The ABC’s of Chest Trauma

What’s the Problem?

- 2/3 of trauma patients have chest trauma
- Responsible for 25% of all trauma deaths
- Most injuries can be managed with simple maneuvers
- Less than 10% require definitive operative repair

Immediate Priorities in Management of Chest Trauma

- Airway
- Breathing
- Circulation
Case #1
40 year old male has fallen from a scaffold, landing on a pile of wooden pallets

What are your initial thoughts about possible injuries?
How are you going to determine his injuries?
How likely are you to miss injuries if you don't expose and palpate the patient’s chest?
What factors complicate chest assessment?
What assessment findings would alert you that this patient is in acute distress?

What Injuries are Possible?

Always Look at the Back!!
Rib Fractures

- What complications might this patient suffer?
- How does pre-morbid status affect onset and severity of complications?
- What can we do to prevent these complications from occurring, or at least lessen their severity?

Life Threatening Injuries

- Tension Pneumothorax
- Flail Chest w/ pulmonary contusion
- Open chest wounds
- Massive Pneumo/Hemothorax
- Tracheo-bronchial disruption
- Cardiac Tamponade

Tension Pneumothorax

- Common with both blunt and penetrating trauma
- Diminished breath sounds (listen laterally)
- Subcutaneous emphysema
- Hypotension
Subcutaneous Emphysema

Treatment
- Needle Thoracostomy
  - 14 to 16 gauge needle
  - Mid-clavicular
  - Anterior axillary

Pitfalls of Needle Thoracostomy
- May not decompress the tension
- Bleeding/lung laceration
- May kink
- Mandates that patient gets a chest tube
Case #2

22 year old male stabbed in left chest just lateral to the nipple

BP 120/78, O2 sat 95%

CXR shows 50% pneumothorax

Open Chest Wounds

- Loss of chest wall support
- Direct pulmonary injury
- Magnitude of blood loss may be underappreciated
Treatment for open chest wounds

- Direct pressure to control bleeding
- Semi-occlusive dressing
- Chest tube
- Early intubation to support ventilation

“There is no organ in the chest or abdomen that has not been injured by a chest tube.”

Pitfalls of Chest Tube Placement

- Damage to heart/lung/vessels
- Intra-abdominal placement with injury to spleen and/or liver
- Subcutaneous placement
- Last hole not in the thoracic cavity
- Pain from the tube being in too far
Case #2 continued

Heart rate now 130's, BP upper 90's
Chest tube output 500cc/2 hours
CXR shows some opacity over the left lung field

Indications for Thoracotomy

- Greater than 1000-1500 cc initial output
- 200-250 cc bleeding over 2-4 hours
- Hemodynamic instability
Case #3

78 year old male driver of vehicle that struck a tree head on

Paradoxical chest wall movement easily seen
Multiple rib fractures seen on CT
Flail chest/Pulmonary Contusion

- 3 or more ribs fractured in two or more places
- Increased mechanical work of breathing
- Impaired gas exchange due to underlying pulmonary contusion

Brad - video, scroll over and click play

Treatment: Flail chest

- May require early intubation, mechanical ventilation
- Pain control for rib fractures
- Oxygenation will worsen over first 24 to 48 hours
- Rib plating
- External binding is not beneficial
What Does He Need?

- Intubation/ventilation support
- CVP/A-line
- Euvolemia
- Pain control
- Tracheostomy
- PEG
- DVT prophylaxis
- Consider transfer to higher level of care

Diaphragmatic Rupture

- Most commonly presents on the left side
- Often a delay in diagnosis if ventilated
- Instability usually due to abdominal injury

Blunt Aortic Injury

- Free rupture dies prior to the hospital
- Most alive on admission are contained hematomas
- Operative repair can be delayed with blood pressure control
Blunt Cardiac Injury (AKA Cardiac Contusion)

- Signs and Symptoms
  - Chest pain and tenderness
  - Broken Steering Column
  - Arrhythmias
- Diagnosis
- Treatment - expectant, monitor for 24-48 hr

Cardiac Tamponade

- Most commonly due to penetrating trauma
- Early signs may be subtle
  - Muffled heart tones
  - Jugular Venous Distension
  - Hypotension
- Requires a high index of suspicion

Case # 4

26 y/o male with GSW to R upper arm and multiple defensive stab wounds

Pt had significant bleeding from GSW site.

HR 81, BP 89/48, RR 20, O2 sats 92%, GCS 15

Actions?
What injuries are possible?

Tracheobronchial Injuries
- Penetrating or blunt injuries
- Often present with tension pneumothorax
- Persistent, massive air leak
- May be difficult to ventilate due to loss of tidal volume
- Often require several chest tubes

What Next?
- Blood, fluids
- Chest tube
- Intubation
- CT if stable
- OR if unstable
- Bronch
- Upper endoscopy
Case #4

- 80 y/o male fell off skateboard
- Sustained left rib fx 4-12
- Admitted at outside facility 7 days--discharged home
- Chest x-ray and CT done
- Repeat chest x-ray for 2 days then DC x-ray
- Discharge on day 7

Case #4 continued

- Bounce back to ED a few hours later following DC with difficulty breathing, extreme chest pain and fever
- Chest x-ray and CT;
  - What are these going to show?
He was admitted to ICU
Thoracic Injury management Protocol ordered
Worked up for Sepsis
Pigtail drain placed by interventional radiology
No epidural placed

July 2018 started Protocol
Education to respiratory therapy, nursing, trauma advanced practice providers
Inclusion is 3 or more rib fractures

Thoracic Injury Management Protocol
Inclusion Criteria (Extubated or recently extubated)
• Rib or Sternal fracture (Absence of high spinal cord injury)
First PICC Score:
- Pain: 2 - moderate
- Inspiration: 3 - Goal to alert volume
- Cough: 2 - weak
- Total Score: 7

How will this information guide care?

What if his PICC score was this:
- Pain: 1 - severe
- Inspiration: 2 - below alert level
- Cough: 2 - weak
- Total score: 5
Last PICC Score done day 3 of 8 transferred to floor
Pain: 3-controlled
Inspiration: 4-above goal volume
Cough: 2-weak
Total: 9

PIC Statistics Improvements in Care

- Incentive spirometer consistently in patients room on day one of initiation of PIC protocol
- Increased patient education on need for IS, use of IS, deep breath, and cough
- ICU readmit d/t respiratory failure decrease
- Pain control improved (epidurals placed earlier in care process)

PIC Statistics Improvements in Care

Total Patients Seen July-December

Trends Noticed Since Implementation of PIC Protocol
Summary

- Common
- Mechanism of injury important
- Course often very prolonged
- Elderly and/or those with co-morbidities do poorly
- Knowledge of natural history essential to anticipate/prevent complications as course evolves