



## Chapter 36 – Multiple Trauma

### Episode Overview:

- 1) List indications for activation of a trauma team
- 2) What is the general approach to a multi-trauma patient?
- 3) List commonly missed trauma injuries
- 4) ED thoracotomy indications and contraindication for blunt and penetrating trauma

### Wisecracks:

- 1) Describe the term permissive hypotension and when you would not use it
- 2) What are 3 goals for out of hospital care of a trauma patient

### Rosen's in Perspective

#### Epidemiology

- trauma is the leading cause of death in people aged 1-44 yrs

#### Trauma Systems

- regionalized trauma systems have been shown to decrease mortality by 15-25%
- general goal is scoop and run, but this can result in over and under triaging patients
  - o each system has a complex decision scheme to aid EMS and dispatchers in health care resources

#### Principles of Disease

- mechanism of injury provide general info on what injuries may be present
  - o eg. head on MVC (aortic tear) vs rear end collision (central cord syndrome)
  - o penetrating trauma vs blunt trauma
  - o high velocity/caliber penetrating injury vs knife
- other considerations:
  - o pediatric/infant patients
  - o geriatric trauma (medical comorbidities, medications (blood thinners/beta blockers etc.)



## 1) List indications for activation of a trauma team

- Physiologic
  - Systolic < 90
  - RR < 10 / > 30
  - GCS ≤12, or focal neuro deficit
- Anatomic
  - Amputation proximal to elbow or knee
  - ≥ 2 long bone #
  - Flail chest
  - Tension pneumo or hemothorax
  - Suspected spinal injury with deficit
  - Suspected penetrating injury: head, and anywhere proximally
  - Unstable pelvis injury
- Mechanistic
  - Ejection from vehicle
  - Pedestrian impact > 30 km/hr
  - High speed MVC or roll over
  - Fall > 20 ft or 6 m
  - Severe deceleration injury
  - Bicycle or motorcycle crash > 30 km/hr
  - 2nd or 3rd degree burns > 10% BSA
  - Inhalation burns
  - Special considerations:
    - >60
    - <16
    - Pregnancy
- Logistical
  - If the emergency physician needs more help and resources

## 2) What is the general approach to a multi-trauma patient?

After receiving information about an incoming trauma patient this one possible approach to prepare the team (from EM cases episode 83):

- 1) What do we know
- 2) What do we expect to see? What are the possibilities?
- 3) What do we do and the contingency plans?
- 4) Role assignments
- 5) Rally point / check in at 5 mins

ATLS approach:



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Airway

Breathing

Circulation

Disability (GCS/Pupils/Gross Motor)

Exposure

More logical approach:

1. Prepare your team!
2. Control deadly bleeding - TQs, bind pelvis, scalp lacs,
3. Resuscitate before you intubate
  - a. Decompress the chest
  - b. Bind the pelvis
4. Give blood ASAP in the bleeding trauma patient!
  - a. “Call for 4 units of un-crossmatched blood”

Primary Survey:

Airway

- protection: blood, vomit, debris, hematoma formation, obstruction
- oxygenation: avoid hypo or hyperoxia
- ventilation: avoid acidosis

Breathing

- work of breathing, tachypnea
- chest trauma signs
- treat as appropriate: intubation, finger thoracotomy, chest tubes, cricothyrotomy

Circulation

- control deadly bleeding
- clinical indicators of adequate perfusion (mental status)
- vitals, monitors, IVs
- fluids <2L crystalloid, blood (O pos. unless a child-bearing female)
- TXA
- E-FAST exam

Disability

- GCS, pupils, power and movement x4

Exposure

- Undress completely
- Look in axilla, groin, buttocks
- Treat hypothermia
- COVER PATIENT BACK UP



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Secondary Survey:

- AMPLE history
- treat injuries not noted or dealt with in the primary survey

Radiologic Evaluation:

- generally order minimal imaging tests: CXR, pelvic xray, eFAST: although may be excluded with advanced ultrasound in patients going to CT scanner
- c-spine plain x-rays are poorly sensitive – but a lateral neck may be all you can get in the unstable patient in the trauma room
  - Nexus Criteria: no imaging if:
    - No posterior midline tenderness
    - No focal neurological deficits
    - Normal mental status
    - No intoxication
    - No distracting injury
  - Canadian C-spine Tool also a good option to use
- CT imaging much better at detecting injuries
- Pelvic X-ray definitely should be performed for:
  - anyone with altered mental status in the setting of trauma
  - pelvic pain, tenderness
  - distracting injury or intoxication

Lab Evaluation in trauma:

- lactate and base deficit helpful to predict resuscitation in trauma
- group screen, type, and crossmatch
- INR, fibrinogen
- routine blood work
- B-HCG

Disposition

- Admit vs discharge vs transfer
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**3) List commonly missed traumatic injuries.**

1. Bleeding scalp wounds
2. Extremity fractures
3. Urethral injuries
4. Posterior injuries (i.e. didn't logroll)
5. Penetrating wounds in axillae/buttocks/groin



## 4) ED thoracotomy indications and contraindications for blunt and penetrating trauma

<http://lifeinthefastlane.com/ccf/emergency-thoracotomy/>

### ED resuscitative thoracotomy:

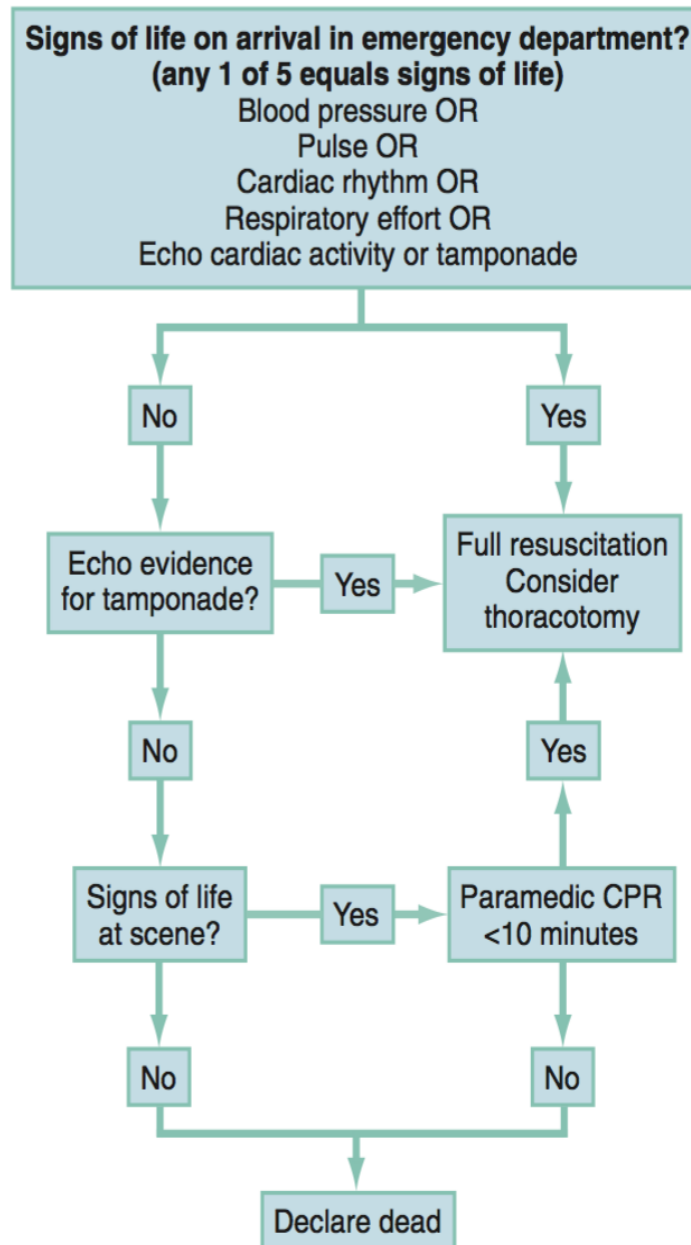
- Goal to:
  - identify phrenic nerve and open pericardial sac (must do this open because in blunt trauma the blood around the heart CLOTS and ***must be removed manually and NOT by a needle***)
  - treat pericardial injuries with staples/foley catheter/sutures/holding finger in place
  - cross clamp aorta
  - hilar twist
  - open cardiac massage

### Blunt trauma indications:

- blunt trauma with:
  - signs of life on arrival to the ED (any 1 of):
    - blood pressure
    - pulse
    - cardiac rhythm
    - respiratory effort
    - U/S ECHO showing cardiac activity or tamponade
  - Less than 10 mins of paramedic-based CPR
    - can consider doing thoracotomy
- consider intubating, giving IV fluids, and needling both chests or bilateral finger thoracostomy
- contraindications:
  - no signs of life on scene and in the ED
  - CPR (despite signs of life initially) > 10 mins
  - system or department reasons\*

### Penetrating trauma indications:

- signs of life in the ED then arrest
- less than 10 mins of CPR
- If no signs of life in the ED, but evidence of tamponade then consider doing thoracotomy
- Contraindications:
  - >10 mins of CPR and no signs of life on arrival to the ED
  - System or department reasons\*



**Figure 36-2.** Penetrating chest trauma emergency department thoracotomy algorithm. *CPR*, cardiopulmonary resuscitation.

For more reading.....

- Roberts and hedges
- Trauma.org
- LTFL



## **EAST-guidelines:**

Recommendation:

In patients presenting pulseless to the emergency department without signs of life after blunt injury, we conditionally recommend against the performance of EDT. This recommendation is based on low quality of evidence and reflects subcommittee group disagreement regarding the strength of the unanimous recommendation against EDT.

Recommendation:

In patients presenting pulseless to the emergency department with signs of life after blunt injury, we conditionally recommend that patients undergo EDT. This recommendation is based on moderate quality of evidence and places emphasis on patient preference for improved survival and neurologically intact survival after EDT.

## **WiseCracks:**

### **1) Describe permissive hypotension and when would you not use it**

According to Rosen's:

- Based on the idea that if you resuscitate someone to their normal blood pressure - you may INCREASE bleeding from a site that has stopped bleeding leading to more hemorrhage
- The idea wasn't supported or refuted according to a Cochrane review cited in Rosen's

For more information

From: <http://lifeinthefastlane.com/ccp/permissive-hypotension/>

Overview:

- The concept remains controversial and is primarily applicable to the penetrating trauma patient
- It is considered part of damage control resuscitation, along with haemostatic resuscitation and damage control surgery.



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Approach:

- Allow SBP to fall low enough to avoid exsanguination but keep high enough to maintain perfusion - titrate to mentation
- Goal is to avoid disruption of an unstable clot by higher pressures and worsening of bleeding (“don’t pop the clot”)
- Avoids cyclic over-resuscitation that can lead to re-bleeding and paradoxically exacerbate hypotension despite increased fluid resuscitation and subsequent complications
- Low BP is not the target, it is a compromise pending emergency surgical intervention
- **Haemorrhage control is the goal, once this achieved (e.g. haemostasis and surgery) normalisation of haemodynamics is appropriate**
- When NOT to use it:
  - In any patient with a suspected or possible head injury
  - ?blunt trauma

## 2) What are 3 goals of out of hospital care of the trauma patient

- A: treat tension ptx, possible intubation
- B: + C: hemodynamic support, massive bleeding
- D: C-spine
  1. Control deadly bleeding
    - a. TQs, direct compression, bind the pelvis,
  2. Protect the airway
    - a. Needle, cric, intubate
  3. Spinal support?

### Pitfalls

- failure to capture airway quickly and forgetting to cric. if needed
- failure to bind the pelvis
- failure to control deadly bleeding
- use of excessive spinal immobilization