The Management of Chest Trauma

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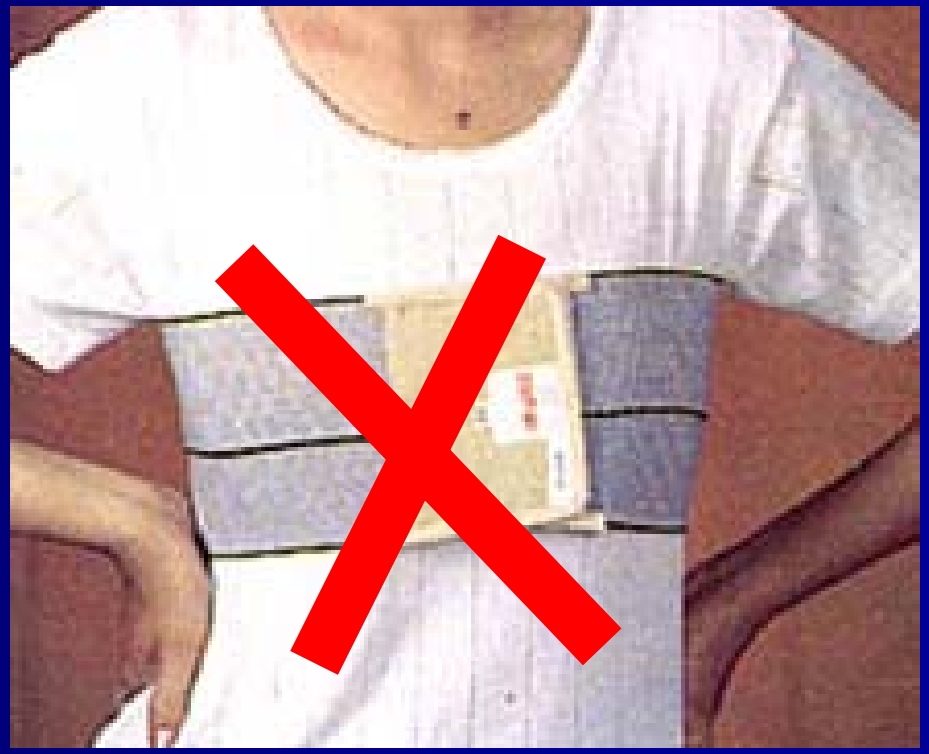
Trichotomizing Rib Fractures

- Upper 1-3
  - vascular injuries
- Middle 4-9
- Lower 10-12
  - liver/spleen injuries

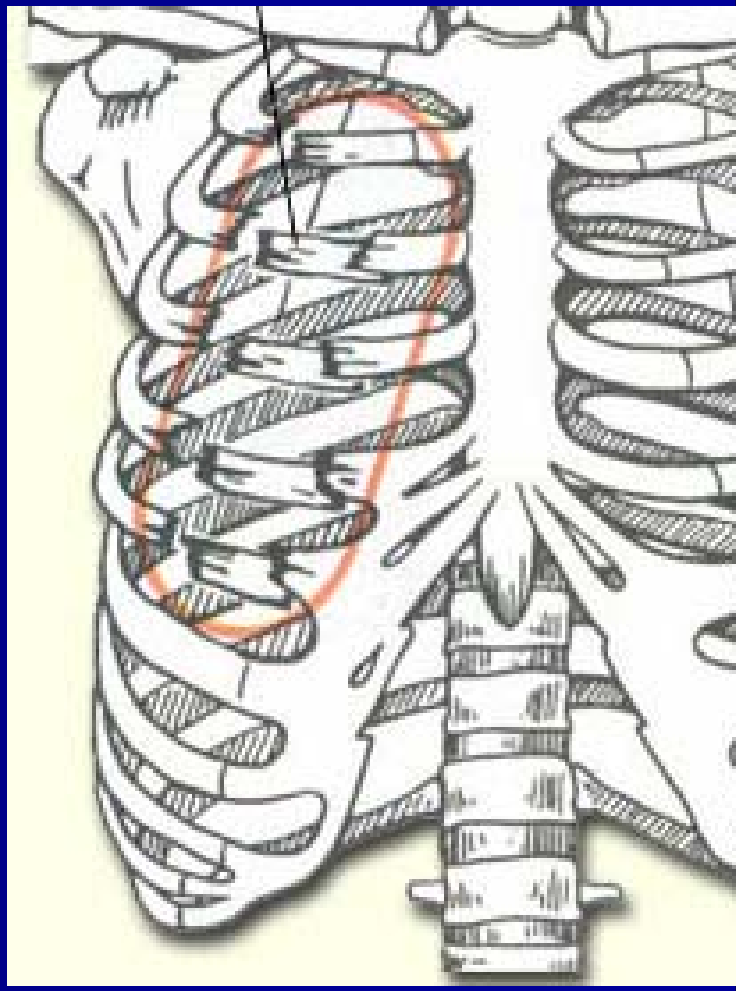
Management

- pain relief
- thoracostomy
  if PPV planned
- disposition
  - hypoxia
  - children
  - term pregnancy
  - elderly



Flail Chest

- definition (3x2)
  - segment motion
  - “sternal flail”
- hypercapnia/hypoxia
  - pendaluft
  - pulmonary contusion
- 20% missed initially
- 10% mortality



Flail Chest - Management

- pre-hospital
  - stabilize
- analgesia
  - epidural
- serial ABGs
- anticipate intubation
- admit to ICU

Pulmonary Contusion

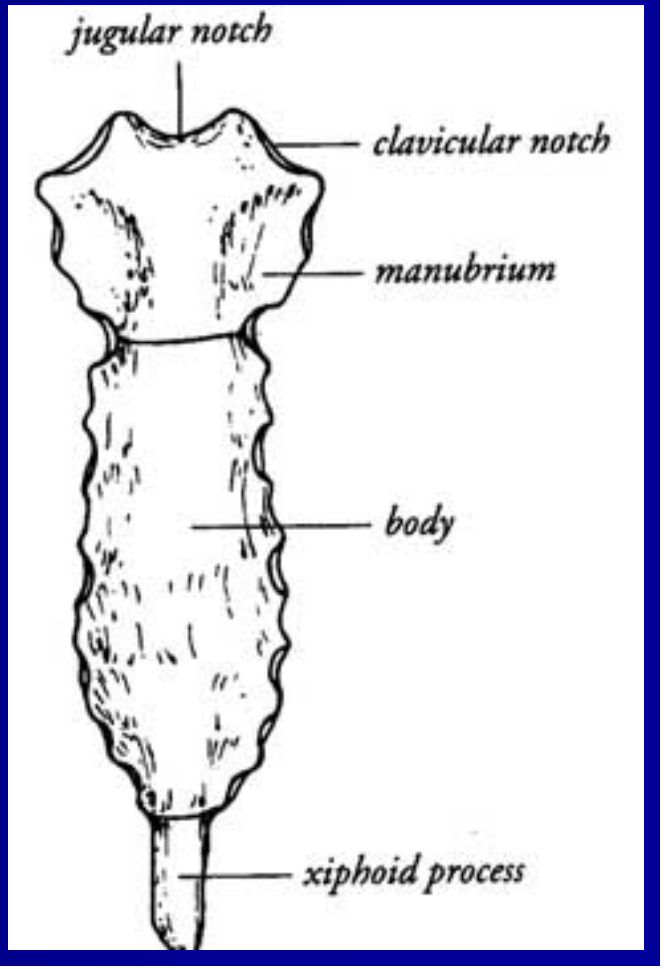
- parenchymal injury
  - blood/protein leak
  - peaks at 48-72 h
- clinical findings
  - dyspnea
  - tachypnea
  - hypoxia

Pulmonary Contusion – cont'd

- CXR
  - dense infiltrate
  - 12-24 hrs
- management
  - supplemental oxygen
  - selective intubation
  - avoid over-hydration

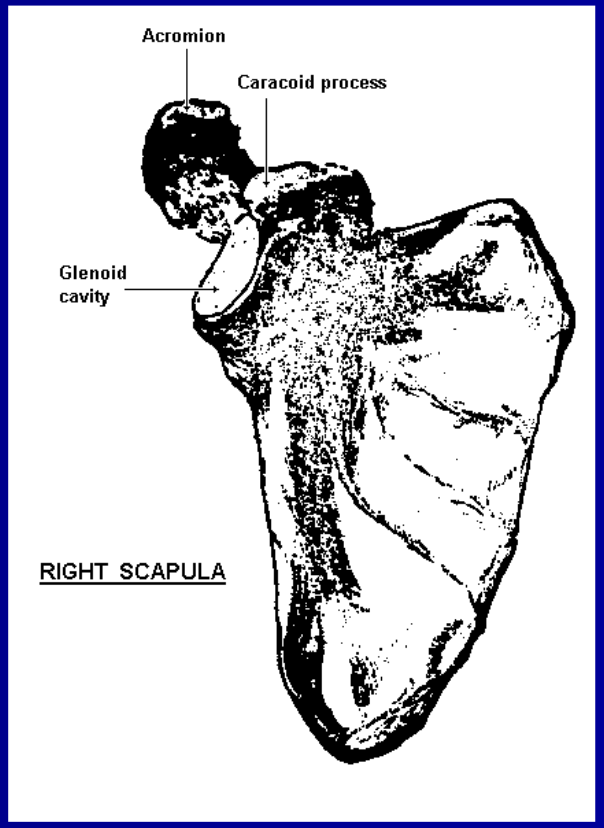
Sternal Fracture

- most at SM or mid-body
- lateral CXR
- associated injuries
  - TAR
  - BCI
  - ventricular rupture
- reduction
- admit



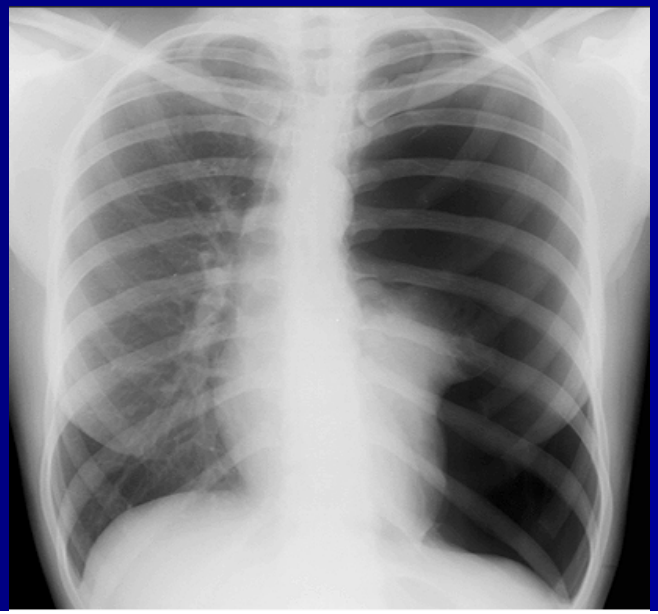
Scapular Fracture

- sturdy and mobile
- other injuries in 80%
- shoulder immobilizer



Pneumothorax

- cause
  - penetration of pulmonary parenchyma
  - bleb rupture during valsalva or crush
- CXR
  - 2 cm = 20%
  - large v small
  - upright, expiratory



Pneumothorax

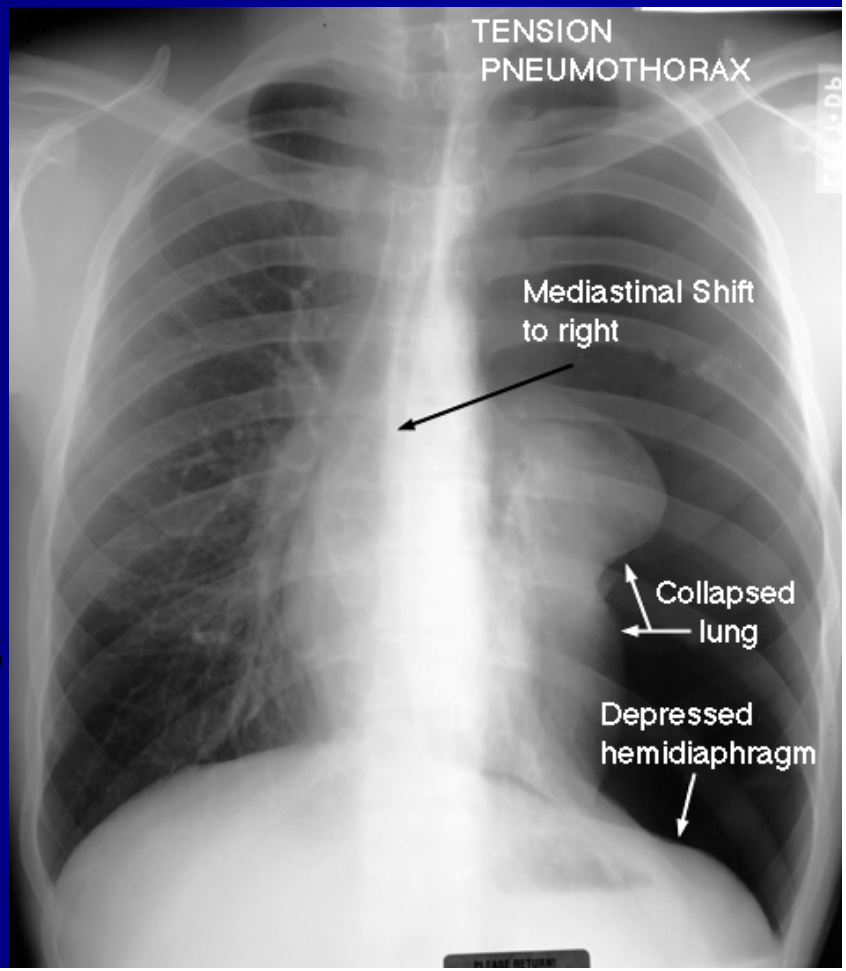
- chest tube
  - large bore if associated hemothorax
  - small bore if large pneumothorax
- observation only
  - small pneumothoraces
  - reliable, healthy, stable patient
  - no mechanical ventilation
  - repeat CXR not worse

Tension Pneumothorax

- cause
  - air leak via a one-way valve
  - positive pressure ventilation
- progressive mediastinal shift
  - impedes venous return

Tension Pneumothorax

- clinical findings
  - extreme dyspnea
  - low BP } **kinked VC**
  - JVD
  - tracheal deviation
  - absent breath sounds
  - hyperresonance
- CXR



Tension Pneumothorax

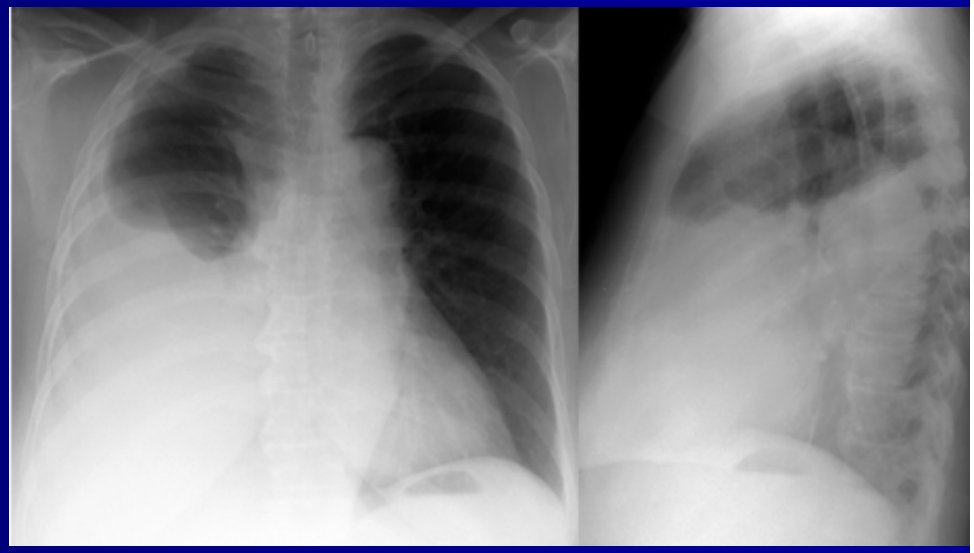
- needle decompression
  - long, large bore (10-16 gauge) angiocath
  - second anterior or the fifth lateral intercostal space
- thoracostomy

Hemothorax

- causes
  - penetration of pulmonary parenchyma
  - injury to intercostal or internal mammary vessels
  - pulmonary hilar injuries,
  - TAR
  - myocardial rupture
- clinical findings
  - dyspnea, tachypnea
  - pleuritic pain
  - absent breath sounds, dullness to percussion

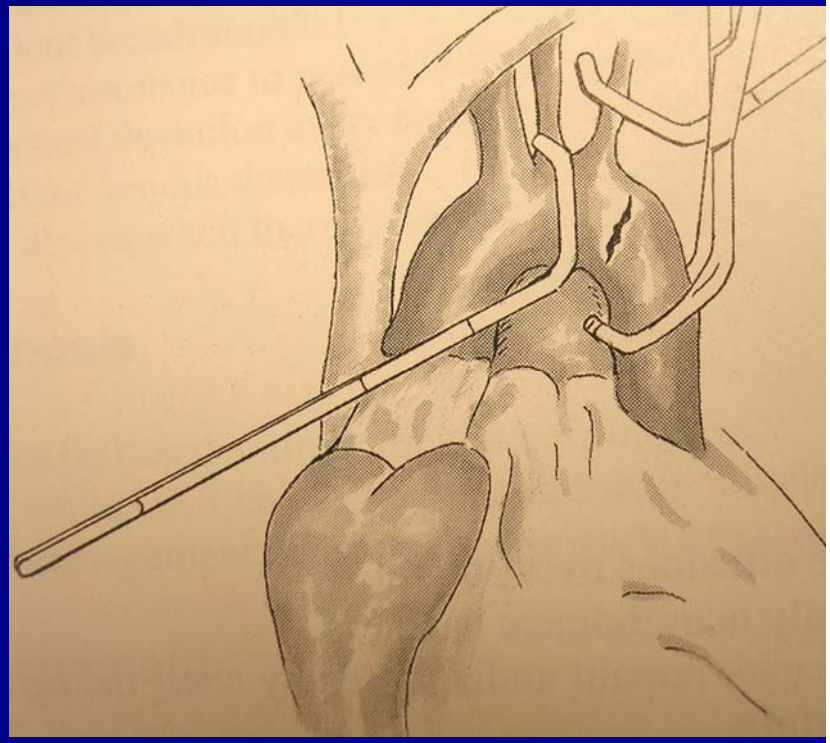
Hemothorax - continued

- CXR
  - upright v supine
- CT more sensitive
- thoracostomy
  - large bore
  - autotransfusion
- thoracotomy
  - > 20 ml/kg initially
  - > 2 ml/kg/h for several hours
  - refractory shock



Traumatic Aortic Rupture (TAR)

- shear force
  - mobile arch
  - fixed descending
- site
  - distal to L subclavian
  - avulsion aortic root
- survivors (15%)
  - intact adventitia

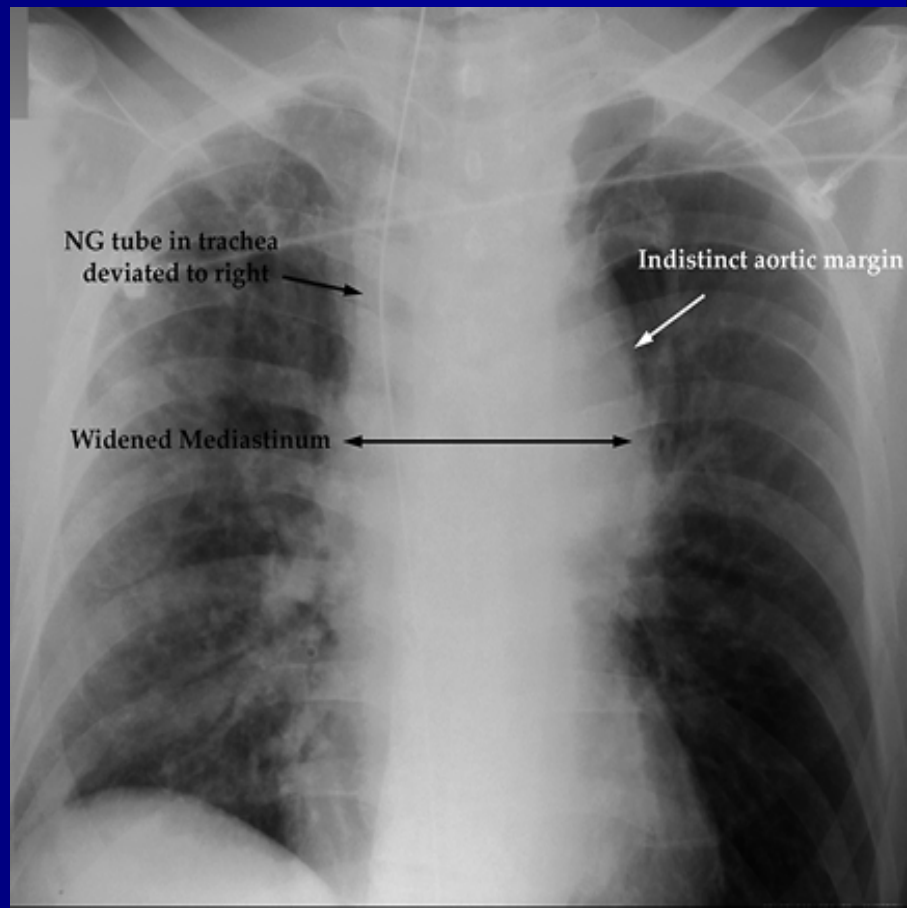


TAR - Presentation

- chest pain radiating to back
- dyspnea
- BP
  - 50% are hypotensive
  - some have reflex hypertension due to stretch of aortic sympathetic fibers

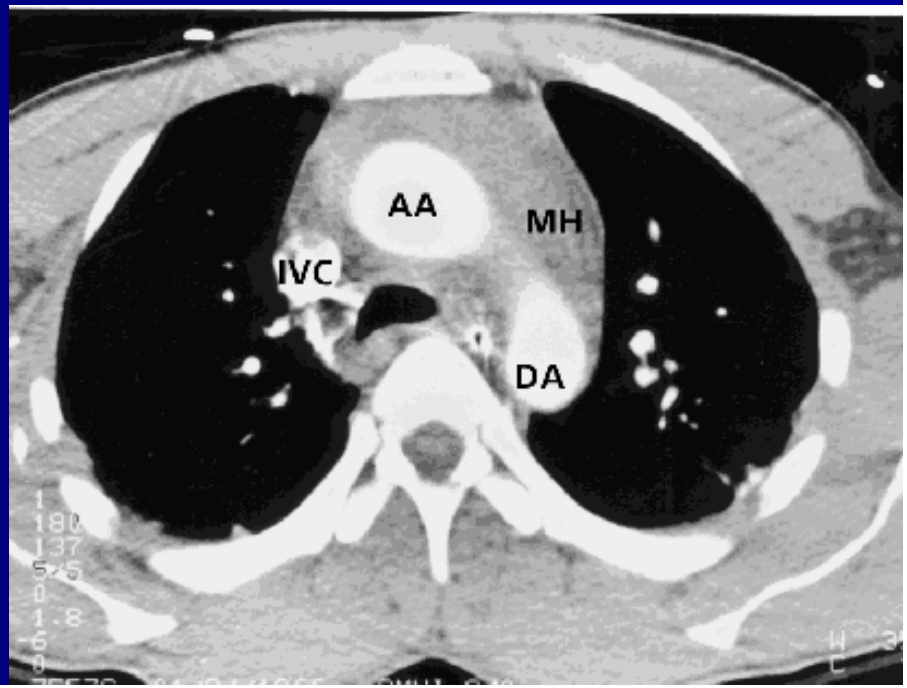
TAR - CXR

- wide mediastinum
- lost aortic knob
- apical cap
- rightward ETT/NGT
- 5-10% normal



TAR - Helical CT

- reduce aortography
- risk double contrast
- mediastinal hematoma
  - sensitivity 100%
  - specificity 25%

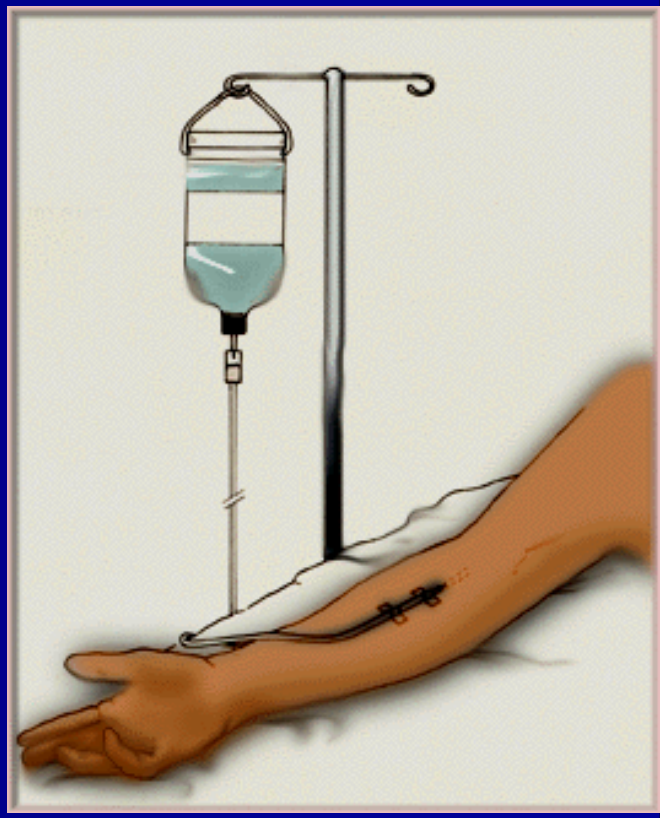


TAR - Aortography

- "gold standard"
  - before bypass
  - uncovers multiple tears
- indications
  - high suspicion
  - CT or TEE abnormal

TAR - Management

- thoracotomy
- hypertension
  - SBP 100-120 mmHg
  - esmolol/nitroprusside
  - labetalol



TAR - Prognosis

- 85% die at scene
- 15% survive to ED
  - if undiagnosed
    - 30% dead in a day
    - 60% dead in a week
    - 90% dead in a month

Blunt Cardiac Injury

- pathophysiology
- clinical findings
  - chest pain/tenderness/ecchymosis
  - tachycardia/dysrhythmia
  - cardiogenic shock

BCI - diagnosis

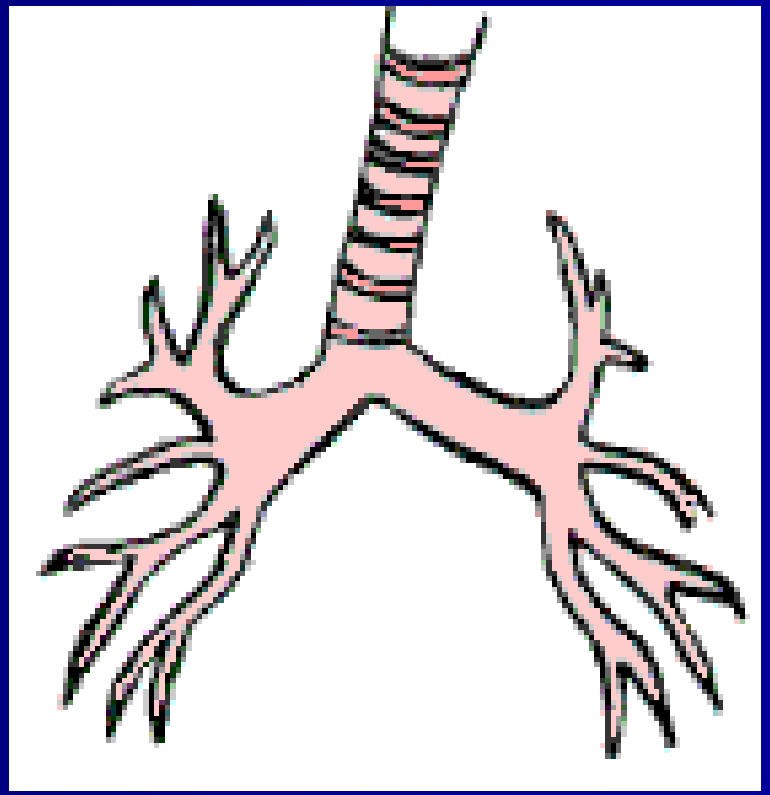
- ECG
- ECHO
- enzymes

BCI - Management

- discharge
- telemetry
- ICU
- dysrhythmias
- shock
- cardiac arrest:

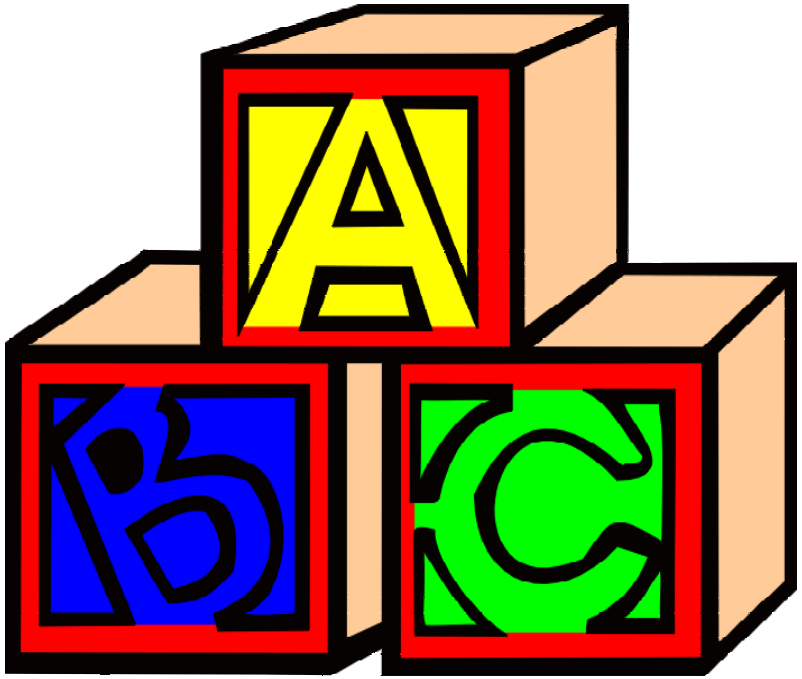
Tracheobronchial Disruption

- 80% are 2 cm of carina
- 15% mortality
- findings
- management



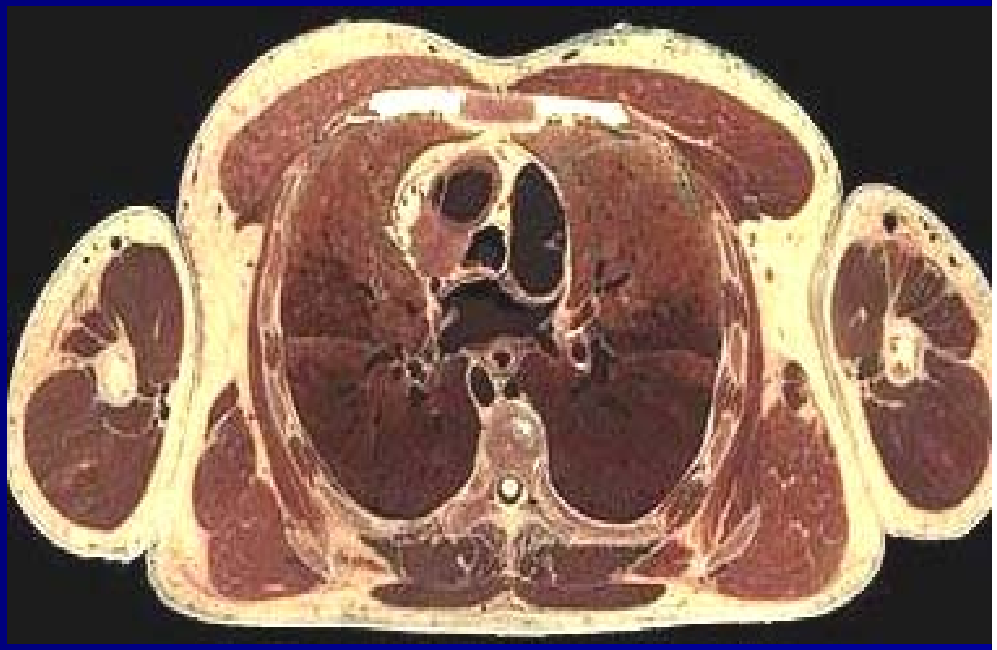
Penetrating Injuries - Priorities

- treatment
  - needle decompression
  - intubation
  - thoracotomy
- classification
  - transmediastinal
  - central
  - thoracoabdominal
  - peripheral



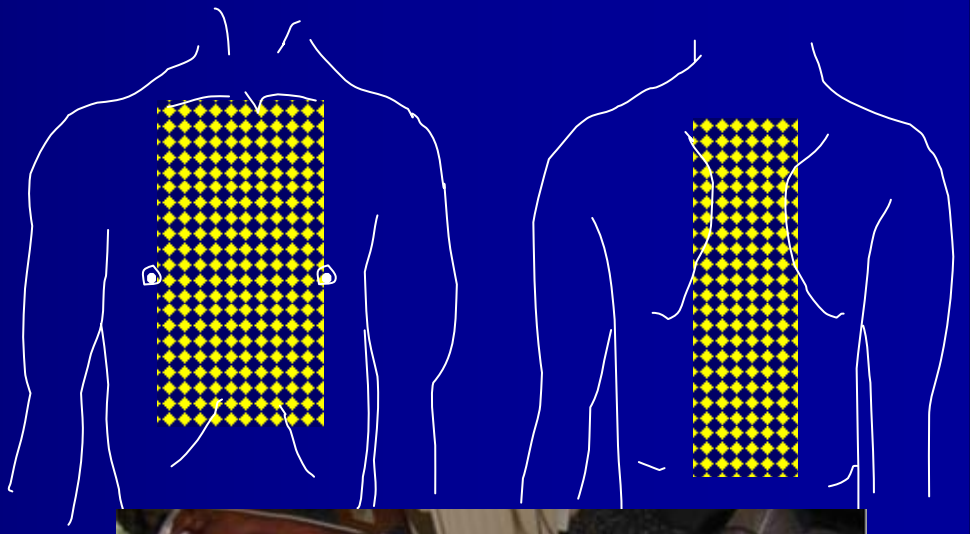
Transmediastinal Wounds

- highly lethal
- routine testing
  - ECHO
  - aortography
  - bronchoscopy
  - esophagram
  - esophagoscopy



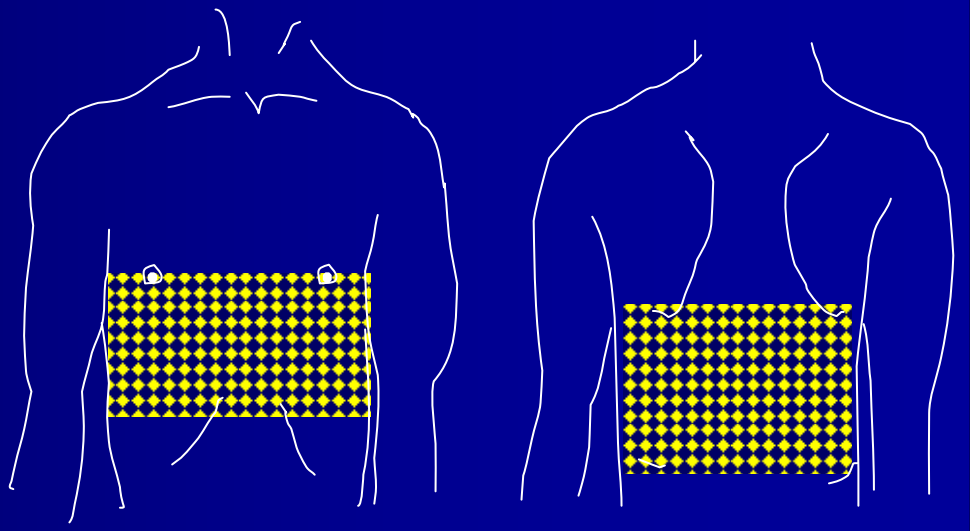
Central Wounds … the "Box"

- routine testing
  - ECHO
- selective testing
  - aortography
  - esophagram
  - esophagoscopy
  - bronchoscopy



Thoracoabdominal Wounds

- location
- injuries
- CT/DPL
- laparoscopy



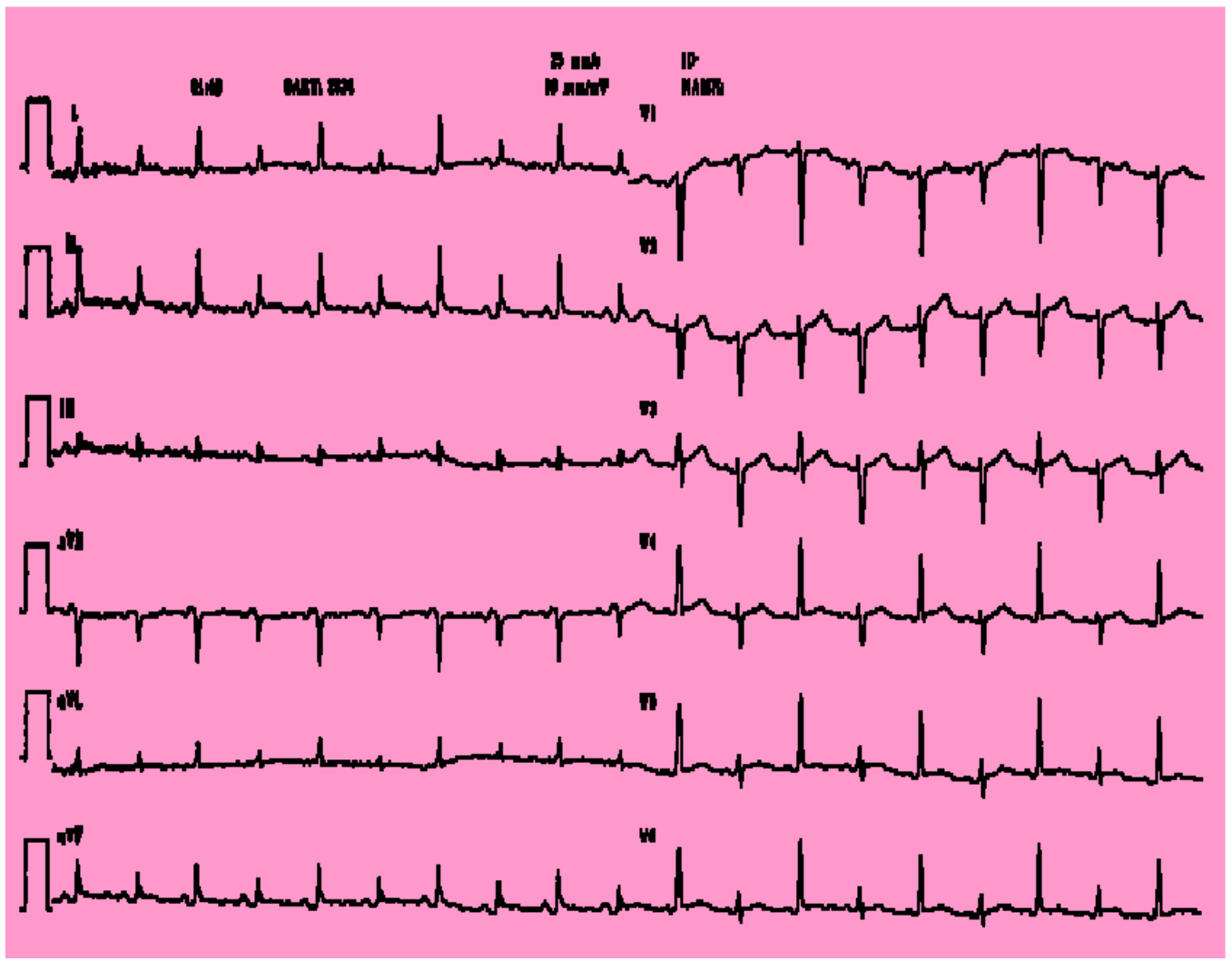
Peripheral Wounds

- location
- selective angiography
- discharge

Cardiac Tamponade

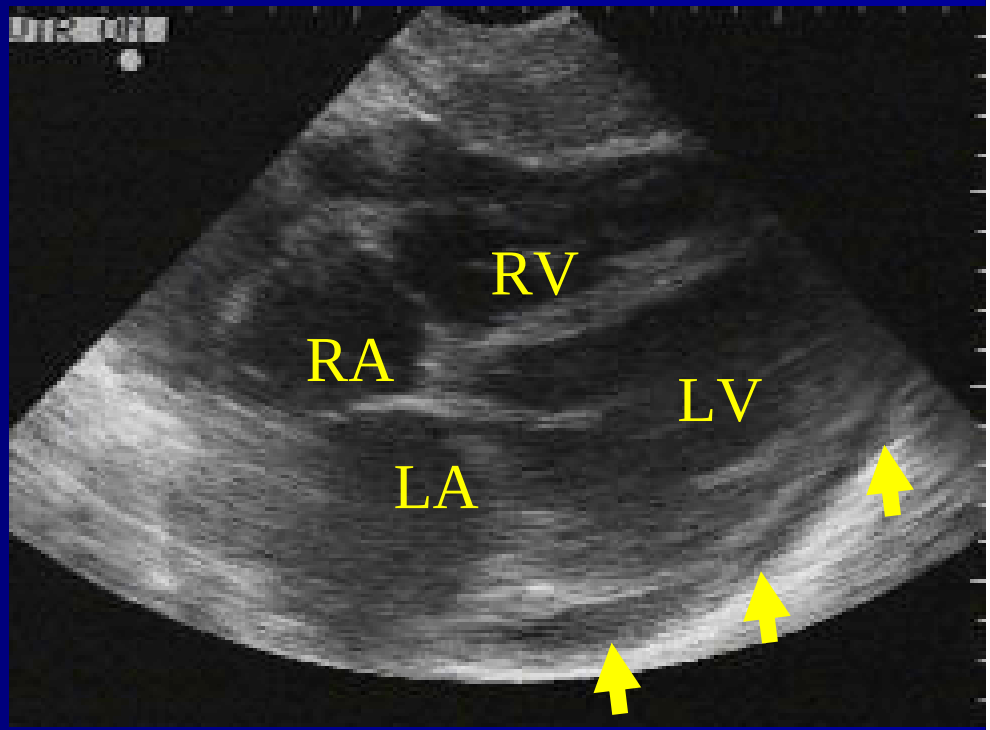
- inflow obstruction
  - cardiogenic shock without pulmonary edema
- highly lethal
- Beck's triad
  - hypotension
  - JVD
  - muffled heart sounds
- ECG
  - tachycardia
  - electrical alternans

Electrical Alternans



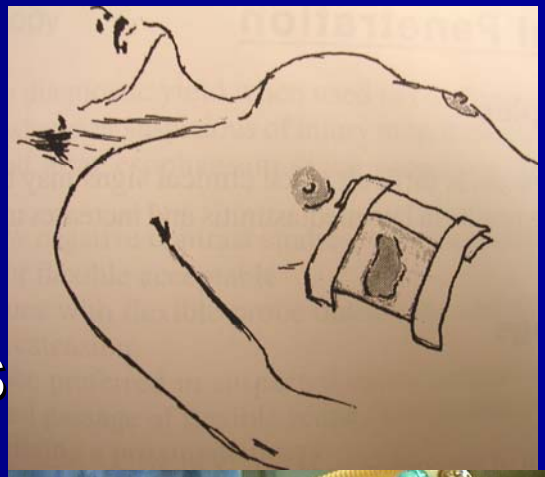
Cardiac Tamponade – Dx and Tx

- ECHO
  - effusion
  - RV collapse
  - 96% accurate
- management
  - thoracotomy
  - pericardiocentesis
  - pericardiotomy



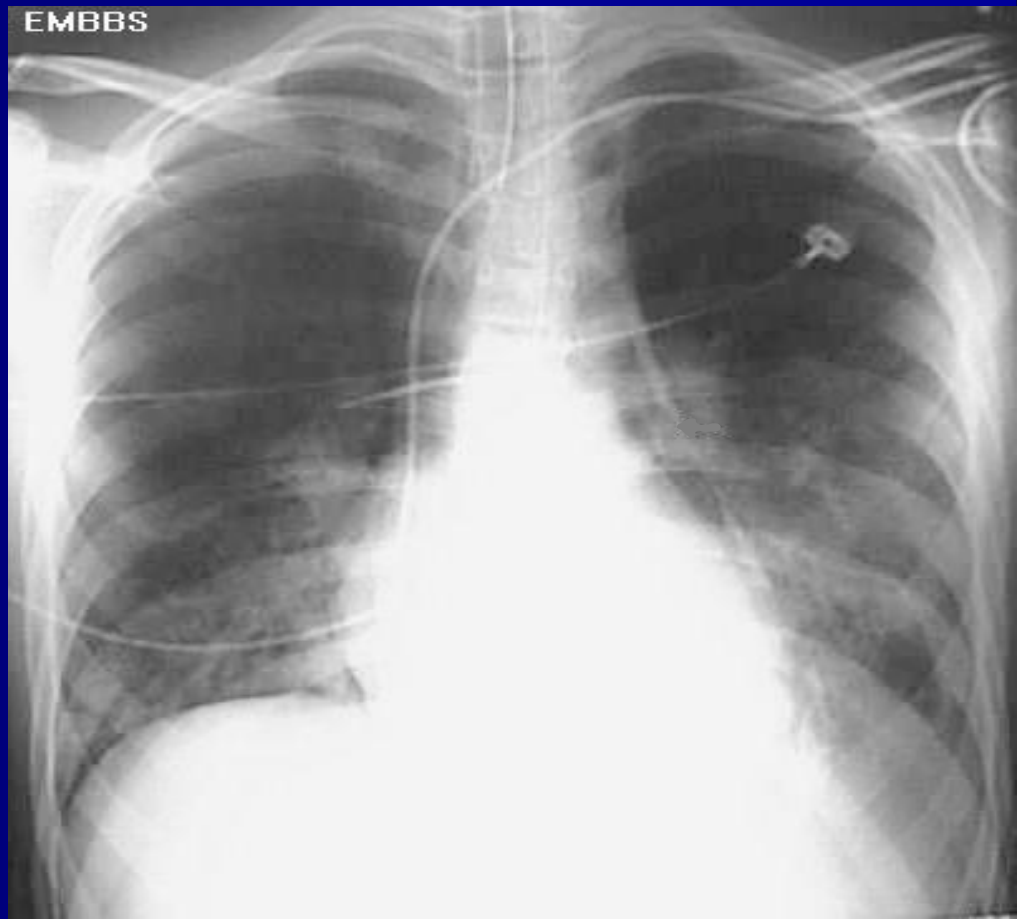
Communicating Pneumothorax

- high energy
- large defect
- defeats bellows effect
- “sucking chest wound”
- severe respiratory distress
- management
  - flutter valve dressing
  - thoracostomy
  - ETT
  - repair



Esophageal Penetration

- 50% mortality
- findings
- CXR
- esophagram
- esophagoscopy
- treatment



Air Embolism

- alveolar-venous communication
- air in coronary arteries
  - “box cars” sign
- cardiac arrest after intubation
- management
  - left lateral decubitus and Trendelenburg
  - thoracotomy
  - cross-clamp hilum
  - aspirate air

Questions?