Pediatric Thoracic Trauma

Learning Objectives

• Understand the difference in approach to pediatric and adult blunt trauma in terms of physiology and anatomy with specific reference to thoracic injury
• Review the ATLS approach to thoracic trauma
• Review E and M of specific thoracic injuries
• Case scenarios
Pediatric Thoracic Trauma

- 5-10% peds trauma admissions
- 85% blunt; 15% penetrating
- Multisystem involvement > 50%
- Overall 15% die
  - 50% of these from associated head injury
- Second only to head injury as cause of traumatic death in children

Advanced Trauma Life Support

- Predicated on identifying and treating the most life threatening injuries first
- A process; do it the same way every time to avoid missed injuries
- Taught sequentially; performed concurrently
- An organized team approach
ATLS

• Primary Survey
  – Airway- patent or not? Adjuncts. Oxygen.
  – Breathing- chest movement, auscultation
  – Circulation-pale, cool? Cap refill. BP
  – Disability- neurologic deficit. GCS.
  – Expose- quickly assess all. Keep warm.

ATLS

• Secondary Survey
  – A head to toe examination and system evaluation
  – Called out to recorder
ATLS

• Tests/adjuncts/consults
  – CXR
  – C-spine evaluation
  – Labs, U/A
  – CT imaging as needed
  – Consultants/transfer as needed ASAP

• A formal management plan is now made for admission or transfer

Trauma Lab Panel

• ABG
• Lactate
• Electrolytes
• LFT’s(CMP)
• Lipase
• Urinalysis
• UPT as indicated
• Ethanol/Drugs of Abuse Screen
Anatomic Differences: Chest

- Ribs largely cartilaginous; tend to bend not break. Fracture= large force applied
- Mediastinum very mobile; can shift one side to the other easily resulting in pneumothorax-tension pneumothorax-cardiac tamponade
- Lungs can absorb significant energy without obvious signs(pulmonary contusion common)

Pediatric Physiologic Differences

- Ability to maintain cardiac output during hypovolemia through increased heart rate
- Ability to maintain blood pressure through vasoconstriction; hypotension then ensues after advanced hypovolemia
- Beware the tachycardic, peripherally cool pediatric trauma patient
Evaluation of Thoracic Trauma

- Careful history
- Look, Listen, Feel
- CXR standard; hard to beat risk/benefit
- FAST/Pericardial views
- CTA for suspected vascular injury
- Bronchoscopy/Esophagoscopy

Pneumothorax

- Violation of parietal or visceral pleura
- Inadequate oxygenation/ventilation
- Simple, Tension, Open
- Major risk is progression to tension
- Dx: Auscultate, CXR
- In extremis: needle thoracostomy diagnostic and therapeutic. Don’t wait for CXR!
Treatment of Pneumothorax

- Tube thoracostomy = chest tube
- Sized appropriately; bigger is better
- Anterior axillary line, nipple level
- Local anesthesia adequate
- Top of rib always
- Confirm by output, pleurodynamics, CXR
**Hemothorax**

- Majority from blunt trauma; intercostal bleeder from rib fx most common
- Dx: CXR; CT
- RX: Chest tube
- Majority stop bleeding
- Operative indication 15-20 ml/kg initial or 5-10 ml/kg/hr ongoing for 3-4 hours

**Pericardial Tamponade**

- Rare except in penetrating trauma
- Fibrous pericardium; restrictive lesion
- Dx: JVD, muffled heart tones, FAST
- Rx: needle aspiration with cardiac surgical availability
- Pericardial window
- In extremis: Thoracotomy
Tracheobronchial Injury

- **Dx:**
  - Significant blunt trauma
  - Large air leak with persistent pneumothorax
  - Subcutaneous air
  - Bronchoscopy

- **Rx:**
  - Dependent on findings
  - Ranges from additional chest tube to primary repair
Major Vascular Injury

- Fortunately uncommon in blunt trauma
- Suspect: widened mediastinum, apical cap, deviated NGT
- Dx: CTA; angio if unclear
- Rx: conservative vs OR
Diaphragm Rupture

- Uncommon
- Left greater than right
- Can be missed by CT
- Suspect with hemothorax; lucency in chest; ngt deviation
- Treatment operative
Myocardial Contusion

- Blunt trauma setting
- Often associated with sternal fracture
- Localized tenderness
- Myocardial electrical irritability
- Cardiac enzymes elevated
- ECHO indicated r/o other injury
- Treatment supportive
Penetrating Thoracic Trauma

- Goal is to identify and treat injuries from path of penetration
- Isolated hemothorax injury: Chest tube with output assessment: OR vs observation
- Involvement of mediastinum: FAST, CTA
- Involvement of SCA/SCV: CTA
- Beware penetration below nipple level: is abdomen involved?
Pediatric ED Thoracotomy

- Role in penetrating trauma with acute arrest
  - Goal: volume preservation/resuscitation allowing operative repair of injury
  - Anterolateral thoracotomy with aortic cross clamp
  - To OR if signs of life
- No effective role in blunt trauma