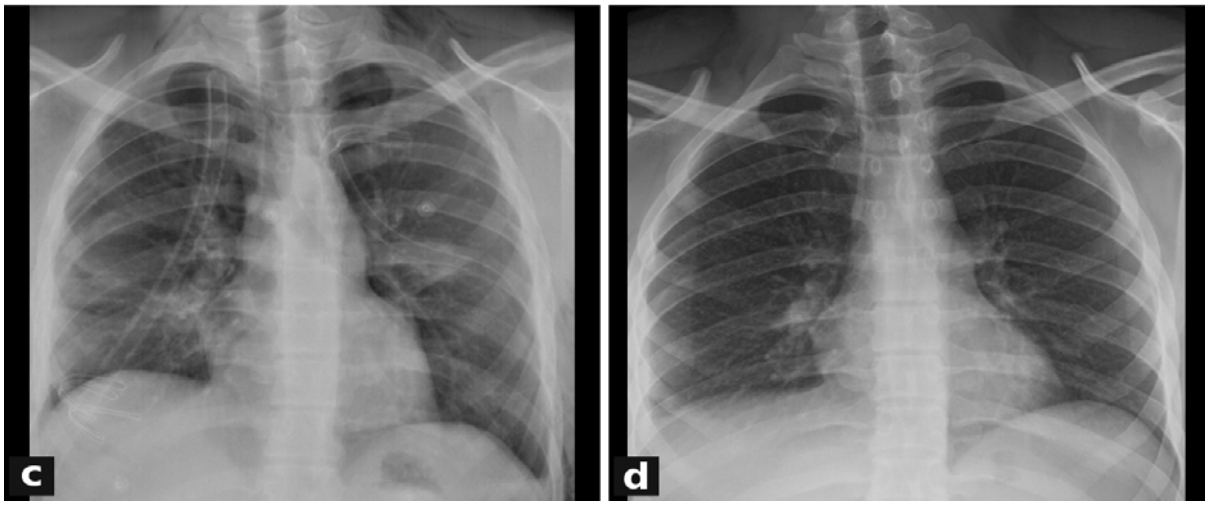


Figure 2. (c) Postoperative chest radiograph showing bilateral lung expansion with bilateral chest tubes; (d) follow-up chest radiograph after chest tube removal showing full lung expansion.

M4453-Tam Metin

THE FIRST 24 HOURS IN PEDIATRIC BURNS: FLUID RESUSCITATION CALCULATIONS AND CONTROVERSIAL AREAS

Abuser Sezgin

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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

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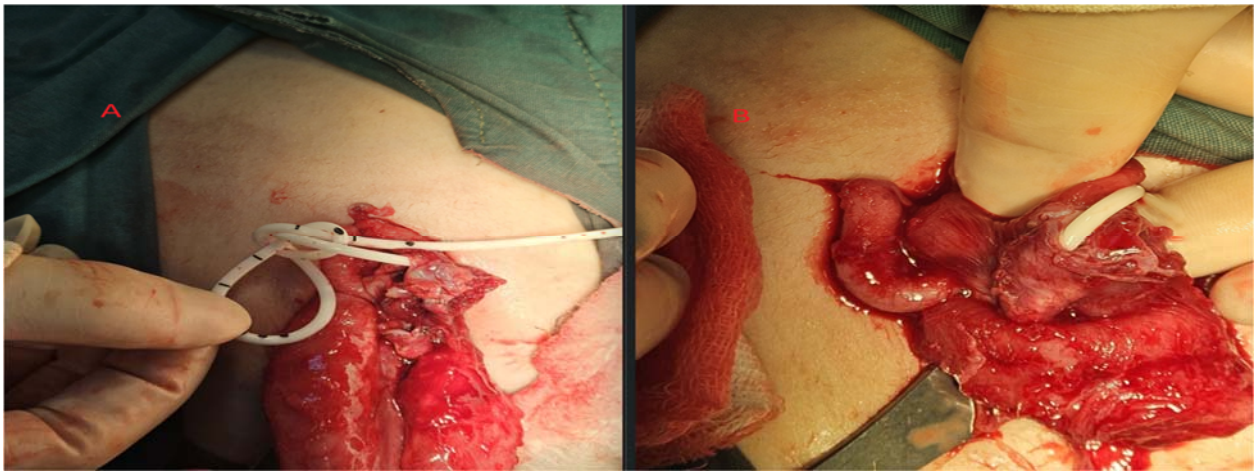
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Introduction: Ventriculoperitoneal (VP) shunting is the standard treatment for pediatric hydrocephalus. True knotting of the distal catheter around the bowel is an exceptionally rare cause of shunt malfunction. We report a pediatric case to emphasize 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

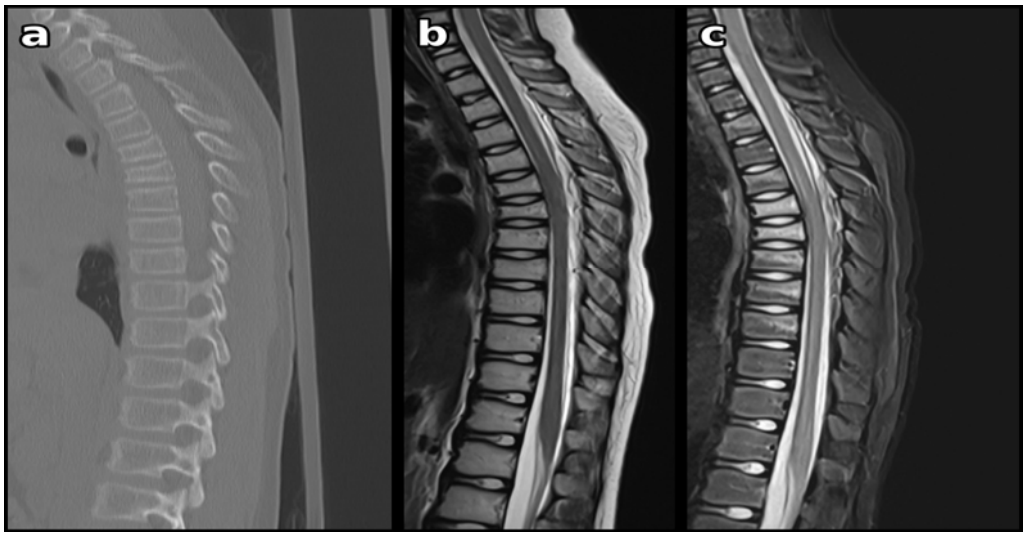


Figure 1. Imaging at admission. (a) Sagittal thoracic computed tomography in the bone window shows multilevel vertebral body compression fractures with anterior height loss. (b) Sagittal T2-weighted magnetic resonance image demonstrates the posterior epidural collection; the reported extent is T1–T9, without cord signal abnormality. (c) Sagittal STIR image demonstrates vertebral endplate compression and marrow oedema.

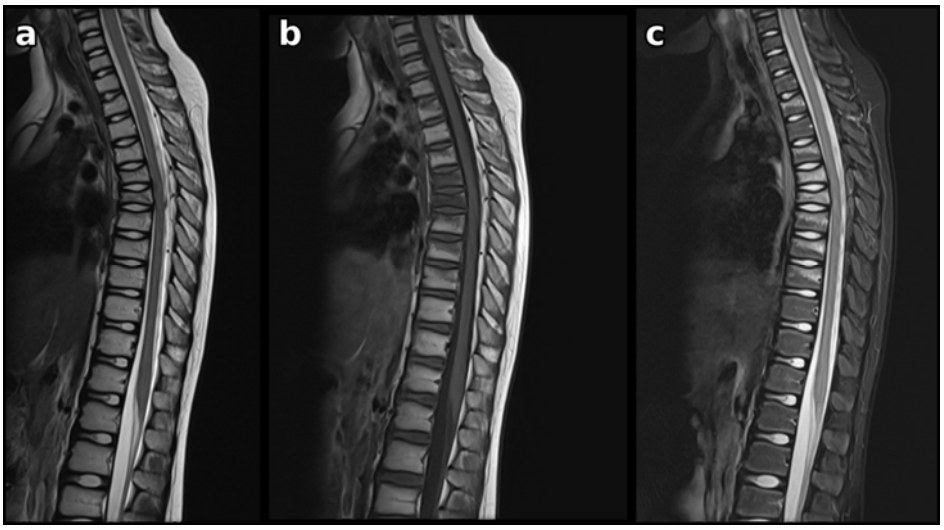


Figure 2. Follow-up magnetic resonance imaging. Sagittal (a) T2-weighted, (b) T1-weighted and (c) STIR images after non-operative management. The epidural haematoma has resorbed, with normal cord calibre and signal and no residual compression. Vertebral body heights are maintained without progressive 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

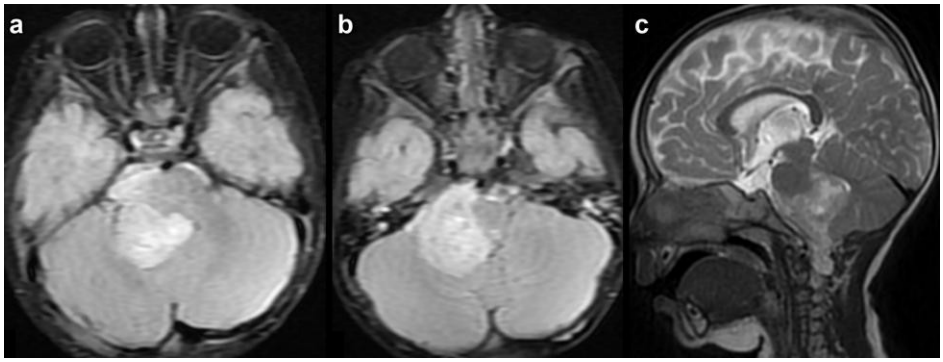


Figure 1. Preoperative magnetic resonance imaging. (a) Axial T2-FLAIR image: a well-defined mass in the right cerebellomedullary angle cistern fills the fourth ventricle. (b) Axial T2-FLAIR image at a higher level: the mass continues to occupy the fourth ventricle between the cerebellar hemispheres. (c) Midline sagittal T2 image: the mass lies within the fourth ventricle and displaces and compresses the brainstem anteriorly.

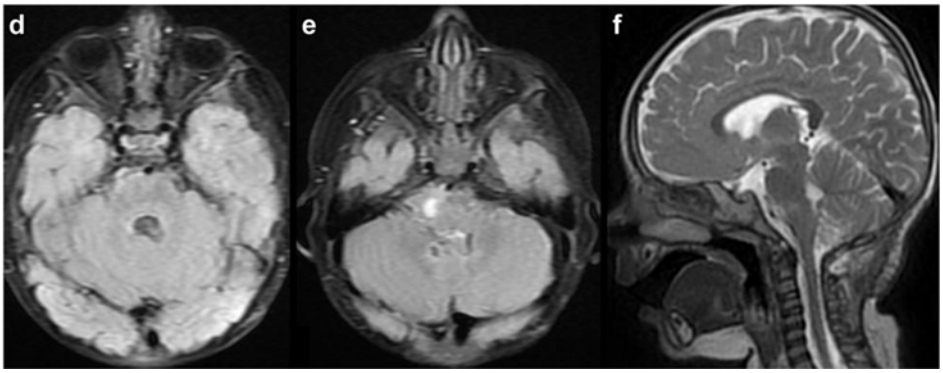


Figure 2. Imaging after suboccipital craniotomy and near-total resection. (d) Axial T2-FLAIR image: the fourth ventricle is decompressed and the brainstem is no longer displaced. (e) Axial T2-FLAIR image at the level of the resection bed: a small focus of signal change remains and the mass effect has 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

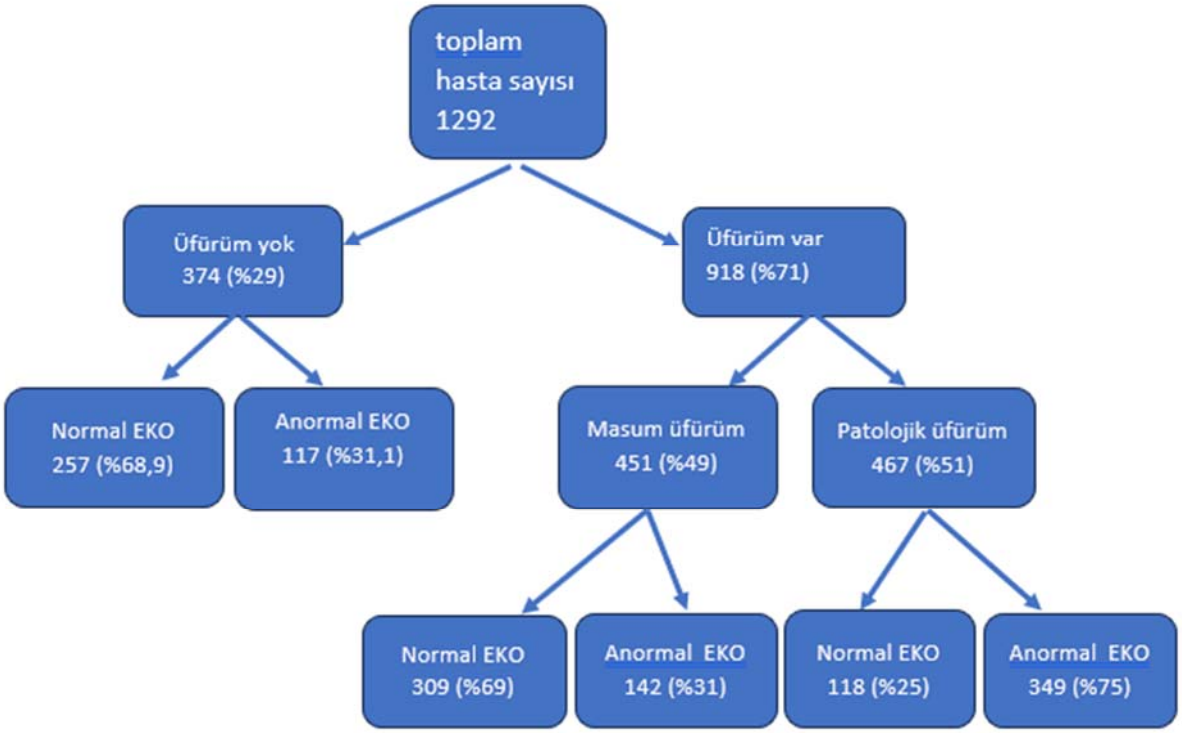
Çalışmaya dahil edilen 1292 hastanın yaş dağılımı incelendiğinde; hastaların %10,2'sinin 0-1 yaş, %10,3'ünün 1-5 yaş, %25,7'sinin 5-10 yaş ve %53,8'inin 10 yaş üzerinde olduğu saptanmıştır. Sevk edilen hastaların %71'inde (918 hasta) çocuk kardiyoloji uzmanı tarafından yapılan muayenede üfürüm varlığı 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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M4490-Özet 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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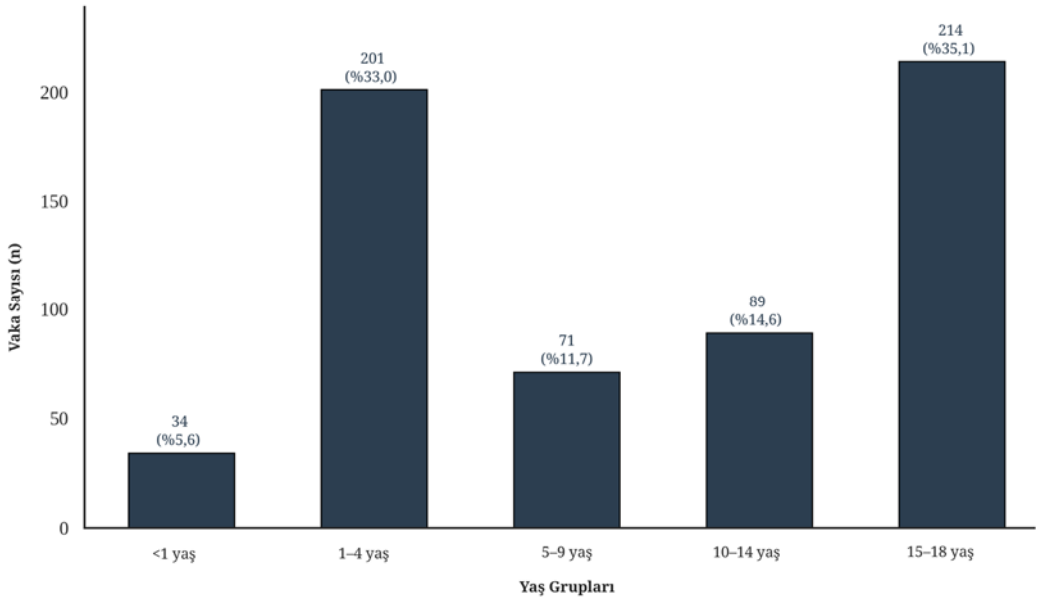
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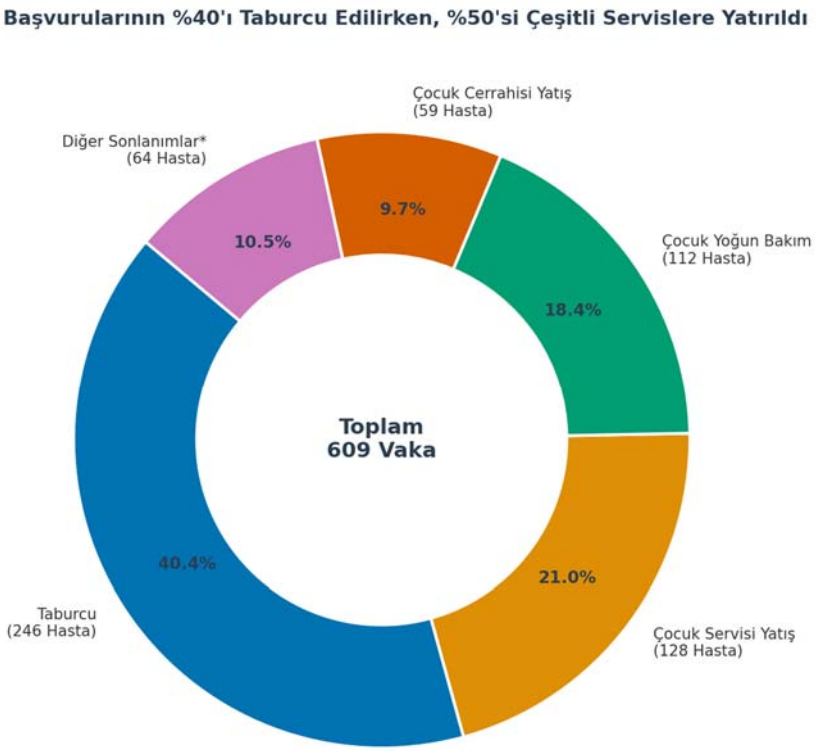
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Şekil 1.



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?

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 contexts.

The possible psychosocial effects of play and sport cannot be reduced solely to physiological energy 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
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	Conceptual	Separates acute safety from post-discharge	It is not a validated scale,

developed in this review		movement through a measurable transition gate.	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.

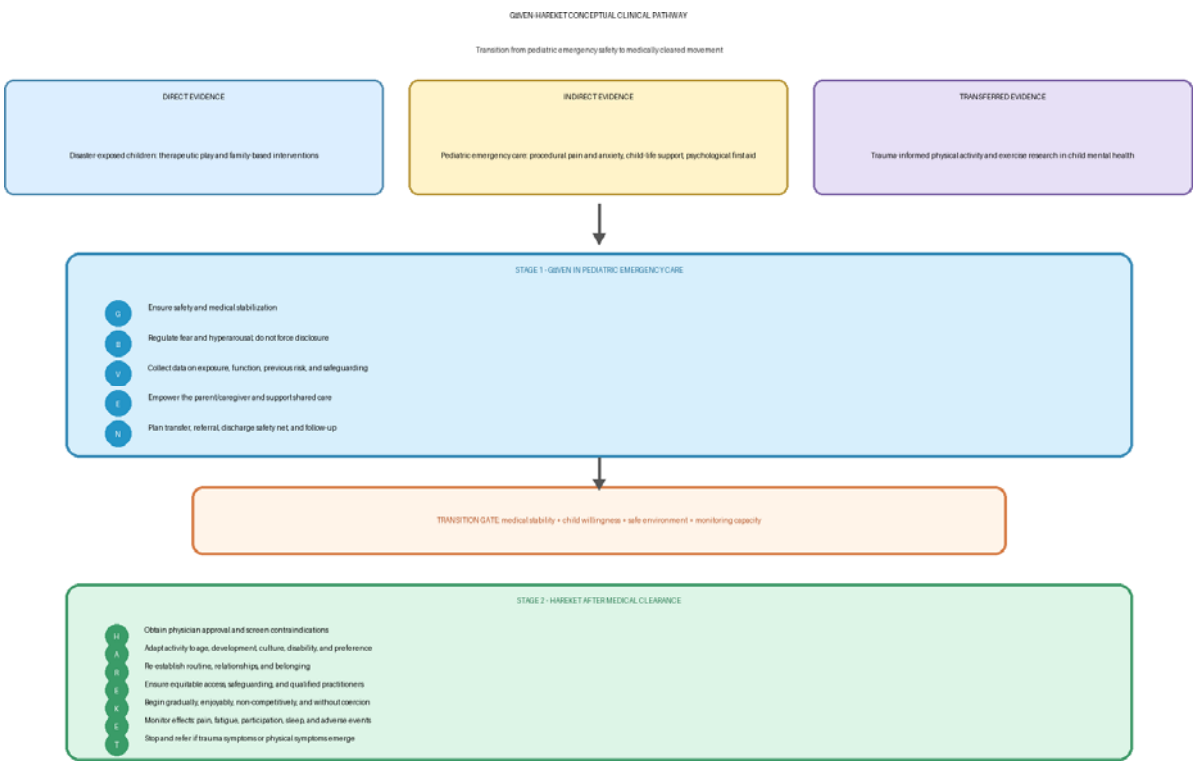


Figure 1. GÜVEN-HAREKET conceptual clinical pathway. The model integrates evidence levels with acute-safety and post-medical-clearance movement stages; it has not been prospectively validated.

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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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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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.

KAYNAKLAR

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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.

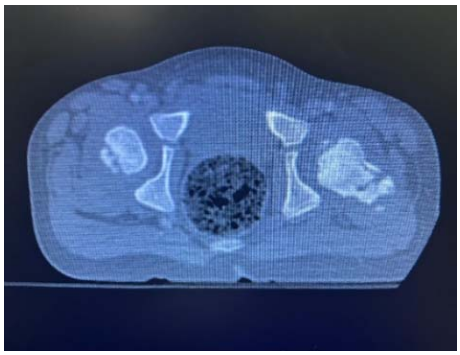


Fig. 1. Pelvic CT showing left femoral neck fracture.

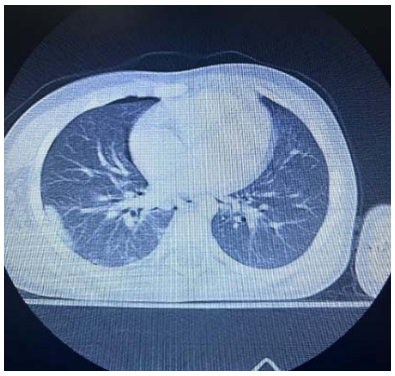


Fig. 2. Thoracic CT showing right pneumothorax and hemothorax.

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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M4521-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 requires prompt assessment for vascular complications, including thrombosis, dissection, and impaired perfusion. Doppler ultrasonography (US) is the first-line imaging modality; however, it may be diagnostically insufficient in the presence of complex arterial anatomy or segmental vascular pathology. We present the clinical contribution of non-contrast-enhanced magnetic resonance angiography (MRA) in two adult and pediatric cases in which Doppler US did not provide a definitive diagnosis.

Cases: A 52-year-old man with diabetic nephropathy underwent living-donor renal transplantation. On postoperative day 7, an unexpected increase in serum creatinine was detected. Although Doppler US raised suspicion of a vascular complication, it could not definitively establish the need for surgical revision in this graft with multiple renal arteries. Non-contrast-enhanced MRA demonstrated marked segmental hypoperfusion in the lateral graft parenchyma. Emergency surgical exploration revealed a 4 × 4 cm ischemic area, along with dissection and thrombosis of the segmental renal arteries supplying this region. Revascularization restored graft perfusion, and graft function was preserved.

A 17-year-old girl with hypertensive nephropathy developed oliguria and an inadequate decrease in serum creatinine after living-donor renal transplantation. Doppler US demonstrated increased vascular resistance. Non-contrast-enhanced MRA showed heterogeneous parenchymal signal while flow in the main renal artery and intrarenal vasculature was preserved. Surgical exploration excluded vascular pathology, whereas graft biopsy confirmed acute antibody-mediated rejection. Renal function gradually improved under immunosuppressive therapy.

Discussion: In the first case, non-contrast-enhanced MRA identified segmental ischemia that could not be definitively characterized by Doppler US, contributing to timely surgical intervention. In the second case, preservation of the main and intrarenal vascular flow directed diagnostic evaluation toward nonvascular causes. Non-contrast-enhanced MRA may be a useful adjunct in selected patients with early renal allograft dysfunction when Doppler US is equivocal or contrast administration is undesirable. Its lack of ionizing radiation and contrast requirement may offer particular advantages in pediatric renal transplant recipients.

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

M4525-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)

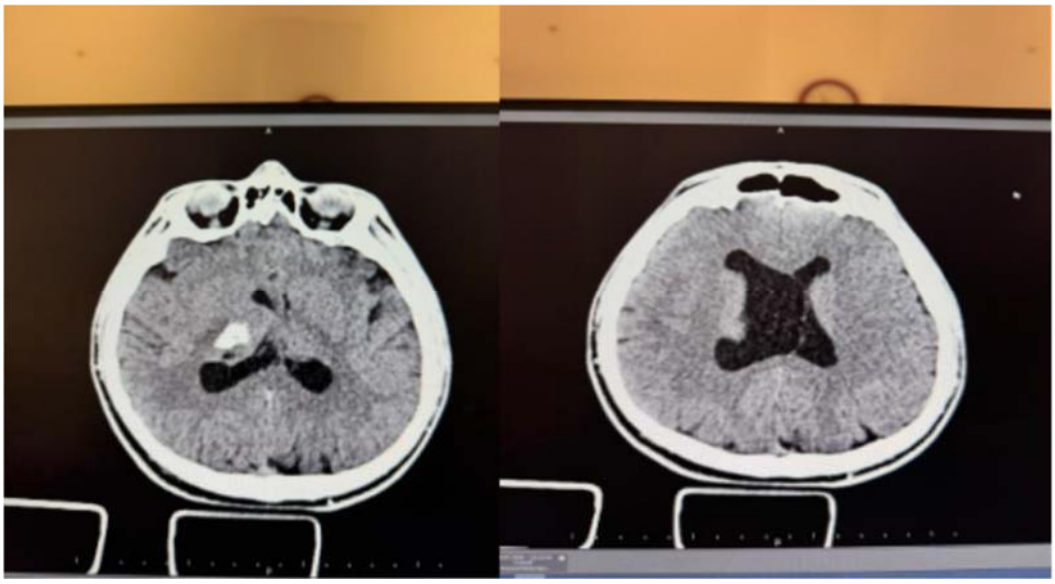


Figure 1. Non-contrast brain computed tomography demonstrating a 2 × 1 cm mass-like lesion at the level of the right thalamus, adjacent to the lateral ventricle.

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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M4525-Özet Metin

FEVER IN THE FIRST 30 DAYS OF LIFE: AN AGE-STRATIFIED APPROACH TO LUMBAR PUNCTURE, EMPIRICAL THERAPY, AND SAFE DISPOSITION

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ABSTRACT

Introduction / Aim

Fever during the first month of life may be the only manifestation of an invasive bacterial infection (IBI). This review aimed to synthesize current evidence for evaluation, lumbar puncture (LP), empirical treatment, and disposition of febrile infants aged 0–30 days, emphasizing the updated PECARN prediction rule.

Methods

A structured narrative review of PubMed-indexed studies and guidelines was conducted, prioritizing the 2021 American Academy of Pediatrics guideline, the Canadian Paediatric Society statement updated in May 2026, and prospective evidence published through August 2026. Recommendations were organized by postnatal age, clinical appearance, urinalysis, procalcitonin (PCT), absolute neutrophil count (ANC), and herpes simplex virus risk.

Results

A rectal temperature ≥38.0°C measured at home or in hospital warrants evaluation. Full sepsis evaluation, parenteral antimicrobial therapy, and hospital observation remain standard for ill-appearing infants and most infants aged ≤21 days. In carefully selected, well-appearing infants aged 22–28 days, normal inflammatory markers may support selective LP under close observation. In a pooled JAMA analysis of 1,537 infants aged ≤28 days, the updated PECARN rule—negative urinalysis, PCT ≤0.5 ng/mL, and ANC ≤4,000/mm³—classified 41.1% as low risk, with 94.2% sensitivity and 99.4% negative predictive value for IBI; no bacterial meningitis was misclassified. However, residual bacteremia risk, hospitalization rates, and limited outpatient evidence preclude routine discharge based solely on this rule. Viral positivity does not eliminate IBI risk.

Conclusion

Age remains the first decision node. Biomarker-based stratification may reduce LP in selected neonates but should not replace cultures, serial examination, institutional protocols, or reliable follow-up.

M4526-Özet 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

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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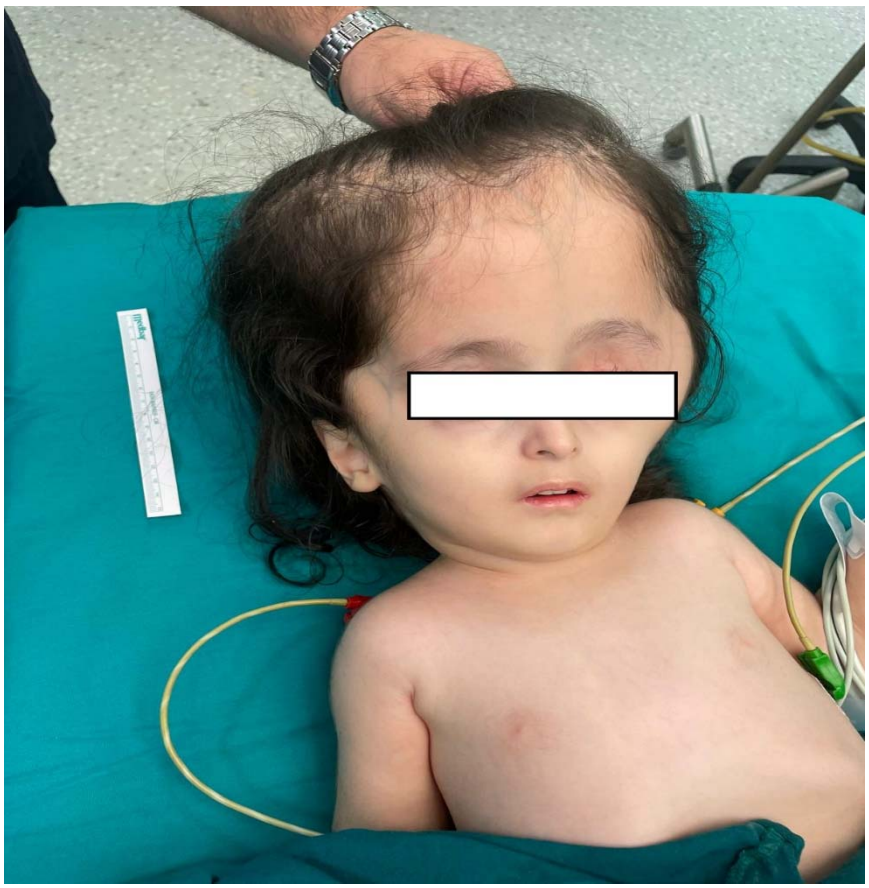
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M4534-Tam Metin

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.Ülkemizde 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%).

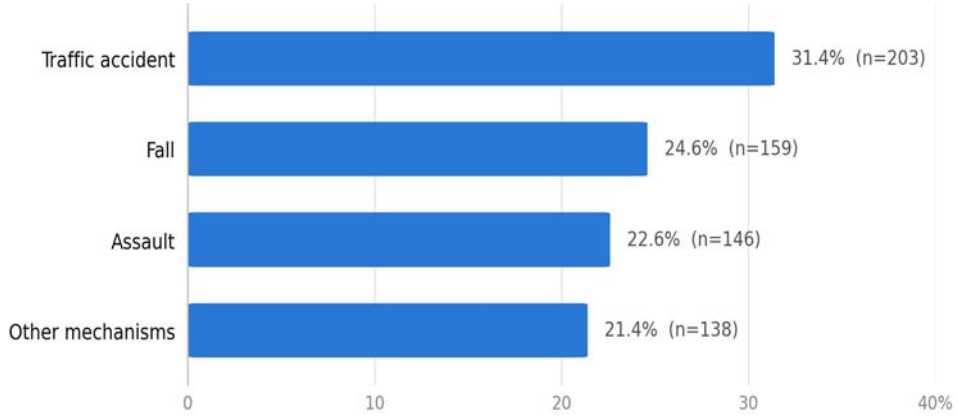


Figure 1. Distribution of pediatric forensic trauma mechanisms (N = 646).

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

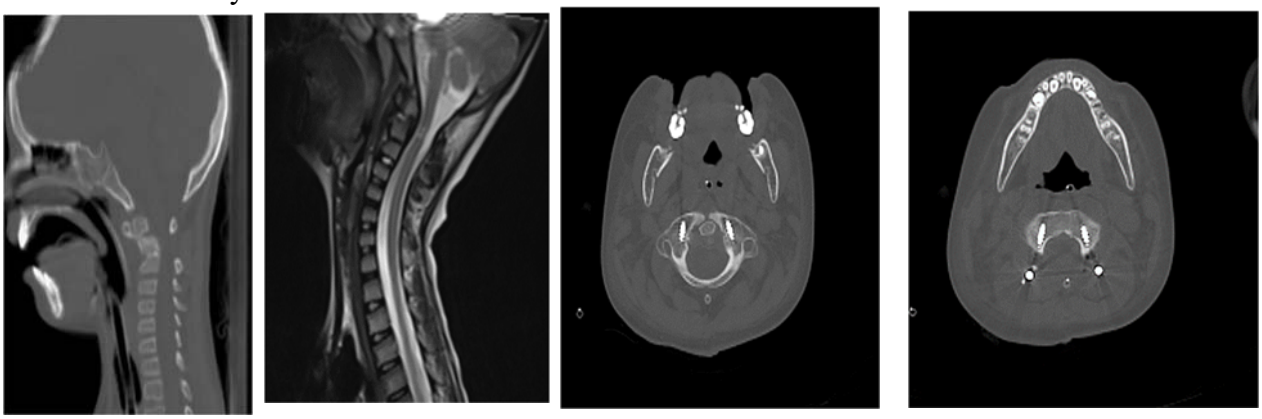
C2 VERTEBRAL FRACTURE AND ATLANTOAXIAL INSTABILITY IN A PEDIATRIC PATIENT WITH DOWN SYNDROME: ACUTE TETRAPARESIS FOLLOWING MINOR TRAUMA

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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

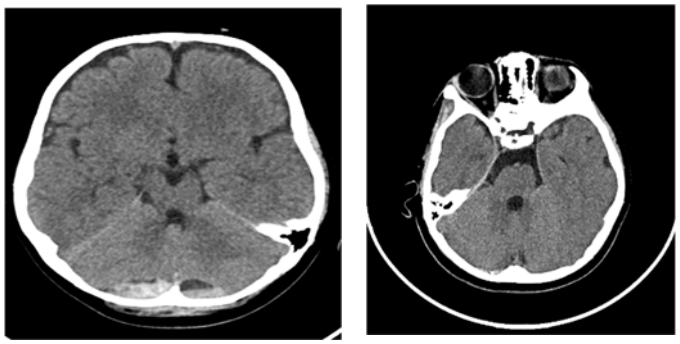
CONSERVATIVE MANAGEMENT OF PEDIATRIC POSTERIOR FOSSA EPIDURAL HEMATOMA: A CASE REPORT

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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

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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.

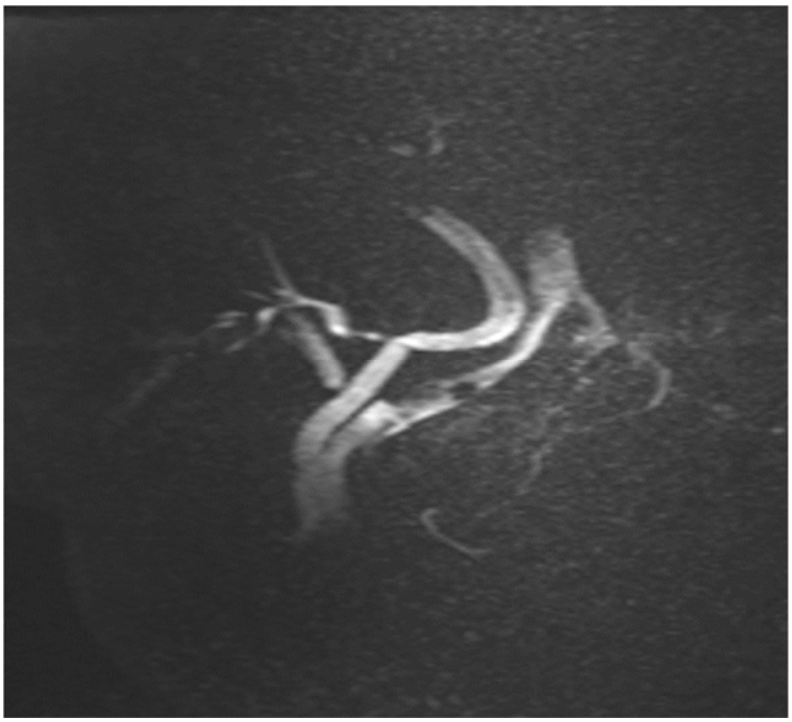
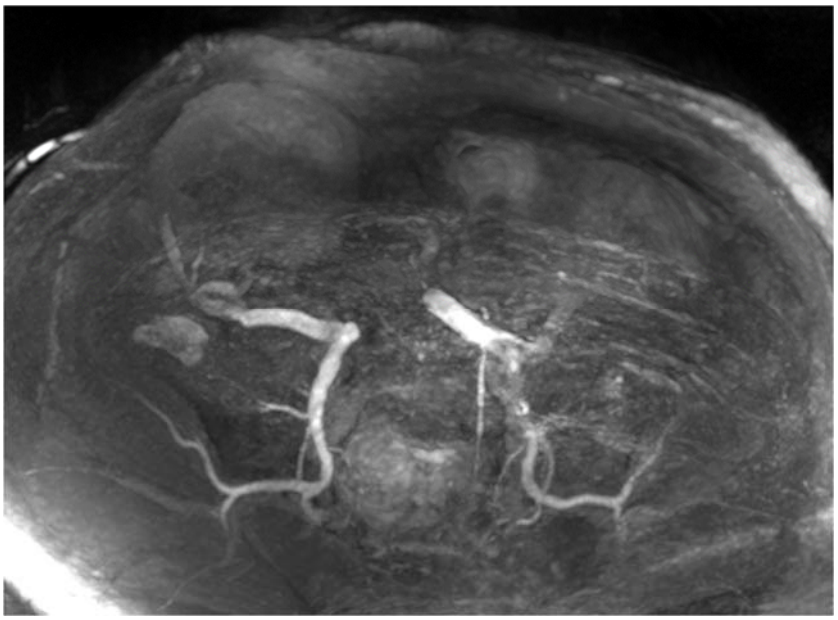


Figure 2. Case 2. Non-contrast-enhanced magnetic resonance angiography shows heterogeneous graft parenchymal signal with preserved main renal arterial and intrarenal vascular flow.



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

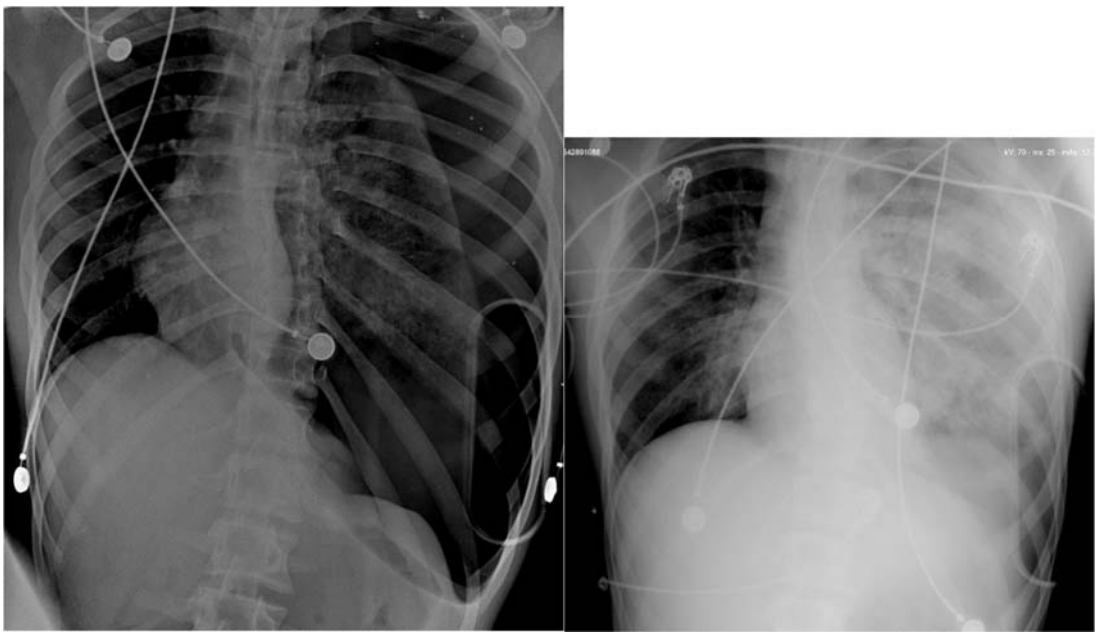
Yüksek enerjili motosiklet kazası sonrası entübe şekilde getirilen 15 yaşında erkek hasta değerlendirildi. İlk fiziki muayenede Glasgow Koma Skalası (GKS) skoru 3 olan derin nörolojik depresyon, belirgin hipotansiyon (kan basıncı: 80/40 mmHg), sinüs taşikardisi, sol hemitoraksta solunum seslerinin alınamaması 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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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.

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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)

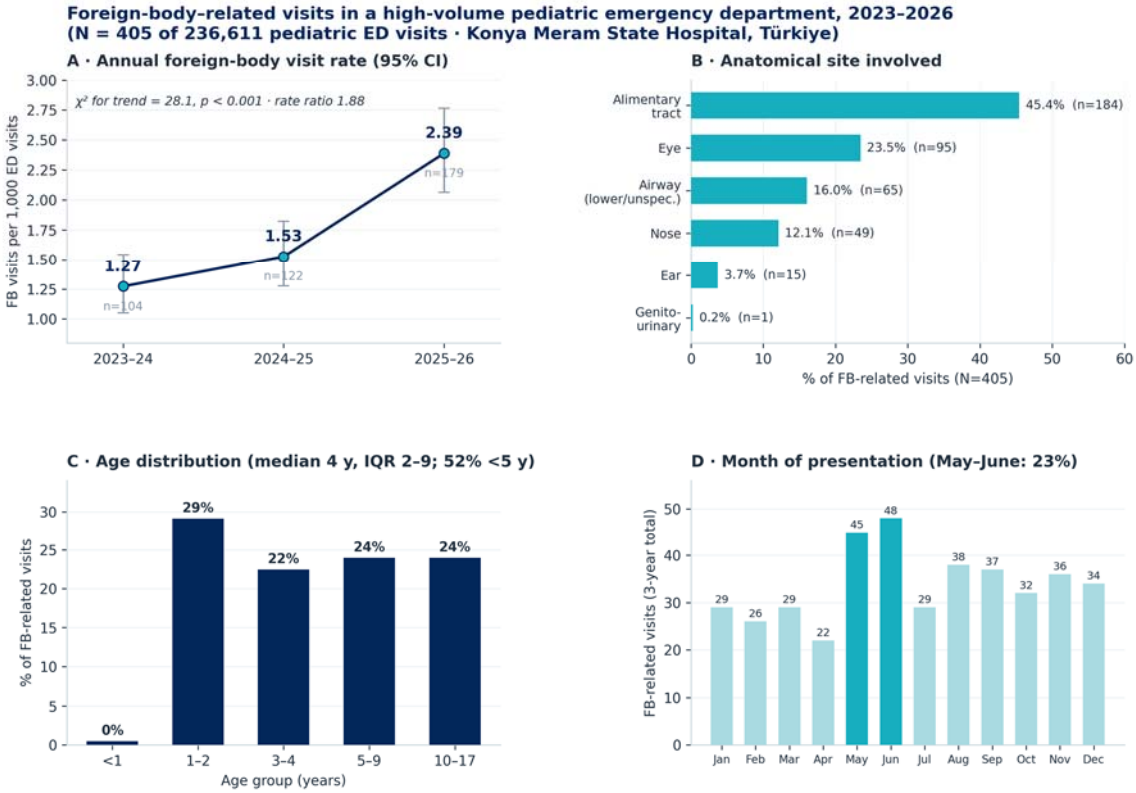


Figure 1. Foreign-body-related visits: (A) annual rate with 95% CI, (B) anatomical site, (C) age distribution, (D) month of presentation.

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.

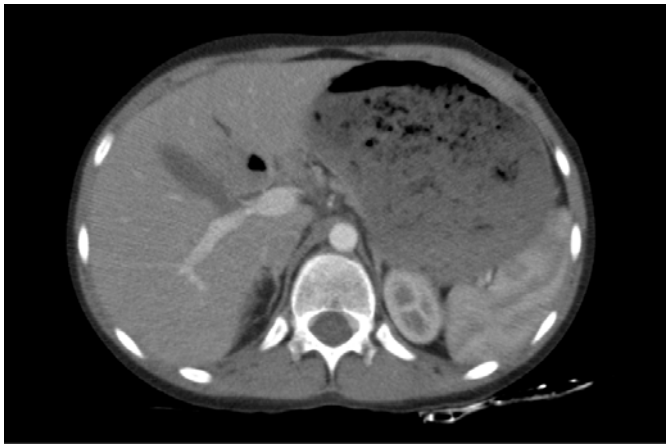


Figure 2.

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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.

KAYNAKLAR

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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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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

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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)

Variable	n	Value
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)
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

Variable	Female (n=58)	Male (n=68)	p
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
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

Variable	n	r_s	p
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
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-Tam Metin

KÜNT DALAK VE KARACİĞER YARALANMALARINDA NON-OPERATİF YÖNETİM

Birsen Ertekin
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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

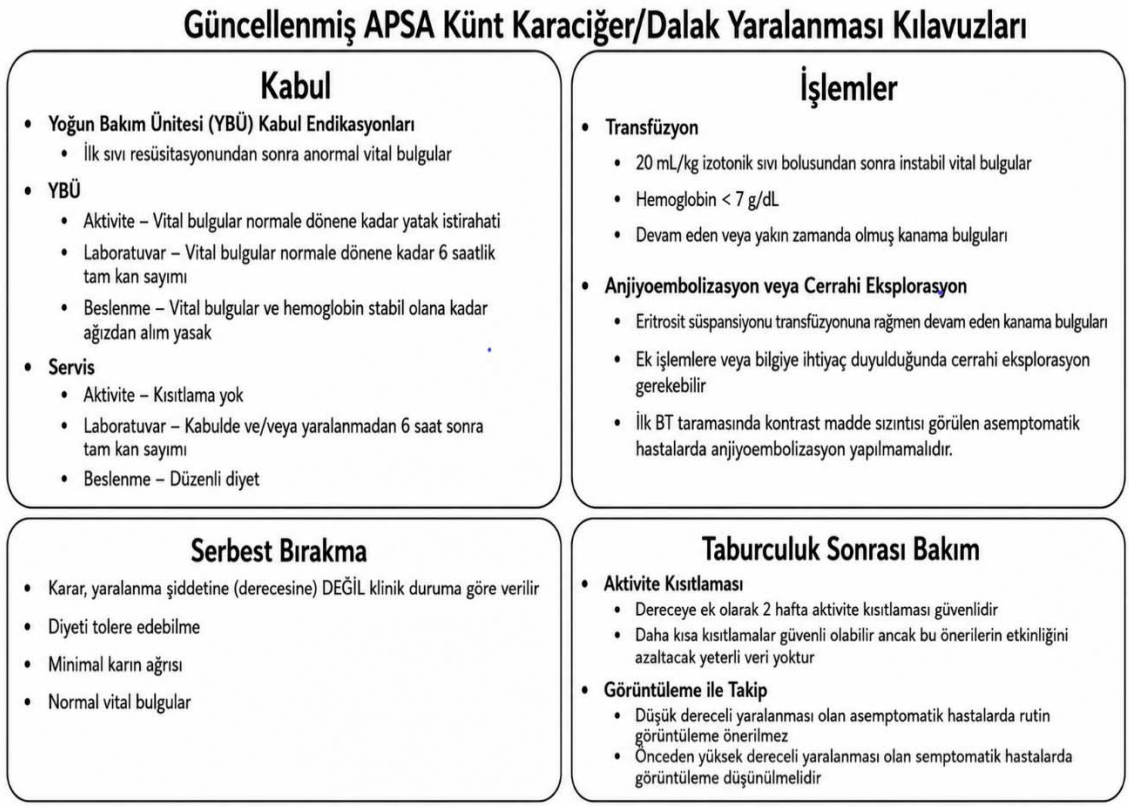
Hastaya ait faktörler	Radyolojik/Klinik faktörler
Kombine organ yaralanması	Kontrast ekstravazasyonu
Hipotansiyon	Yüksek dereceli yaralanma
Taşikardi	Transfüzyon gereksinimi
Yüksek sıvı ihtiyacı	Eşlik eden pankreas/böbrek yaralanması

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

Ayhan Tabur[1]

[1]Sağlık Bilimleri Üniversitesi Gazi Yaşargil Eğitim ve Araştırma Hastanesi

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

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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.

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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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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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M4574-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	206×10³/µL	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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M4575-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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M4575-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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