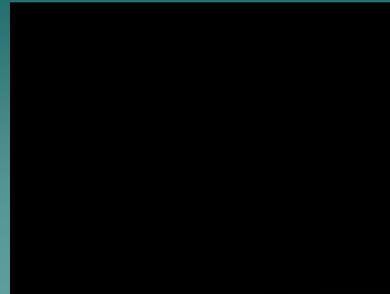


Pathophysiology of Thoracic Trauma Flail Chest

- ◆ Three or more adjacent ribs fracture in two or more places
- ◆ Serious chest wall injury with underlying pulmonary injury
 - Reduces volume of ventilation
- ◆ Paradoxical movement



Paradoxical Movement



Management of the Chest Injury Patient

- ◆ **Flail Chest**
 - Dress with bulky bandage against flail segment
 - ◆ Stabilizes fracture site
 - High flow O₂
 - ◆ Consider ET



Pathophysiology of Thoracic Trauma Open Pneumothorax

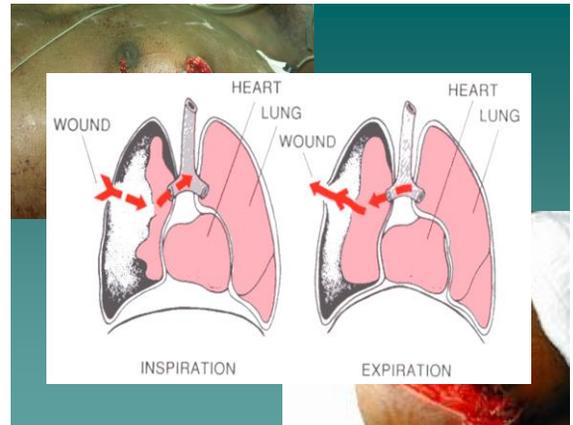
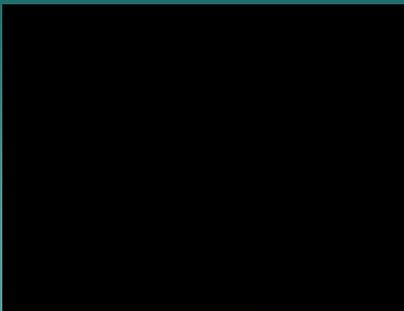
- ◆ Free passage of air between atmosphere and pleural space
- ◆ Air replaces space for lung tissue
- ◆ Air will be drawn through wound if wound is 2/3 diameter of the trachea or larger

Pathophysiology of Thoracic Trauma Open Pneumothorax

- ◆ Signs & Symptoms
 - Penetrating chest trauma
 - Sucking chest wound
 - Frothy blood at wound site
 - Severe Dyspnea
 - Hypovolemia

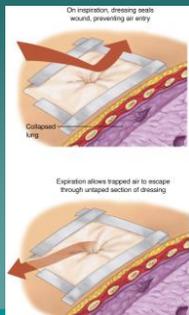


Sucking Chest Wound



Management of the Chest Injury Patient

- ◆ **Open Pneumothorax**
 - High flow O₂
 - Cover site with sterile occlusive dressing taped on three sides
 - Progressive airway management if indicated



Sealing a Wound

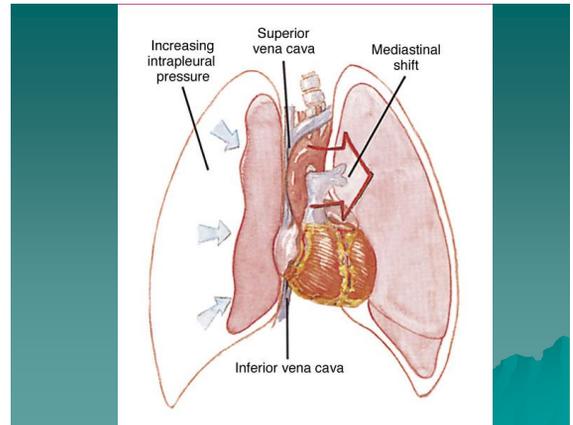
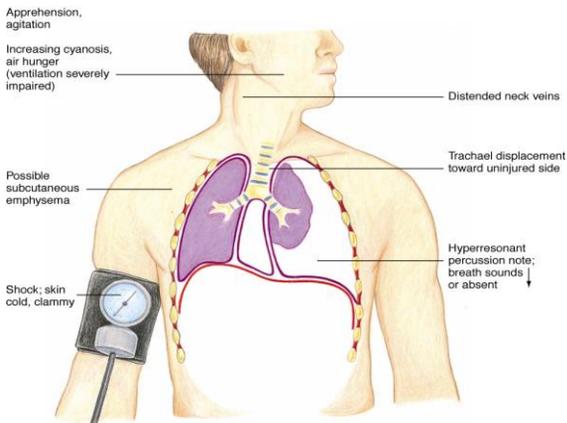


Sealing a Wound



Pathophysiology of Thoracic Trauma Tension Pneumothorax

- ◆ Closed chest
- ◆ Progression from Simple or Open pneumothorax
- ◆ Excessive pressure reduces effectiveness of v/q



Pathophysiology of Thoracic Trauma Pulmonary Injuries

Tension Pneumothorax Signs & Symptoms

- ◆ Dyspnea
- ◆ Hypoxia/cyanosis
- ◆ JVD
- ◆ Hyperinflation of injured side of chest
- ◆ Hyperresonance of injured side of chest



Management of the Chest Injury Patient

◆ Tension Pneumothorax

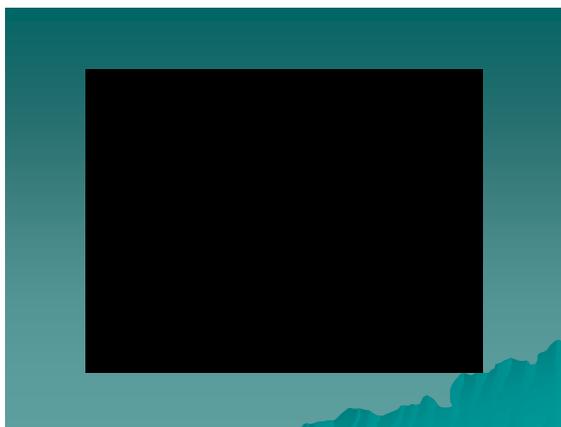
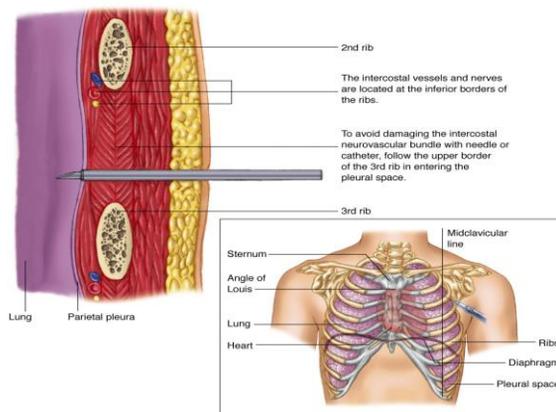
– Confirmation

– Pleural Decompression

◆ 2nd intercostal space in mid-clavicular line

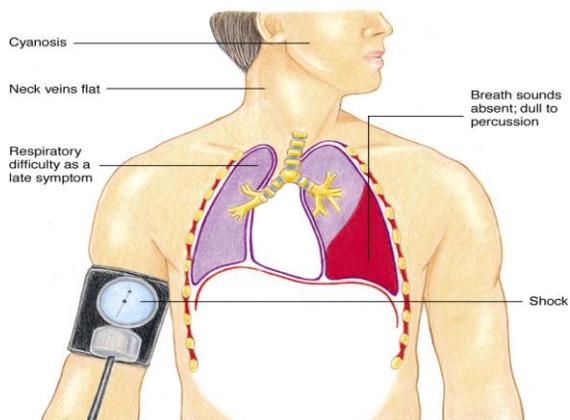
◆ Consider multiple decompression sites if patient remains symptomatic

– Large over the needle catheter



Pathophysiology of Thoracic Trauma Hemothorax

- ◆ Accumulation of blood in the pleural space
- ◆ Serious hemorrhage may accumulate 1,500 mL of blood
 - Mortality rate of 75%
 - Ventilation/Perfusion mismatch
 - Shock
- ◆ Typically accompanies a pneumothorax



Management of the Chest Injury Patient

◆ Hemothorax

- High flow O₂
- Shock Management
 - ◆ Positioning, warmth
 - ◆ 2 large bore I.V.'s
 - EVALUATE BREATH SOUNDS for fluid overload



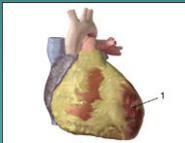
Pathophysiology of Thoracic Trauma Pulmonary Contusion

- ◆ 30-75% of patients with significant blunt chest trauma
- ◆ Typical MOI
 - Rib fx
 - Deceleration
 - ◆ Chest impact on steering wheel
- ◆ Micro-hemorrhage may account for 1-1 ½ L of blood loss in alveolar tissue



Pathophysiology of Thoracic Trauma Myocardial Contusion

- ◆ Right Atrium and Ventricle is commonly injured
- ◆ Electrical disturbances due to irritability of damaged myocardial cells
- ◆ Progressive problems
 - Hematoma
 - Myocardial necrosis
 - Dysrhythmias
 - CHF &/or Cardiogenic shock



Thoracic Trauma Cardiovascular Injuries

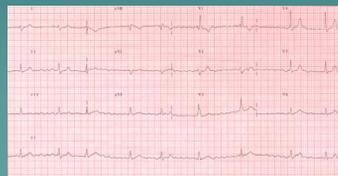
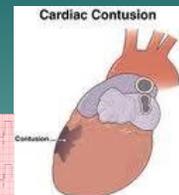
Myocardial Contusion Signs & Symptoms

- ◆ Bruising of chest wall
- ◆ Tachycardia and/or irregular rhythm
- ◆ Associated injuries
 - Rib/Sternal fractures
- ◆ Chest pain unrelieved by oxygen



Management of the Chest Injury Patient

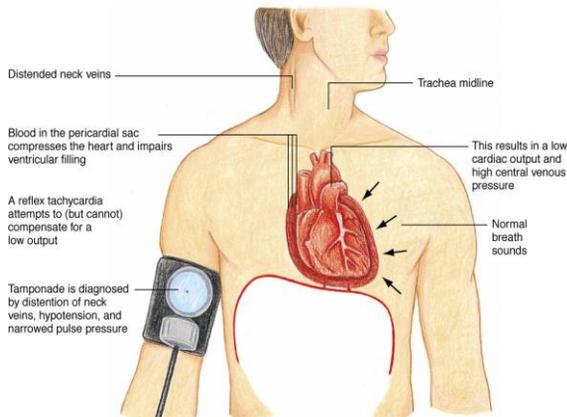
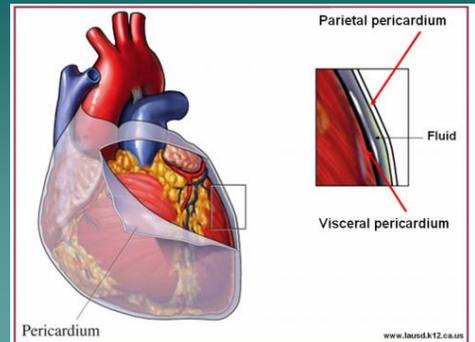
- ◆ **Myocardial Contusion**
 - Monitor ECG
 - ◆ Alert for dysrhythmias
 - ◆ ALS / BLS



Pathophysiology of Thoracic Trauma Pericardial Tamponade

- ◆ Restriction to cardiac filling caused by blood or other fluid within the pericardium
- ◆ Occurs in <2% of all serious chest trauma
 - Very high mortality
 - 200 ml of blood

Pericardium



Thoracic Trauma Cardiovascular Injuries

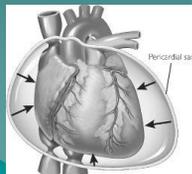
Pericardial Tamponade Signs & Symptoms

- ◆ Dyspnea
 - Normal breath sounds
- ◆ Pale/ cyanotic
- ◆ Beck's Triad
 - JVD
 - Muffled heart tones
 - Hypotension



Management of the Chest Injury Patient

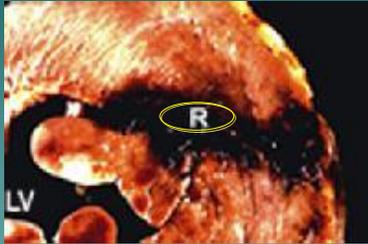
- ◆ **Pericardial Tamponade**
 - High flow O₂
 - I.V. access
 - "Diesel Therapy"



Pathophysiology of Thoracic Trauma Myocardial Aneurysm/Rupture

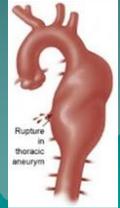
- ◆ Occurs almost exclusively with extreme blunt thoracic trauma
- ◆ Secondary due to necrosis resulting from AMI
- ◆ Signs & Symptoms
 - Severe rib or sternal fracture
 - Possible signs and symptoms of cardiac tamponade
 - Absence of vital signs

Myocardial Rupture



Pathophysiology of Thoracic Trauma Traumatic Aortic Rupture

- ◆ Aorta most commonly injured in severe blunt or penetrating trauma
 - 85-95% mortality
- ◆ Injury may be confined to areas of aorta attachment
- ◆ Signs & Symptoms
 - Rapid deterioration of vitals
 - Pulse deficit between right and left upper or lower extremities



Aortic Rupture



Management of the Chest Injury Patient

- ◆ **Aortic Aneurysm/Rupture**
 - AVOID rough handling
 - Initiate I.V. therapy en-route
 - ◆ Mild hypotension may be protective
 - Keep patient calm

Pathophysiology of Thoracic Trauma Traumatic Rupture of the Diaphragm

- ◆ Herniation of abdominal organs into thorax
- ◆ MOI
 - High pressure blunt chest trauma
 - Penetrating trauma
- ◆ Signs & Symptoms
 - ◆ Restriction of ipsilateral lung
 - ◆ Displacement of mediastinum
 - ◆ Bowel sounds may be noted in thorax





Management of the Chest Injury Patient

- ◆ **Diaphragmatic rupture**
 - Oxygen administration
 - ◆ Positive pressure ventilation will worsen the injury
 - Rapid transport
 - NG tube placement (MC, protocol)

Pathophysiology of Thoracic Trauma Traumatic Esophageal Rupture

- ◆ 30% mortality
- ◆ Contents in esophagus/stomach may move into mediastinum
- ◆ Subcutaneous emphysema
- ◆ Pain, hoarseness, dysphagia, respiratory distress, shock



Management of the Chest Injury Patient

- ◆ **Esophageal injury**
 - Fluid replacement for shock
 - Rapid Transport
 - Watch airway



Pathophysiology of Thoracic Trauma Tracheobronchial Injury

- ◆ 50% of patients with injury die within 1 hr of injury
- ◆ Signs & Symptoms
 - Tachypnea, tachycardia
 - Cyanosis
 - Hemoptysis
 - Massive subcutaneous emphysema
 - Suspect/Evaluate for other closed chest trauma



SUB-Q Air



Pathophysiology of Thoracic Trauma Traumatic Asphyxia

- ◆ Results from severe compressive forces applied to the thorax
- ◆ Signs & Symptoms
 - Head & Neck become engorged with blood
 - ◆ Face and tongue swollen
 - ◆ Bulging eyes with conjunctival hemorrhage
 - JVD
 - Hypotension, Hypoxemia



QUESTIONS ?



FOR MORE INFORMATION....

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