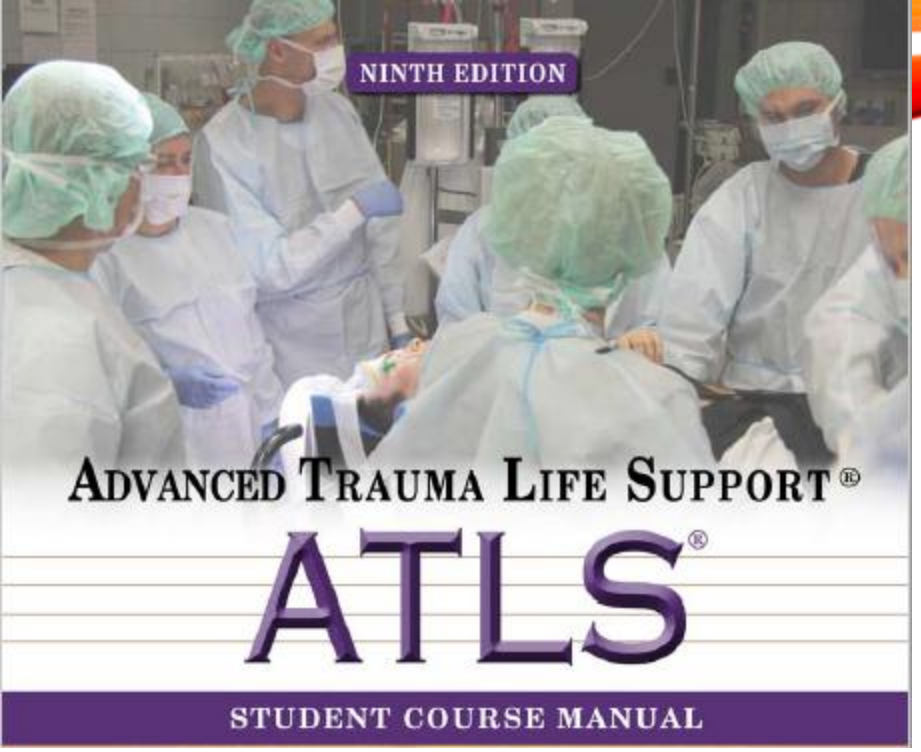
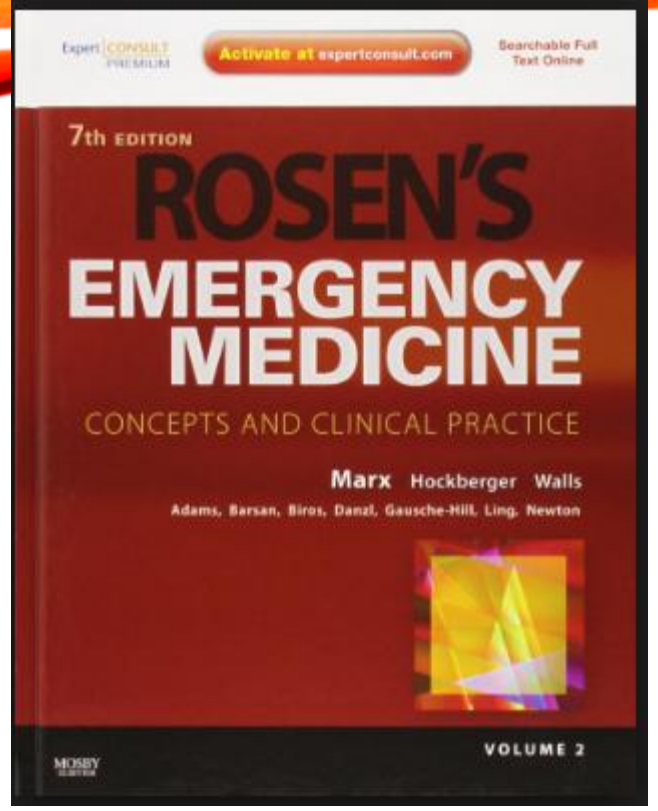
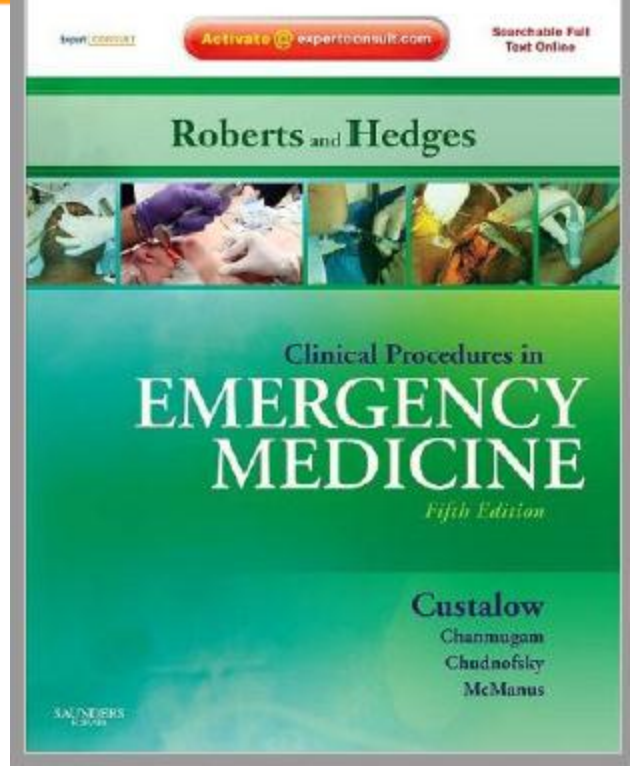
# ÖLÜMCÜL TORAKS YARALANMALARı VE ACIL YÖNETIMI

**Uz.Dr.Barış Murat Ayvacı**

**Okmeydanı Eğitim ve Araştırma Hastanesi**




ClinicalKey®
Lead with answers.

Trip

UpToDate®

NATIONAL GUIDELINE CLEARINGHOUSE

ClinicalTrials.gov
A service of the U.S. National Institutes of Health

# TORAKS TRAVMASI

- Mortalite
- Önlenebilir neden
- Künt göğüs travmalarının <%10
- Penetran göğüs travmalarının %15-30 operatif
- İyatrojenik ☹

# ASIL OLAN

- Hipoksi
- Hiperkarbi
- Asidoz
- Primer değerlendirmenin asıl amacı **HİPOKSİ'nin** düzeltilmesi.


# ACEP Clinical Policies

# Göğüs Cerrahisi Çalışma Grubu



## Belgeler

# PRIMER DEĞERLENDIRME

- Havayolu Obstruksiyonu (airway)
- Tansiyon pnömotoraks
- Açık pnömotoraks
- Flail chest ve pulmoner kontüzyon
- Masif hemotoraks
- Kariyak tamponat

LIFE IN THE FASTLANE

A widely used mnemonic for the 6 killer conditions to think of, and actively search for, during the primary survey is **ATOM-FC**:

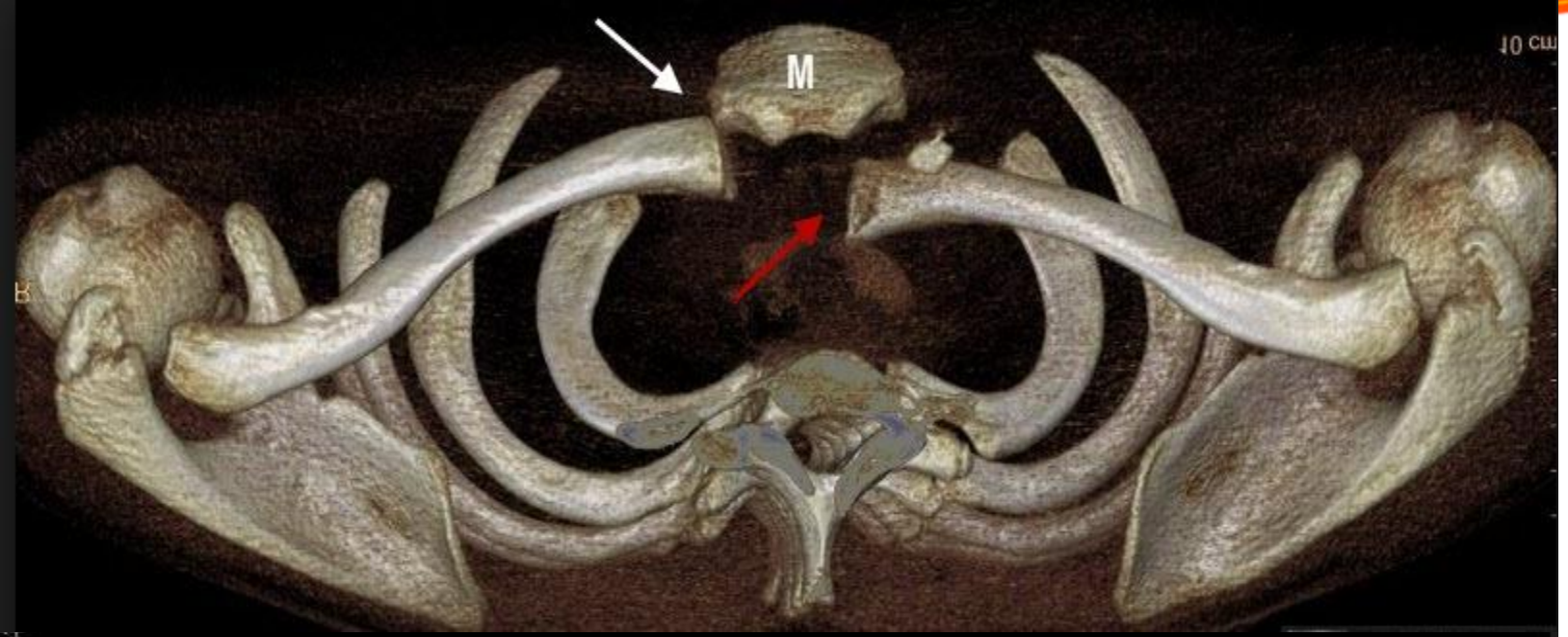
> - Airway obstruction or disruption
> - Tension pneumothorax
> - Open pneumothorax
> - Massive haemothorax
> - Flail chest
> - Cardiac tamponade

# SEKONDER DEĞERLENDİRME

- Basit pnömotoraks
- Hemotoraks
- Pulmoner kontüzyon
- Trakeobronşial ağaç yaralanması
- Künt kardiyak yaralanma
- Travmatik aort yaralanması
- Travmatik diyafragmatik yaralanma
- Künt özefageal rüptür

# HAVAYOLU

- **Dinle:** Ağız,burun, AC alanları  oskültasyon (!)
- Orofarenks yabancı cisim ?Nasıl?
- Yardımcı solunum kasları??(suprasternal, interkostal)
- Hipoksi??
- Saturasyon ?? Ventilasyon göstergesi??**End tidal Co2?**
- Siyanoz??
- Uyku hali??



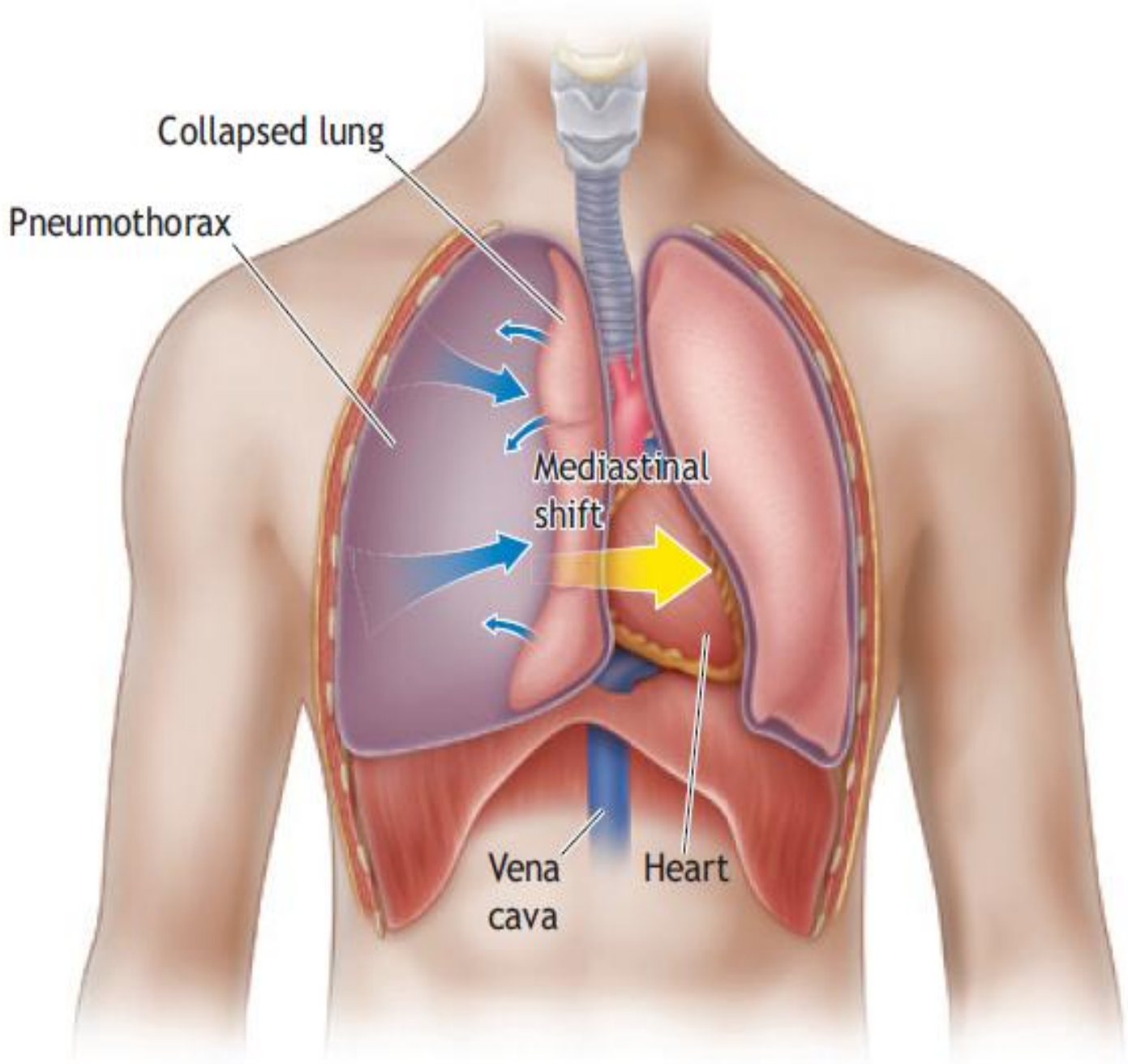

YOU HEARD,
BUT DID YOU
LISTEN?

# BREATHiNG

- Boyunluk !!!... trakea orta hattı ??
- Toraksı gözle??? palpe et?? ve dinle
- Solunum sayısı hipoksi göstergesi olabilir.
- **Siyanoz olmaması yeterli doku oksijenizasyonu ve yeterli bir havayolu olduğu anlamına gelmez**

# TANSİYON PNOMOTORAKS

- Tek yönlü valf (AC veya duvar)
- Obstruktif şok
- PPV MV
- Klinik bir tanı



# TANSIYON PNÖMOTORAKS


## AKLIMIZA BAŞKA HANGİ DURUMU GETİRİYOR?

- Solunum hareketi olmadan eleve hemitoraks
- Boyun venlerinde distansiyon
- Trakeal deviasyon
- Tek taraflı solunum sesleri yokluğu

- Göğüs ağrısı
- Hava açlığı
- Solunum sıkıntısı
- Taşikardi
- Hipotansiyon
- Siyanoz (geç bulgu ☹)

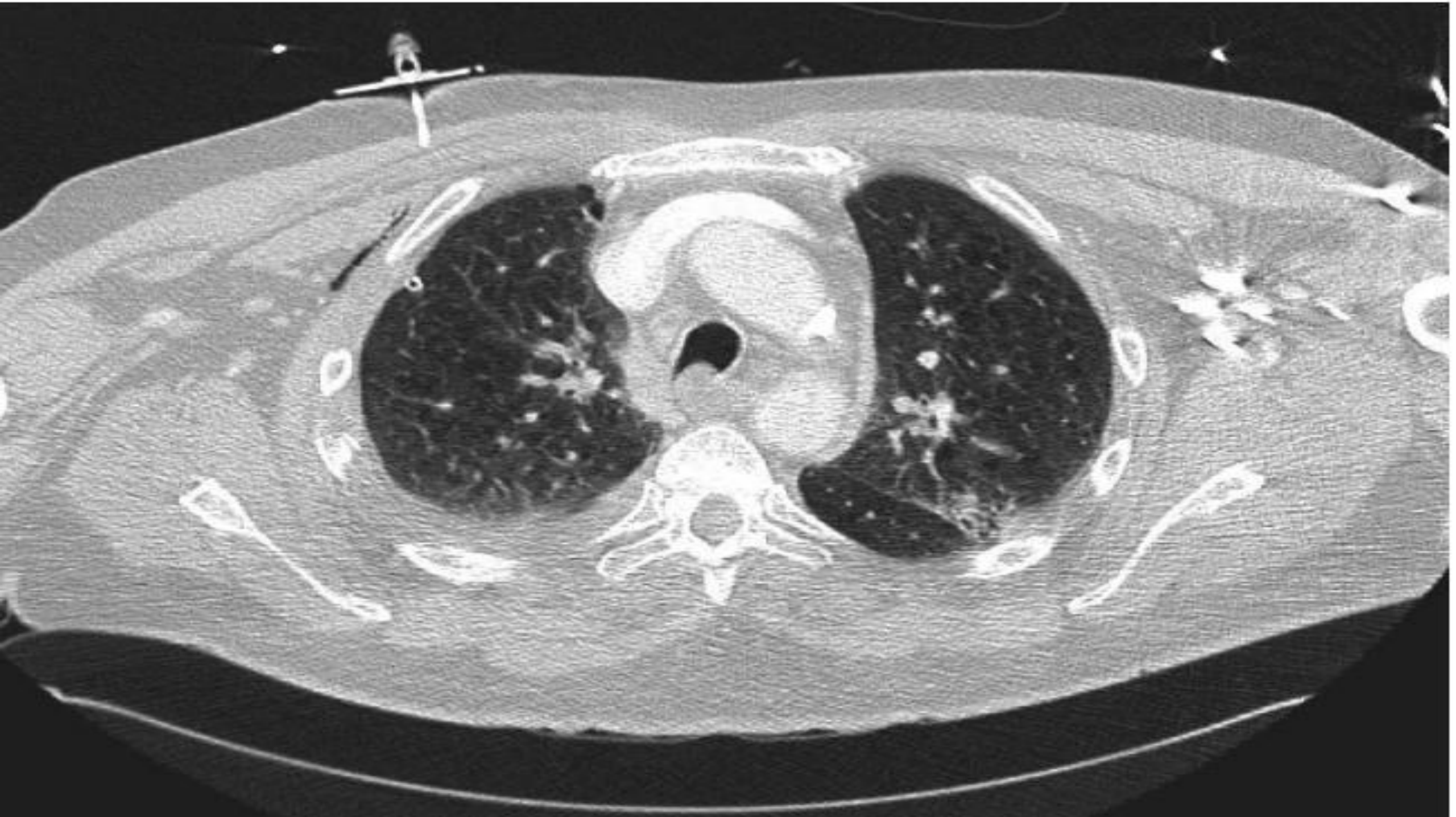
# KARDIYAK TAMPONAT/MASIF HEMOTORAKS

- Etkilenen hemitoraksta hiperrezonans
- Deviye trakea
- Etkilenen hemitoraksta solunum seslerinin yokluğu

# ADVANCED TRAUMA LIFE SUPPORT®

# ATLS®

Tension pneumothorax requires immediate decompression and may be managed initially by rapidly inserting a large-caliber needle into the second intercostal space in the midclavicular line of the affected hemithorax (■ FIGURE 4-2). However, due to variable thickness of the chest wall, kinking of the catheter and other technical or anatomic complications, this maneuver may not be successful. See Skill Station VII:



# TANSİYON PNÖMOTORAKS TEDAVİ

- Göğüs duvarı kalınlığı
- 5 cm >%50 plevral boşluğa ulaşır
- 8 cm >%90
- **Kesin tedavi :TÜP TORAKOSTOMİ**

MEDLINE®

# Failed needle decompression of bilateral spontaneous tension pneumothorax.

## Abstract

This case report presents a young male admitted with primary bilateral spontaneous tension pneumothorax and severe respiratory distress. This is an extremely rare condition. The patient was on the verge of hypoxic cardiac arrest and the attempted needle thoracocentesis was unsuccessful. Needle thoracocentesis in the midclavicular line of the second intercostal space is widely used and recommended as first-line treatment of tension pneumothorax. Reviewing the literature, the procedure is not based on solid evidence. It has high failure rates and potentially serious complications. Alternatives to this approach are perhaps more appropriate. Correctly done, needle thoracocentesis has its place in the presence of a diagnosed or suspected tension pneumothorax when no other options are available. If needle thoracocentesis is chosen, then insertion in the mid-anterior axillary line of the 3rd-5th intercostal space is an appropriate alternative site. Otherwise, lateral thoracostomy, with or without chest tube insertion, is a safe procedure with a high success rate. It should be considered as the first-line treatment of tension pneumothorax, particularly in the unstable patient.

# Optimal positioning for emergent needle thoracostomy: a cadaver-based study.


## Abstract

Needle thoracostomy is an emergent procedure designed to relieve tension pneumothorax. High failure rates because of the needle not penetrating into the thoracic cavity have been reported. Advanced Trauma Life Support guidelines recommend placement in the second intercostal space, midclavicular line using a 5-cm needle. The purpose of this study was to evaluate placement in the fifth intercostal space, midaxillary line, where tube thoracostomy is routinely performed. We hypothesized that this would result in a higher successful placement rate.

Twenty randomly selected unpreserved adult cadavers were evaluated. A standard 14-gauge 5-cm needle was placed in both the fifth intercostal space at the midaxillary line and the traditional second intercostal space at the midclavicular line in both the right and left chest walls. The needles were secured and thoracotomy was then performed to assess penetration into the pleural cavity. The right and left sides were analyzed separately acting as their own controls for a total of 80 needles inserted into 20 cadavers. The thickness of the chest wall at the site of penetration was then measured for each entry position.

A total of 14 male and 6 female cadavers were studied. Overall, 100% (40 of 40) of needles placed in the fifth intercostal space and 57.5% (23 of 40) of the needles placed in the second intercostal space entered the chest cavity ($p < 0.001$); right chest: 100% versus 60.0% ($p = 0.003$) and left chest: 100% versus 55.0% ($p = 0.001$). Overall, the thickness of the chest wall was 3.5 cm ± 0.9 cm at the fifth intercostal space and 4.5 cm ± 1.1 cm at the second intercostal space ($p < 0.001$). Both right and left chest wall thicknesses were similar (right, 3.6 cm ± 1.0 cm vs. 4.5 cm ± 1.1 cm, $p = 0.007$; left, 3.5 ± 0.9 cm vs. 4.4 cm ± 1.1 cm, $p = 0.008$).

In a cadaveric model, needle thoracostomy was successfully placed in 100% of attempts at the fifth intercostal space but in only 58% at the traditional second intercostal position. On average, the chest wall was 1 cm thinner at this position and may improve successful needle placement. Live patient validation of these results is warranted.



J Trauma

Published November 1, 2011.

Volume 71, Issue 5; Pages 1099-103; discussion 1103



Inaba K[1], Branco BC, Eckstein M, Shatz DV, Martin MJ, Green DJ, Noguchi TT, Demetriades D.

Author information

MEDLINE®

# Needle thoracostomy: Clinical effectiveness is improved using a longer angiocatheter.

J Trauma Acute Care Surg

Published February 1, 2016.

Volume 80, Issue 2; Pages 272-7

Aho JM[1], Thiels CA, El Khatib MM, Ubl DS, Laan DV, Berns KS, Habermann EB, Zietlow SP, Zielinski MD.

Author information



## Abstract

Decompression of tension physiology may be lifesaving, but significant doubts remain regarding ideal needle thoracostomy (NT) catheter length in the treatment of tension physiology. We aimed to demonstrate increased clinical effectiveness of longer NT angiocatheter (8 cm) compared with current Advanced Trauma Life Support recommendations of 5-cm NT length.

This is a retrospective review of all adult trauma patients from 2003 to 2013 (age > 15 years) transported to a Level I trauma center. Patients underwent NT at the second intercostal space midclavicular line, either at the scene of injury, during transport (prehospital), or during initial hospital trauma resuscitation. Before March 2011, both prehospital and hospital trauma team NT equipment routinely had a 5-cm angiocatheter available. After March 2011, prehospital providers were provided an 8-cm angiocatheter. Effectiveness was defined as documented clinical improvement in respiratory, cardiovascular, or general clinical condition.

There were 91 NTs performed on 70 patients (21 bilateral placements) either in the field (prehospital, n = 41) or as part of resuscitation in the hospital (hospital, n = 29). Effectiveness of NT was 48% until March 2011 (n = 24). NT effectiveness was significantly higher in the prehospital setting than in the hospital (68.3% success rate vs. 20.7%, $p < 0.01$). Patients who underwent NT using 8 cm compared with 5 cm were significantly more effective (83% vs. 41%, respectively, $p = 0.01$). No complications of NT were identified in either group.

MEDLINE®

# What Is the Optimal Device Length and Insertion Site for Needle Thoracostomy in UK Military Casualties? A Computed Tomography Study.


## Abstract

Significant lessons to inform best practice in trauma care should be learned from the last decade of conflict in Afghanistan and Iraq. This study used radiological data collated in the UK Military Hospital in Camp Bastion, Afghanistan, to investigate the most appropriate device length for needle chest decompression of tension pneumothorax (TP). We reviewed the optimal length of device and site needed for needle decompression of a tension pneumothorax in a UK military population and found no significant difference between sites for needle chest decompression (NCD). As a result, we do not recommend use of devices longer than 60mm for UK service personnel.



J Spec Oper Med

Published January 1, 2015.

Volume 15, Issue 3; Pages 60-5



Blenkinsop G, Mossadegh S, Ballard M, Parker P.

# Needle thoracostomy for tension pneumothorax: the Israeli Defense Forces experience

LTC Jacob Chen, MD, PhD
Capt Roy Nadler, MD
Maj Dagan Schwartz, MD
Col Homer Tien, MD
LTC Andrew P. Cap, MD, PhD
Col Elon Glassberg, MD, MHA

Accepted for publication:
Nov. 12, 2014

**Correspondence to:**
E. Glassberg
Trauma & Combat Medicine Branch
Surgeon General's Headquarters,
Medical Corps
Israel Defense Forces
Ramat Gan, Israel
idf_trauma@idf.gov.il

DOI: 10.1503/cjs.012914

**Background:** Point of injury needle thoracostomy (NT) for tension pneumothorax is potentially lifesaving. Recent data raised concerns regarding the efficacy of conventional NT devices. Owing to these considerations, the Israeli Defense Forces Medical Corps (IDF-MC) recently introduced a longer, wider, more durable catheter for the performance of rapid chest decompression. The present series represents the IDF-MC experience with chest decompression by NT.

**Methods:** We reviewed the IDF trauma registry from January 1997 to October 2012 to identify all cases in which NT was attempted.

**Results:** During the study period a total of 111 patients underwent chest decompression by NT. Most casualties (54%) were wounded as a result of gunshot wounds (GSW); motor vehicle accidents (MVAs) were the second leading cause (16%). Most (79%) NTs were performed at the point of injury, while the rest were performed during evacuation by ambulance or helicopter (13% and 4%, respectively). Decreased breath sounds on the affected side were one of the most frequent clinical indications for NT, recorded in 28% of cases. Decreased breath sounds were more common in surviving than in nonsurviving patients. (37% v. 19%, $p < 0.001$). A chest tube was installed on the field in 35 patients (32%), all after NT.

**Conclusion:** Standard NT has a high failure rate on the battlefield. Alternative measures for chest decompression, such as the Vygon catheter, appear to be a feasible alternative to conventional NT.

Am J Emerg Med. 2016 Dec;34(12):2310-2314. doi: 10.1016/j.ajem.2016.08.038. Epub 2016 Aug 20.

# Determination of the chest wall thicknesses and needle thoracostomy success rates at second and fifth intercostal spaces: a cadaver-based study.

Ozen C[1], Akoglu H[2], Ozdemirel RO[3], Omeroglu E[4], Ozpolat CU[5], Onur O[6], Buyuk Y[7], Denizbasi A[8].

Author information

## Abstract

**INTRODUCTION:** The purposes of this study were to measure the chest wall thicknesses (CWTs) at second intercostal space (ICS) mid-clavicular line (MCL) and fifth ICS MAL directly, and compare the actual success rates of needle thoracostomies (NTs) by inserting a 5-cm-long syringe needle. Predictive values of weight, body mass index (BMI) and CWT were also analyzed.

**MATERIALS AND METHODS:** This study included 199 measurements of 50 adult fresh cadavers from both hemithoraces. Five-centimeter-long syringe needles were inserted and secured. Penetration into the pleural cavity was assessed, and CWTs at 4 locations were measured. Achieved power of this study for the primary aim of CWT comparison from $2^{nd}$ and $5^{th}$ ICSs was .94.

**RESULTS:** Overall mean CWTs at $2^{nd}$ ICS MCL and $5^{th}$ ICS MAL were measured as 2.46 ± 0.78 and 2.89 ± 1.09, respectively, and $5^{th}$ ICS MAL was found to be statistically thicker (P = .002). The success rate of NT at $2^{nd}$ ICS MCL was 87% (95% CI, 80-94), and that at $5^{th}$ ICS MAL was 78% (95% CI, 70-86; P = .3570). Only 6 (17.1%) of 35 failed NTs had a CWT greater than 5-cm. Needle thoracostomy has failed in 29 (14.9%) of 194 locations, despite a CWT less than 5-cm. Below a weight of 72 kg, BMI of 23 $kg/m^2$, or CWT of 2.4 cm, all NTs were successful.

**DISCUSSION AND CONCLUSIONS:** In this report, we present the largest cadaver-based cohort to date to the best of our knowledge, and we observed a statistically nonsignificant 9% more NT success rate at $2^{nd}$ ICS at a power of 88% and statistically significant more success rate in males at $5^{th}$ ICS was (47.7%). We also observed thinner CWTs and higher success rates than previous imaging-based studies. A BMI of 23 $kg/m^2$ or less and weight of 72 kg or less seem to accurately rule-out NT failure in cadavers, and they seem to be better predictors at the bedside.

UpToDate®

Suspected tension pneumothorax is treated with immediate tube thoracostomy or needle decompression using a large angiocatheter (eg, 14 gauge). Needles as long as 7 cm may be necessary depending upon the size of the patient. Acceptable sites for needle insertion include the second or third intercostal space in the midclavicular line or the fifth intercostal space in the midaxillary line. If needle decompression is performed first, it is followed by tube thoracostomy. A chest tube size of at least 36 French is used. Needle decompression is discussed in greater detail separately. (See "Prehospital care of the adult trauma patient", section on 'Needle chest decompression'.)

Based on these studies, we recognize it can be difficult to determine when prehospital needle thoracostomy should be performed, but suggest the procedure is most likely to be useful under the following conditions:

- Mechanism of injury suggests the likelihood of pneumothorax
- Patient is in respiratory distress, based on clinical signs and symptoms, and low pulse oximetry despite supplemental oxygen
- Hemodynamic instability is present
- Transport time is prolonged

Providers should be aware that a tension pneumothorax can be localized, and that needle thoracostomy may not be effective in such circumstances [87].

Providers should be aware that a tension pneumothorax can be localized, and that needle thoracostomy may not be effective in such circumstances [87].

Acceptable sites for insertion of a 14-gauge angiocatheter include the second or third intercostal space in the midclavicular line, or the fifth intercostal space in the anterior or mid-axillary line. Depending on the patient's body habitus, needles as long as 8 cm may be required to perform the technique effectively [88-96]. We suggest using the anterior site for prehospital treatment. Direct stabilization and continued observation can be performed more easily in a moving ambulance using the anterior site; catheters placed at the lateral site may be dislodged by the patient's arm, and may be more prone to obstruction [97]. However, axillary placement may be easier to perform [98,99]. The skin should be cleaned with providine-iodine prior to insertion of the needle.

NICE National Institute for Health and Care Excellence

## Management of Chest Trauma in Pre-hospital Settings

Use clinical assessment to diagnose pneumothorax for the purpose of triage or intervention.

Consider using eFAST (extended focused assessment with sonography for trauma) to augment clinical assessment only if a specialist team equipped with ultrasound is immediately available and onward transfer will not be delayed.

Be aware that a negative eFAST of the chest does not exclude a pneumothorax.

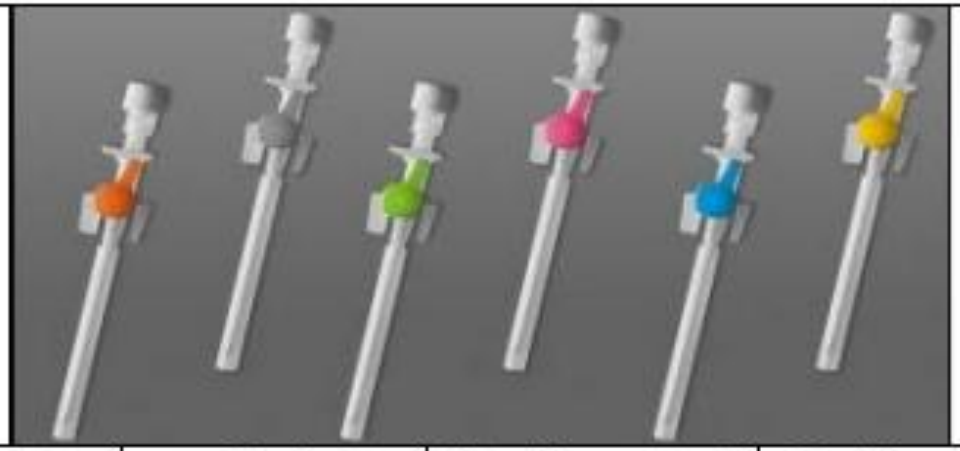
Only perform chest decompression in a patient with suspected tension pneumothorax if there is haemodynamic instability or severe respiratory compromise.

Use open thoracostomy instead of needle decompression if the expertise is available, followed by a chest drain via the thoracostomy in patients who are breathing spontaneously.

Observe patients after chest decompression for signs of recurrence of the tension pneumothorax.

In patients with an open pneumothorax:

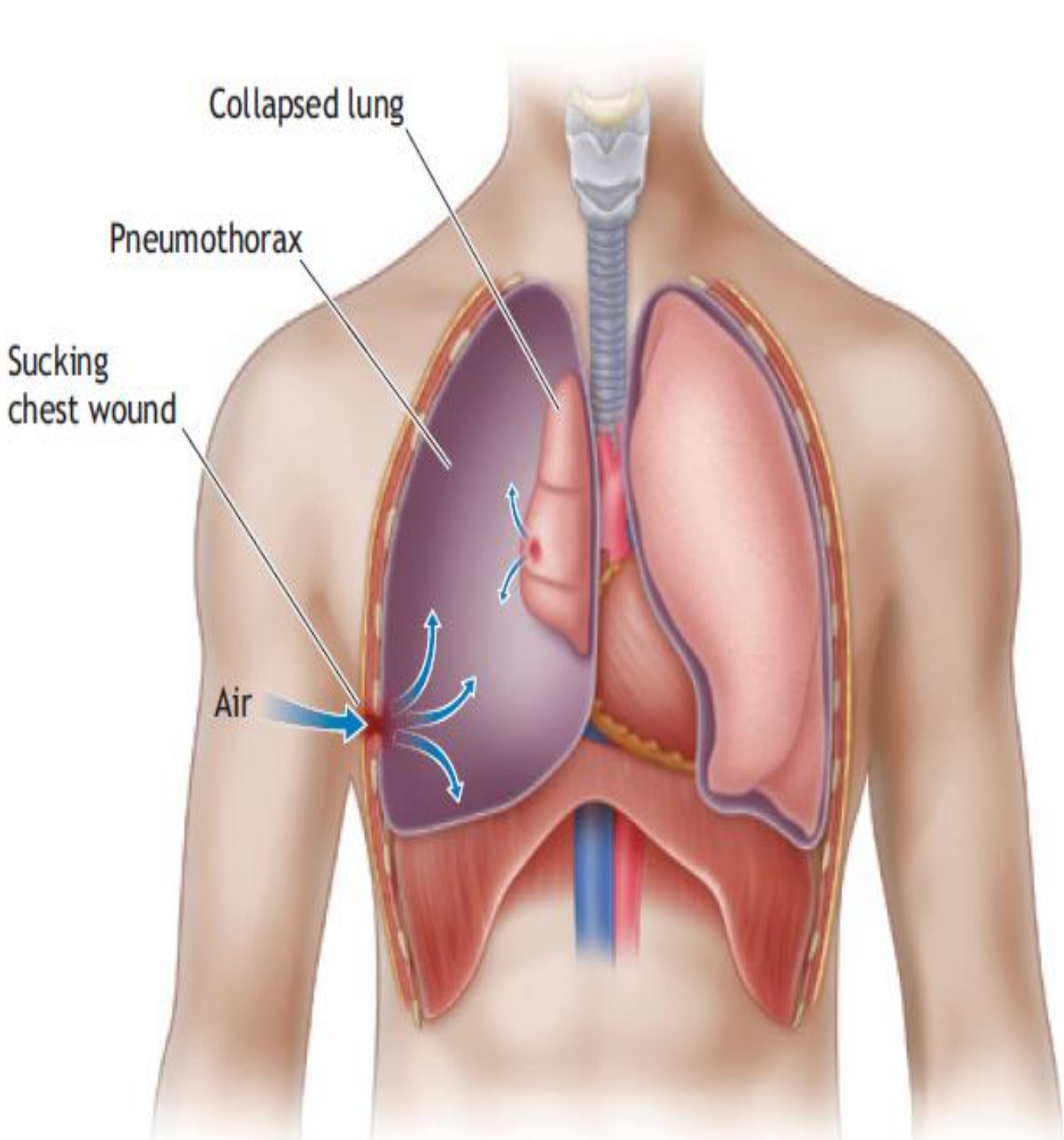
- Cover the open pneumothorax with a simple occlusive dressing **and**
- Observe for the development of a tension pneumothorax

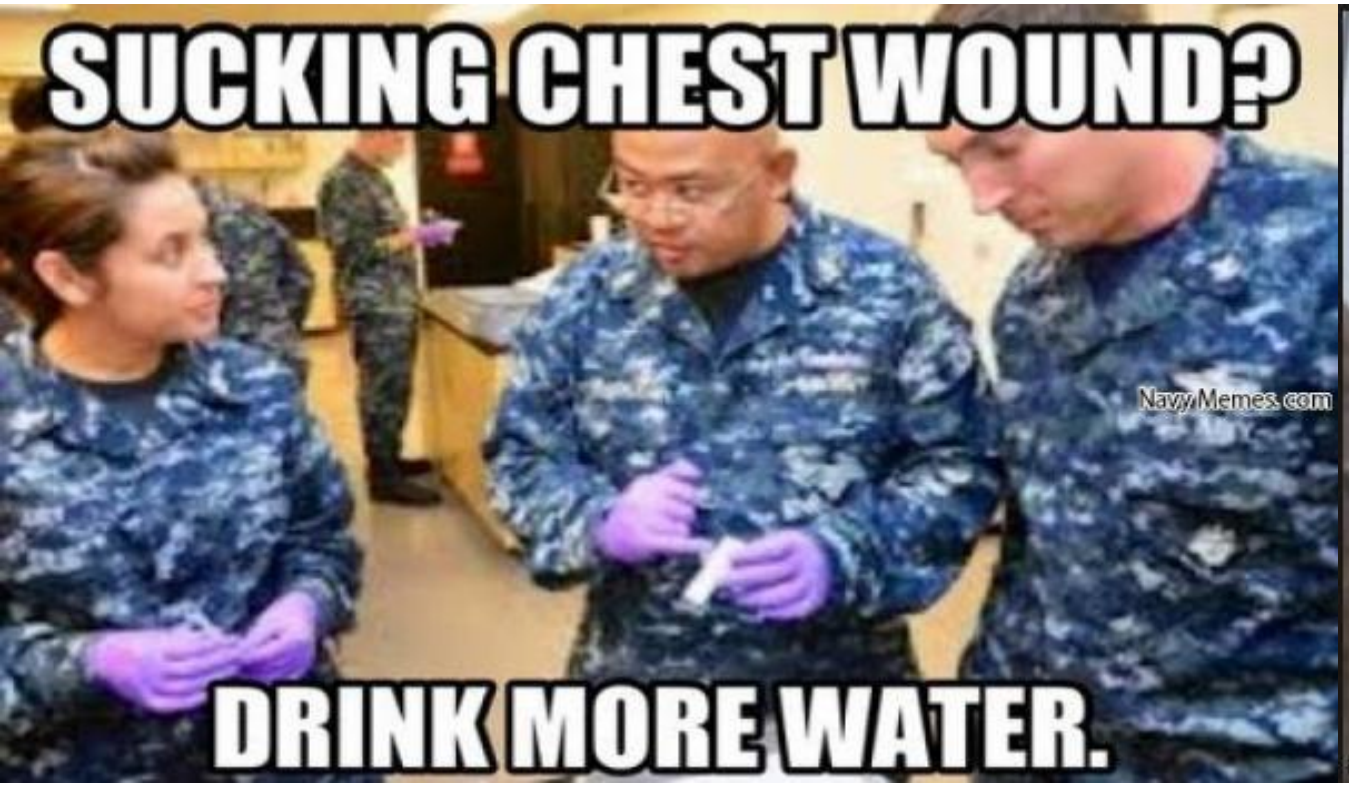


| Numara | Renk | Kanül çapı (mm) | Kanül uzunluğu |
|---|---|---|---|
| 14 | Turuncu | 2.10 | 45 |
| 16 | Gri | 1.75 | 45 |
| 18 | Yeşil | 1.20 | 45 |
| 20 | Pembe | 1.11 | 32 |
| 22 | Mavi | 0.80 | 25 |
| 24 | Sarı | 0.60 | 19 |

# AÇIK PNÖMOTORAKS

- Trekea çapının 2/3'ü veya daha fazla
- Hava daha düşük direnci tercih eder
- Hipoksi ve hiperkarbi ile sonuçlanır




SUCKING CHEST WOUND?
Navy Memes.com
DRINK MORE WATER.


WE'RE GONNA NEED A BIGGER
THREE SIDED OCCLUSIVE DRESSING
imgflip.com

# ADVANCED TRAUMA LIFE SUPPORT®

# ATLS®

**DİKKAT!!!**

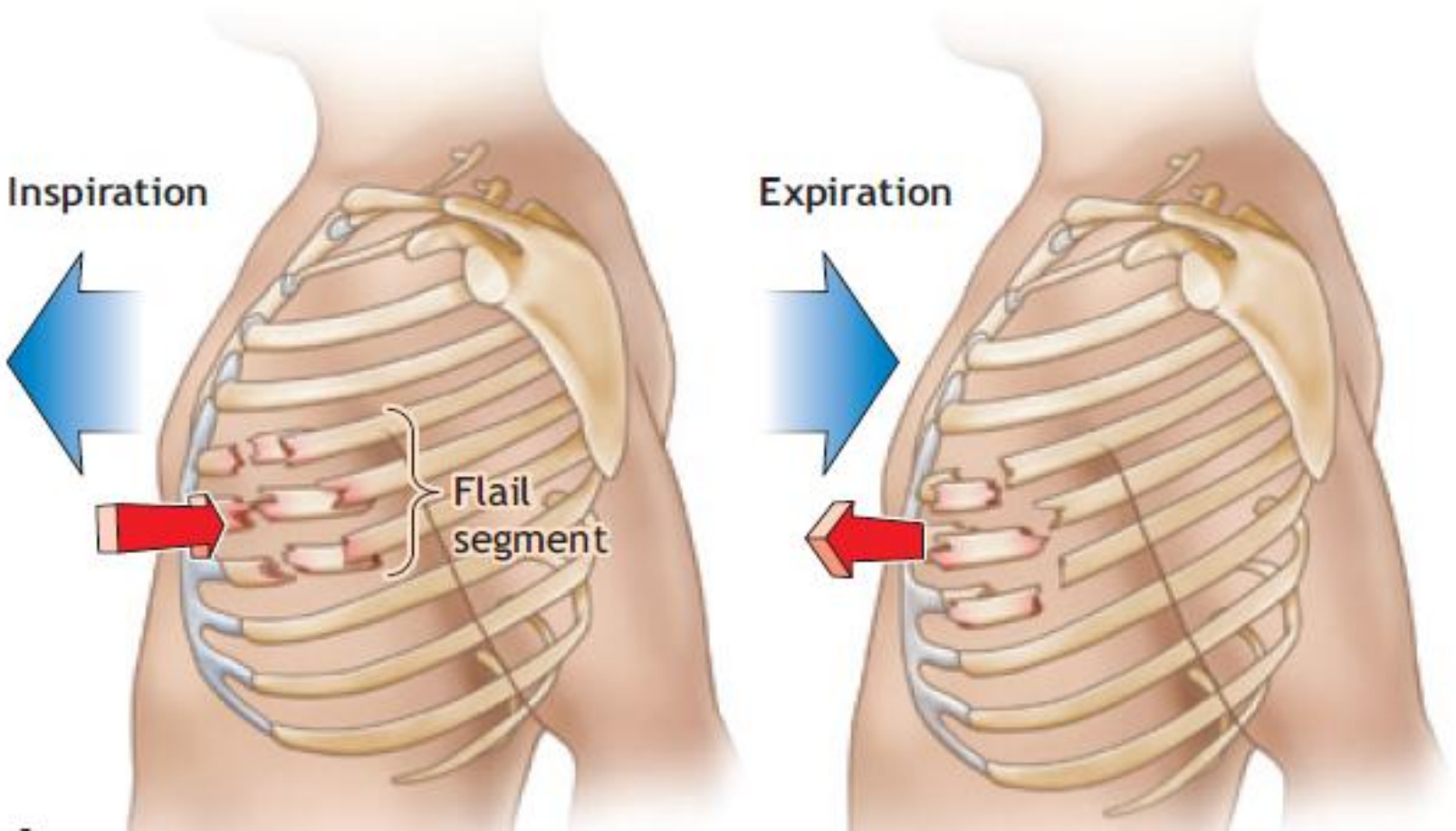
- Üç kenar
- Tamamen : Tansiyon
- İnspiryum/ekspiryum
- Tüp torakostomi
- Cerrahi onarım

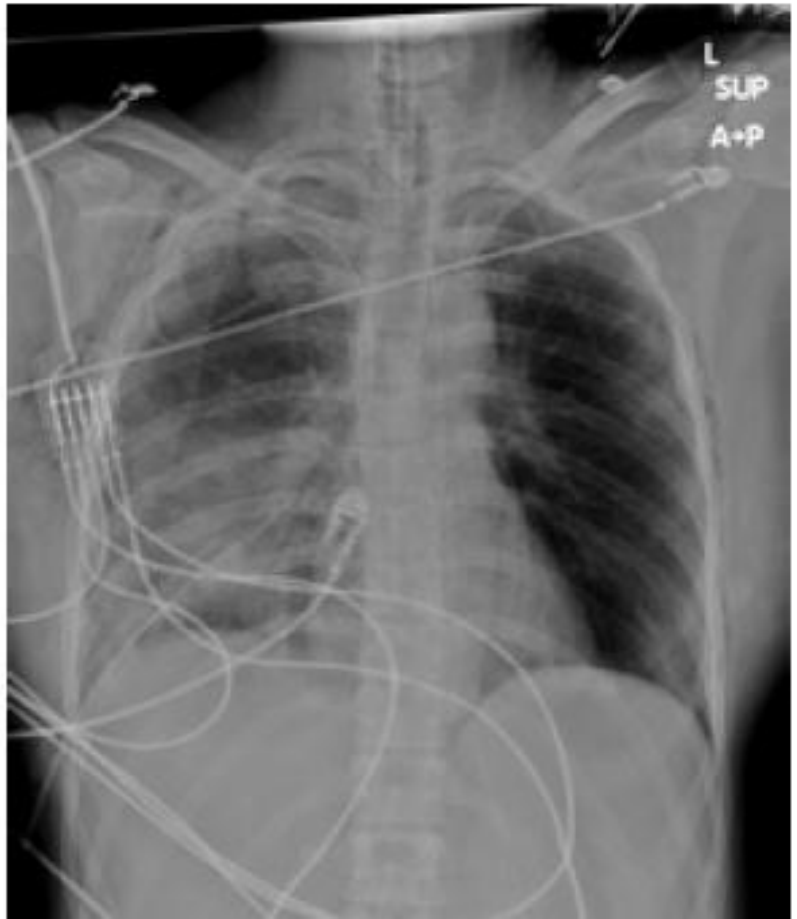
**İngilizce-Türkçe Çeviri**

1. harman döveni, zincire bağlı topuz/çubuk.
2. gürz.
3. harman döveni ile dövmek.
4. (gürz vb. ile) vurmak.
   *His arms flailing the water.*

# FLAIL CHEST VE PULMONER KONTÜZYON

- **2 veya daha fazla kaburganın 2 veya fazla yerden kırılması ile oluşur!!!**



# FLAIL CHEST VE PULMONER KONTÜZYON

- Tek başına hipoksi ile sonuçlanmaz.
- Altta yatan pulmoner kontüzyonun ciddiyeti ve ağrı ile kısıtlanan göğüs hareketleri hipoksinin asıl nedenleridir.
- **Tanı: İnspeksiyon, palpasyon**

# TEDAVI

- Yeterli ventilasyon
- Oksijenizasyon
- Sıvı resusitasyonu (!)
- Analjezi
- İnterkostal sinir bloğu
- **Hipoksiden sakın**
- Entübasyon gereksinimi için solunum sayısını, arteriyel oksijen seviyesini ve soluma iş yükünü gözle

Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

## Guideline Title

Management of pulmonary contusion and flail chest: an Eastern Association for the Surgery of Trauma practice management guideline.

## Bibliographic Source(s)

Simon B, Ebert J, Bokhari F, Capella J, Emhoff T, Hayward T 3rd, Rodriguez A, Smith L, Eastern Association for the Surgery of Trauma. Management of pulmonary contusion and flail chest: an Eastern Association for the Surgery of Trauma practice management guideline. J Trauma Acute Care Surg. 2012 Nov;73(5 Suppl 4):S351-61. [134 references] PubMed

Level 2

Trauma patients with PC-FC should not be excessively fluid restricted but rather should be resuscitated as necessary with isotonic crystalloid or colloid solution to maintain signs of adequate tissue perfusion. Once adequately resuscitated, unnecessary fluid administration should be meticulously avoided.

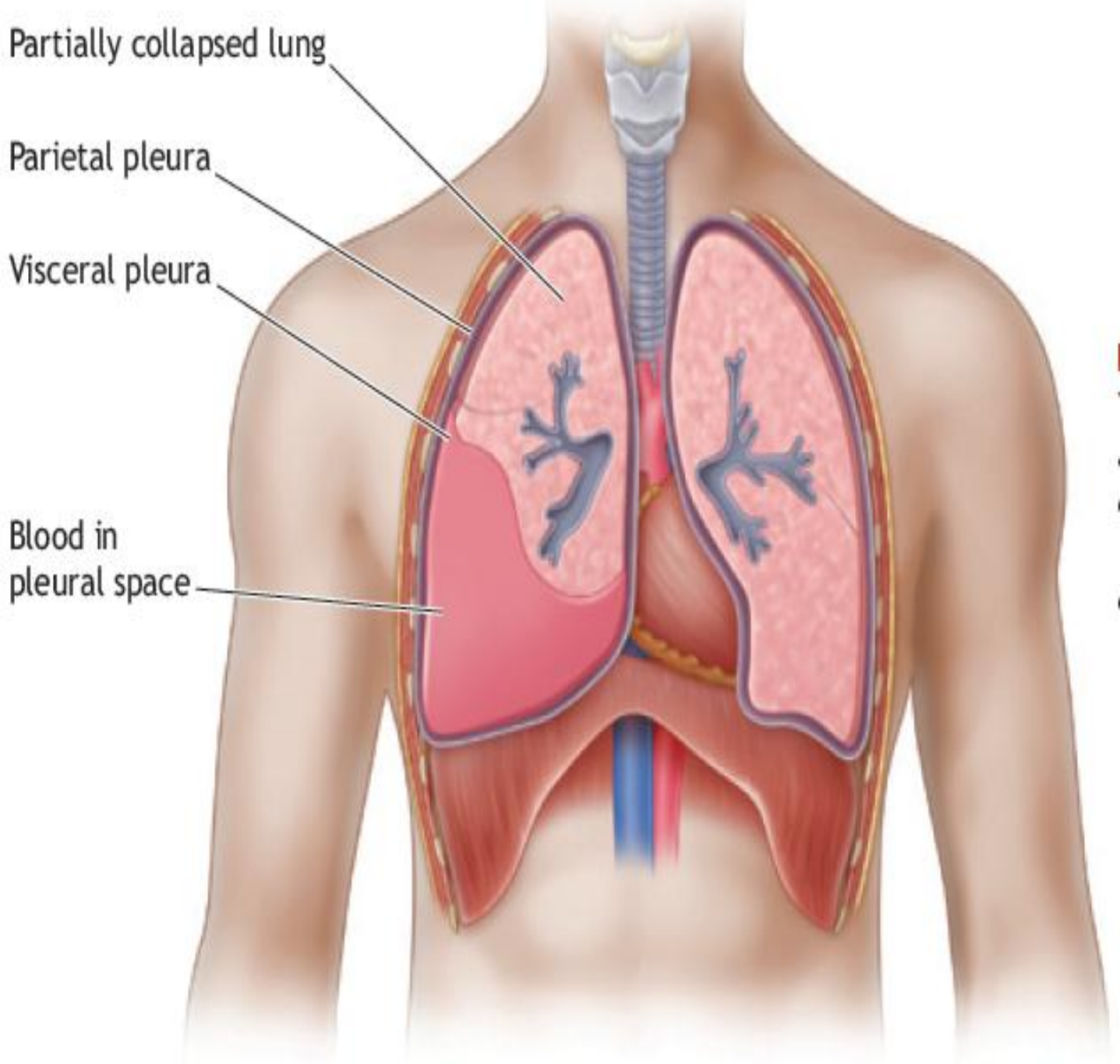
1. A pulmonary artery catheter *may* be useful to avoid fluid overload during resuscitation.
2. Obligatory mechanical ventilation in the absence of respiratory failure solely for the purpose of overcoming chest wall instability should be avoided.
3. Patients with PC-FC requiring mechanical ventilation should be supported in a manner based on institutional and physician preference and separated from the ventilator at the earliest possible time. Positive end-expiratory pressure (PEEP)/continuous positive airway pressure (CPAP) should be included in the ventilatory regimen.

4. The use of optimal analgesia and aggressive chest physiotherapy should be applied to minimize the likelihood of respiratory failure and ensuing ventilatory support. Epidural catheter is the preferred mode of analgesia delivery in severe FC injury (see the Eastern Association for the Surgery of Trauma [EAST] guidelines: Pain management guidelines for blunt thoracic trauma ).
5. Steroids should not be used in the therapy of PC.

Penetrating anterior chest wounds medial to the nipple line and posterior wounds medial to the scapula should alert the practitioner to the possible need for thoracotomy because of potential damage to the great vessels, hilar structures, and the heart, with the associated potential for cardiac tamponade. **Thoracotomy is not indicated unless a surgeon, qualified by training and experience, is present.**

# MASIF HEMOTORAKS

- >1500 ml kan (hipotansiyon/şok)
- 1/3 veya > total kan hacmi
- Sonuç hipoksi



# MASIF HEMOTORAKS TEDAVI

- Kan hacminin tamamlanması
- Dekompresyon
- İv hidrasyon izotonik
- Tip spesifik kan replasmanı en kısa sürede
- Ototransfüzyon ??
- Torakotomi gereksinimini düşün

# TORAKOTOMI ENDIKASYONU

- >200 ml 2-4 saat (karar sadece kanama miktarına göre alınmaz)
- Hastanın fizyolojik durumu göz önünde bulundurulmalıdır
- Tekrarlayan kan replasmanı ihtiyacı endikasyon doğurur.
- Kanın rengi torakotomi için zayıf bir göstergedir.

**TABLE 10–2 Indications for Surgery after Tube Thoracostomy Based on the Results of the Thoracostomy**

| |
|---|
| Massive hemothorax, >1000–1500 mL initial drainage |
| Continued bleeding |
| >300–500 mL in 1st hr |
| >200 mL/hr for first 3 or more hr |
| Increasing size of hemothorax on chest film |
| Persistent hemothorax after two functioning tubes placed |
| Clotted hemothorax |
| Large air leak preventing effective ventilation |
| Persistent air leak after placement of second tube or inability to fully expand lung |

This is meant to be a guide, and clinical judgment should always be used.

# RESUSITATIF TORAKOTOMI

- NEA +penetran  ok
- Penetran + yaşam belirtisi yok : Yapma (spontan hareket, organize EKG, reaktif pupil)
- Künt + NEA yapma

for immediate resuscitative thoracotomy. A qualified surgeon must be present at the time of the patient's arrival to determine the need and potential for success of a resuscitative thoracotomy in the emergency department (ED). Restoration of intravascular volume should be

The therapeutic maneuvers that can be effectively accomplished with a resuscitative thoracotomy are:

- Evacuation of pericardial blood causing tamponade
- Direct control of exsanguinating intrathoracic hemorrhage
- Open cardiac massage
- Cross-clamping of the descending aorta to slow blood loss below the diaphragm and increase perfusion to the brain and heart

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

# European Resuscitation Council Guidelines for Resuscitation 2015 Section 4. Cardiac arrest in special circumstances

Anatolij Truhlář[a,b,*], Charles D. Deakin[c], Jasmeet Soar[d], Gamal Eldin Abbas Khalifa[e], Annette Alfonzo[f], Joost J.L.M. Bierens[g], Guttorm Brattebø[h], Hermann Brugger[i], Joel Dunning[j], Silvija Hunyadi-Antičević[k], Rudolph W. Koster[l], David J. Lockey[m,w], Carsten Lott[n], Peter Paal[o,p], Gavin D. Perkins[q,r], Claudio Sandroni[s], Karl-Christian Thies[t], David A. Zideman[u], Jerry P. Nolan[v,w], on behalf of the Cardiac arrest in special circumstances section Collaborators[1]

*Cardiac tamponade and resuscitative thoracotomy.* Cardiac tamponade is the underlying cause of approximately 10% of cardiac arrest in trauma.[97] Where there is TCA *and* penetrating trauma to the chest or epigastrium, immediate resuscitative thoracotomy (RT) via a clamshell incision[188] can be life saving.[189] The chance of survival is about 4 times higher in cardiac stab wounds than in gunshot wounds.[190]

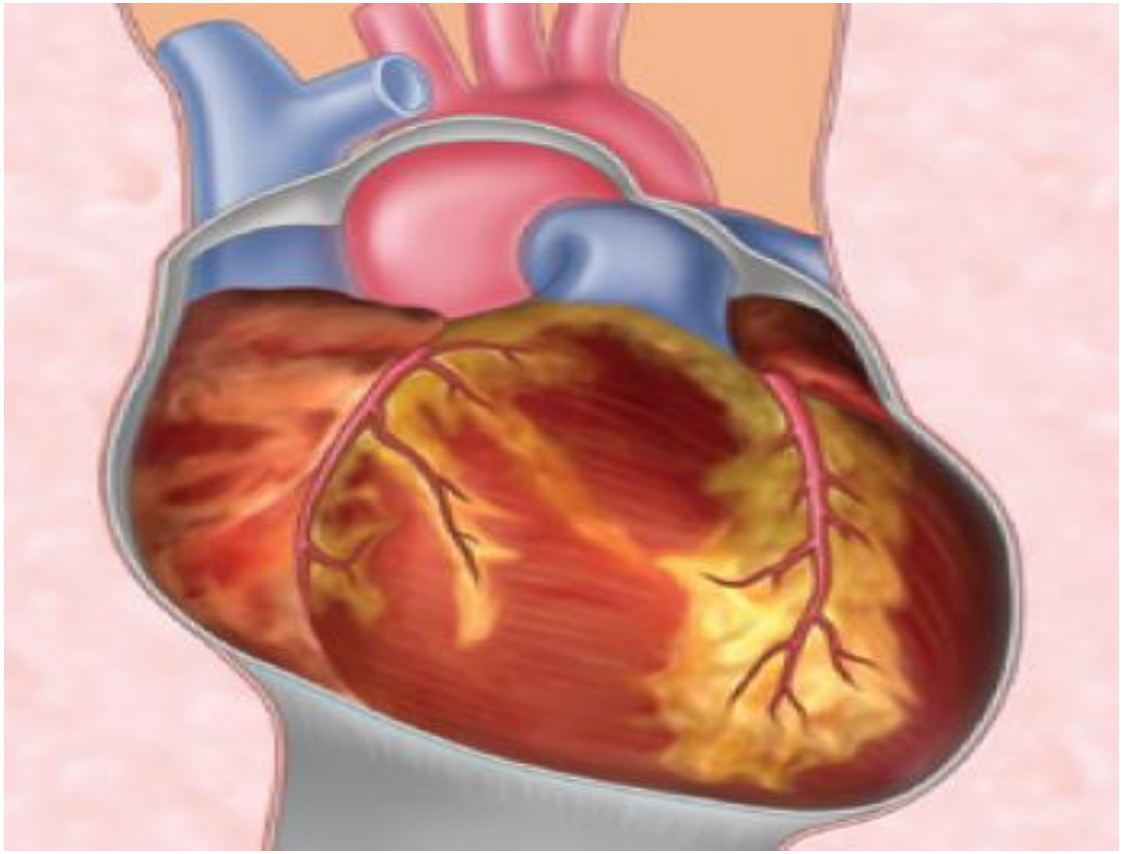
Resuscitative thoracotomy is also applied for other life threatening injuries; the evidence was examined in 2012[191] and guidelines produced which recommend that, *after arrival in hospital*, the decision to proceed with RT should include the following criteria:

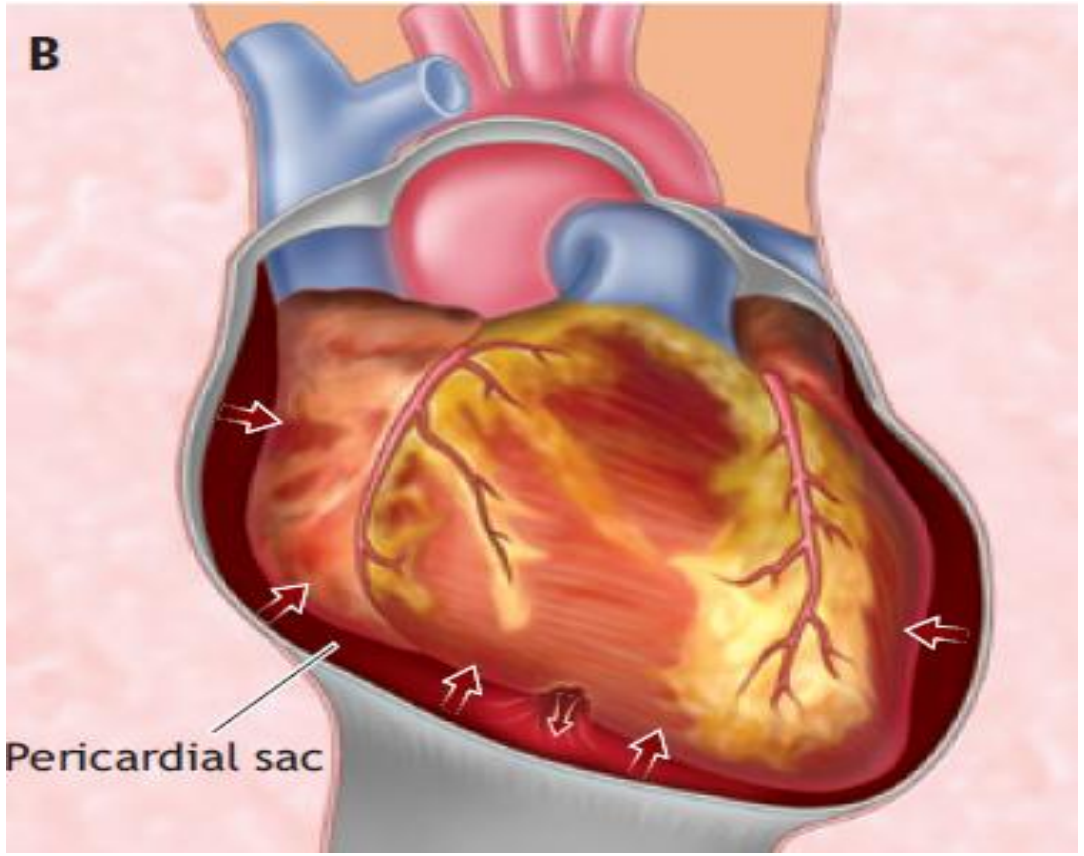
- blunt trauma patients with less than 10 min of prehospital CPR;
- penetrating torso trauma patients with less than 15 min of CPR.

These guidelines estimate survival rates for RT of approximately 15% for all patients with penetrating wounds and 35% for patients with a penetrating cardiac wound. In contrast, survival from RT following blunt trauma is dismal, with survival rates of 0–2% being reported.[191,192]

Successful RT is time critical. One UK service recommends that if surgical intervention cannot be accomplished within 10 min after loss of pulse in patients *with penetrating chest injury*, on scene RT should be considered.[10] Based on this approach, of 71 patients who underwent RT at scene, 13 patients survived and 11 of these made a good neurological recovery.

# KARDİYAK TAMPONAT





# BECK'S ☺

- Venöz basınç artışı
- Arteriyel basınçta düşüş
- Derinden gelen kalp sesleri(!)


FIGURE 4-7 Cardiac Tamponade. (A) Normal heart. (B) Pericardial tamponade can result from penetrating or blunt injuries that cause the pericardium to fill with blood from the heart, great vessels, or pericardial vessels. (C) Ultrasound image showing cardiac tamponade.

# TANI /TEDAVİ

Prompt diagnosis and evacuation of pericardial blood is indicated for patients who do not respond to the usual measures of resuscitation for hemorrhagic shock and in whom cardiac tamponade is suspected. The diagnosis can usually be made with the FAST exam. If a qualified surgeon is present, surgery should be performed to relieve the tamponade. This is best performed in the operating room if the patient's condition allows. If surgical intervention is not possible, pericardiocentesis can be diagnostic as well as therapeutic, but it is not definitive treatment for cardiac tamponade. See Skill

- Ekokardiyografi
- FAST
- İV hidrasyon

European Heart Journal (2015) **36**, 2921–2964
doi:10.1093/eurheartj/ehv318



# 2015 ESC Guidelines for the diagnosis and management of pericardial diseases

**The Task Force for the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology (ESC)**

**Endorsed by: The European Association for Cardio-Thoracic Surgery (EACTS)**

## Recommendations for the diagnosis and treatment of cardiac tamponade

| Recommendations | Class[a] | Level[b] | Ref.[c] |
|---|---|---|---|
| In a patient with clinical suspicion of cardiac tamponade, echocardiography is recommended as the first imaging technique to evaluate the size, location and degree of haemodynamic impact of the pericardial effusion | I | C | |
| Urgent pericardiocentesis or cardiac surgery is recommended to treat cardiac tamponade | I | C | |
| A judicious clinical evaluation including echocardiographic findings is recommended to guide the timing of pericardiocentesis | I | C | |
| A triage system may be considered to guide the timing of pericardiocentesis (*Web Figure 4*) | IIb | C | |
| Vasodilators and diuretics are not recommended in the presence of cardiac tamponade | III | C | |

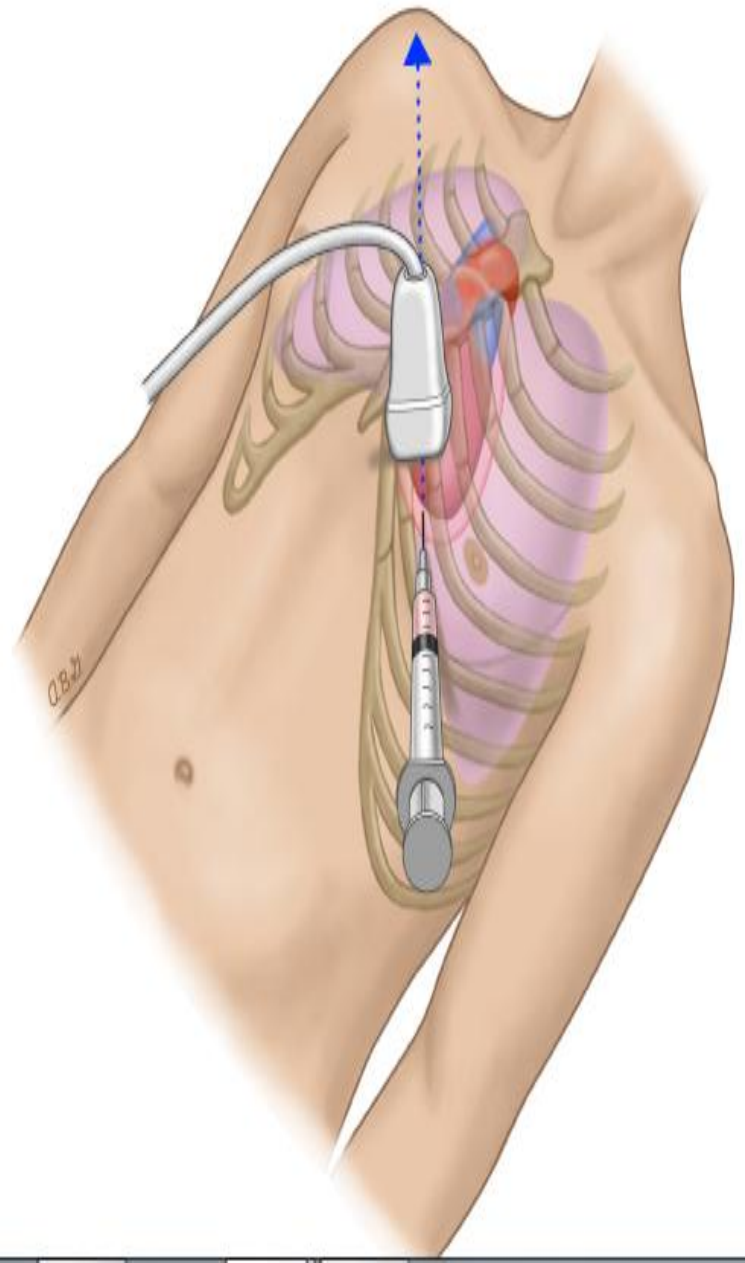
[a]Class of recommendation.
[b]Level of evidence.
[c]Reference(s) supporting recommendations.

## Table 9 Causes of cardiac tamponade

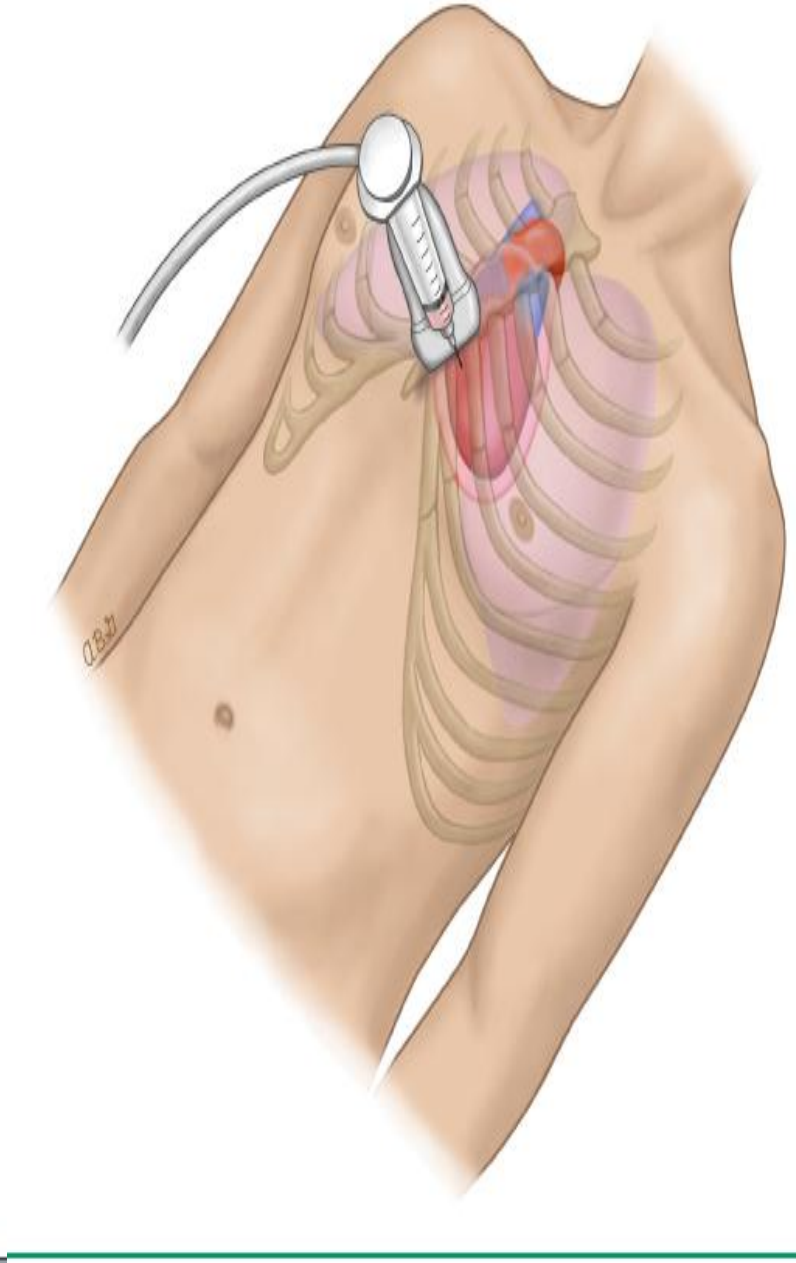
**Common causes:**
- Pericarditis
- Tuberculosis
- Iatrogenic (invasive procedure-related, post-cardiac surgery)
- Trauma
- Neoplasm/malignancy

**Uncommon causes:**
- Collagen vascular diseases (systemic lupus erythematosus, rheumatoid arthritis, scleroderma)
- Radiation induced
- Postmyocardial infarction
- Uraemia
- Aortic dissection
- Bacterial infection
- Pneumopericardium

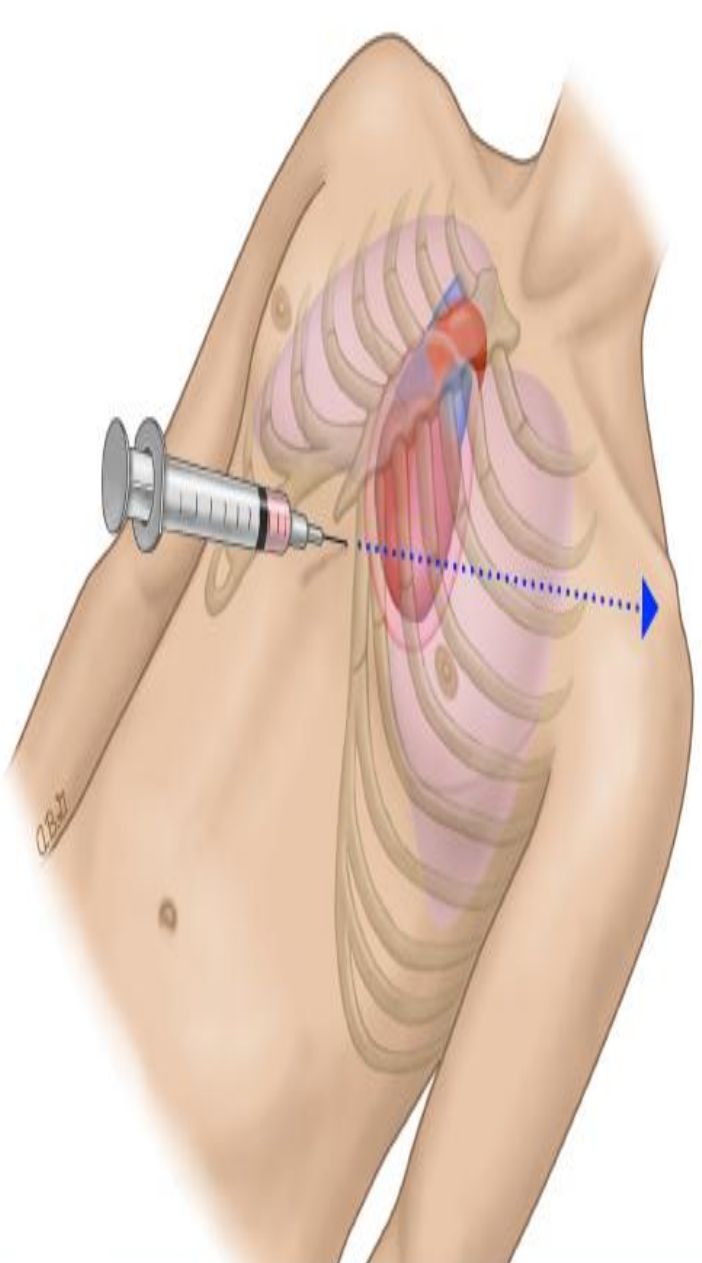
## Emergency pericardiocentesis apical approach



## Emergency pericardiocentesis parasternal approach



## Emergency pericardiocentesis subxiphoid approach



Contents lists available at ScienceDirect

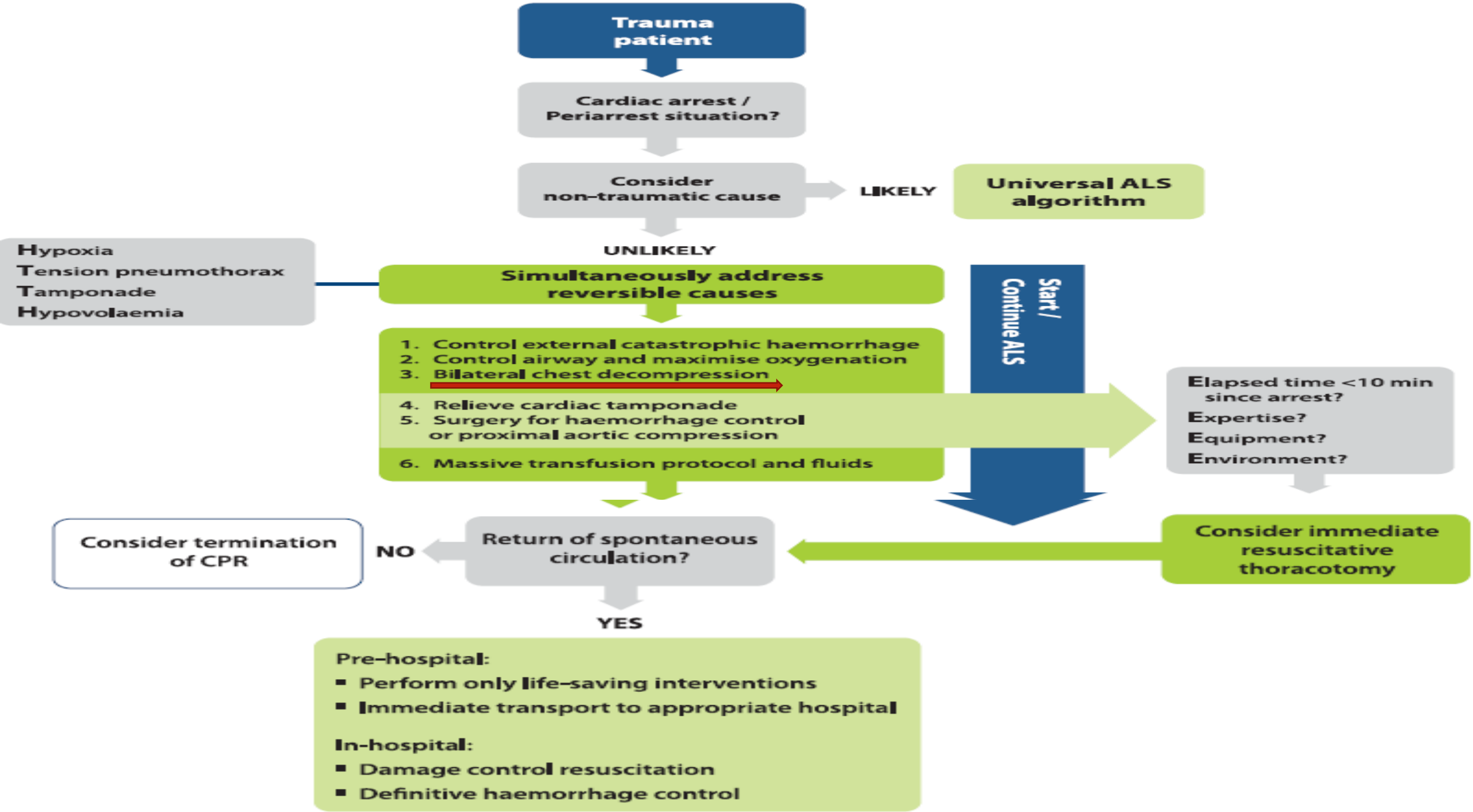
Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

# European Resuscitation Council Guidelines for Resuscitation 2015 Section 4. Cardiac arrest in special circumstances

Anatolij Truhlář[a,b,*], Charles D. Deakin[c], Jasmeet Soar[d], Gamal Eldin Abbas Khalifa[e], Annette Alfonzo[f], Joost J.L.M. Bierens[g], Guttorm Brattebø[h], Hermann Brugger[i], Joel Dunning[j], Silvija Hunyadi-Antičević[k], Rudolph W. Koster[l], David J. Lockey[m,w], Carsten Lott[n], Peter Paal[o,p], Gavin D. Perkins[q,r], Claudio Sandroni[s], Karl-Christian Thies[t], David A. Zideman[u], Jerry P. Nolan[v,w], on behalf of the Cardiac arrest in special circumstances section Collaborators[1]

Tranexamic acid (TXA) (loading dose 1 g over 10 min followed by infusion of 1 g over 8 h) increases survival from traumatic haemorrhage.[182] It is most effective when administered within the first hour and certainly within the first 3 h following trauma.[182] Give TXA in the prehospital setting when possible.


Trauma patient
Cardiac arrest / Periarrest situation?
Consider non-traumatic cause
LIKELY
Universal ALS algorithm
UNLIKELY
Hypoxia
Tension pneumothorax
Tamponade
Hypovolaemia
Simultaneously address reversible causes
1. Control external catastrophic haemorrhage
2. Control airway and maximise oxygenation
3. Bilateral chest decompression
4. Relieve cardiac tamponade
5. Surgery for haemorrhage control or proximal aortic compression
6. Massive transfusion protocol and fluids
Start / Continue ALS
Elapsed time <10 min since arrest?
Expertise?
Equipment?
Environment?
Consider immediate resuscitative thoracotomy
Return of spontaneous circulation?
NO
Consider termination of CPR
YES
Pre-hospital:
Perform only life-saving interventions
Immediate transport to appropriate hospital
In-hospital:
Damage control resuscitation
Definitive haemorrhage control


GOD, GRANT ME PATIENCE.
mimiandeunice.com
HURRY UP!