Urgent Thoracic Conditions
University of Kansas School of Medicine
Surgery 900

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A good reading source is Schwartz’ Principles of Surgery

1. General—Types of Injuries
   Penetrating injuries
   Missiles—low vs. high velocity
   Knife wounds
   
   Blunt injuries
   Automobile—rapid deceleration
   Crush—machinery, etc.

2. ABCDE and Shock are pre-requisite knowledge areas for this didactic session
   Airway
   Breathing
   Circulation
   Disability
   Exposure
   
   Levels of Hypovolemic Shock and associated volume loss

3. Conditions Requiring Urgent Correction—how much time do you have? how should you position the patient? what if you are in the field (i.e. not in a hospital or aid station?)
   A. Airway obstruction due to:
      Foreign body—remove it
      Tongue—chin lift, jaw thrust, with neutral cervical spine
      Initial Management: clear obstructions, establish an oral airway
      Definitive Management: oro/nasotracheal intubation, ventilate
      
      Massive cranio-facial trauma or difficulty identifying cords
      Initial Management: Unvisualized vocal cords for any reason requires rapid, secure access, i.e. cricothyroidotomy (a secondary option is cannulated airway with or without O2 jet ventilation) (what are the advantages of cricothyroidotomy? what are the landmarks?)
      Definitive Management: Conversion in hospital to a secure airway with larger bore tracheal tube (formal tracheostomy; why is emergency tracheostomy a misnomer?)
B. Tension Pneumothorax
Clinical identification—dilated neck veins with respiratory effort but no air movement on the side affected, hyper-resonant chest with absent breath sounds, +/- tracheal deviation
Initial Management: Insert a large bore needle, 2nd intercostal space, mid-clavicular line anteriorly (McSwain Dart) (what are the topographical landmarks?)
Definitive Management: Insert chest tube after decompression with Dart (what size? where? which direction?)

C. Open Pneumothorax
Clinical identification—“sucking chest wound”, normal or collapsed neck veins with respiratory motion but no air movement via mouth or trachea, “to-and-fro” movement of air in and out of chest wall defect.
Initial Management: cover the wound, create a flap valve water tight dressing
Definitive Management: Insert a chest tube at a separate site, close the wound in OR (why? what is a 3 sided dressing?)

D. Massive flail chest
Clinical identification—results from 2 point fracture of 4 or more ribs, observe paradoxical motion of segment, vigorous respiratory motion with little air movement.
Initial Management: Endotracheal intubation, positive pressure ventilation
Definitive Management: Positive pressure ventilation until segment stabilizes, lung contusion improves (what are the signs of a lung contusion? what would be evidence of improvement? when is surgical intervention for flail chest indicated?)

E. Massive hemothorax
Clinical identification—consider the typical mechanism of injury, dull to percussion, hypotension, >/=1500 cc blood via chest tube
Initial Management: Insert a chest tube, identify blood volume loss
Definitive Management: Thoracotomy in OR or ER trauma bay (why? what are the accompanying signs of massive hemothorax? what is a hemothorax volume <1500cc? what if all of the blood clot is not evacuated?)

4. Conditions Requiring Urgent Thoracotomy
A. Continued Intrapleural Bleeding
Clinical identification—>100 cc/hr x 6hr via chest tube (this varies by clinician’s judgment/experience); usually during
monitoring phase after initial management of submassive hemothorax or other chest injury)

Management: Thoracotomy; usually one finds a bleeding intercostal artery (pulmonary vein branch bleeding usually seals off with lung re-expansion; why? what is the likely mechanism of injury?)

B. Massive air leak

Clinical identification—mechanism of injury \( \rightarrow \) trachea compressed against vertebra by steering wheel, 80% of injuries occur within 2.5 cm of carina, CXR shows complete atelectasis with large air leak via chest tubes or symmetrical downward displacement of bilateral hila.

Management: Accurate identification and repair/ventilation; remember that bronchoscopy or failed intubation may obstruct airway and lead to rapid death (what measures should one take to manage acute airway obstruction during bronchoscopy in this condition?)

C. Other—advanced/interested students will read about these and complete the outline

1. Pericardial Tamponade
   - Clinical identification—distended neck veins, muffled heart tones (what condition has similar findings? how do you differentiate?)
   - Initial Management
   - Definitive Management

2. Acute heart failure due to valve/septal injury
   - Clinical identification
   - Initial Management
   - Definitive Management

3. Widened mediastinum
   - Clinical identification—in blunt trauma, what condition does this imply?
   - Initial Management
   - Definitive Management

4. Esophageal Perforation
   - Clinical identification
   - Initial Management
   - Definitive Management

Differentiating Urgent Thoracic Conditions—word to the wise

Be sure to be able to differentiate Tension pneumothorax vs. Massive hemothorax vs Pericardial tamponade by clinical evaluation. Be sure to be able to demonstrate the evaluation and interventions and do explain what you should do as you do it.
A. Vital signs—P, BP
B. Neck findings—JVD, tracheal position
C. Chest findings—Breath sounds, Percussion note
D. Cardiac sounds—normal vs. muffled

Techniques to know, demonstrate and interpret:
- Cricothyroidotomy
- Intercostal needle decompression
- Chest tube insertion (tube thoracostomy)
- Set up chest tube collection device (pleur-evac or sealed bottle system)
- Pericardiocentesis

Techniques to know and describe:
- Pericardial window
- Thoracotomy
- Sternotomy