

Chest Trauma

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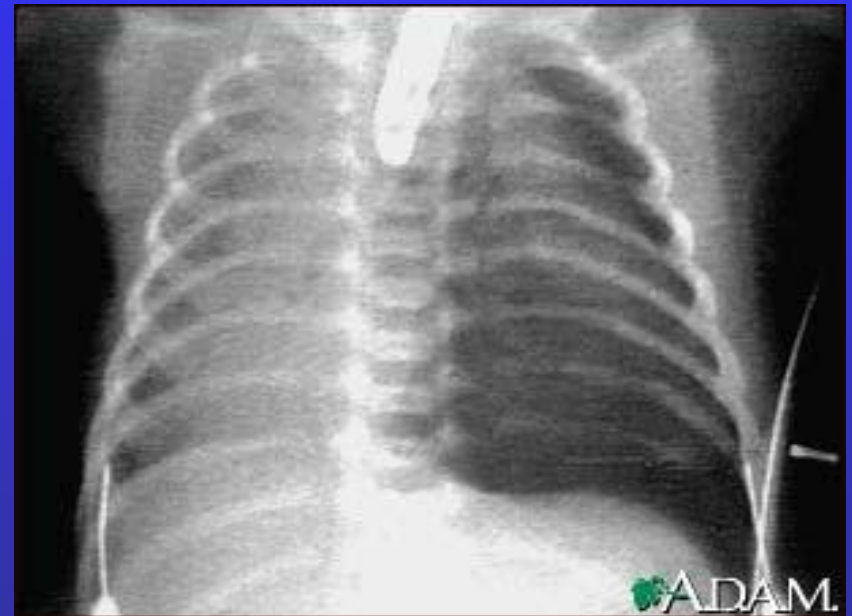
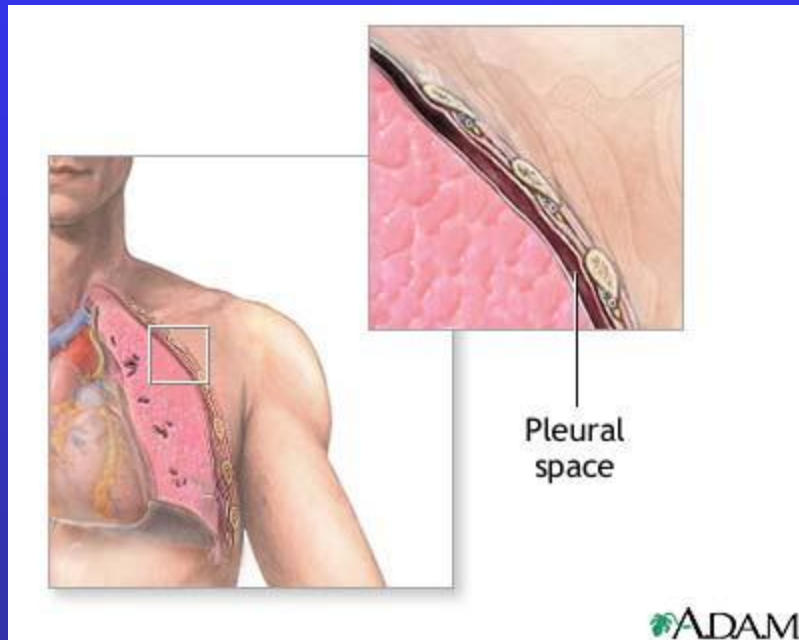


Rib Fractures

- Control Pain
 - Analgesics
 - Opiates
 - NSAIDS
 - Local rib blocks
 - Thoracic Epidural
- Admit it patient elderly, > 3 rib fractures, suspicion of other injury
- Pulmonary toilet



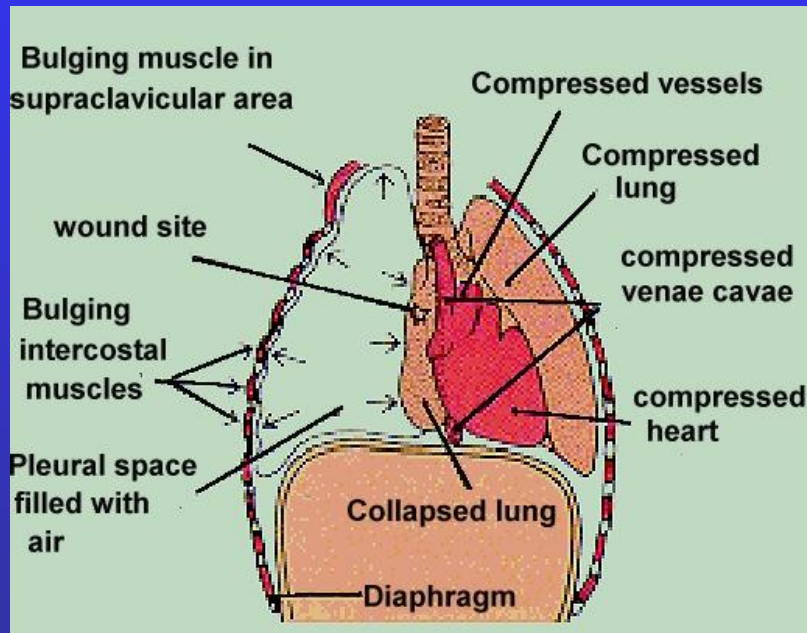
Pneumothorax



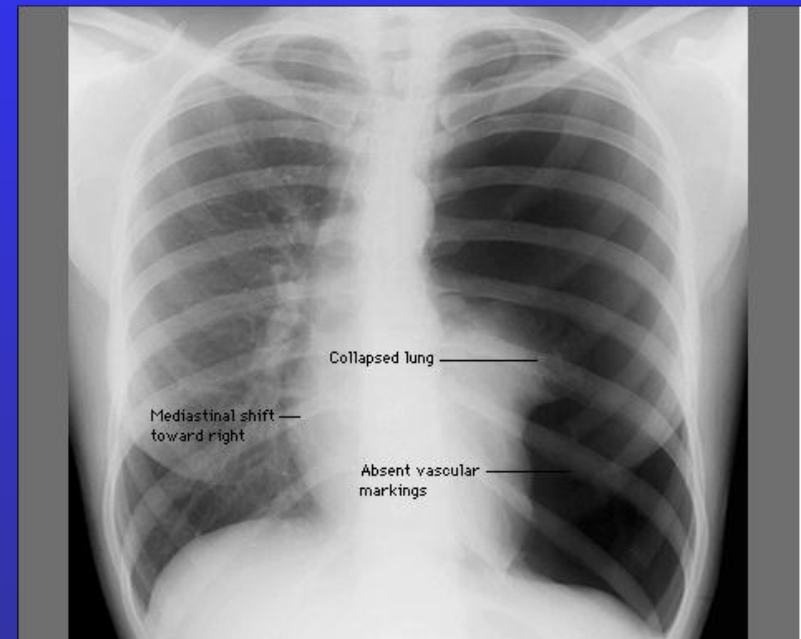
<http://health.allrefer.com/health/tension-pneumothorax-pneumothorax-chest-x-ray.html>



Tension Pneumothorax



<http://kuriakon00.tripod.com/tension.html>



http://info.med.yale.edu/intmed/cardio/imaging/cases/pneumothorax_tension/



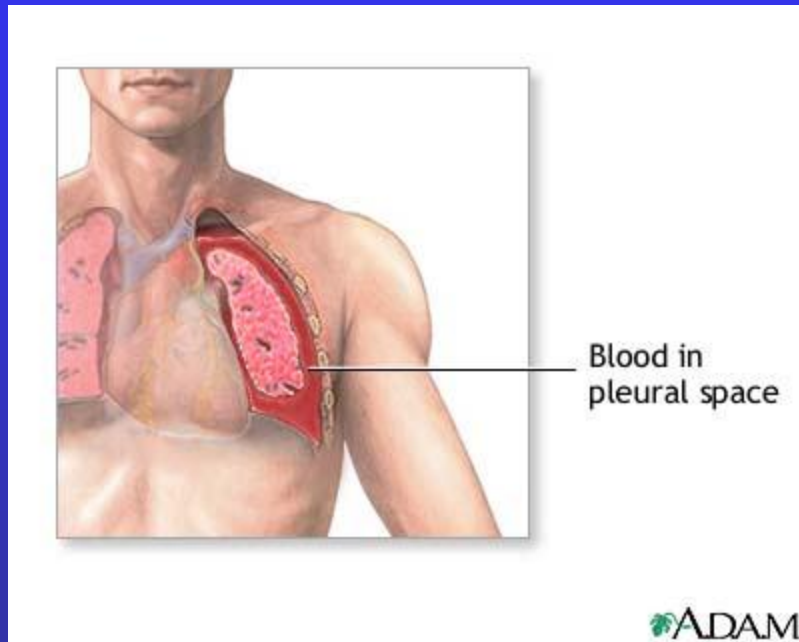
Needle Decompression



<http://nursing.umaryland.edu/students/~jkohl/scenario/needle.htm>



Hemothorax



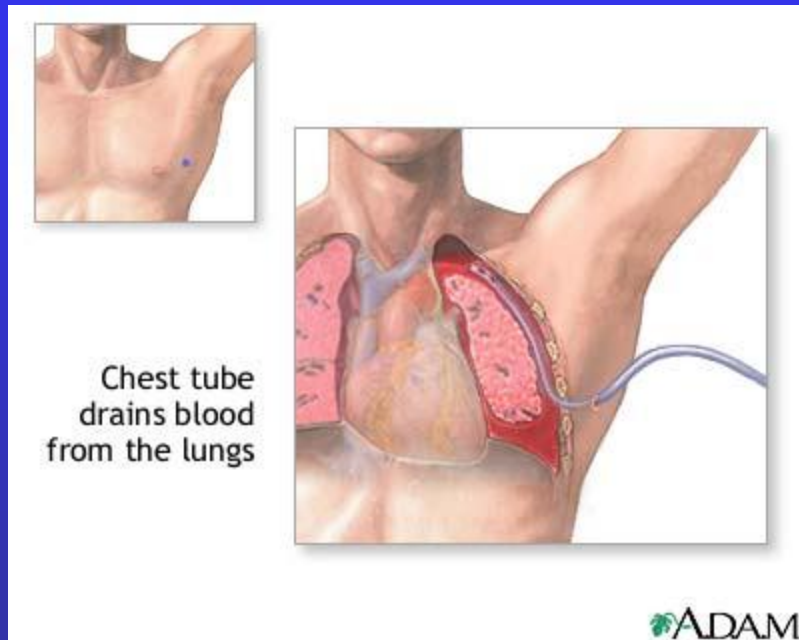
<http://health.allrefer.com/health/tension-pneumothorax-chest-tube-insertion-series-2.html>

<http://nursing.umaryland.edu/students/~jkohl/scenario/needle.htm>



Chest Tube Placement

- Anterior axillary line, posterior to pectoralis major muscle
- 5th intercostal space (opposite the nipple)



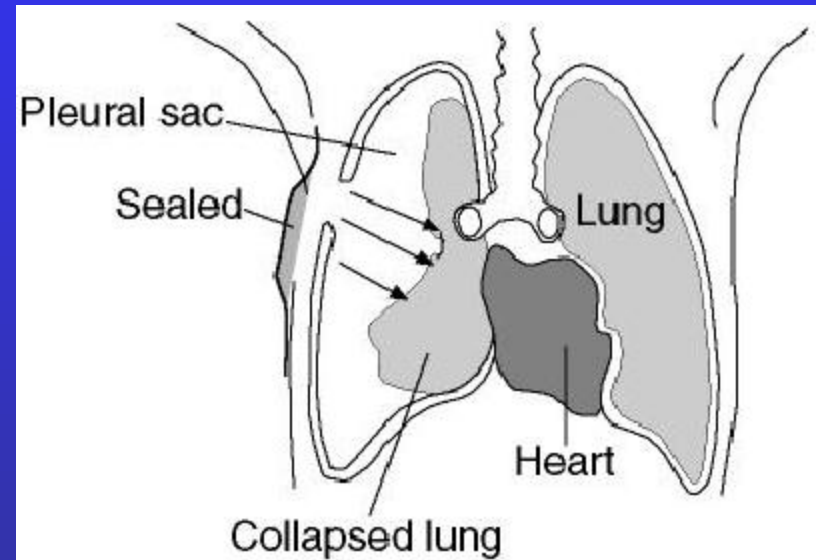
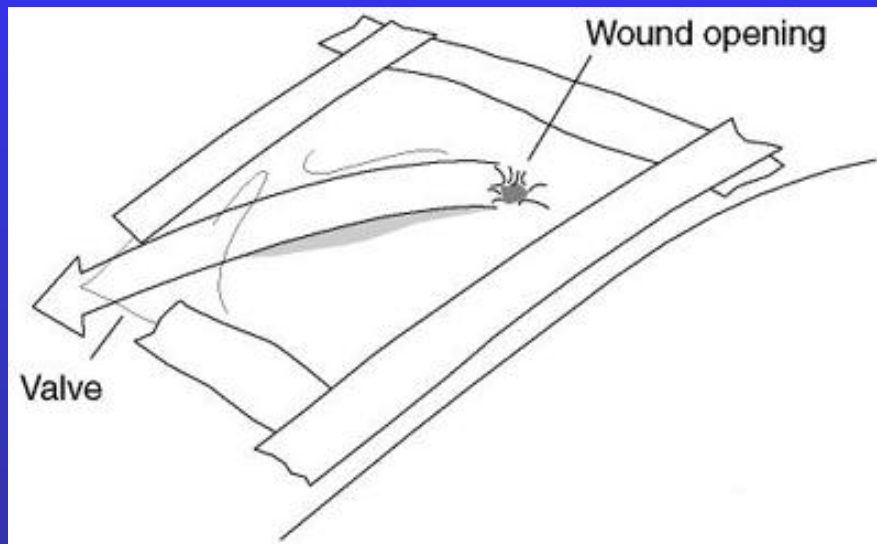
Open Pneumothorax



- Open Penetrating Wound
- Lung Laceration
- Inability to ventilate due to open chest cavity



Sucking Chest Wound-First Aid Treatment



<http://www.vnh.org/FirstAidAnatomy/ChestWound.html>



Sucking Chest Wound-Definitive Treatment

- Intubation
- Mechanical Ventilation
- Chest Exploration



<http://www.trauma.org/imagebank/imagebank.html>



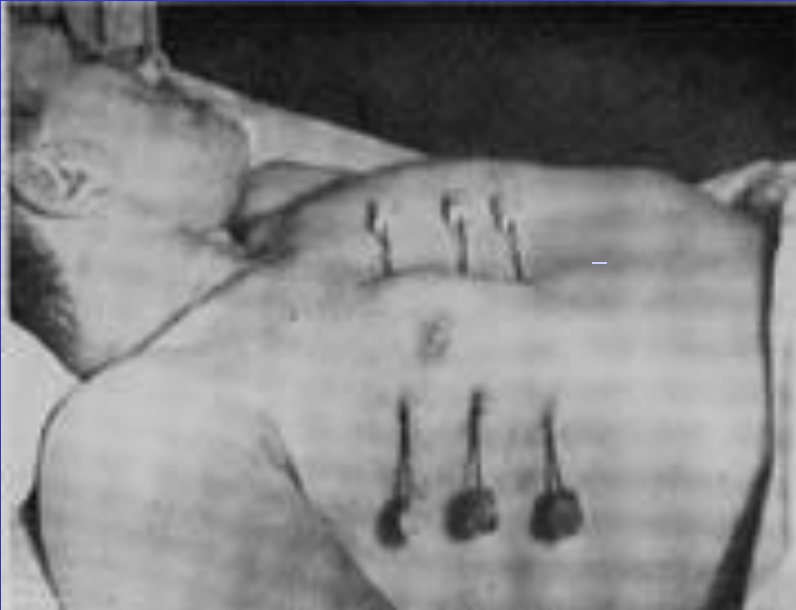
Flail Chest



- Fractures of two or more ribs in two or more places
- Unstable segment of chest wall
- Paradoxical motion of chest wall



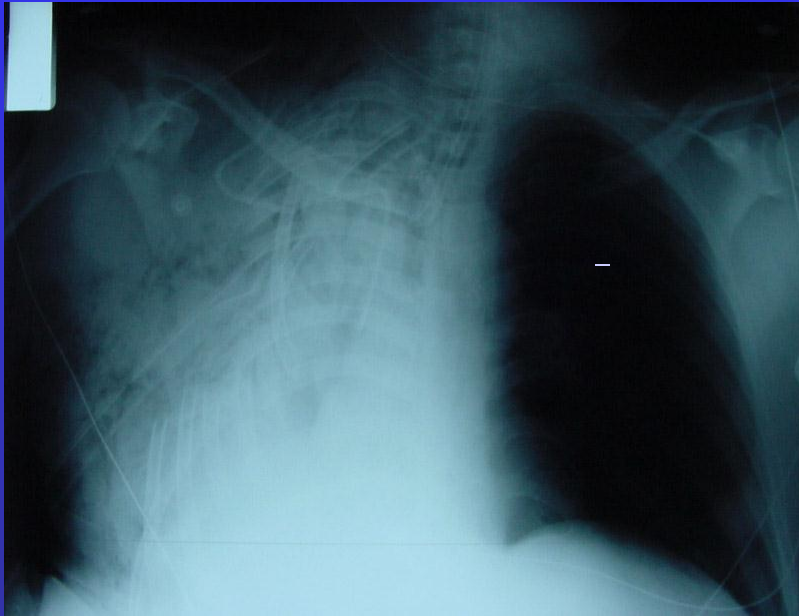
Obsolete Treatment



<http://www.trauma.org/imagebank/imagebank.html>



Unstable Chest Wall Treated with “Internal Pneumatic Stabilization”



<http://www.trauma.org/imagebank/imagebank.html>



Same patient after stabilization of ribs



<http://www.trauma.org/imagebank/imagebank.html>



The Main Problem is
usually underlying
Pulmonary Contusion NOT
mechanical chest wall
instability



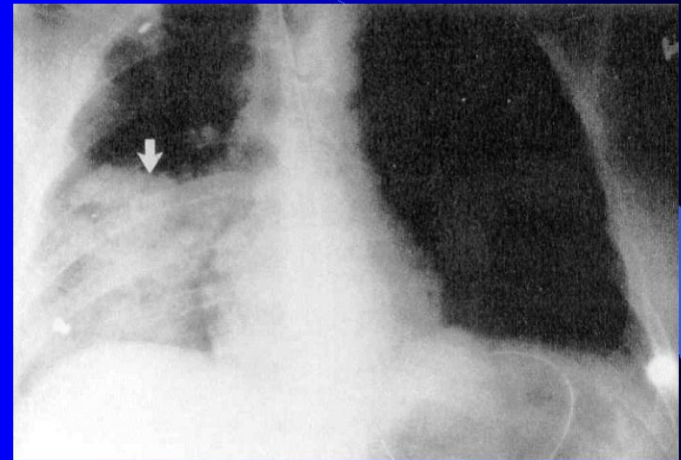
Principles of Flail Chest Treatment

- A,B,C
- Chest Wall Analgesia
 - Thoracic Epidural
 - Rib Blocks
- Mask CPAP
- Intubation and Mechanical Ventilation
- VERY RARELY – Internal Fixation



Pulmonary Contusion

- A bruise to the lung
- Airspace opacification
- No air bronchogram



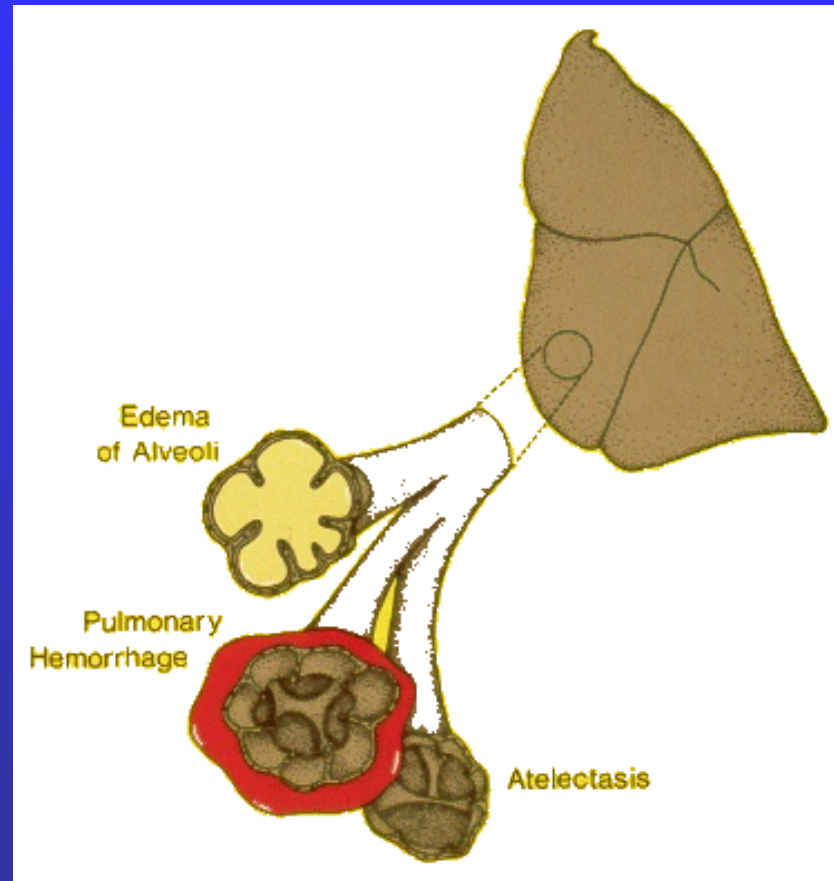
14/02/2004

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<http://medweb.bham.ac.uk/wmaet/presentations/Pulmonary%20Contusion.ppt>



Components of Pulmonary Contusion



Clinically

- Dyspnoea
- Tachypnoea
- Tachycardia
- Hypoxaemia/
Hypercarbia
- Hypotension
- Chest wall bruising
- 50% haemoptysis
- Wheeze or creps or
absent BS

<http://medweb.bham.ac.uk/wmaet/presentations/Pulmonary%20Contusion.ppt>



Treatment of Pulmonary Contusion

- ABC
- Oxygen
- Analgesia
 - Parenteral
 - Chest wall
 - Rib blocks
 - Thoracic epidural
- Mask CPAP/BIPAP
- Intubation and Mechanical Ventilation
- Fluid Restriction



Indications for Endotracheal Intubation

- Hypoventilation
- Hypoxia
- Pulmonary Toilet
- Airway Protection
- “Semi-stable” Trauma Victim requiring multiple radiologic procedures (relative indication)
- “Prophylactic Intubation” – eg. A big burn



Pulmonary Blast Injury

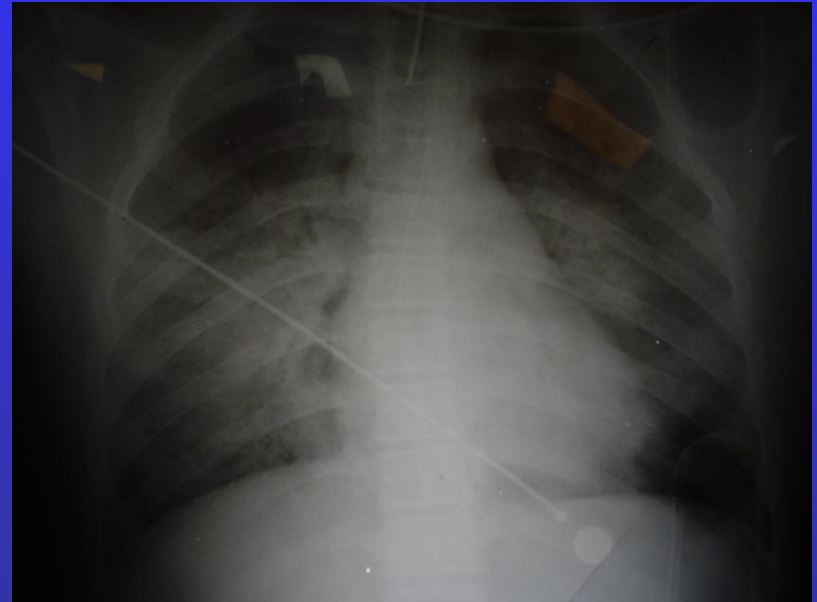
- 74 yo woman injured in a bus bombing Jan. 29, 2004
- Admitted with rt rib fxs, pulmonary contusion, hemothorax and amputations rt and lt 2nd digits.
- Required 10 days of mechanical ventilation





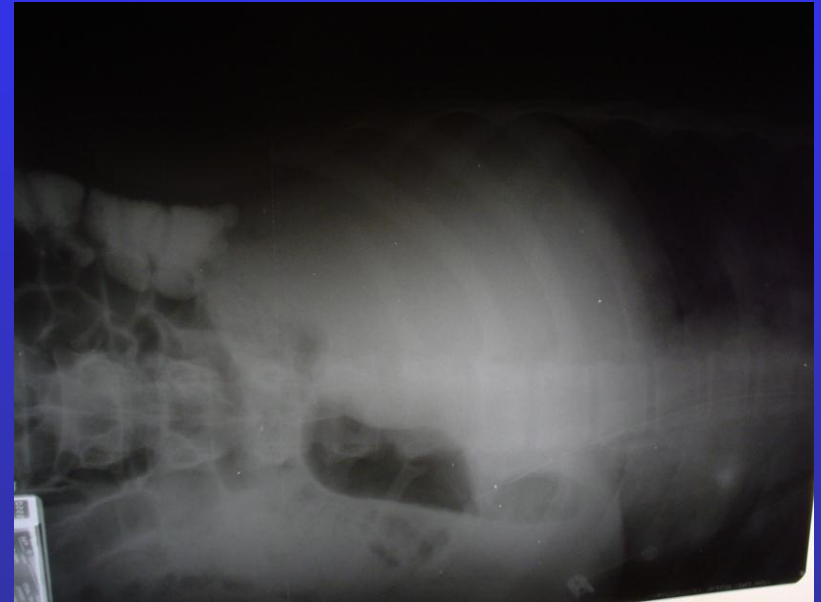
Pulmonary Blast Injury

- 14 yo boy injured in bus bombing Jan 29, 2004
- Admitted with profound hypoxia, acidosis and hypercarbia
- Intubation/mechanical ventilation



Pulmonary Blast Injury

- HD 3 Respiratory
Status improved but
sudden deterioration in
abdominal findings
and right lateral
decubitus suggestive
of free air
- Exploratory
laparotomy: negative



Pulmonary Blast Injury

- Left hemiparesis
- Hyperagitation
- Question air embolus +/- blast injury to brain
- Head CT negative
- Outcome: extubated, disposition: rehab center



Pulmonary Blast Injury at SZMC

January 29, 2004, Bus Bombing

- 23 patients evaluated
- 11 patients admitted
- 10/11 admissions had radiographic evidence of pulmonary blast injury
- 4/10 patients with blast injury patients required intubation and mechanical ventilation
- Deaths: 0



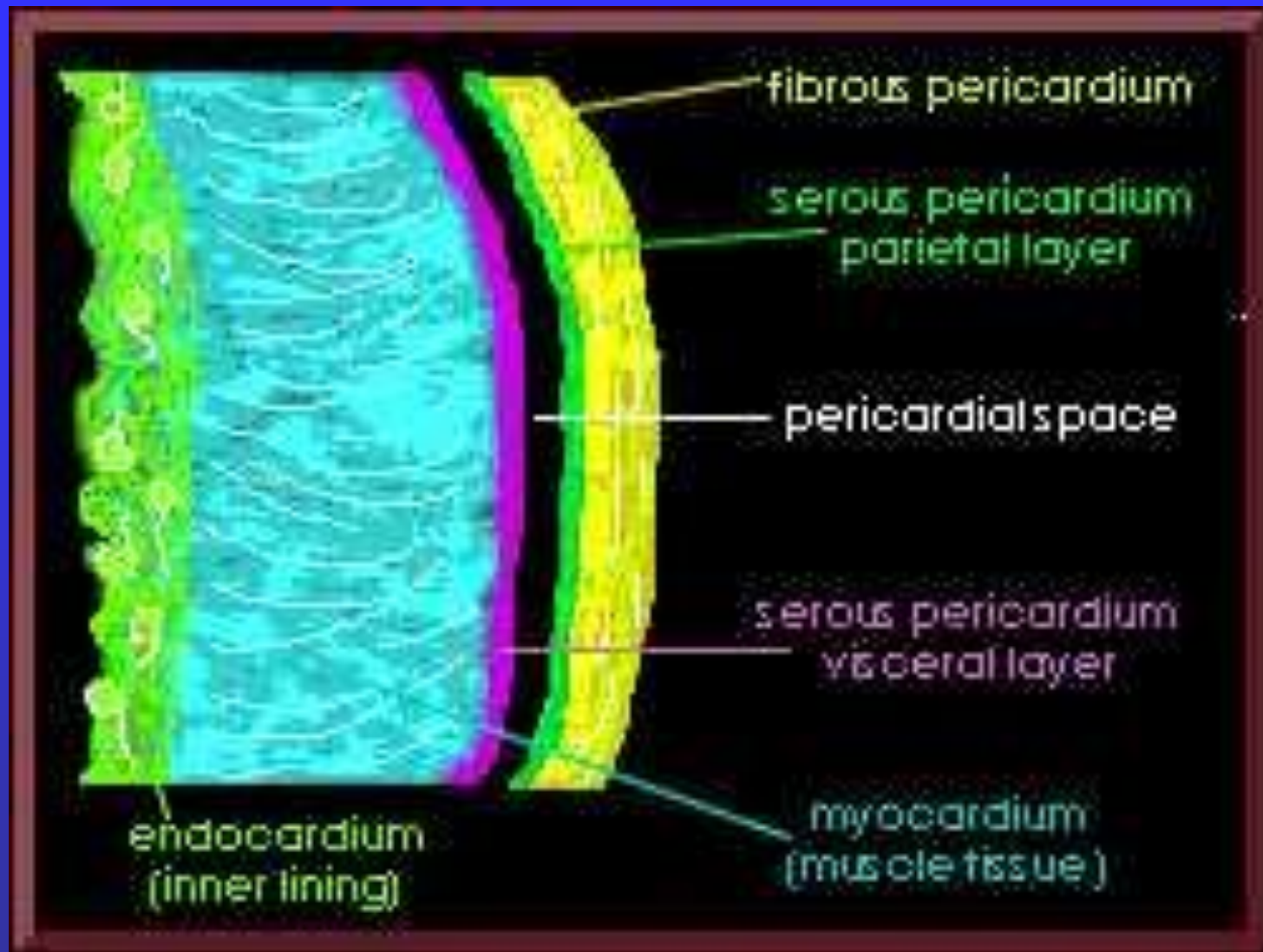
Case Presentation

- 17 year old girl struck by car
- Presents to ER hemodynamically stable, awake and alert with RR = 22 with CXR similar to the one on the right
- Pneumomediastinum is present

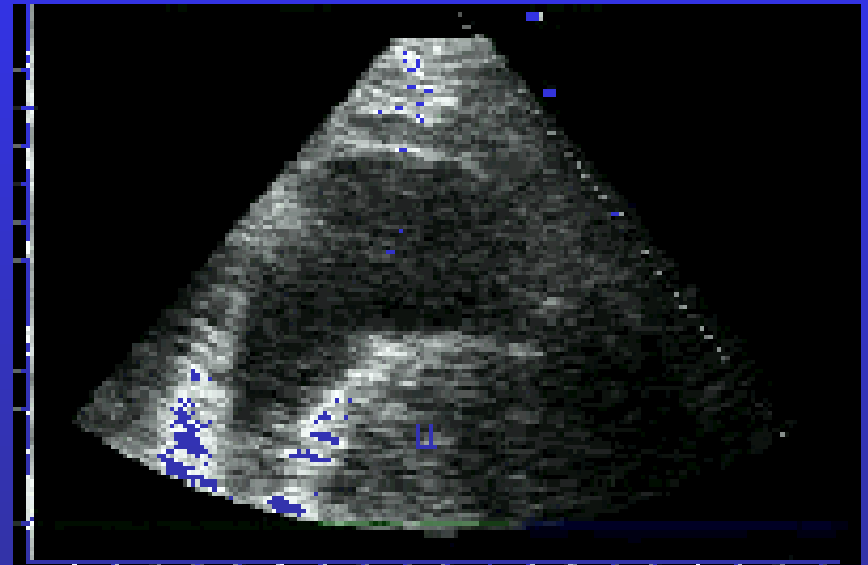
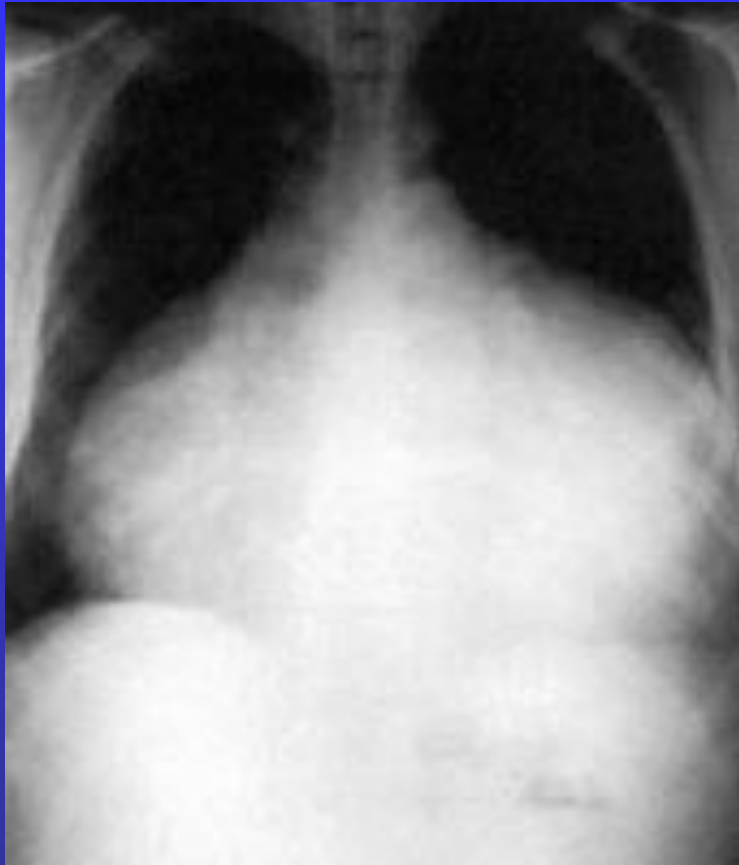


<http://www.amershamhealth.com/medcyclopaedia/Volume%20V%201/TRAUMATIC%20RUPTURE%20TRACHEOBRONCHIAL%20TREE.asp#>





Chronic Tamponade



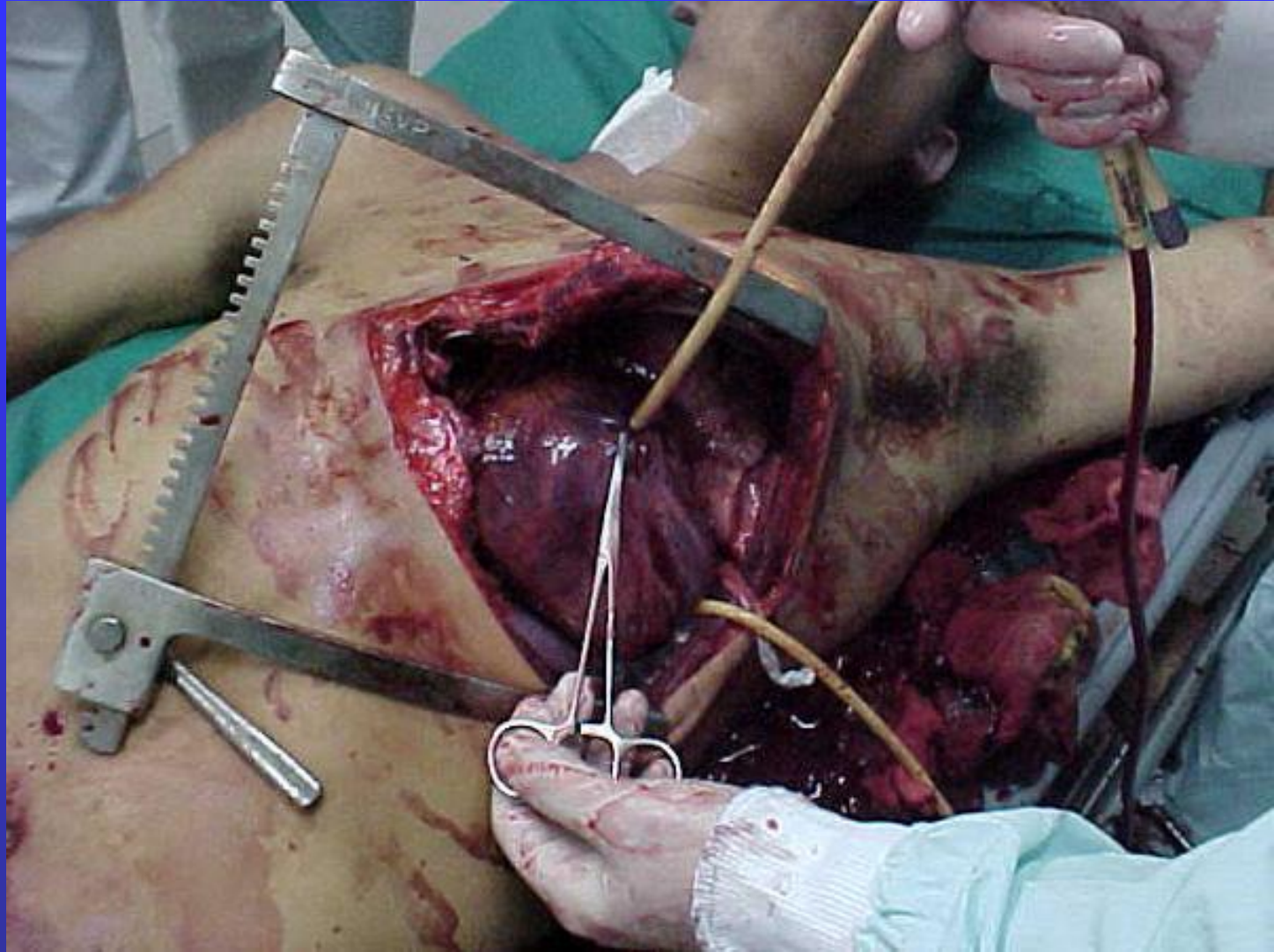
Cardiac Tamponade

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<http://www.trauma.org/imagebank/imagebank.html>





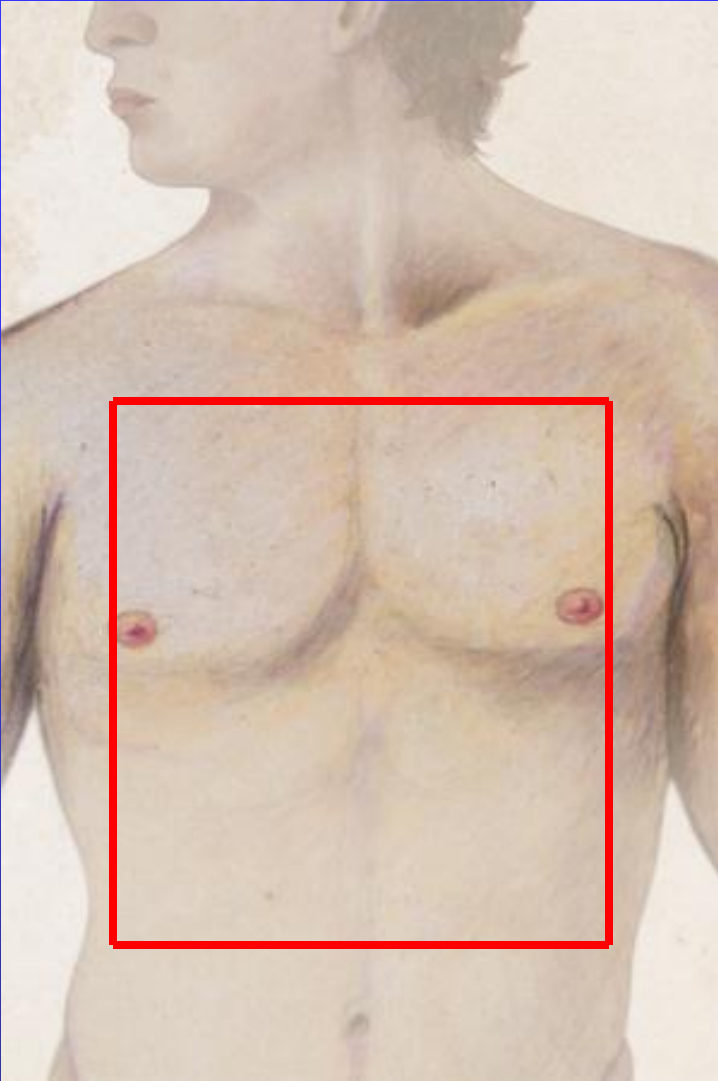
<http://www.trauma.org/imagebank/imagebank.html>





<http://www.cyber-nurse.com/veetac/horrorctam.htm>





Beck's Triad

- Hypotension
- Jugular Venous Distension
- Muffled Heart Sounds



Additional Signs of Cardiac Tamponade

- Pulsus Paradoxicus
- Kussmaul's Sign: Elevated Jugular Venous Pressure on Inspiration
- Water bottle heart on chest x-ray

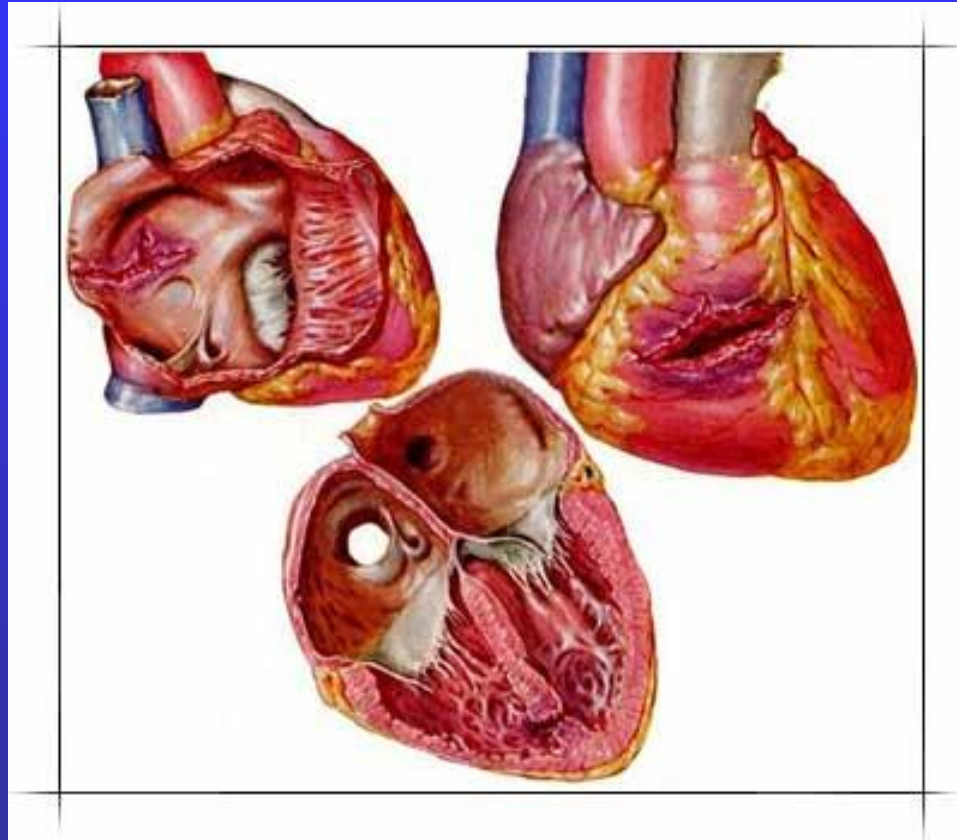


Case Presentation

- Patient with stab wound to the chest in the box
- BP on admission 70 systolic
- BP rises to 90 systolic with fluid
- FAST exam: no blood in abdomen.
Examiner thinks heart is ok



Blunt Cardiac Injury



<http://www.vh.org/adult/provider/surgery/bluntcardiacinjury/>



Blunt Cardiac Injury

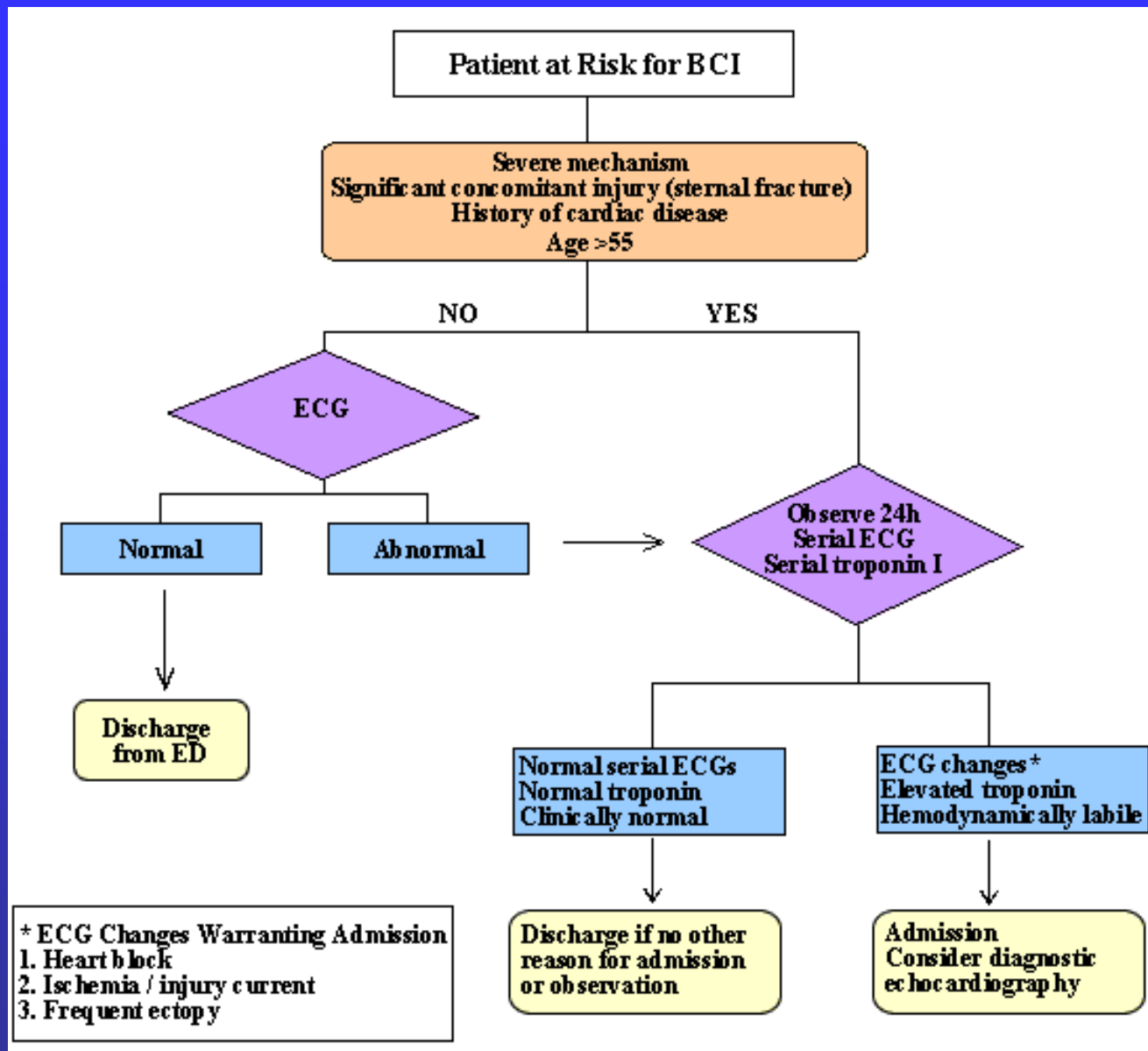
- Spectrum of Disease ranging from “concussion” manifested by arrhythmias to cardiac rupture
- Cardiac Contusion a problematic term
 - EKG evidence
 - Ultrasound evidence
 - Technician Scan--NO



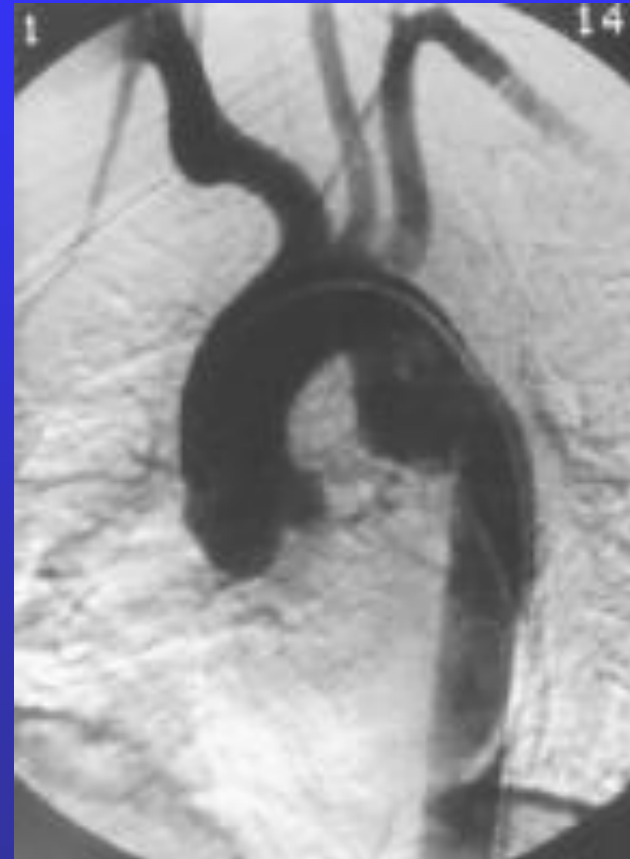
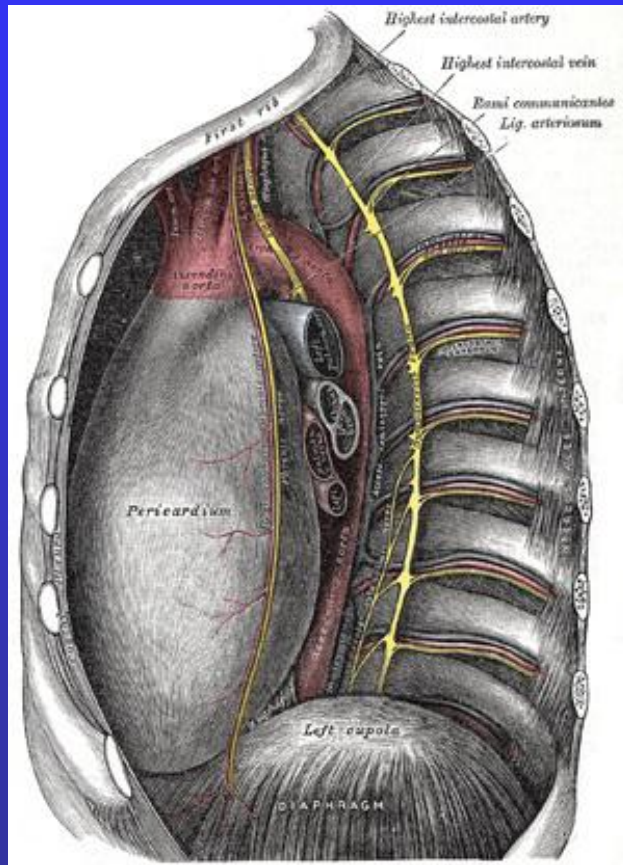
Cardiac Contusion

- Patients with a normal EKG in the ER do not need ICU admission to R/O a diagnosis of myocardial contusion (They may need ICU admission for other reasons)
- Patients who have an abnormal EKG in the ER should be admitted to a monitored bed



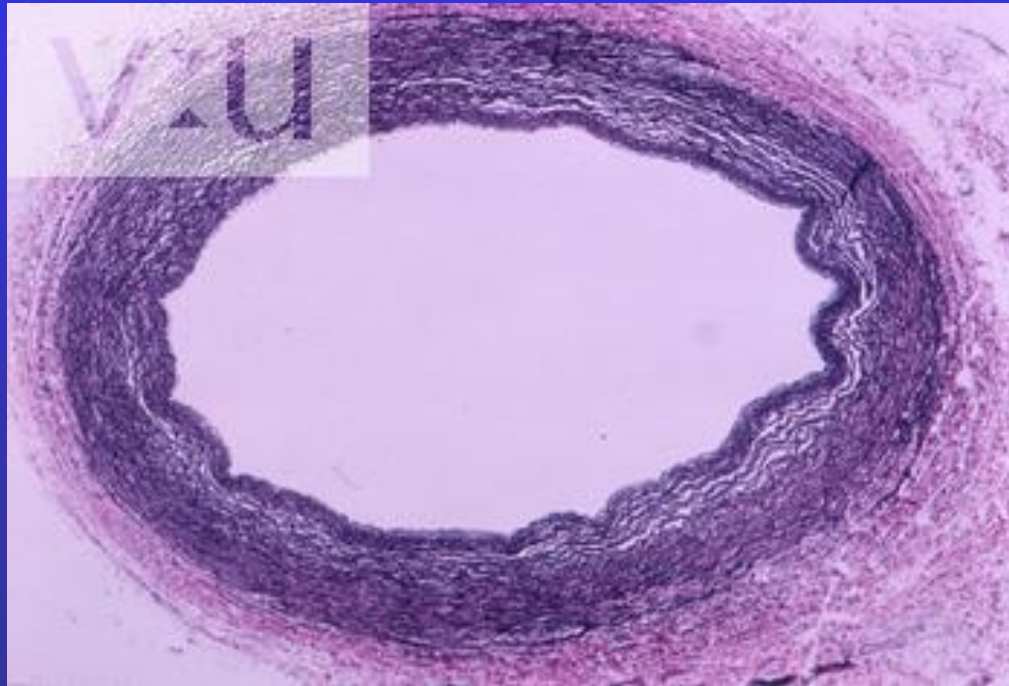


Thoracic Aortic Injury



Spectrum of Injury

- Intimal Tear
- Tear of Intima and Media
- Free Rupture



<http://www.visualsunlimited.com/browse/vu978/vu97852.html>



Ruptured Thoracic Aorta

- 90% of patients dead at the scene
- 50% of the patients who arrive at the hospital are dead within 24 hours without proper diagnosis and Rx.



Radiologic Signs Suggesting Ruptured Thoracic Aorta

- Widened Mediastinum
- Blurring of the Aorta Knob
- Extrapleural cap
- Depression of left mainstem bronchus
- Ng tube shifted to the right
- 1st and 2nd rib fractures
- Fractured sternum/scapulaSSS

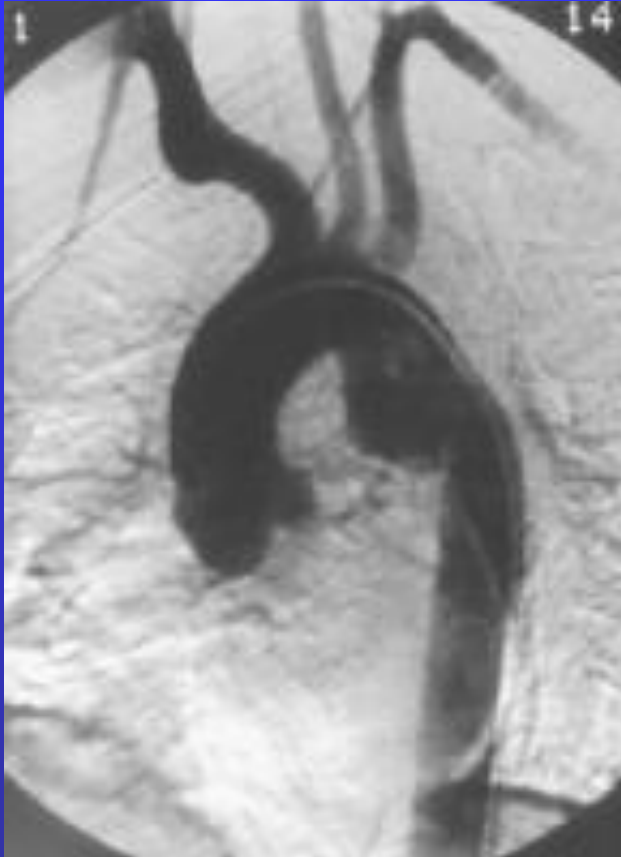


Diagnosis and Rx of Ruptured Thoracic Aorta

- High Index of Suspicion
 - Mechanism of Injury
 - Associated Radiologic Findings
- Arterial Line
- Beta Blockade
- Additional blood pressure control

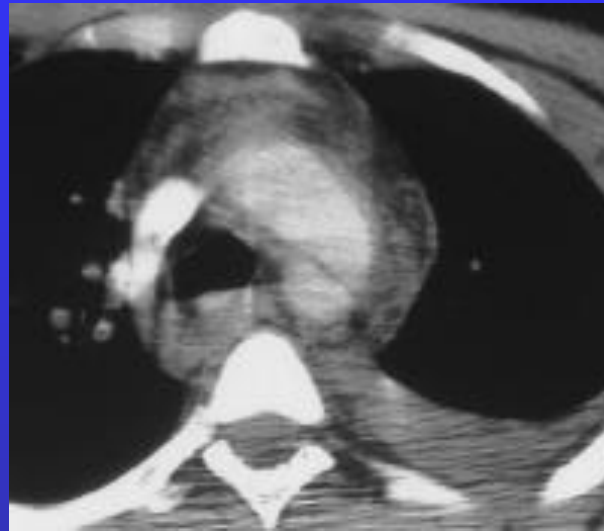


Methods of Diagnosis

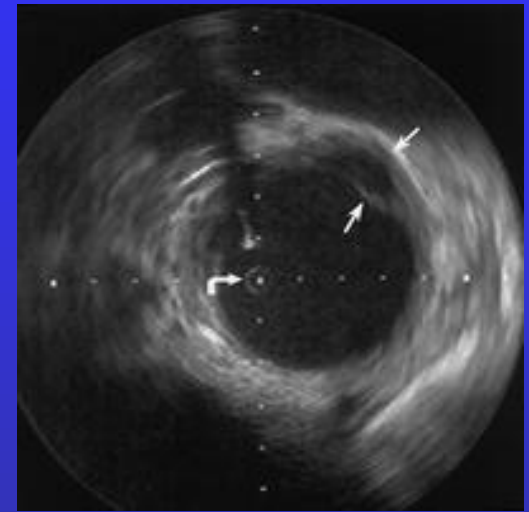


Arteriogram

<http://www.trauma.org/imagebank/imagebank.html>



Helical CT



TEE

<http://radiology.rsnajnl.org/cgi/content/full/227/2/434>



Methods of Treatment

- Observation with blood pressure and wall tension control
- Repair
 - With or without graft
 - With or without cardiopulmonary bypass
- Stent placement



Ruptured Left Hemidiaphragm



<http://www.worldwidewounds.com/2002/october/Bowley/Patterns-Of-Injury-MVAS.html>



Ruptured Diaphragm



<http://www.trauma.org/imagebank/imagebank.html>



Transmediastinal Penetrating Trauma

- Unstable – OR
- Stable—CT
- R/O injury to
 - Aorta
 - Esophagus
 - Heart
 - Tracheobronchial tree
 - Lung
 - Great Vessels



Summary

- ABCDE
- Diagnoses to make in the Primary Survey
 - Simple/Tension Pneumothorax
 - Open Pneumothorax
 - Hemothorax
 - Flail Chest
 - Cardiac Tamponade
- Stage of Resuscitation
 - Pulmonary contusion
 - Ruptured Diaphragm
 - Ruptured bronchus



Summary

- Diagnoses to make in the Secondary Survey
 - Blunt Cardiac Injury
 - Blunt Injury to the Aorta
 - Esophageal Injury (rare)

