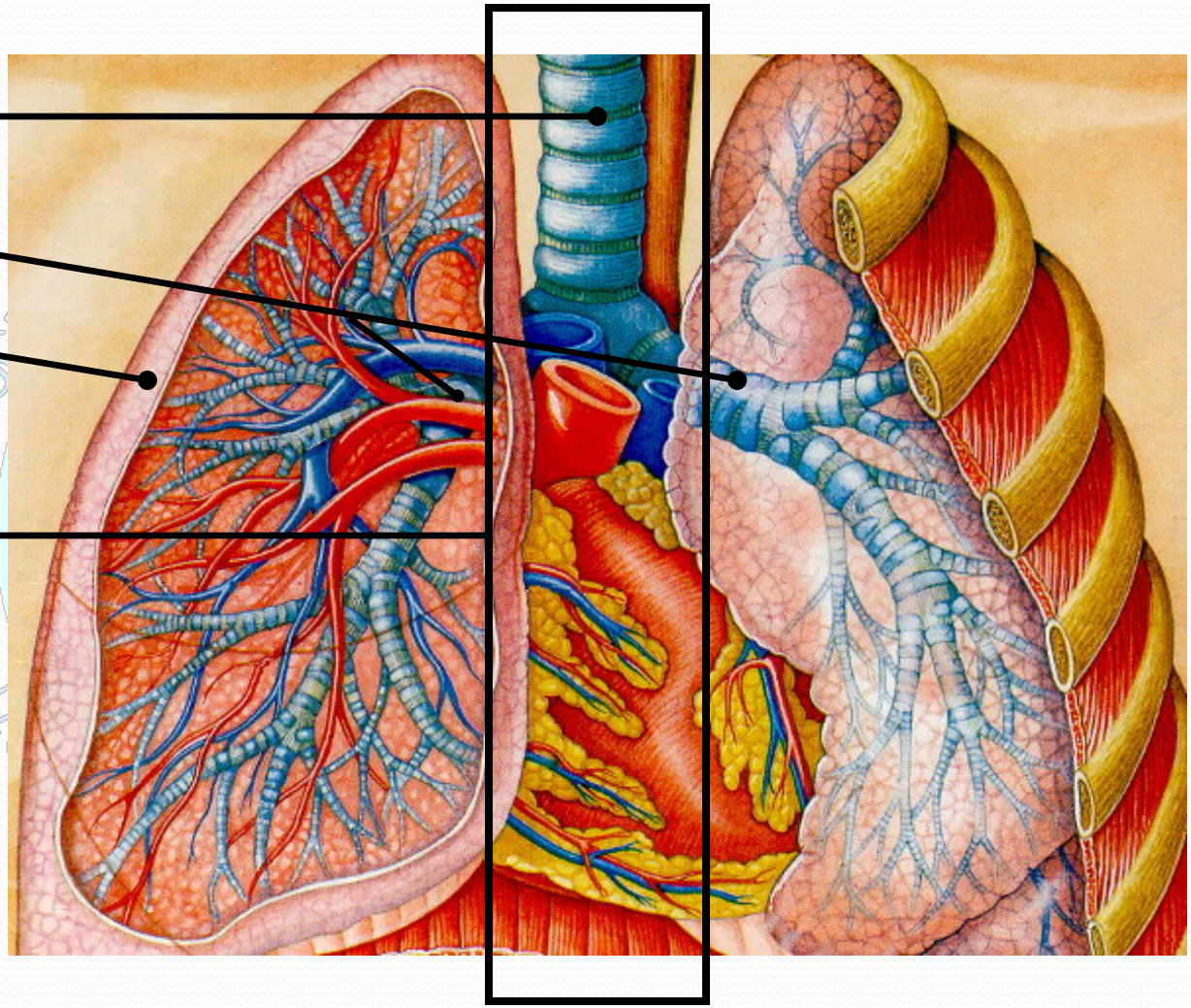
# Pulmonary Injury and Needle Decompression

# General

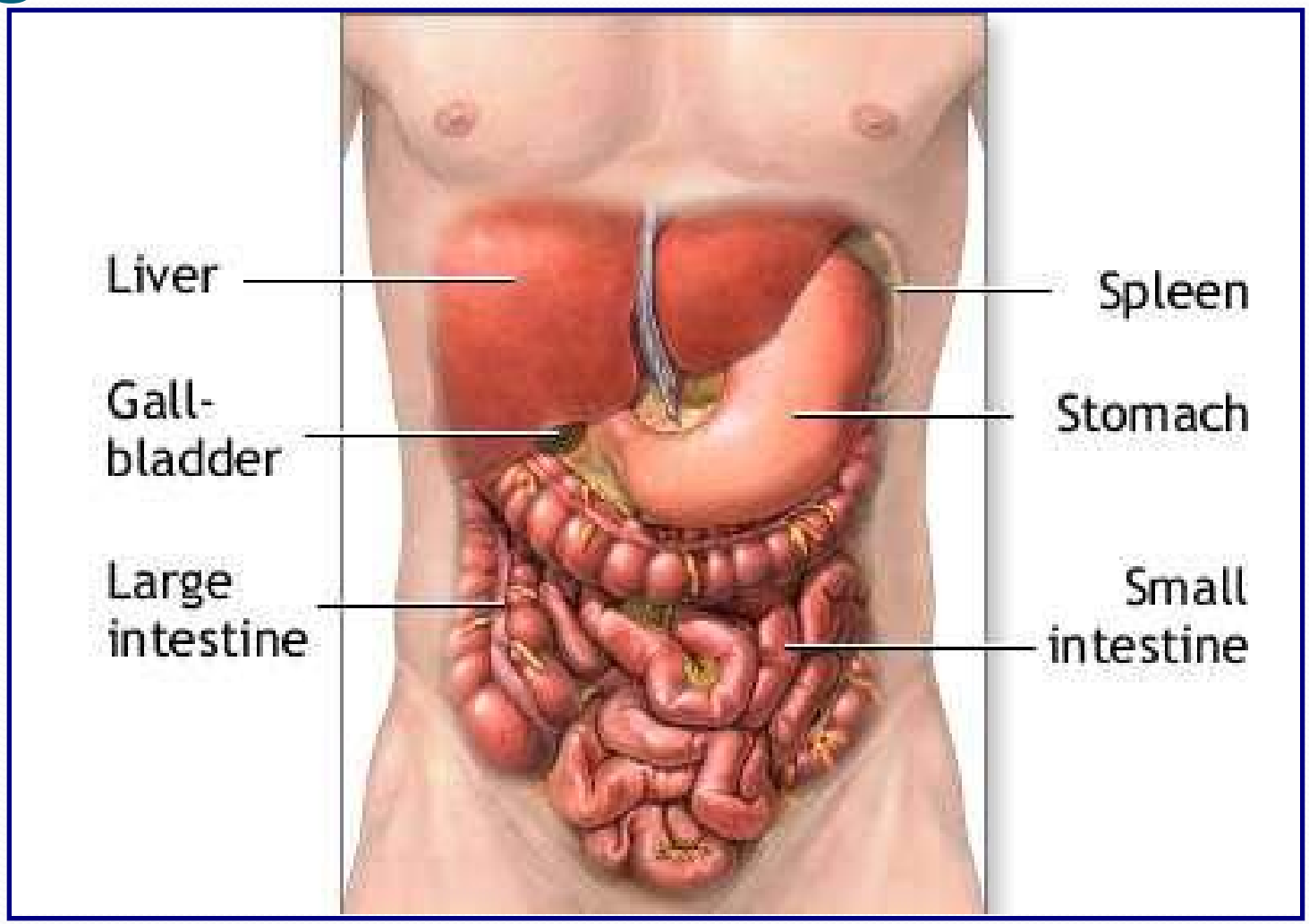
- Chest injuries may result from:
  - Gunshot wounds (GSW)
  - Shrapnel
  - Explosions
  - Motor vehicle crashes (MVC)
  - Falls
  - Crush injuries
  - Stab wounds
  - Pulmonary Over Inflation Injury

# Organs of the Thorax

- Trachea
- Bronchi
- Lungs
- Mediastinum



# Organs of the Abdomen

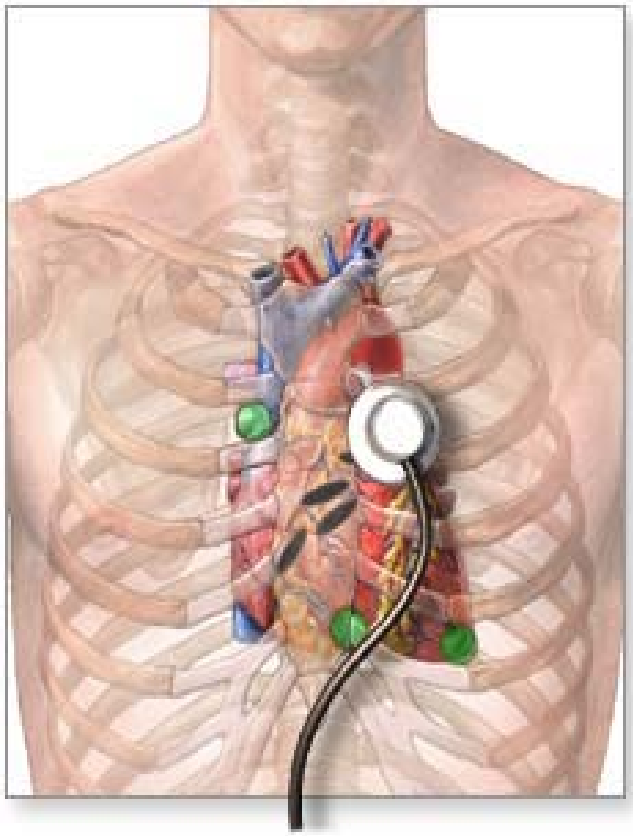


# Assess Respirations

- Respiratory rate and effort:
  - Tachypnea
  - Bradypnea
  - Labored
  - Retractions
  - Progressive respiratory distress

# Assess the Chest Wall

- Lung sounds – Percussion.
  - Absent or decreased
    - Unilateral
    - Bilateral
  - Hyperresonance
    - Pneumothorax
    - Tension pneumothorax
  - Hyporesonance (hemothorax)



# Assess the Chest Wall

- Compare both sides of the chest at the same time when assessing for asymmetry.

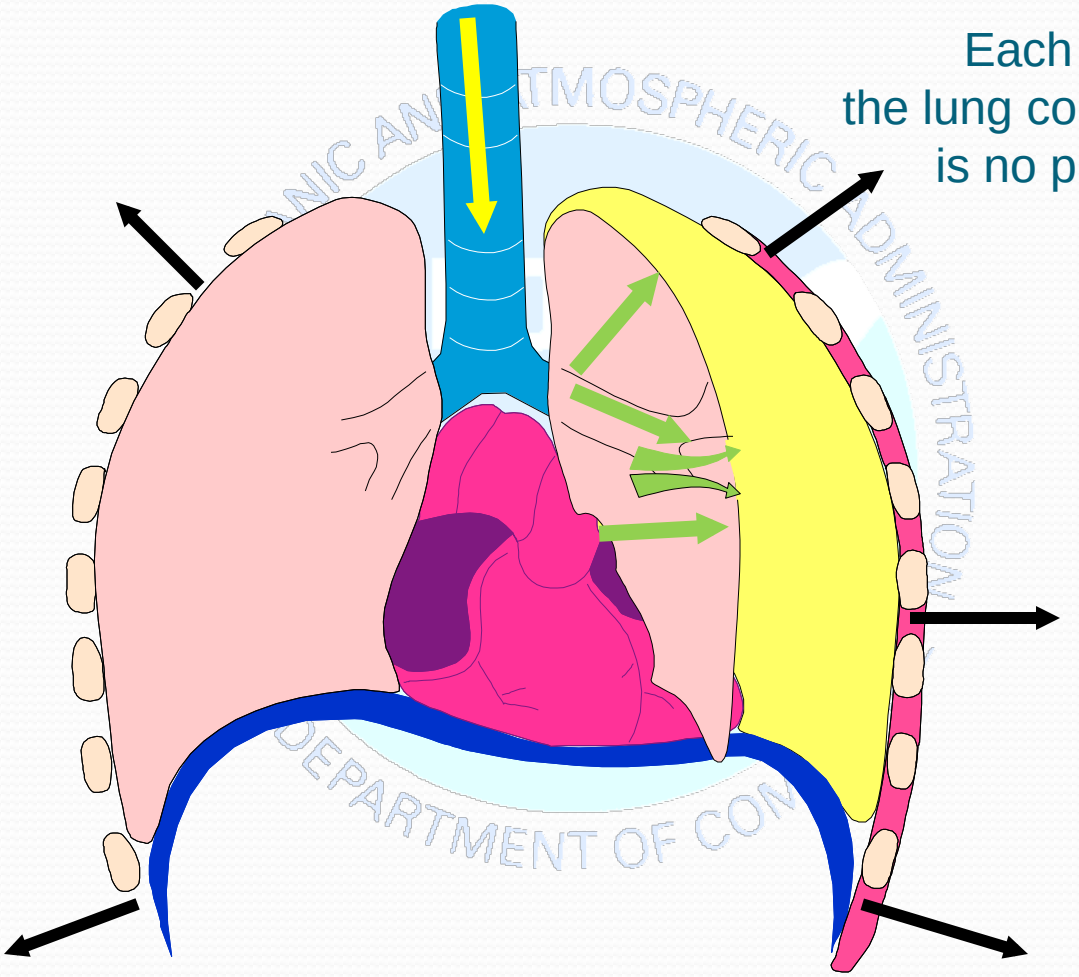
# Chest Physiology

- Chest normally has negative pressure.
- Penetrating wound creates a positive pressure in chest cavity.
- Air will enter the easiest route. If a hole in the chest is smaller than 2/3 the size of the trachea, air will enter through the trachea preferentially and not through the hole in the chest.

# Tension Pneumothorax

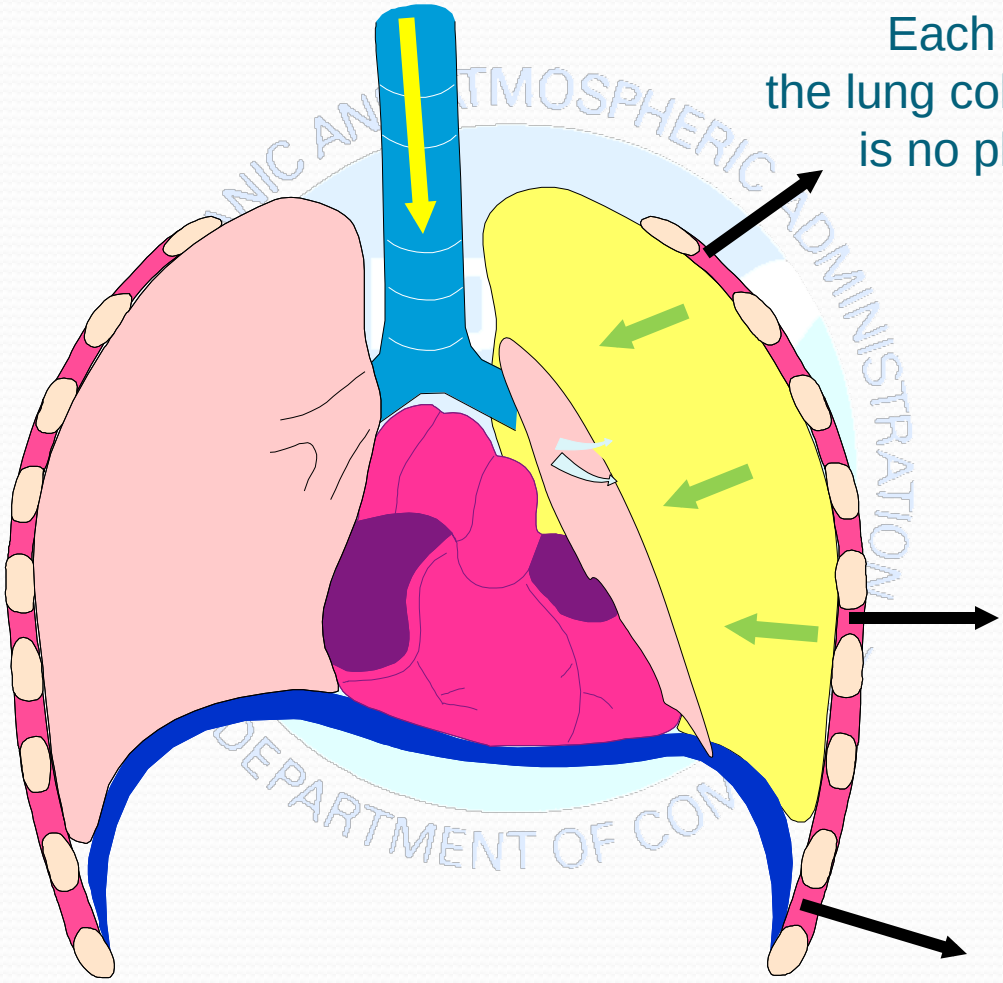
- Air builds in pleural space with no where for the air to escape
- Results in collapse of lung on affected side that results in pressure on mediastium,the other lung, and great vessels

# Tension Pneumothorax



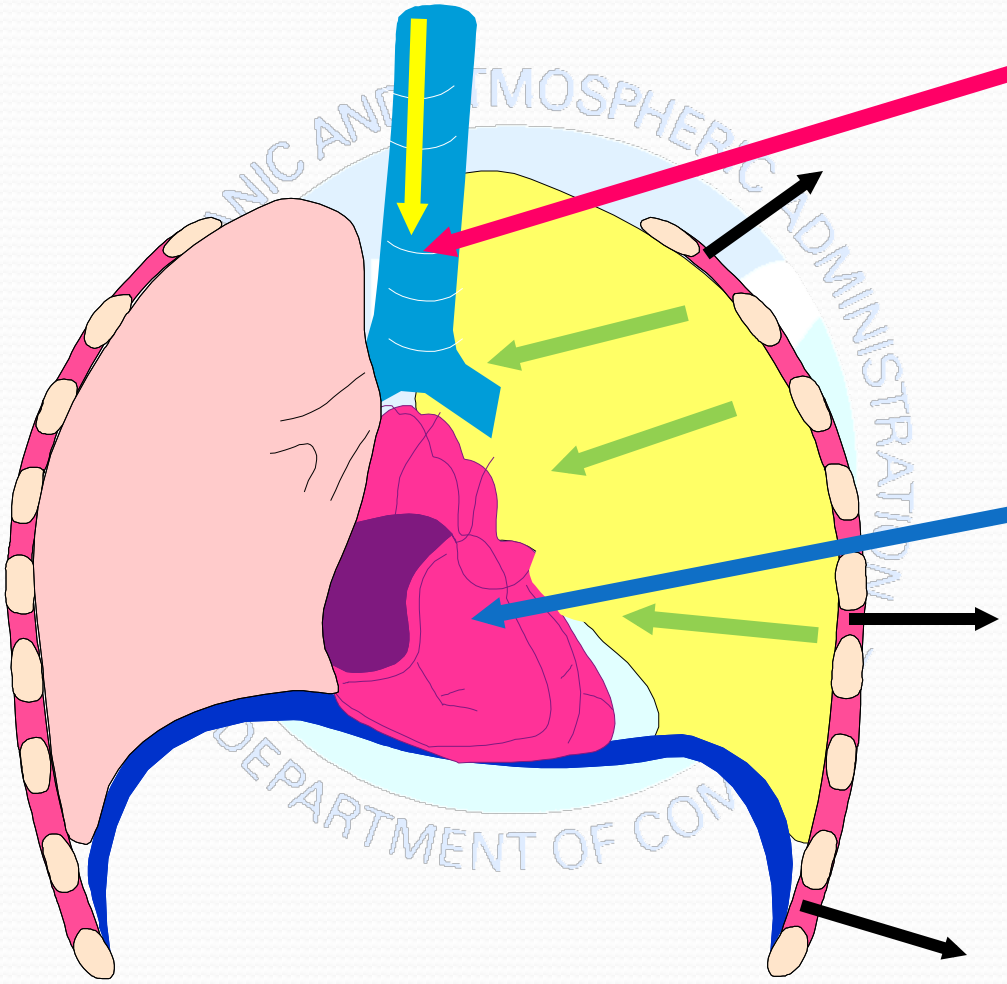
Each time we inhale, the lung collapses further. There is no place for the air to escape..

# Tension Pneumothorax



Each time we inhale, the lung collapses further. There is no place for the air to escape..

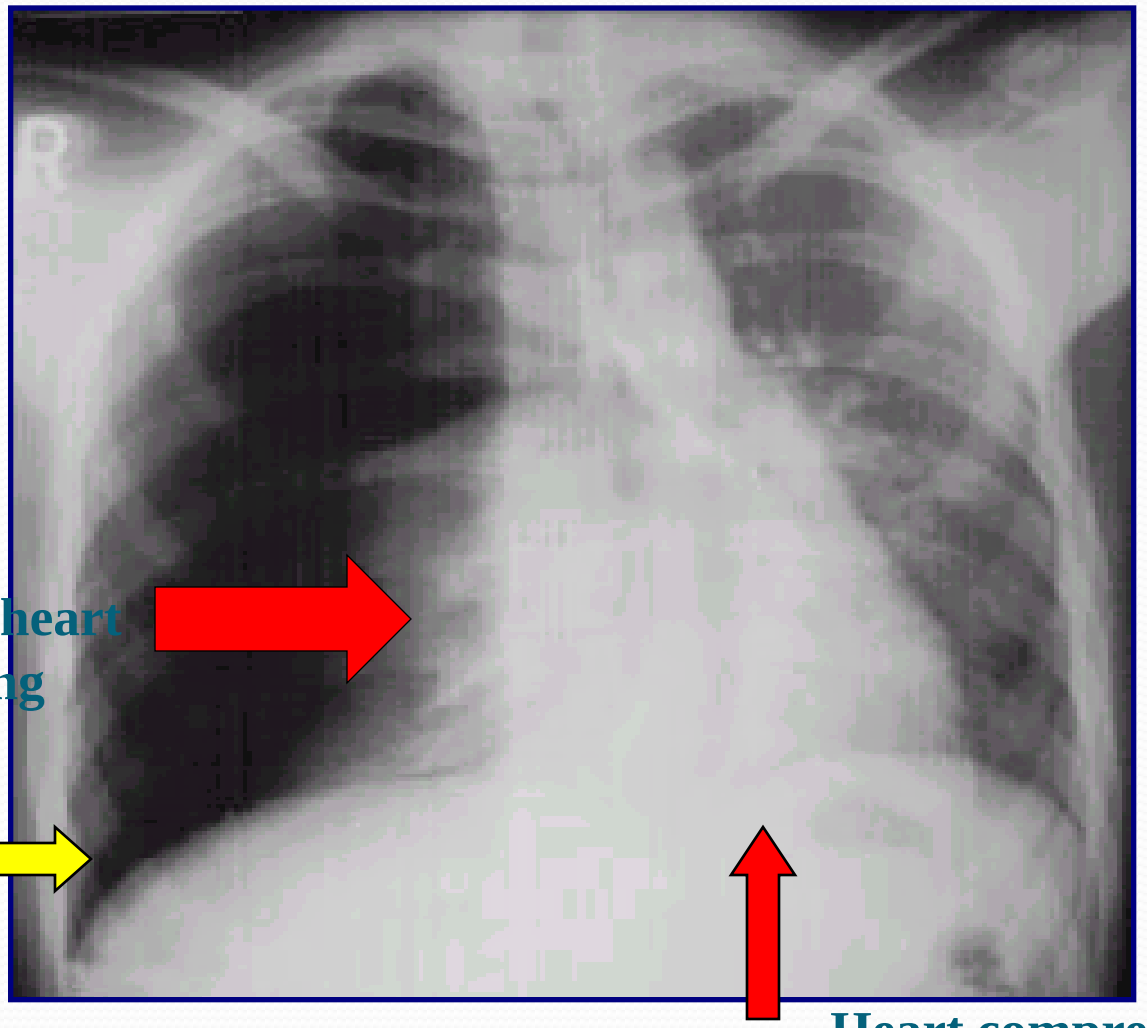
# Tension Pneumothorax



The trachea is pushed to the good side

Heart is being compressed

# Tension Pneumothorax



Air pushes over heart and collapses lung

Air outside lung from wound

Heart compressed not able to pump well

# Signs and Symptoms of Tension Pneumothorax

- Anxiety, agitation, and apprehension
- Diminished or absent breath sounds
- Cyanosis

- Rapid shallow breathing (tachypnea)
- Distended neck veins

# Signs and Symptoms of Tension Pneumothorax

- Clinical presentation:
  - Diminished or absent breath sounds
  - Hyperresonance to percussion on affected side
  - Hypotension, cold clammy skin
  - Casualty begins to deteriorate rapidly
  - Decreased lung compliance (intubated)
  - Tracheal deviation (*late*)

# Tension Pneumothorax

- If after sealing the open pneumothorax, the casualty develops progressive difficulty breathing, consider this a tension pneumothorax and perform a needle chest decompression.

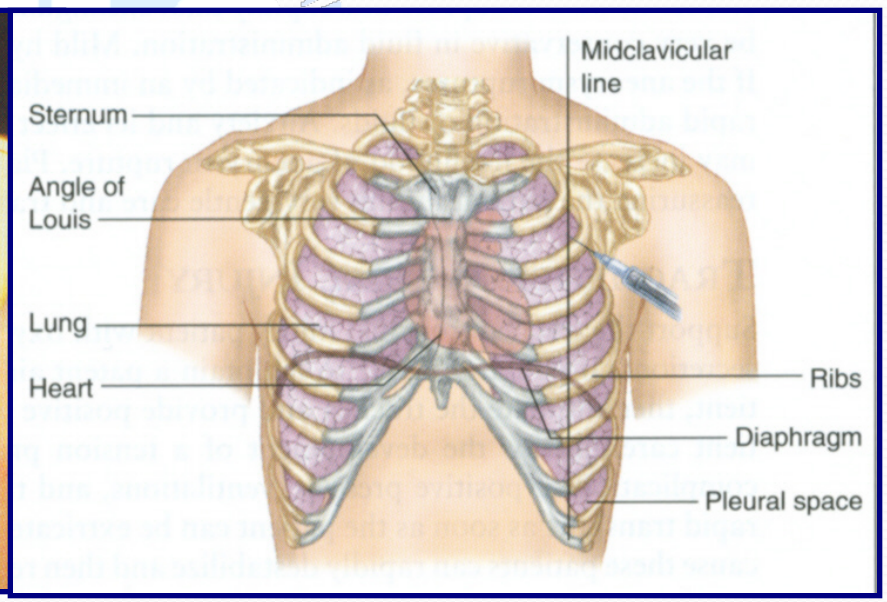
- If no capability of NCD exists and the casualty continues to have progressive respiratory distress, remove the occlusive dressing and stick a gloved finger into the open wound and attempt to "burp" the wound.

# Needle Decompression

- Locate 2-3 Intercostal space midclavicular line
- Cleanse area using aseptic technique
- Insert catheter ( 14g or larger) at least 3” in length over the top of the 3rd rib( nerve, artery, vein lie along bottom of rib)
- Remove Stylette and listen for rush of air
- Place Flutter valve over catheter
- Reassess for Improvement

# Needle Chest Decompression

- Procedure:
  - Identify the second ICS on the anterior chest wall, MCL:

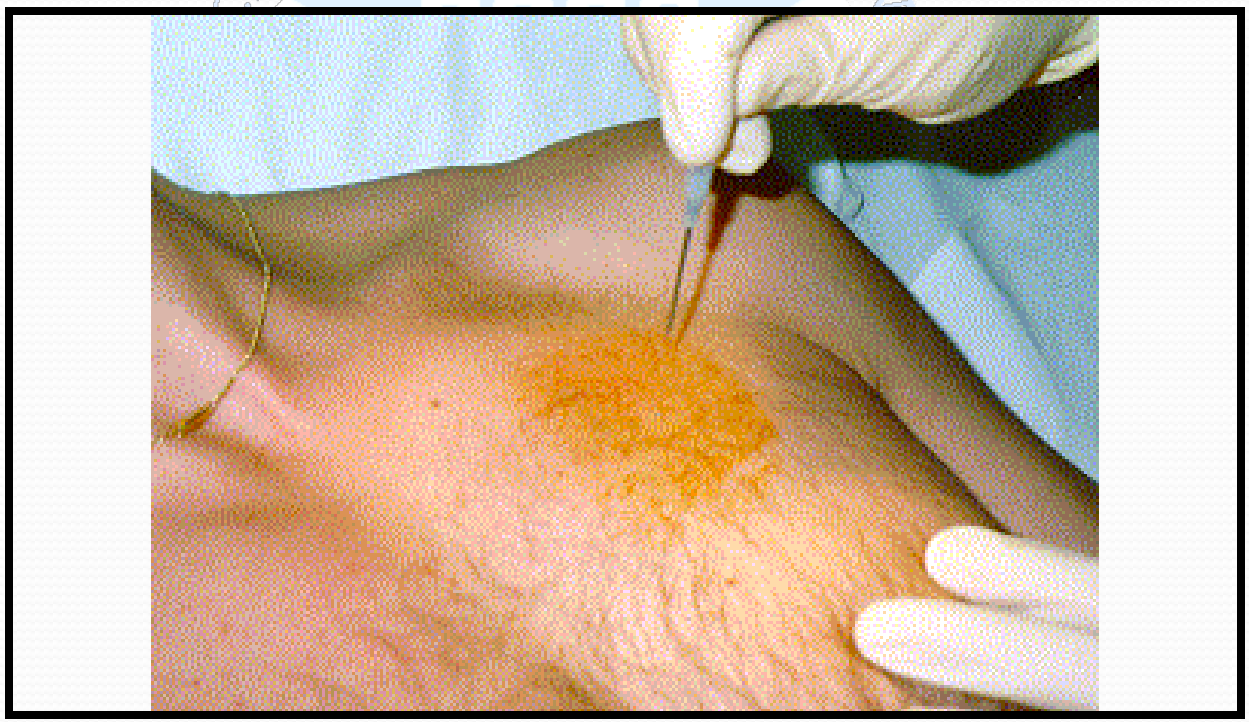


# Needle Chest Decompression

- Prep the area with an antimicrobial agent.
- Insert a 14 ga. Catheter at 90° angle over the top of 3rd rib, into the 2nd ICS the MCL.
- Needle should be long to enter the chest (3 inches).

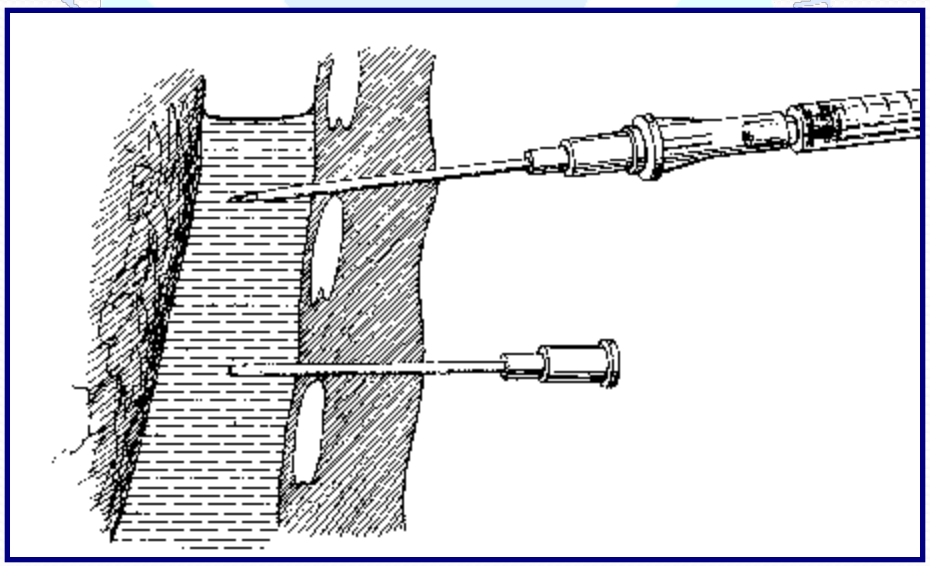

# Performing a Needle Chest Decompression

Firmly insert the needle into the skin at a 90 degree angle relative to the curvature of the skin.



# Needle Chest Decompression

- If a tension pneumothorax is present, a “hiss of air” may be heard escaping from the chest cavity.
- Remove the needle, leave the catheter in place.

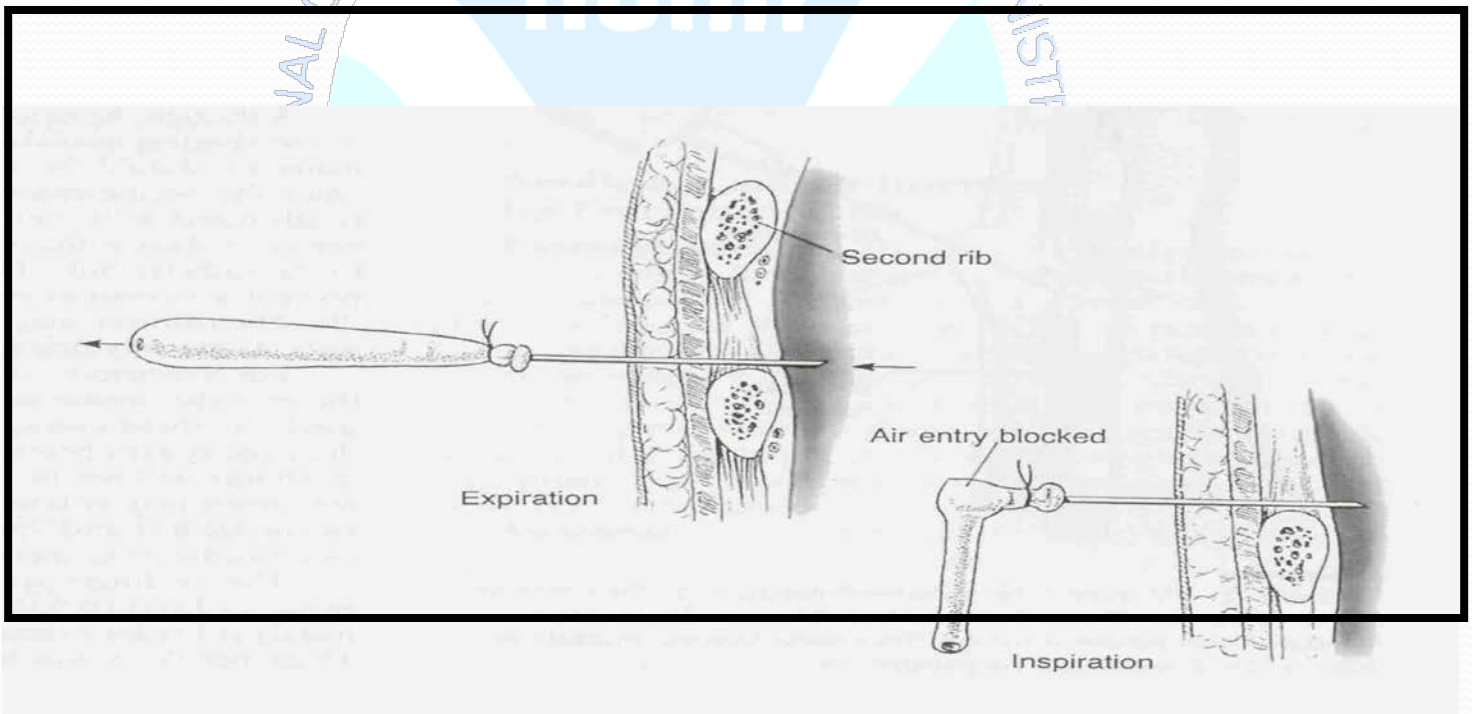


# Flutter Valve

- Asherman Chest Seal makes good Flutter Valve .

# Flutter Valve

May also use a finger from a latex glove.



# Tension Pneumothorax

- Management:
  - Ensure an open airway
  - Decompress the affected side

- Indications:
  - Penetrating chest wound with progressive respiratory distress

# Needle Chest Decompression

- Tape the catheter hub to the chest wall.
- The casualty's condition should rapidly improve.
- Evacuate ASAP.

# Needle Chest Decompression

- Complications:
  - Insertion of the needle over the top of the rib prevents laceration of the intercostal vessels or nerve which can cause hemorrhage or nerve damage.

# Questions?