


Sanders: Mosby's Paramedic Textbook, Revised 3rd Edition

PowerPoint Lecture Notes

Chapter 26: Thoracic Trauma

Chapter 26
Thoracic Trauma



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Objectives

- Discuss epidemiology and mechanism of injury of thoracic trauma
- Describe mechanism of injury, signs and symptoms, and management of:
 - Skeletal injuries to the chest
 - Pulmonary trauma
 - Injuries to the heart and great vessels
 - Esophageal and tracheobronchial injury and diaphragmatic rupture

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Scenario

Your frightened 20-year-old male patient was shot in the chest. A pool of blood encircles his torso, and blood and air bubble out of a small wound to the right of his fourth rib. You place a gloved hand over the wound and call for an occlusive dressing as you continue your assessment. He is anxious, tachypneic and has a very rapid, weak radial pulse. The occlusive dressing and oxygen are applied, and the patient is secured to a spine board. As you load him into the ambulance, the patient has increasing shortness of breath and an increased heart rate. You secure the cot and continue your care en route to the trauma center.

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Discussion

- What additional assessments are critical for this patient?
- Describe your treatment priorities in this situation
- List internal structures at risk for injury in this situation
- Discuss the significance of his new signs and symptoms

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Chest Injuries

- 16,000 deaths per year
- Classifications:
 - Skeletal injury
 - Pulmonary injury
 - Heart and great vessel injury
 - Diaphragmatic injury

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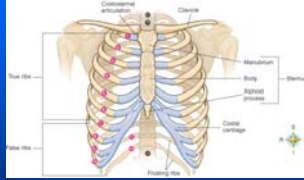
Mechanism of Injury

- Blunt thoracic injuries
 - Forces distributed over large area
- Penetrating thoracic injuries
 - Forces distributed over small area
 - Organs injured usually those that lie along path of penetrating object

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The Thorax

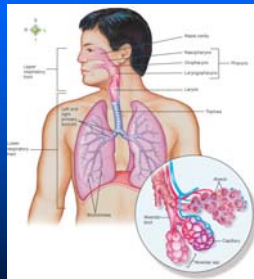
- Skin
- Bones
 - Thoracic cage
 - Sternum
 - Thoracic spine
- Muscles



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Anatomy

- Lungs
 - Parenchyma
 - Alveoli
 - Alveolar-capillary interface
- Pleura
 - Visceral
 - Parietal
 - Serous fluid
- Lobes



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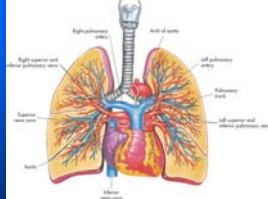
Vessels

- Arteries
 - Aorta
 - Carotid
 - Subclavian
 - Intercostal
 - Innominate
 - Internal mammary
 - Pulmonary
- Veins
 - Superior vena cava
 - Inferior vena cava
 - Subclavian
 - Internal jugular
 - Pulmonary

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Anatomy

- Heart
- Esophagus
 - Thoracic inlet
 - Esophageal foramen through diaphragm
- Mediastinum



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Ventilation

- Mechanical process moving air into and out of lungs
 - Bellows system
- Musculoskeletal structure
 - Intercostal muscles
 - Diaphragm
 - Accessory muscles
 - Changes in intrathoracic pressure



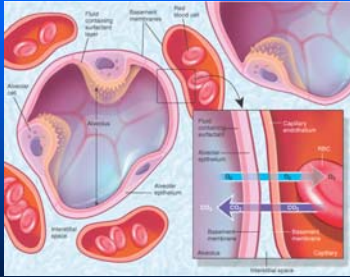
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Respiration

- Exchange of oxygen and carbon dioxide between atmosphere and cells
- Neurochemical control
- Gas exchange
 - Alveolar-capillary interface
 - Capillary-cellular interface
- Pulmonary circulation
- Cardiac circulation

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Respiration



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Clavicular Fractures

- Clavicle most frequently fractured bone
- Common in kids
- Pain, tenderness, deformity
- Sling and swathe



Fracture of left clavicle seen from above left shoulder

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Rib Fractures

- Often ribs 3 to 8
- Simple fx painful not life threatening
- Atelectasis from splinting
- Analgesics
- Assess for underlying injuries



Chest wall asymmetry caused by rib fractures

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Flail Chest

- 2 or more adjacent rib fractures in ≥ 2 places
- May be paradoxical chest movement
- Pulmonary contusion
- Oxygenate
- If respiratory failure assist ventilations
- PEEP

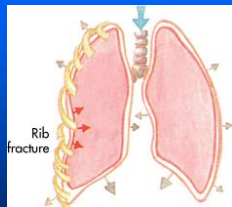
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Flail Chest—Normal Lungs



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Flail Chest During Inspiration



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Flail Chest During Expiration



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Sternal Fractures

- Uncommon
- Very painful
- May be unstable chest wall, heart injury, cardiac tamponade
- Oxygenate
- Assess underlying injuries



Spotty bruising caused by a steering wheel impact

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Pulmonary Injury

- Closed pneumothorax
- Tension pneumothorax
- Open pneumothorax
- Hemothorax
- Pulmonary contusion
- Traumatic asphyxia

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Closed (Simple) Pneumothorax

- Air in pleural space
- Part or total lung collapse
 - Rib fx
 - Paper bag effect
- Chest pain, dyspnea, tachypnea
- Oxygen, ventilate



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Open Pneumothorax (Sucking Chest Wound)

- Disrupts air flow
- Dyspnea, pain, sucking sound
- Seal on three sides
- Oxygenate
- Ventilate

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Open Pneumothorax


Air enters pleural cavity during inspiration; air exits pleural cavity during expiration



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Open Pneumothorax

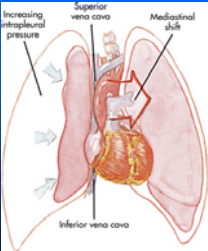
- Sealing a chest wound



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Tension Pneumothorax

- Air trapped in pleural space
 - Anxiety, cyanosis
 - Dyspnea increases
 - Tracheal deviation
 - Hypotension, tachycardia
 - Distended neck veins
 - Unequal chest expansion
 - Subcutaneous emphysema



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Tension Pneumothorax

- May occur after open pneumothorax is sealed with occlusive dressing
- Momentarily remove dressing:
 - Air escapes with audible release of air
 - After release of pressure, reseat wound
- Relieve through thoracic decompression with:
 - Large-bore needle or
 - Commercially available thoracic decompression kit

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Needle Decompression

Insert hollow needle or catheter into affected pleural space



After needle insertion, note audible rush of air as pressure escapes



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Needle Decompression

- Secure catheter and prevent reentry of air into pleural space
- Monitor patient's respiratory status



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Hemothorax

- Blood in pleural space
 - May be 2 L blood loss
- Hypovolemia
- Hypoxemia
- Oxygenate
- Fluid resuscitate



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Hemopneumothorax

- Pneumothorax with bleeding in pleural space
- Findings: Same as with hemothorax
- Management: Same as for hemothorax

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Pulmonary Contusion

- Rapid deceleration forces
- Alveoli rupture
 - Hemorrhage
 - Interstitial edema
- Oxygenate
- Ventilate if needed
- Tachypnea
- Tachycardia
- Cough
- Hemoptysis
- Apprehension
- Dyspnea
- Cyanosis
- Blunt chest trauma

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Traumatic Asphyxia

- Severe crush to chest, abdomen
- Increased intrathoracic pressure
- Facial discoloration
- JVD
- Conjunctival hemorrhage
- Manage airway, breathing



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Myocardial Contusion (Blunt Myocardial Injury)

- Often MVC
- Sternal or rib fx common
- May have chest pain
- Dysrhythmias, palpitations, murmur
- Oxygenate, monitor ECG
 - Treat rhythm disturbance

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Pericardial Tamponade

- Blood leakage into pericardial space
- Heart cannot refill
 - Decreased stroke volume, cardiac output
- Beck's triad
 - Elevated CVP (JVD)
 - Muffled Heart sounds
 - Hypotension

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Pericardial Tamponade

- Other
 - Tachycardia
 - Dyspnea
 - Narrow pulse pressure
 - Upper body cyanosis
 - ECG changes
- Pericardiocentesis

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Myocardial Rupture

- Heart muscle ruptures
- Usually immediate death
- MVC common cause
- Signs and symptoms
 - CHF, cardiac tamponade
- Supportive care

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Traumatic Aortic Rupture

- Shearing forces
- Most die at scene
- Hypertensive upper extremities
- Decreased femoral pulse
- Systolic murmur
- Paraplegia
- Rapid transport



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Penetrating Great Vessel Wounds

- Injuries to chest, abdomen, neck
- Associated with hemothorax, shock, cardiac tamponade, hematomas
- Airway and ventilation support
- Fluid therapy
- Transport to appropriate hospital

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Esophageal Injuries

- Usually penetrating trauma
- Pain, fever, hoarseness, dysphagia, respiratory distress, shock
- Esophageal perforation—cervical
 - Tenderness, SQ emphysema, mediastinitis

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Tracheobronchial Injuries

- Rare but high mortality
- Airway, ventilatory, circulatory support
- Rapid transport
- Hypoxia
- Tachypnea
- Tachycardia
- SQ emphysema
- Dyspnea
- Hemoptysis

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Diaphragmatic Rupture

- Abdominal pain
- Shortness of breath
- Rapid abdominal compression
- Often on left
- Abdomen flat
- Bowel sounds in chest
- Positive-pressure ventilation may worsen condition



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Conclusion

Chest injuries are directly responsible for more than 20% of all traumatic deaths (regardless of mechanism) and account for about 16,000 deaths per year in the United States. The risk of death can be reduced by early recognition of serious signs and symptoms and rapid transport to a trauma center.

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Questions?

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