What You Need to Know About Thoracic Trauma

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Trauma and Critical Care
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Surgical Medical Group

Thoracic Injuries

- Pneumothorax
- Tension Pneumothorax
- Hemothorax
- Cardiac tamponade
- Bronchial Tree injury
- Rib Fractures

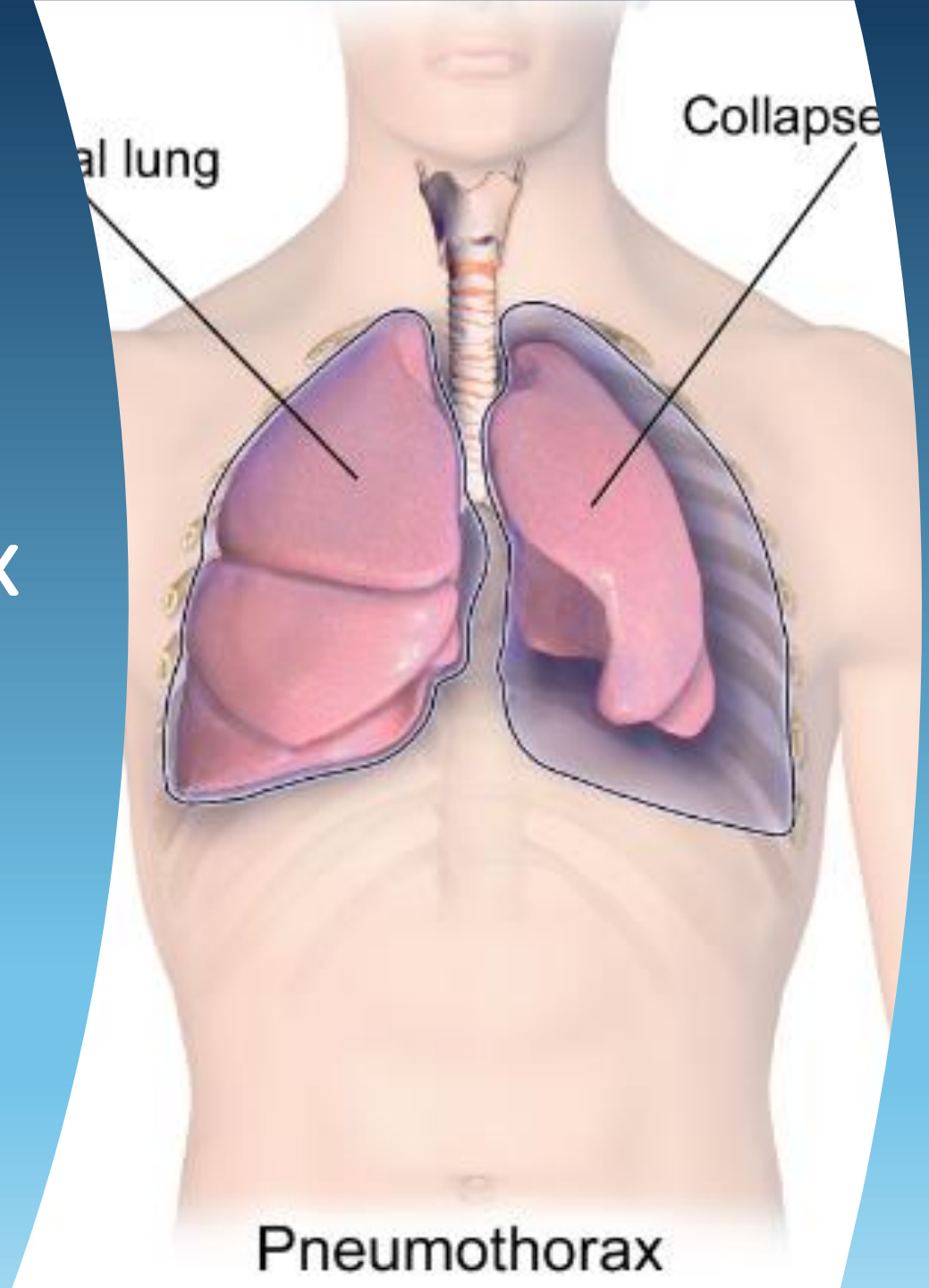
Disclosures

- None

Learning Objectives

- Evaluate Cardiac injury
- Evaluate blunt chest trauma
- Manage injures to the chest
- Treatment of chest trauma

Pneumothorax



- This is when there is air in the pleural space
  - From bleb
  - Blunt or penetrating trauma
  - From central line attempt
  - Air either from the lung or from outside enters the space

- Causes
- Chest pain
- SOB
- Desaturation
- Sense of impending doom

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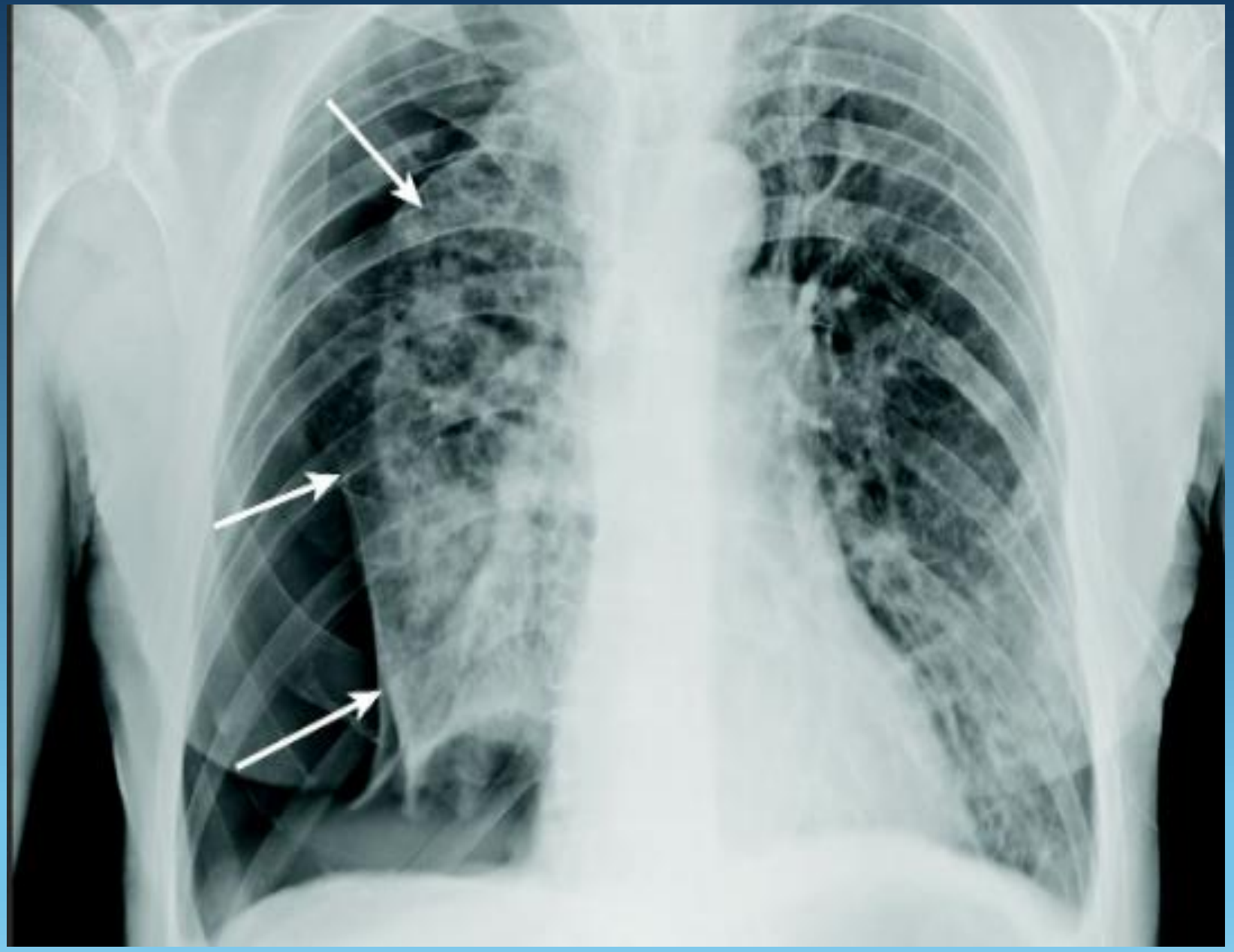
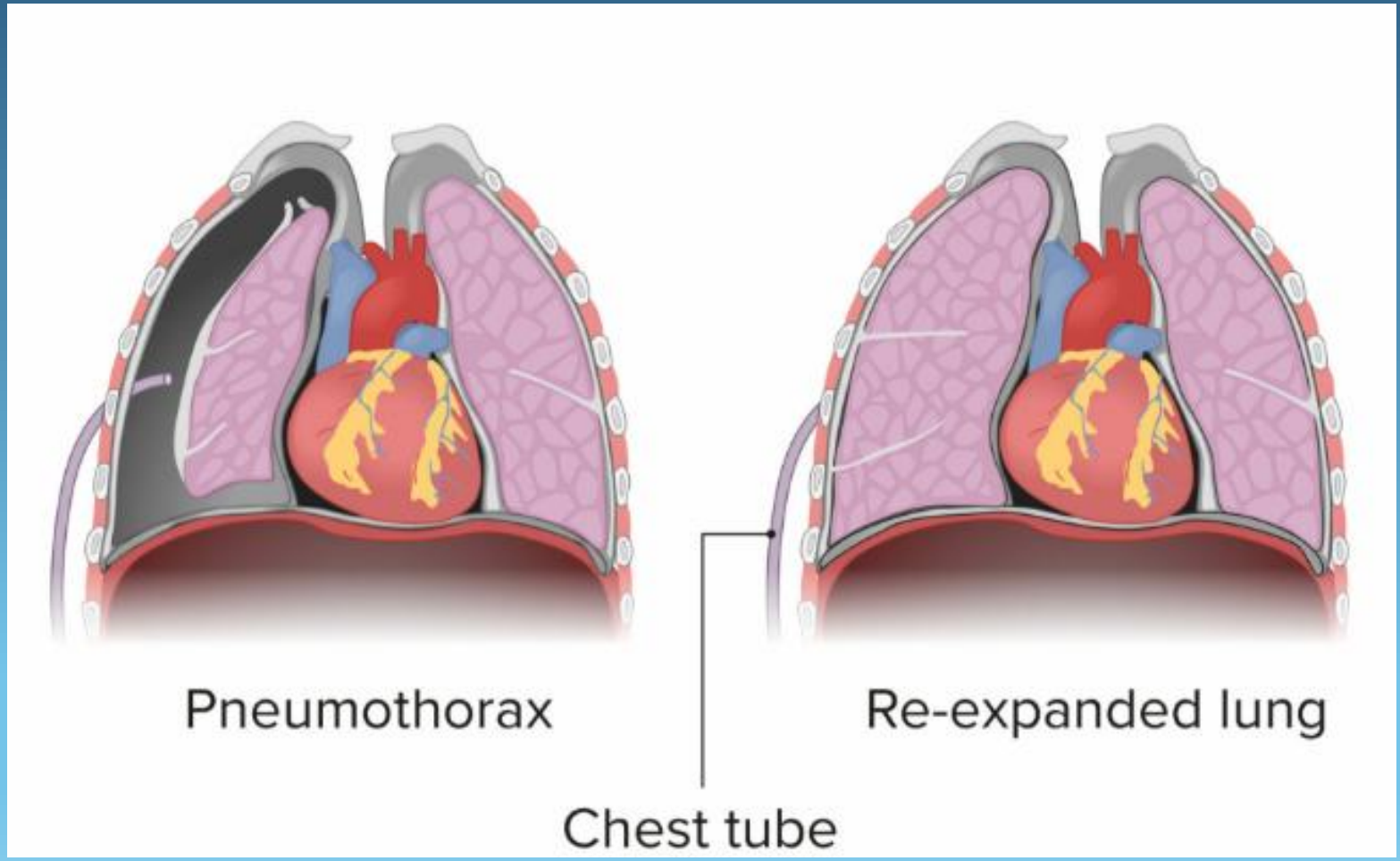
Pneumothorax



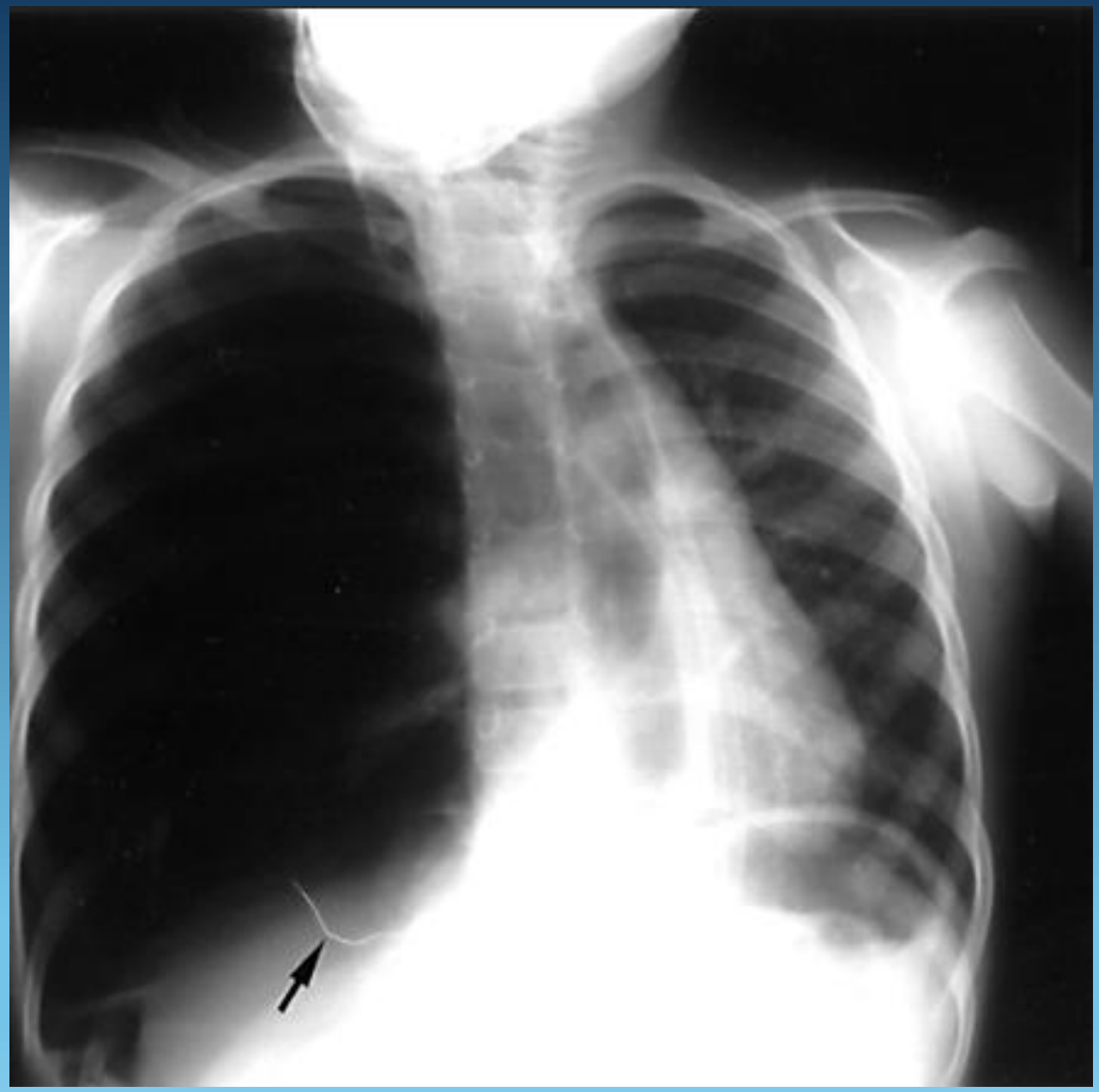
Pneumothorax

- Treat is Re-Expansion of the lung with placement of a chest tube
- The chest tube is placed to -20 cm H2O this is the physiological resting pressure of the chest



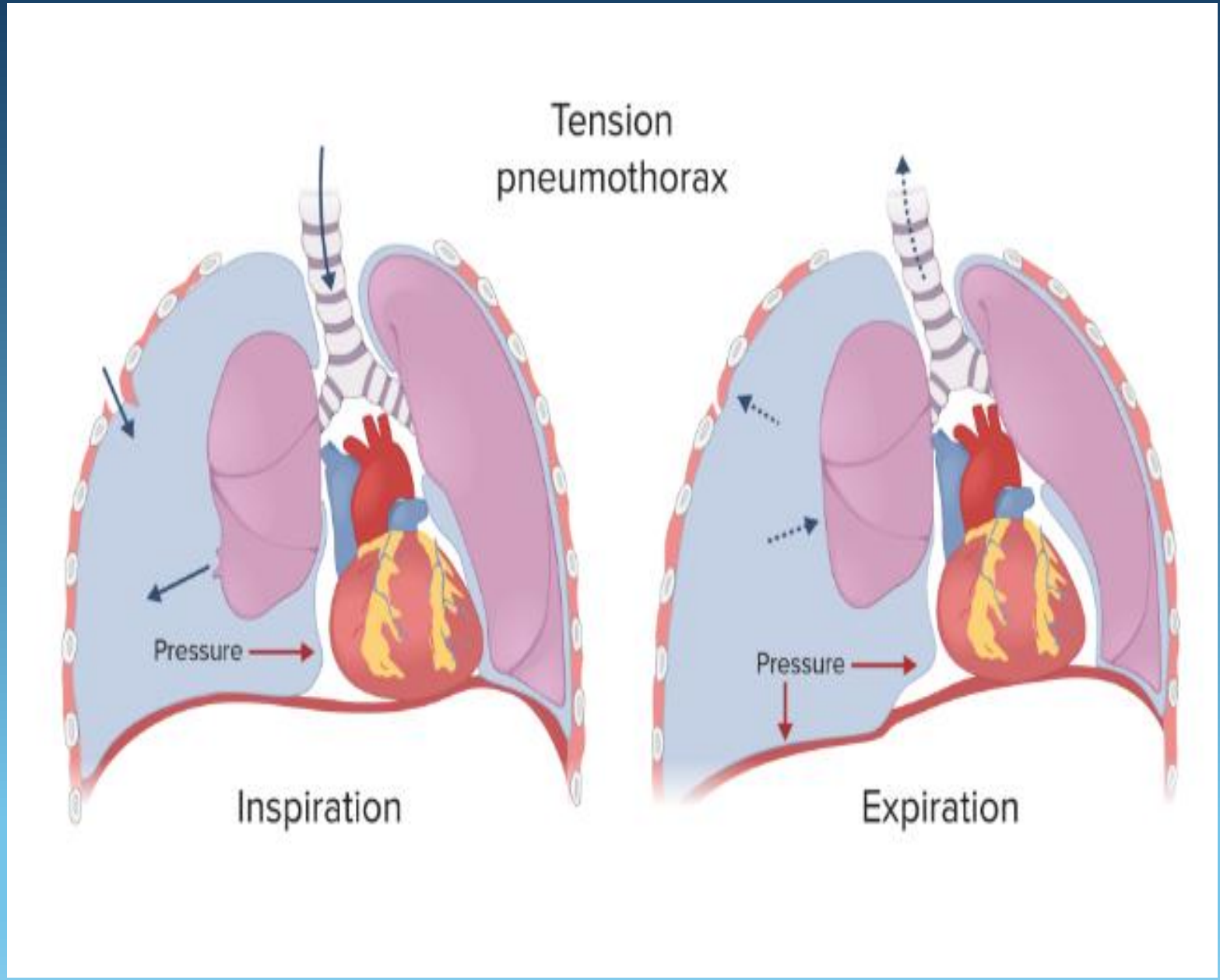
Tension Pneumothorax

- Shift of the mediastinum
- Tracheal deviation away from the pathology
- Distended neck veins
- No Breath sounds
- Patient looks like they are going to die…….because they are!

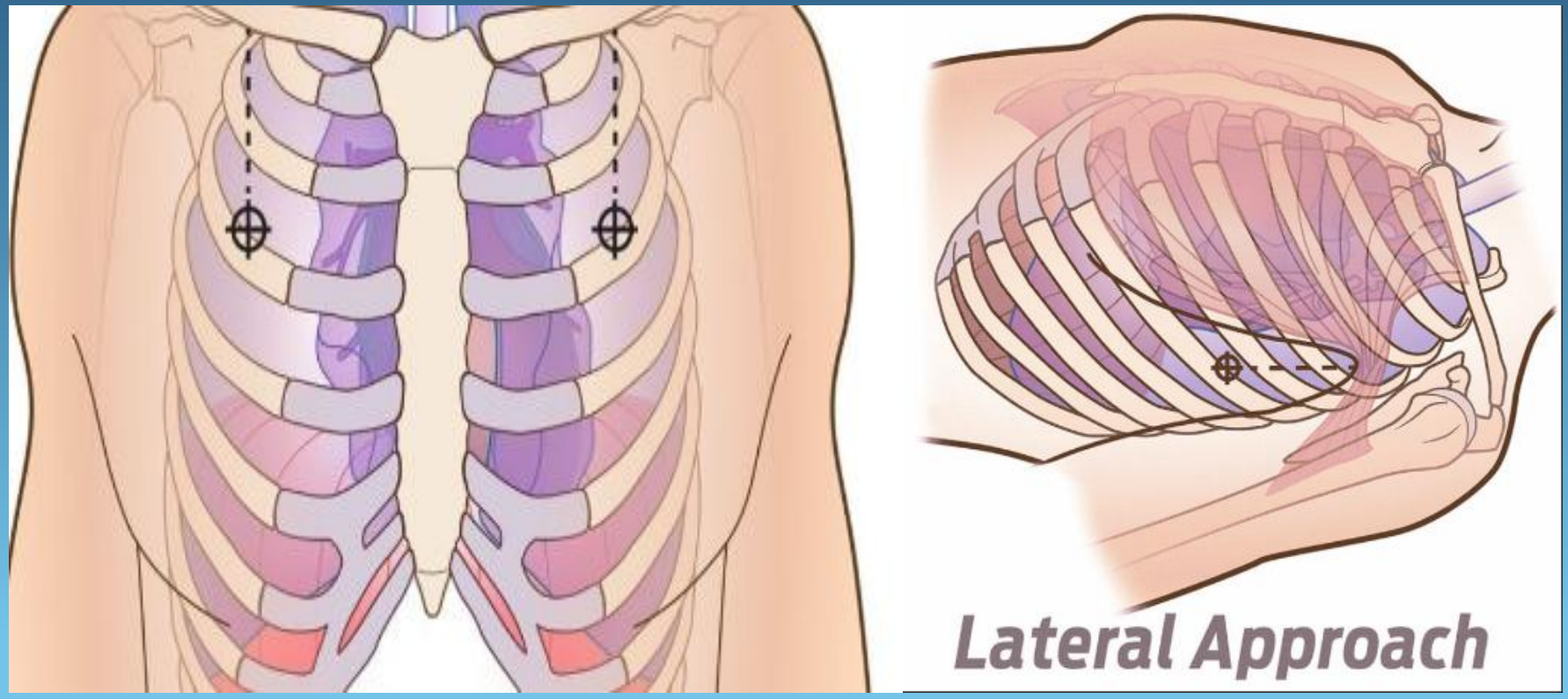


Tension Pneumothorax

- This is a Pneumothorax Ugly Cousin
- This is created by continuous air leaking into the pleural space
- Cuts off Pre-load to the heart
- Causes rapid death
- Two ways to get it
  - “Sucking chest wound”
  - Ventilator “blowing chest wound”



Tension Pneumothorax Needle decompression



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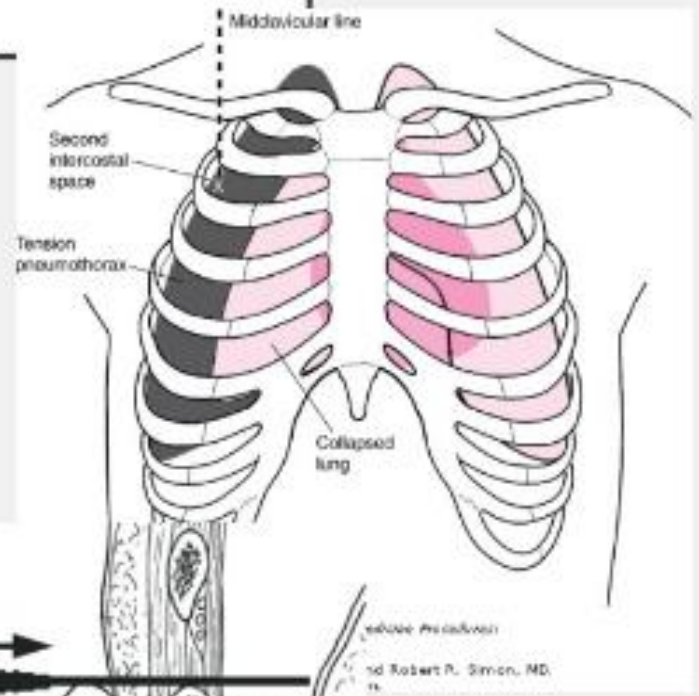
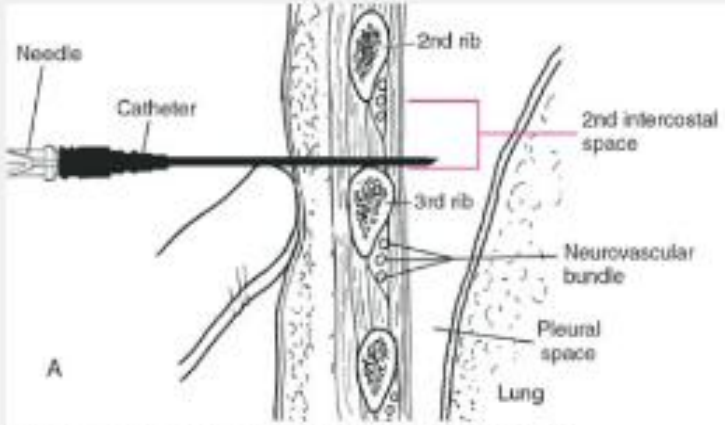
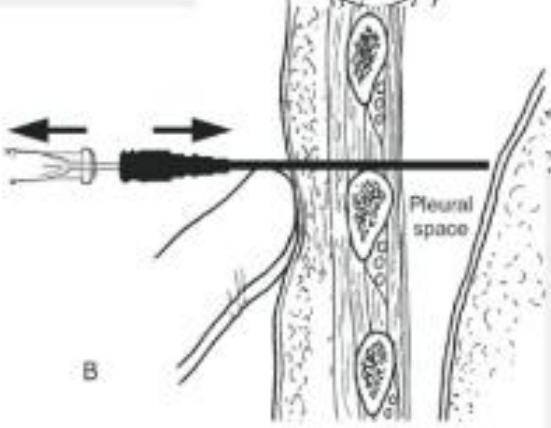
Tension Pneumothorax

NEEDLE DECOMPRESSION

History and physical examination remain the keys to making the diagnosis of pneumothorax.







Source: Reichman EF, Simon RR: *Emergency Medicine Procedures*: http://www.accessemergencymedicine.com

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Tension Pneumothorax

- Key tips
  - Needle decompression is a temporizing maneuver
  - Chest tube is definitive treatment
  - 14-gauge needle or bigger
  - Finger thoracostomy is acceptable treatment option to temporize
  - 5 cm needle makes it to the pleural space 50 percent of the time
  - 8 cm needle makes it to the pleural space 80 percent of the time
  - Bury the needle!

Hemothorax

- Blood in the pleural space
- Either from blunt trauma
  - Rib fractures
  - Lung laceration
  - Spine fractures
- Penetrating trauma

Hemothorax

- Blood in the Pleural space
- Needs to be evacuated with a chest tube
- The lung with stop bleeding 85% of the time with just re-expansion
- 85% of chest trauma can be managed definitively with a chest tube

Hemothorax

- Surgical Exploration
  - 1500 ml or more on chest tube placement
  - 200 ml and hour for 3 or more hours
  - Ongoing transfusion requirements to maintain hemodynamic stability
    - Chest tube may be clotted or partially occluded, and blood can be accumulating in the chest

  - Remember to give 2 grams of ancef prior to chest tube placement. Lowers the incidence of empyema and infection
  - Cant et al. reported no empyema in individuals who received cefazolin for 24 hours compared to a 5% incidence in the placebo group

Blunt Cardiac Contusion

Symptoms

- Most common arrhythmia = sinus tachycardia

Evalution

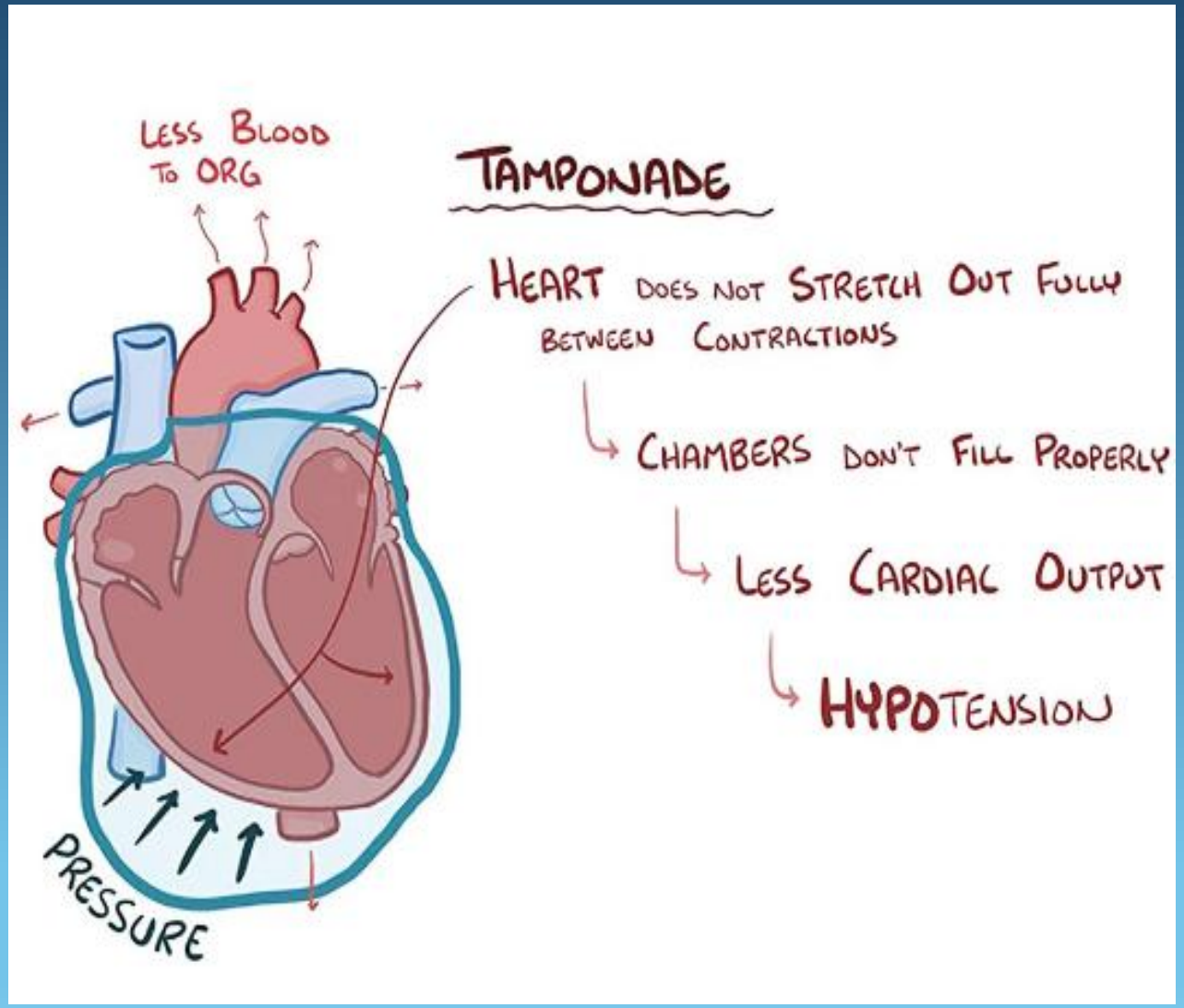
- Index of suspicion = blunt force to the chest. MVC, seatbelt sign, kicked in the chest by a horse etc
- Troponin I q8 x2 and EKG if both negative Blunt cardiac injury Ruled out
- IF either one is positive then need to get echo and cardiology consultation
- 99% of the time it will get better on its own in 3-5 days
- Occasionally the patients can have profound bradycardia from bruising to the conduction system. It will get better. Just have to watch them closely in ICU.

Cardiac tamponade

- This is Bad!
- If not recognized rapidly the patient will deteriorate and die
- In my opinion the subxiphoid view of the EFAST should be first!
- Stops pre-load (Beck's triad)
  - Distended neck veins
  - Muffled heart sounds
  - Hypotension

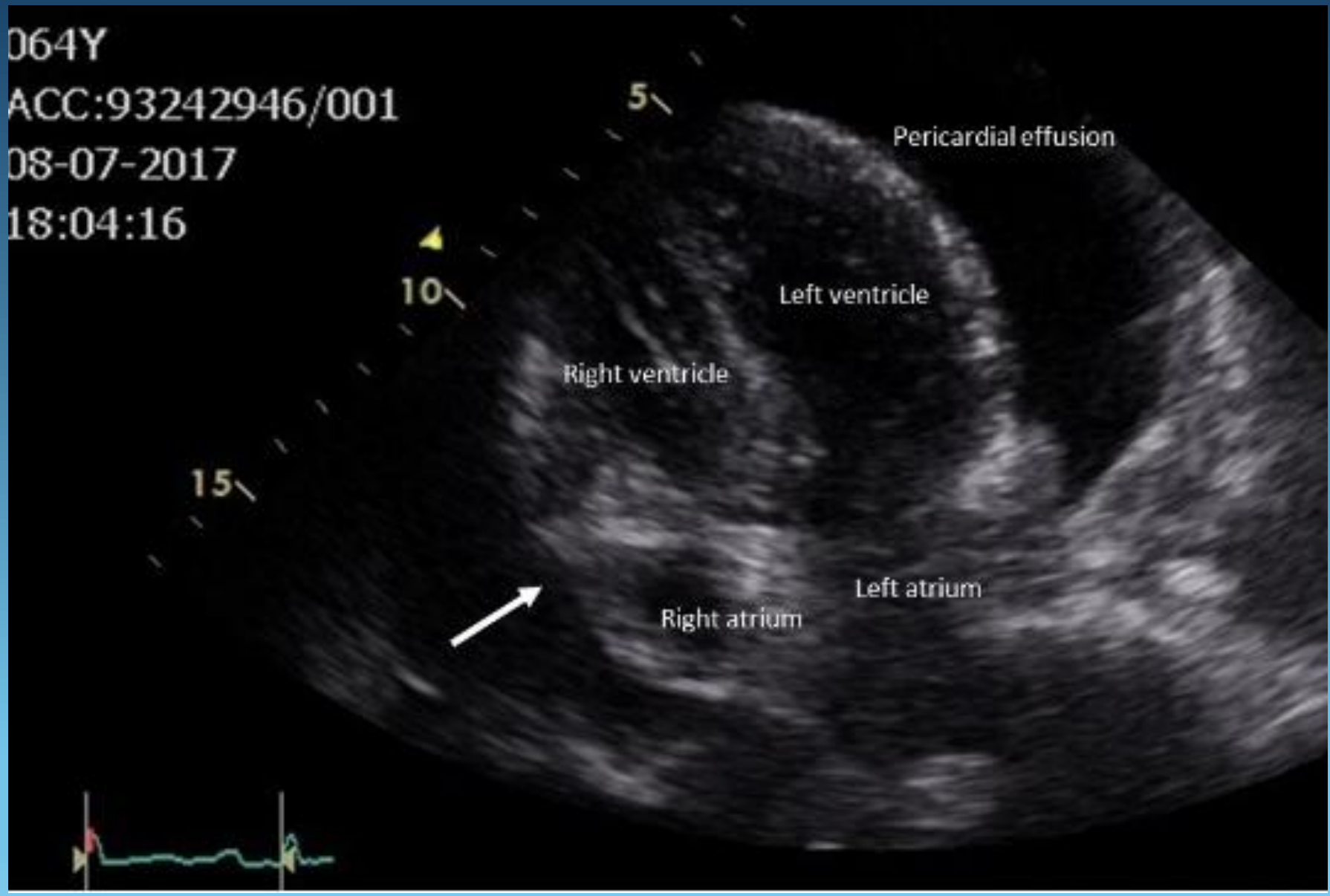
  - No tracheal deviation→ big difference between Tension Pneumothorax

Cardiac Tamponade



- The pericardium is very rigid and does not stretch
- In comparison the ventricle with compress before the pericardium will stretch

Cardiac Tamponade



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Cardiac Tamponade

US Guide increases accuracy and decreases complications

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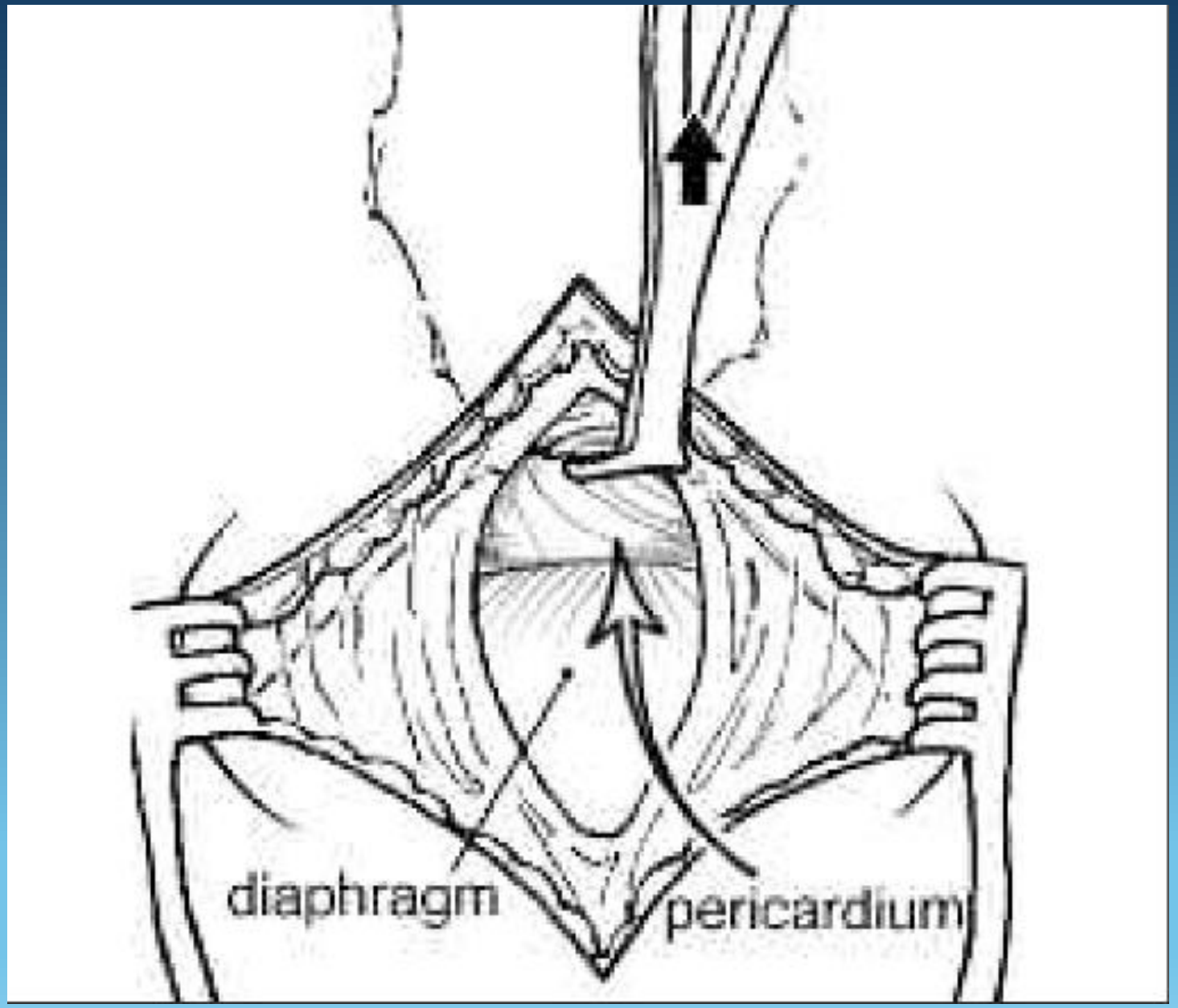
Cardiac Tamponade Pericardial Window



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Cardiac Tamponade

- Goals
  - 1. Cross Clamp the Aorta
    - Resuscitate the heart and brain
  - 2. Open the pericardium
    - Release any tamponade
    - Open cardiac massage
  - 3. Control any bleeding from the left lung
  - 4. Remember to place a chest tube on the right side to rule out blood in the right chest
  - Once you have perfusing cardiac rhythm please go to OR
    - You will need to clamp the internal thoracic artery on the left inferiorly and superiorly as it most likely will have been divided. DO not attempt to suture ligate very difficult. Place clamp on it in ED and then put hemoclip on it in the OR.

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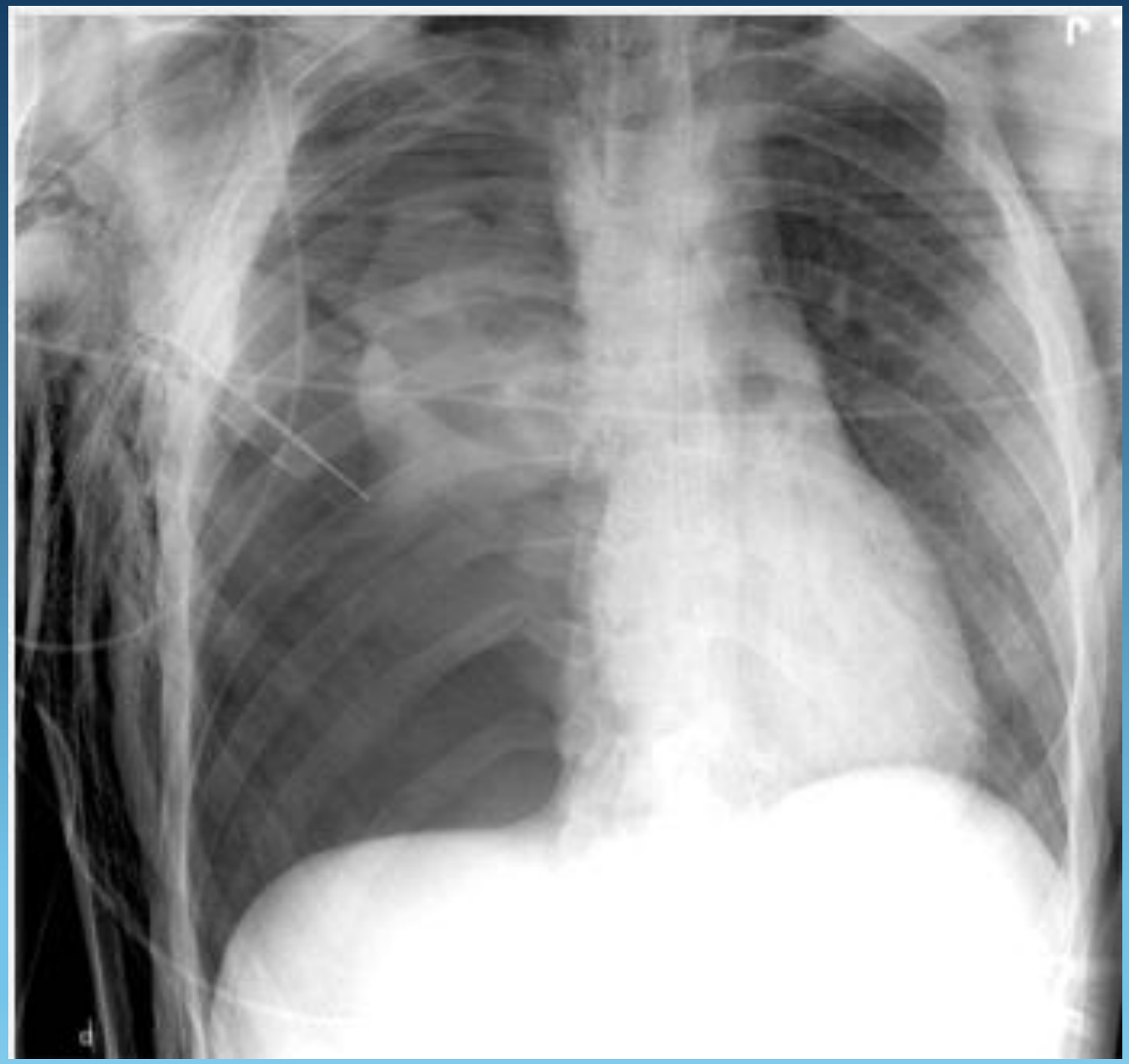
Bronchial Tree Injury

This is difficult to Recognize!

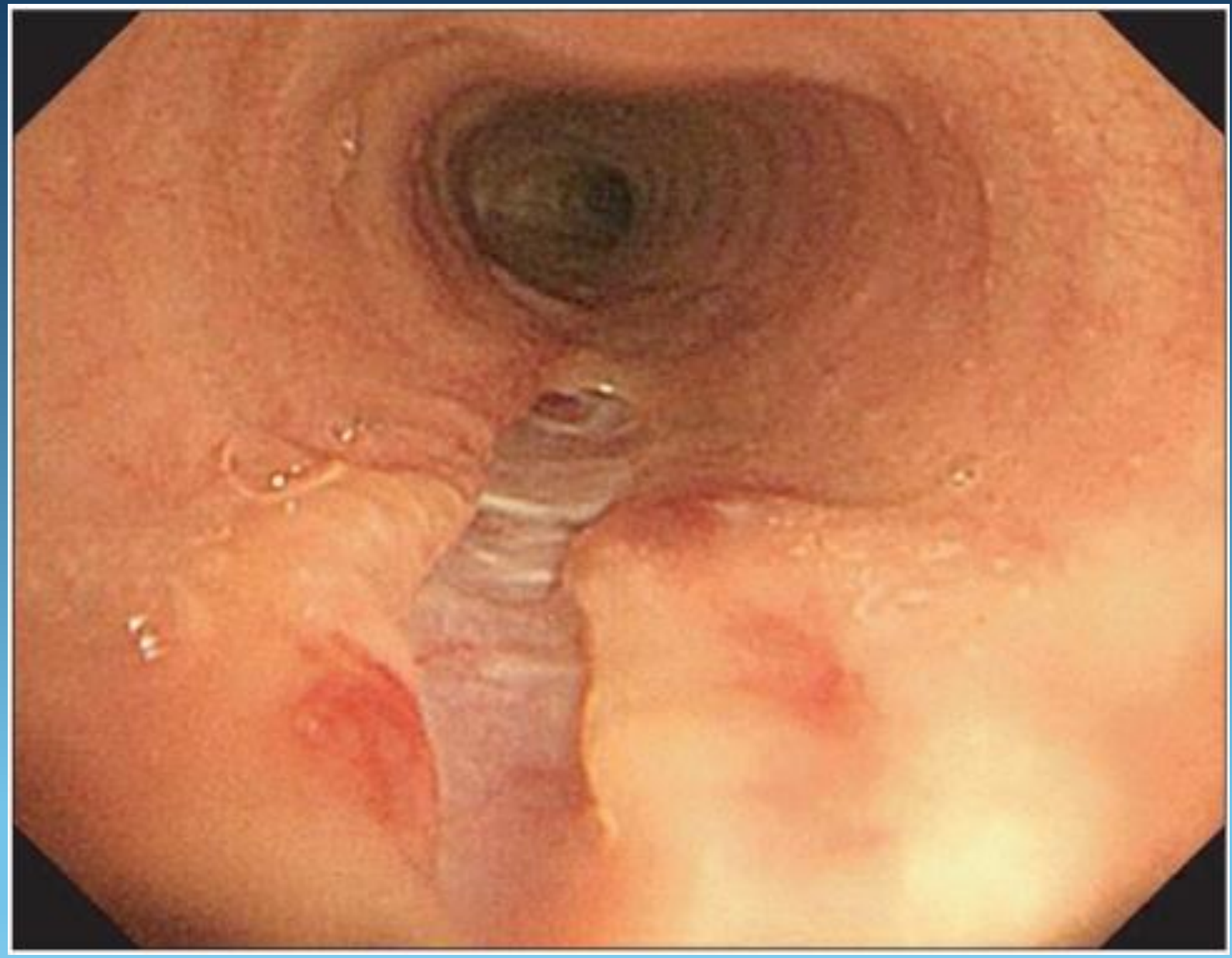
The patient will be in extremis and have a pneumothorax

The patient will have a significant air leak in the chest tube pleurovac when you place it.	The patient will get worse with chest tube placement. They will desaturate and respiratory will tell you they are not getting any vent return if intubated	This is the only time you clamp a chest tube!!!

Bronchial Tree Injury



Bronchial Tree Injury



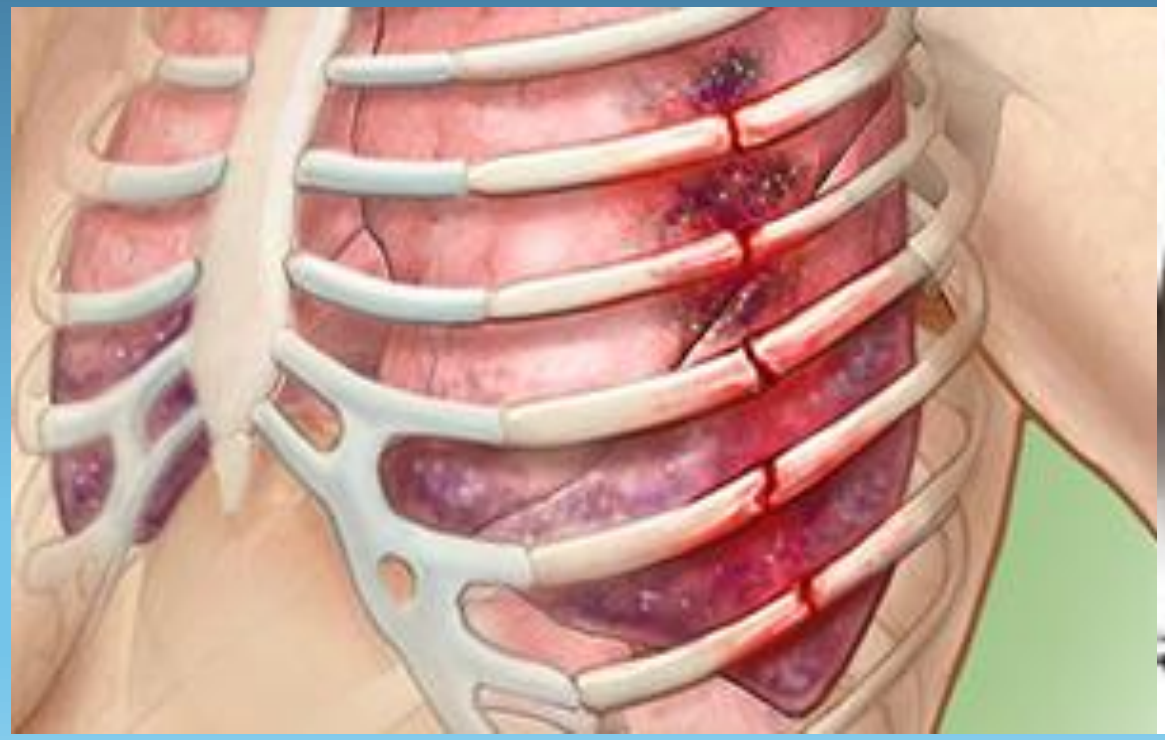
Tracheal Bronchial Tree Injury

How do you save this persons life?

Bronchial Tree Injury

- Clamp the chest tube
- Put the bronchoscope through the ET tube
- If Tracheal injury, then put scope past injury and advance the balloon past injury and inflate cuff→ temporized
- IF left of Right mainstem bronchus. Intubate the other mainstem and then inflate the cuff
  - Cut tidal volume in half
  - Keep chest tubes to suction (unclamp)
  - Temporized
  - Needs surgical repair
  - More than 30 % circumference then it needs resection….

Rib Fractures



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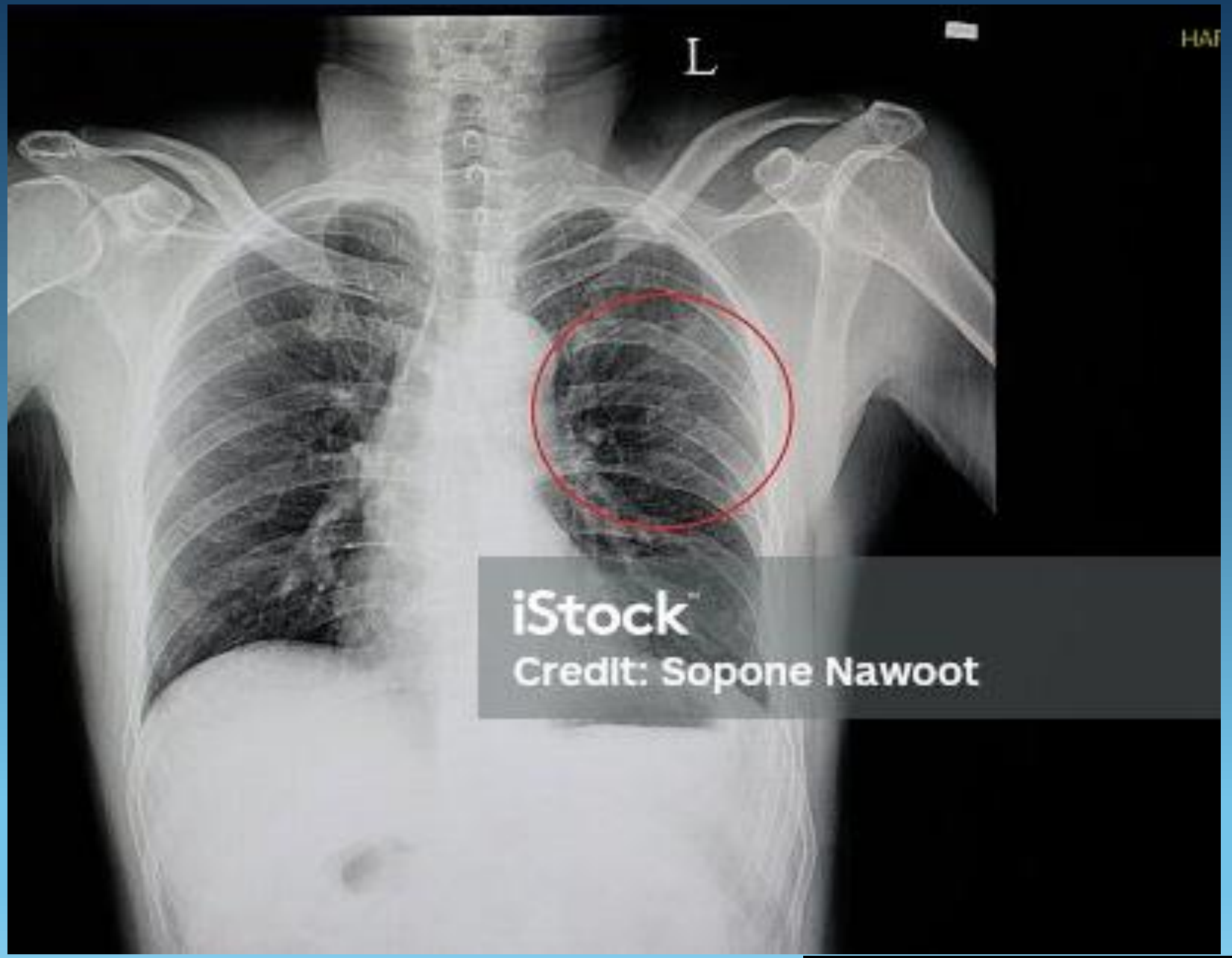

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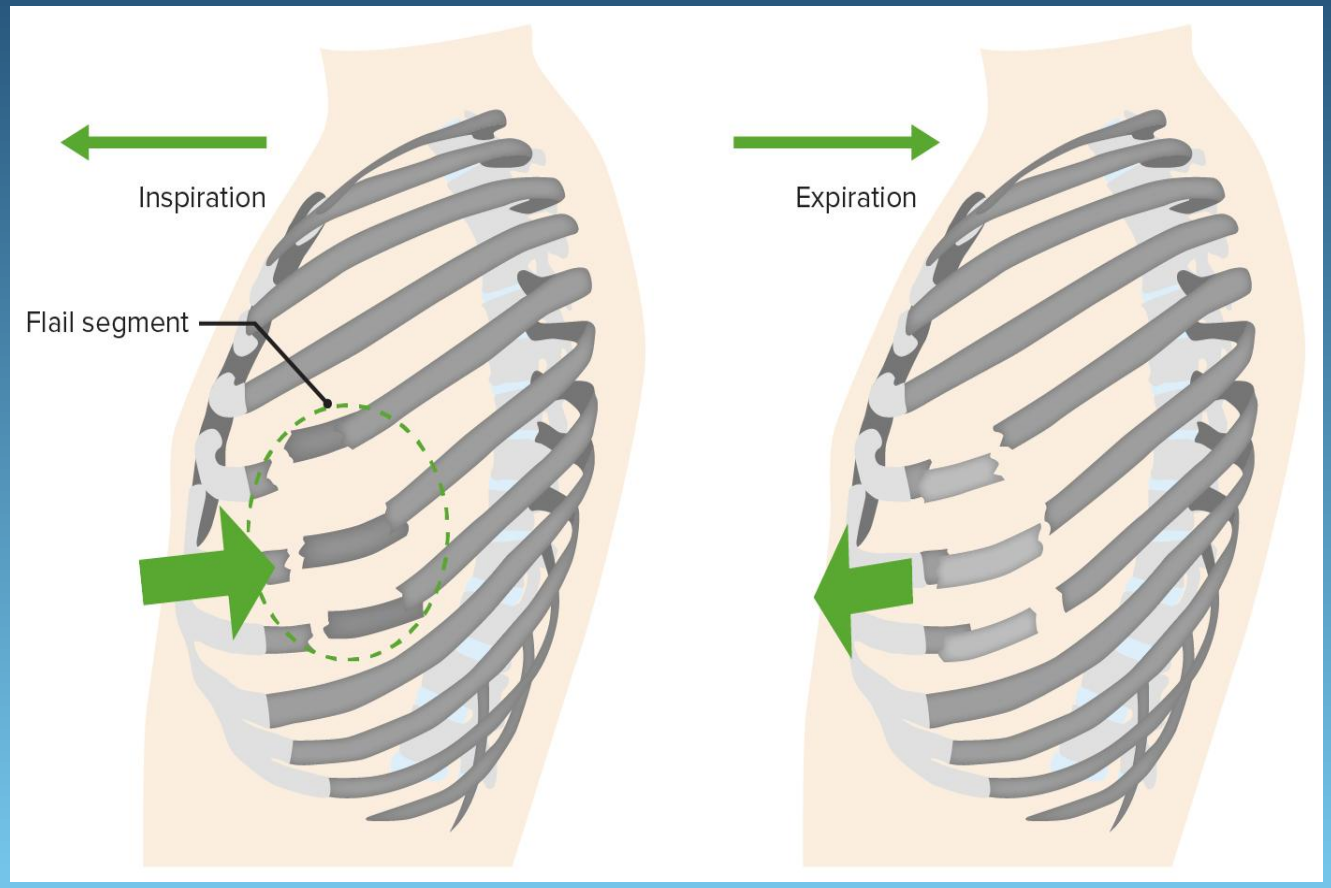
Rib Fractures

Elderly patients who sustain blunt chest trauma with rib fxs have twice the mortality and thoracic morbidity of younger patients with similar injuries. For each additional rib fracture in the elderly, mortality increases by 19% and the risk of pneumonia by 27%.

Rib Fracture protocol exists at many hospitals for any patient over the age of 65

Flail Chest

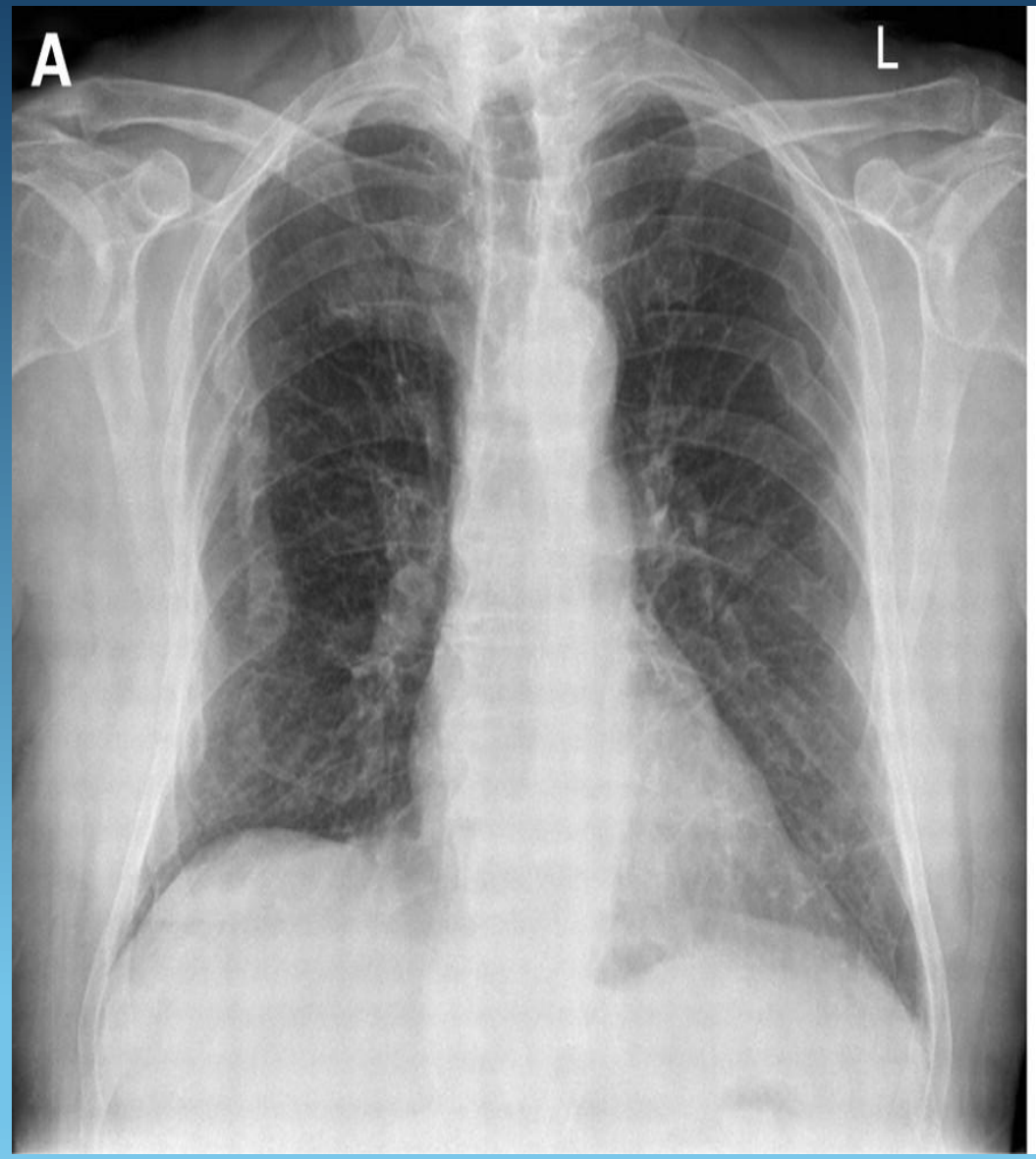


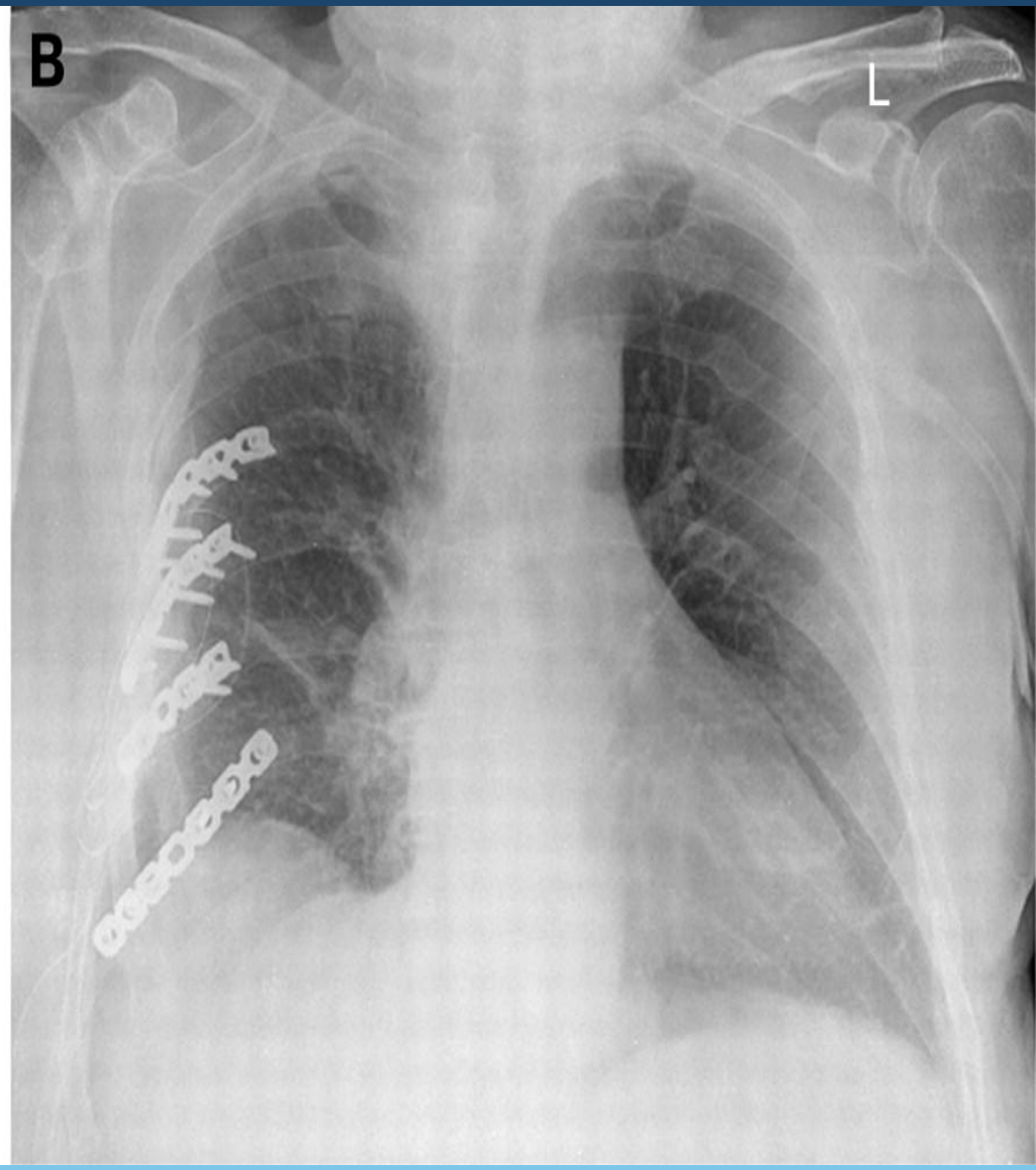
- Paradoxical motion from negative pressure of chest
- 2 or more ribs fractured in 2 or more places
- Immediate treatment
  - Handle pneumothorax or sucking chest wound
  - Positive pressure ventilation

Long term treatment may be internal rib fixation

Patient will fatigue out without intubation. Most have underlying pulmonary contusions

Rib Fixation





Flail Chest

Flail chest is a condition defined as two or more contiguous rib fractures with two or more breaks per rib and has mortality estimates conservatively ranging from 9 to 20%.

Such high mortality rates are attributed to a higher incidence of concomitant injuries and respiratory difficulties.

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