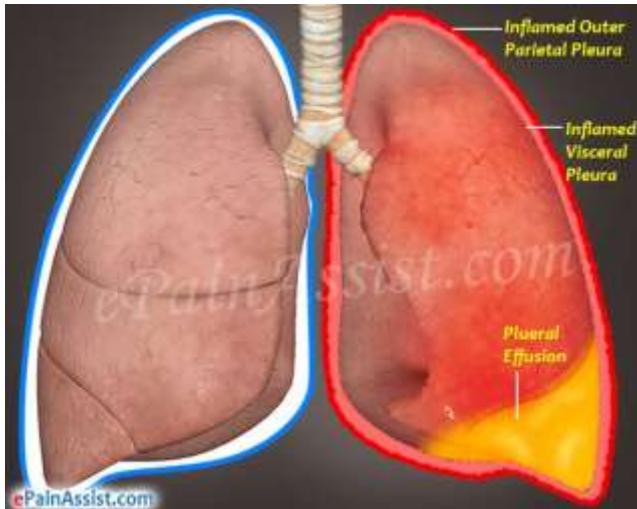


---

# PLEURAL EFFUSION

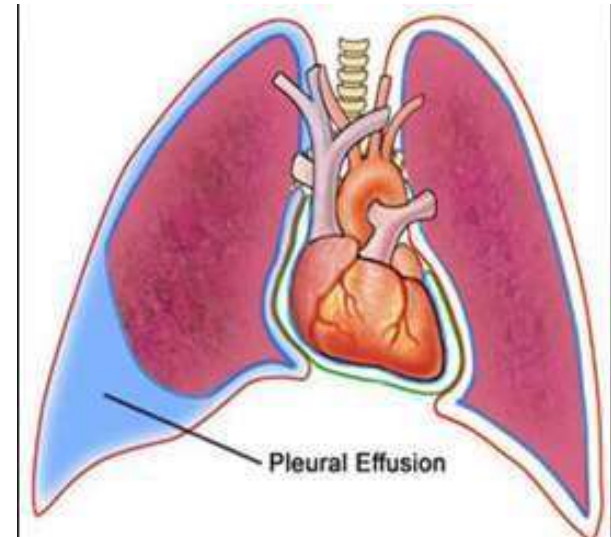


**DR.P.NIRANJAN PRABHAKAR**  
**MBBS MD DNB**  
**DEPARTMENT OF PULMONOLOGY**

---

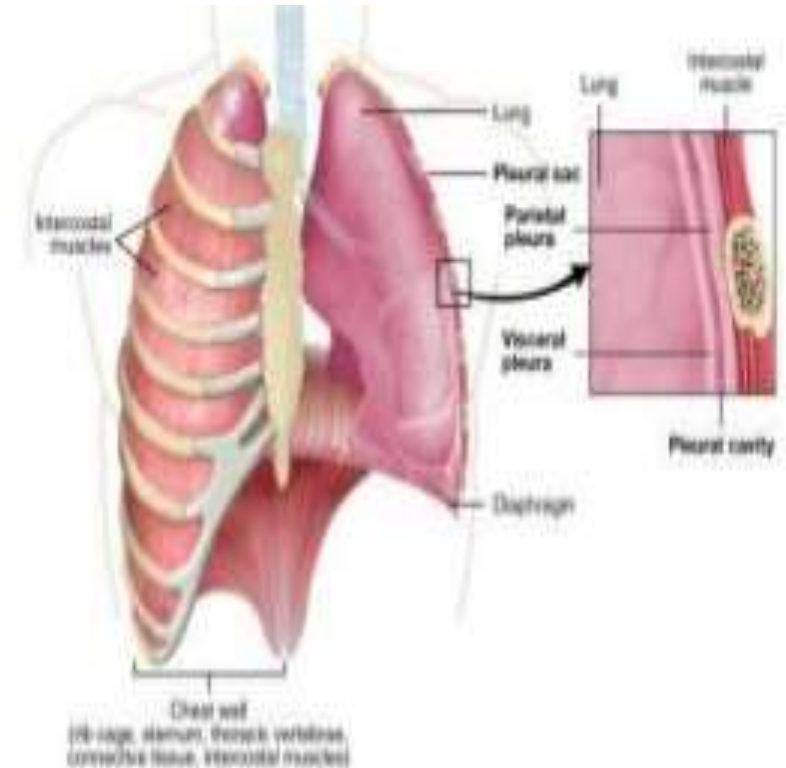
# INTRODUCTION

- There is **Normally a very thin layer of fluid (2 to 10 micrometre thick)** between the two pleural surfaces , the Parietal and the Visceral Pleura
- The Pleural space and the fluid within it are **not under static conditions**
- During Each Respiratory cycle **the pleural pressures and the geometry of the pleural space fluctuate widely .**
- Fluid enters and leaves the pleural spaces constantly



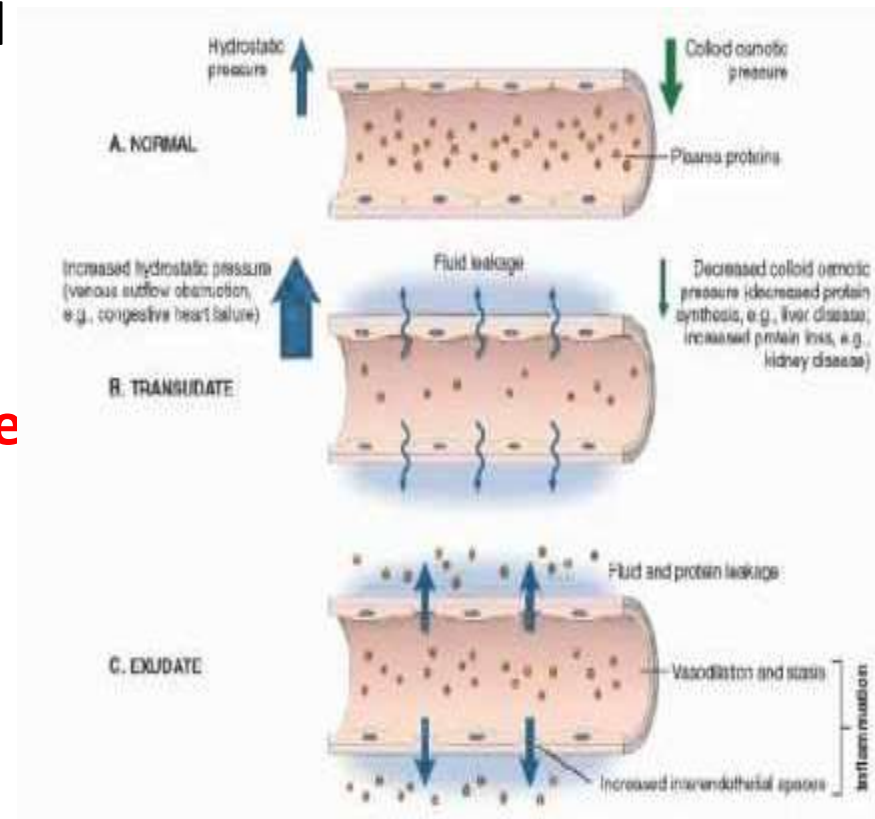
# INTRODUCTION

- The serous membrane covering the lung parenchyma is called the visceral pleura
- The reminder of the lining of the pleural cavity is the parietal pleura
- The parietal pleura receives its **blood supply from the systemic capillaries**
- The visceral pleura is supplied predominantly by **branches of bronchial artery**



# INTRODUCTION

- The lymphatic vessels in the parietal pleura are in direct contact with the pleural space by **means of stomas**
- The stomas are the only route through **which cells and large particles can leave the pleural space**
- Although there are Abundant lymphatics in the visceral pleura , these lymphatics do not appear to participate in the remove of particulate matter from the pleural space



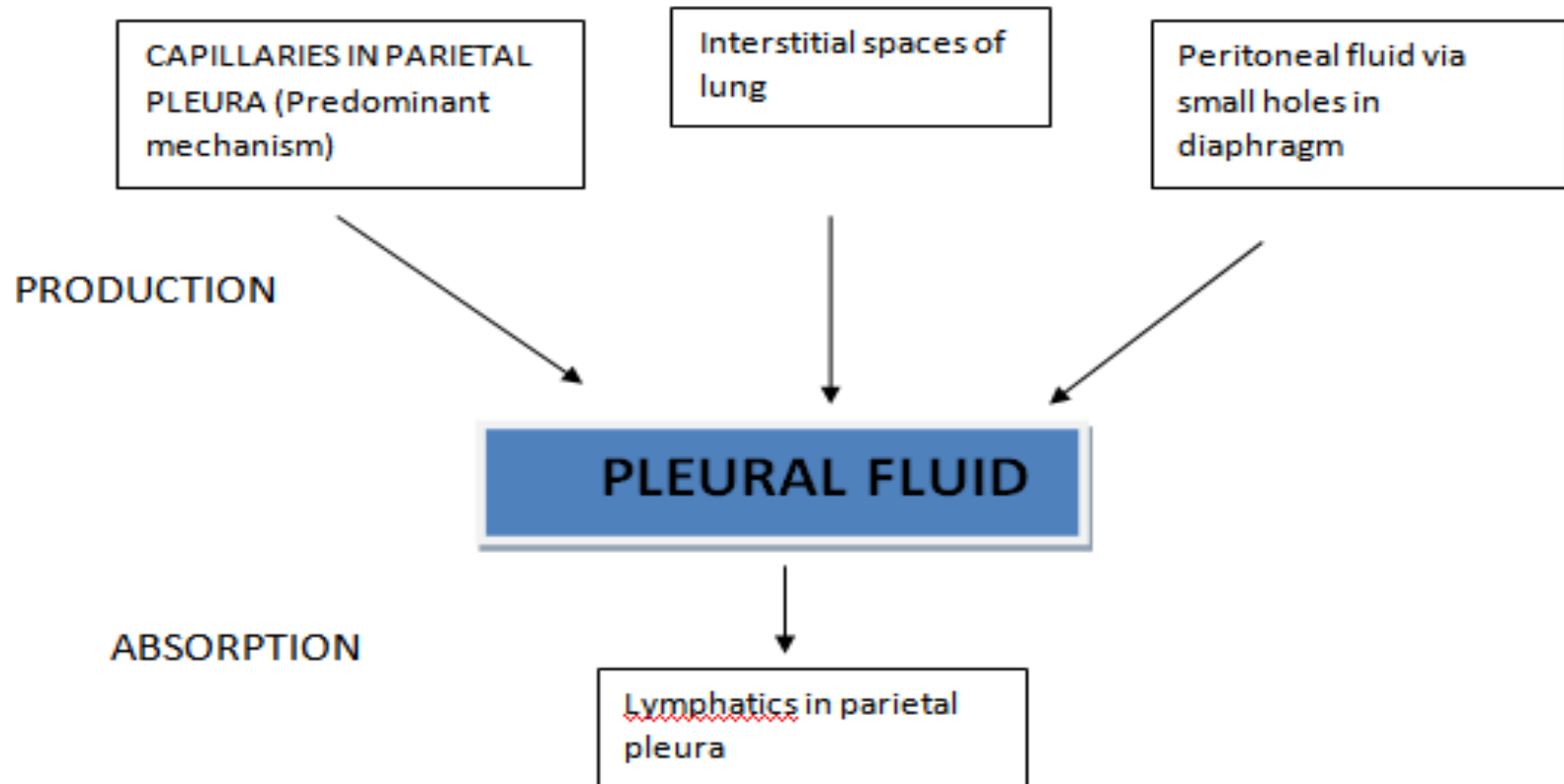
# MECHANISM OF PLEURAL FLUID TURN OVER

---

- ❖ Dependent on the hydrostatic and oncotic pressure across the membranes
  - ❖ When the capillaries in the parietal pleura are considered , it can be seen that the **net hydrostatic pressure favouring the movement of fluid from the capillaries to the pleural space** is the systemic capillary pressure (30 cm of water) minus the negative pleural pressure (-5cm of water) or 35 cm of water
  - ❖ Opposing pressure is the oncotic pressure in the blood (34cm) minus the oncotic pressure in the pleural fluid (5cm) = 29 cm
  - ❖ The resulting net **pressure differences of 6cm (35-29 cm of water)** Favours movement of fluid from the parietal pleura in to the pleural space
-

# SCHEMATIC REPRESENTATION

---



# MECHANICS OF PLEURAL EFFUSION

---

- ❖ Increased capillary/pleural membrane permeability
  - ❖ Increased capillary hydrostatic pressure
  - ❖ Decreased intravascular oncotic pressure
  - ❖ Lymphatic obstruction
  - ❖ Abnormal sites of entry
-

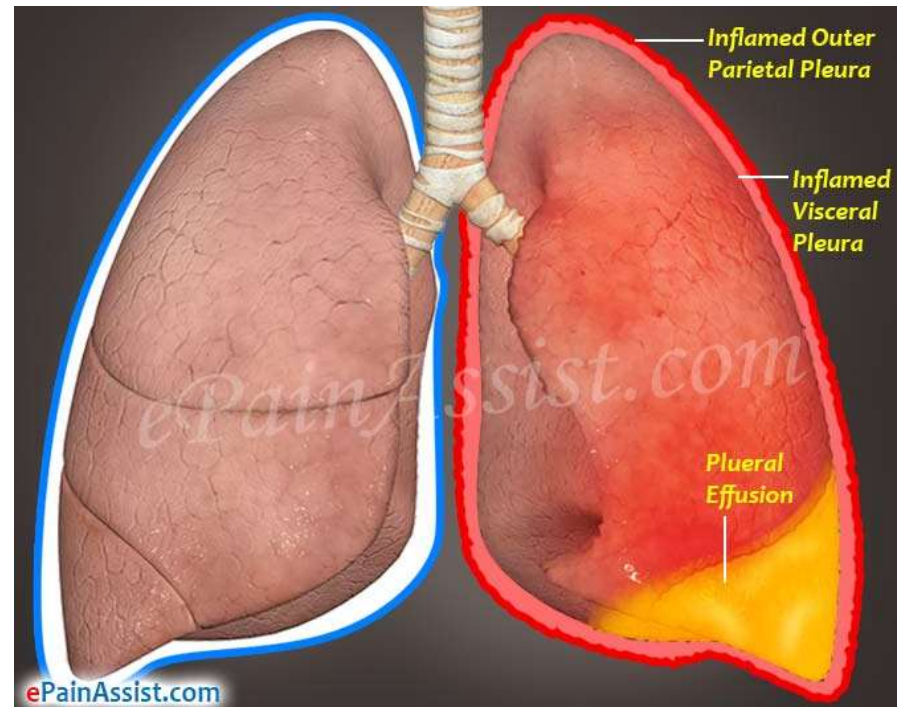
## ETIOLOGY

- Elevated pleural capillary pressure :
    - Congestive heart failure, pericardial disease.
  - Elevated pleural permeability :
    - Pleural inflammation, neoplastic pleural disease (metastatic disease or mesotheliomas), pulmonary emboli, systemic lupus erythematosus (SLE).
  - Decreased serum oncotic pressure :
    - Cirrhosis, nephrotic syndrome, myxedema.
  - Dysfunction of parietal pleura lymphatics drainage.
  - Trauma, such as esophageal perforation, post-cardiac injury syndrome.
-

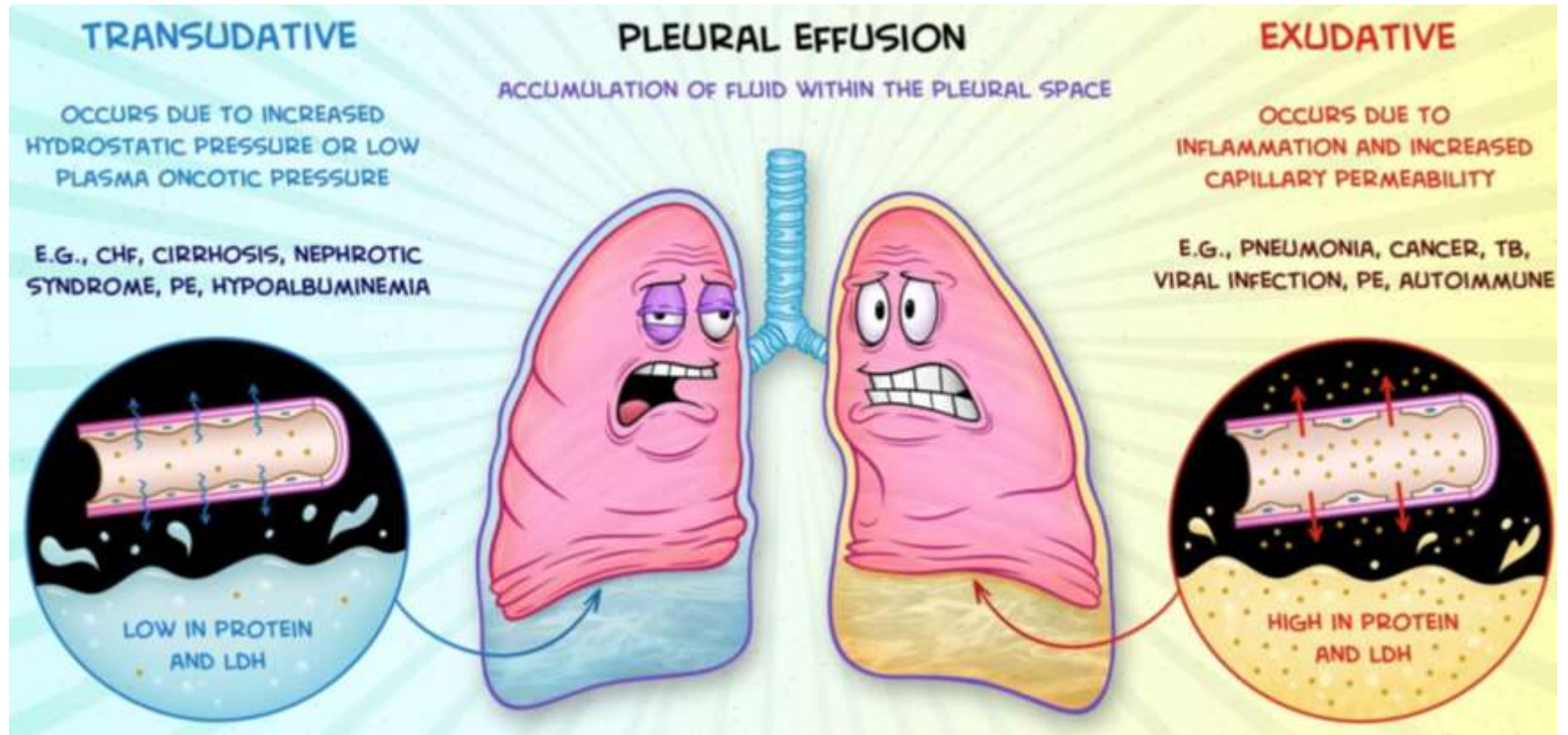


# PATHOPHYSIOLOGY

- ❖ Pleural fluid will accumulate when the **rate of pleural fluid formation is greater than the rate of pleural fluid removal** by the lymphatics
- ❖ Pleural effusions is generally classified in to
  - ✓ **Transudative**
  - ✓ **Exudative**



# TYPES OF EFFUSION



# CAUSES OF EFFUSION

---

## **Transudative effusion**

- ☐ Nephrotic syndrome
- ☐ Congestive cardiac failure
- ☐ Hepatic failure
- ☐ PEM
- ☐ Hypothyroidism

## **Exudative Effusion**

- ☐ Infections-Pneumonia, TB
  - ☐ Malignancy- Metastasis, leukemia/lymphoma
  - ☐ Collagen vascular diseases- SLE, JRA
  - ☐ Traumatic
  - ☐ Drugs- Amiodarone, bromocriptine
  - ☐ Postradiation
-

# NORMAL COMPOSITION OF PLEURAL FLUID

---

○ Volume	0.2 mL/kg
○ Cells/ mm <sup>3</sup>	1000 – 5000
• Mesothelial cells	60%
• Monocytes	30%
• Lymphocytes	5%
• PMN's	5%
○ Protein	1-2 g/dL
○ LDH	<50% plasma level
○ Glucose	≅ plasma level
○ pH	≥ plasma level

---

# LIGHTS CRITERIA

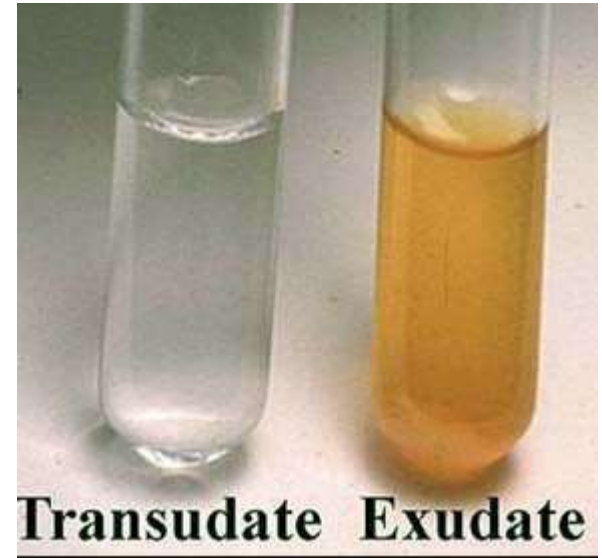
---

Exudative effusion meet at least one of the following criteria, whereas transudative effusions meet none.

- ❖ **Pleural fluid protein/serum protein  $> 0.5$**
- ❖ **Pleural fluid LDH/serum LDH  $> 0.6$**
- ❖ **Pleural fluid LDH-more than two third of serum LDH**

The above criteria misidentify 25% of transudates as exudates.

---



# CLINICAL FEATURES

---

The Common symptoms includes

- Chest pain - **Pleuritic chest pain** indicates **inflammation of the pleura**, specifically, the **parietal Pleura** as the **visceral pleura does not have pain fibres**
  - **Dry Non-productive Cough** – Irritation of the Pleural Surfaces
  - **Dyspnoea** - Pleural Inflammation and Lung compression by the fluid may bring **opposing bronchial walls in to contact**, stimulating the cough reflex.
  - Other Symptoms include – fever , LOA , LOW
-

# EXAMINATION FINDINGS

---

- ❖ Tachypnea,
  - ❖ chest wall fullness
  - ❖ Decreased chest movements on the affected side (hoover's sign)
  - ❖ Tracheal and mediastinal shift in large effusions
  - ❖ Auscultations : Pleural rubs - coarse, creaking, leathery sounds most commonly heard during the latter part of inspiration and the early part of expiration, producing a to-and-fro pattern of sound
  - ❖ Decreased or Absent Breath sounds.
-

# INVESTIGATIONS

---

- Chest X-ray PA View and Lateral Decubitus View
  - Ultrasound Thorax – Quantification and for Marking sites for Diagnostic / Therapeutic Aspiration
  - CT Thorax - **To Confirm the Effusion with underlying mass , Differentiate between Pleural Fluid and Ascites , To Detect Associated Parenchymal involvement.**
  - Diagnostic thoracentesis and Pleural Fluid Analysis : ADA , LDH , TC , DC , Sugar , Protein , Gram Stain , AFB Stain , Genexpert Cell Block Cytology
-



# CHEST XRAY

---



# USG THORAX

---

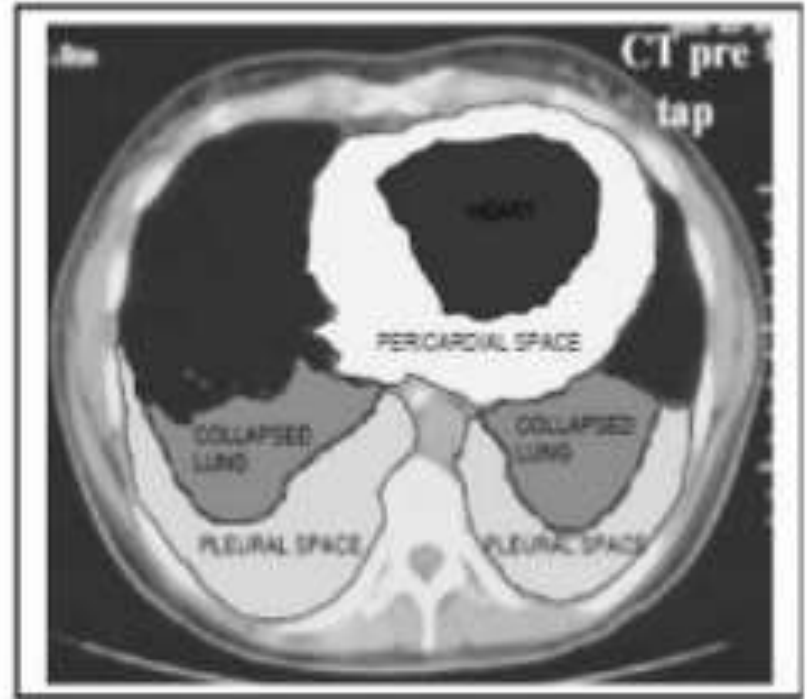


FIGURE 4. Transverse view of a right pleural effusion. A collapsed atelectatic lung is well visualized "floating" in the effusion.

---

# CT THORAX

---



# PLEURAL FLUID MANAGEMENT

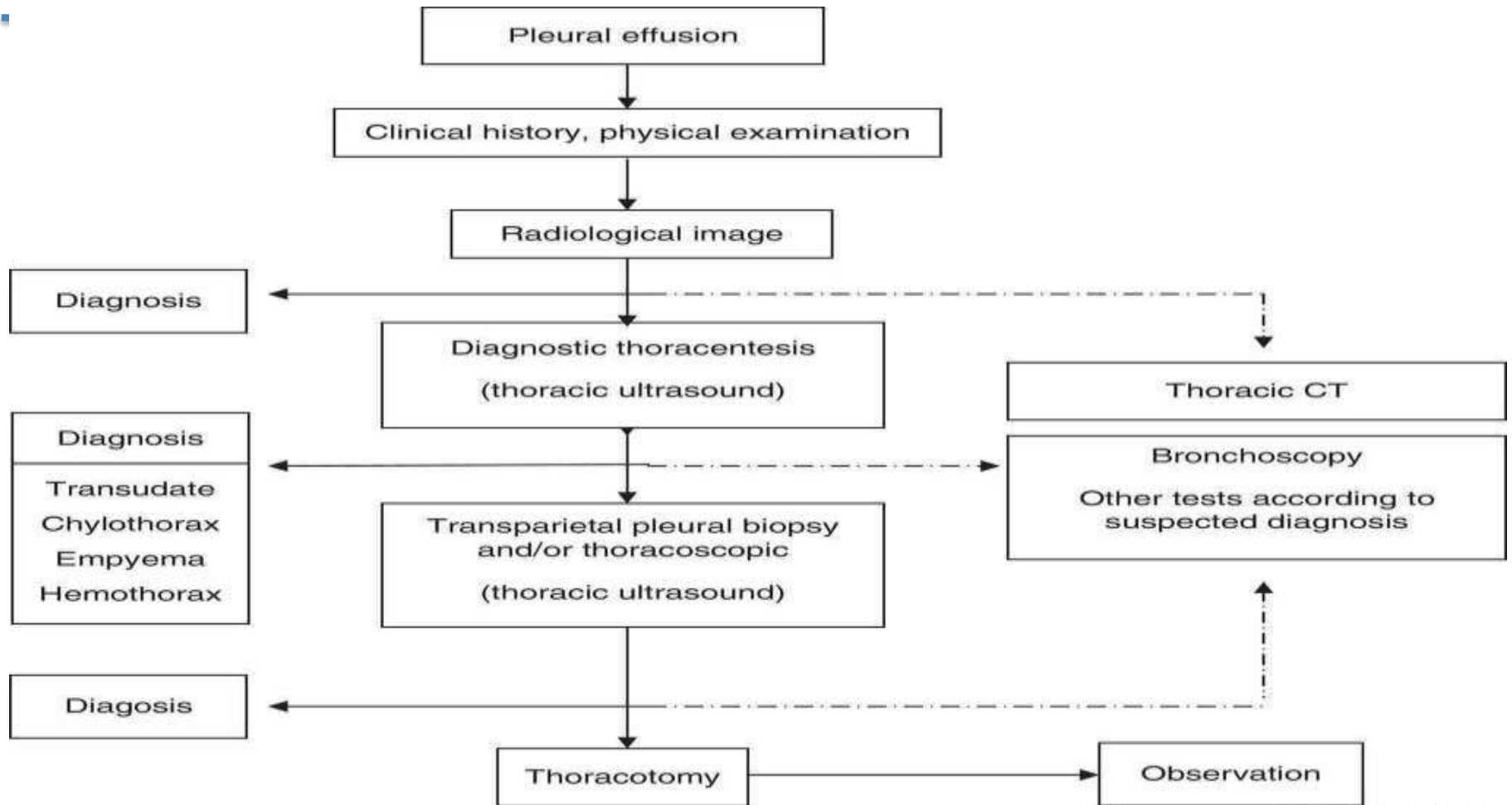
- Observation
    - Defervesce quickly
    - Uncomplicated pleural effusion
  - Therapeutic drainage (thoracentesis)
    - Early exudative phase
  - Tube thoracostomy
    - Complex pleural fluid spaces
  - VATS (Video assisted thoracoscopic surgery)
    - Poor clinical response to above interventions
  - Decortication: removal of pleural peel
-

# OTHER TERMS

---

- Parapneumonic effusion
    - Any pleural effusion associated with bacterial or viral pneumonia
  - Loculated parapneumonic effusion
    - Not free flowing
  - Multiloculated parapneumonic effusion
    - Noncommunicating compartments
  - Empyema (fibrosuppurative exudate)
    - Pus in the pleural space.
    - pH < 7.2, Glucose < 60 mg/dL, High LDH.
-

# TREATMENT



# REFERENCES

---

- **EGAN'S FUNDAMENTALS  
OF RESPIRATORY CARE**
  - **LIGHTS TEXTBOOK OF  
PLEURAL DISEASES**
-

---



**THANK YOU!**



---