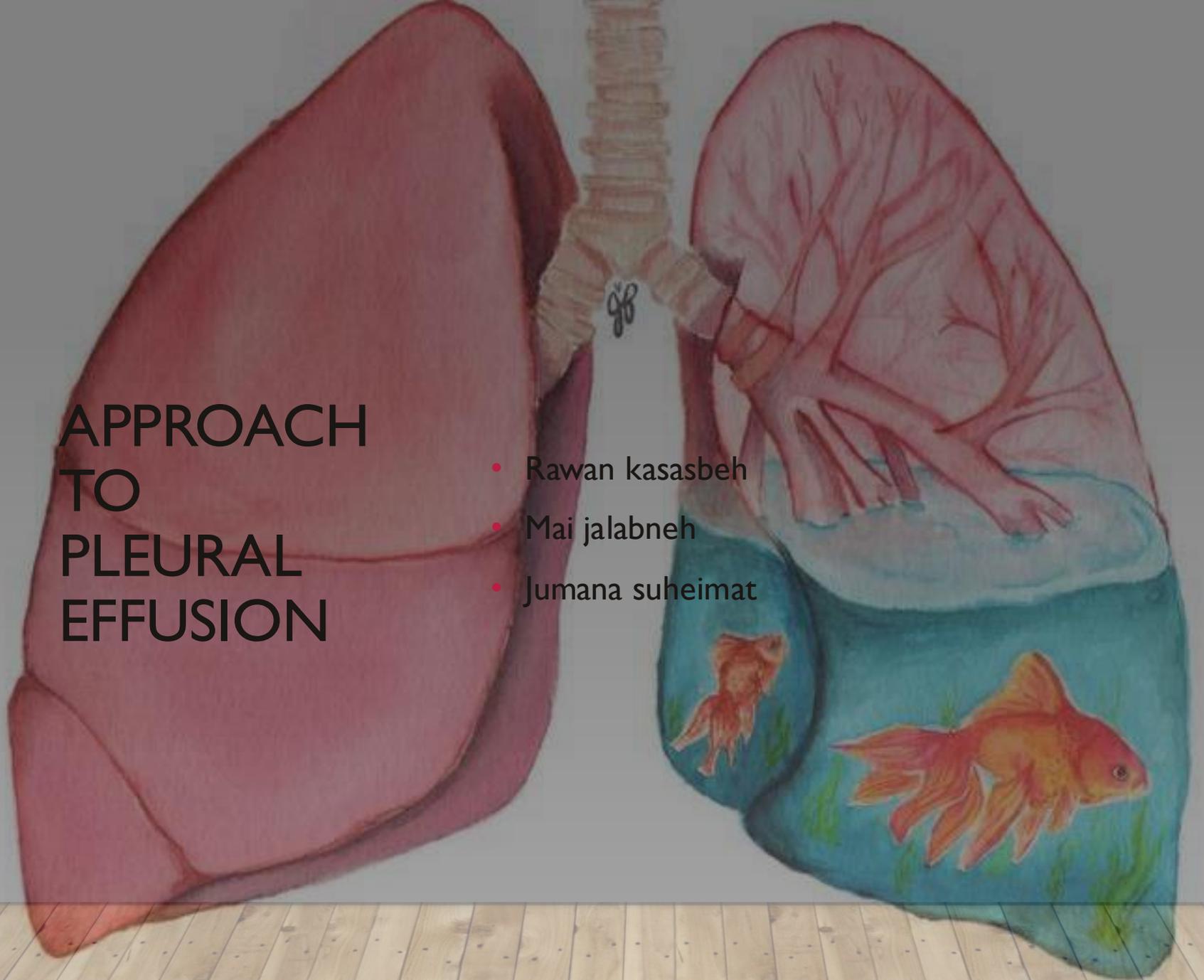
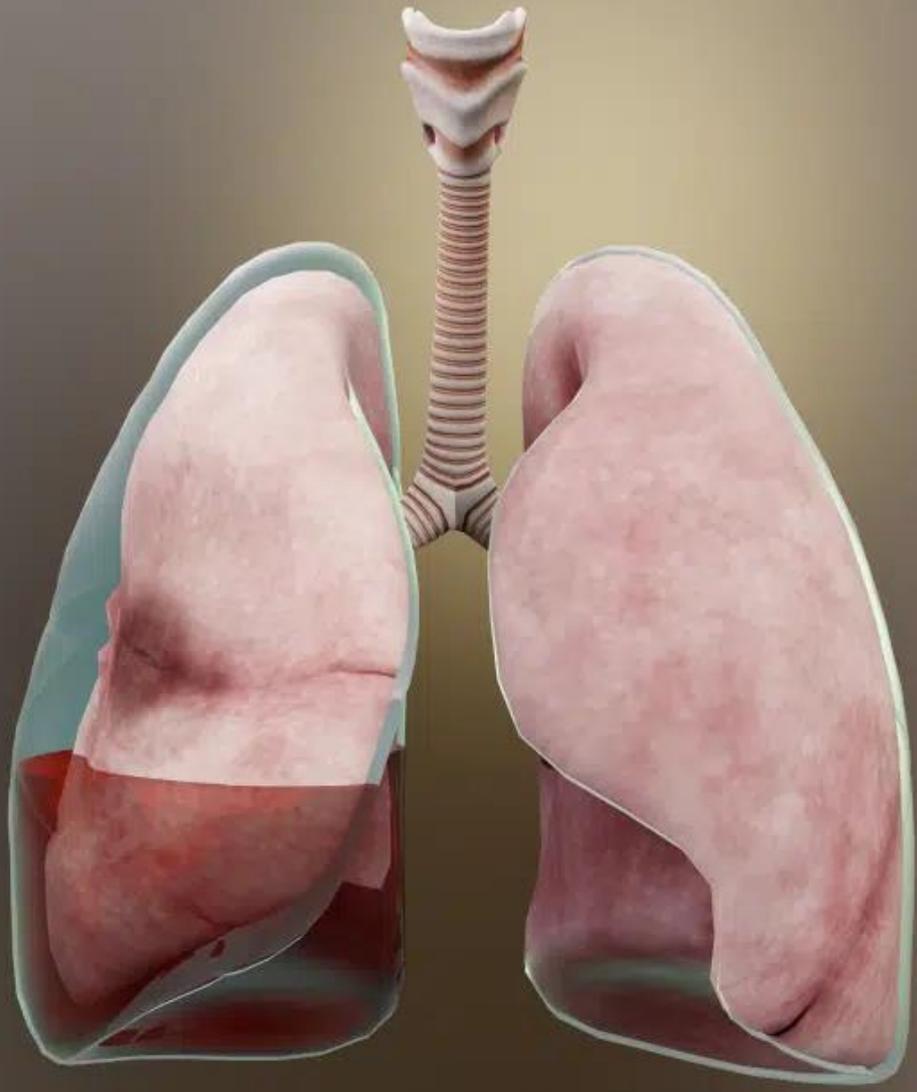


APPROACH TO PLEURAL EFFUSION

- Rawan kasasbeh
- Mai jalabneh
- Jumana suheimat





PLEURAL EFFUSION

- Pleural effusions are a common medical problem with more than 50 recognized causes including disease local to the pleura or underlying lung, systemic conditions, organ dysfunction and drugs
- It occur as a result of increased fluid formation and/or
- reduced fluid resorption.
- The precise pathophysiology of fluid accumulation varies
- according to underlying etiologies.

MECHANISM



Increase permeability
(inflammation) Obstructed
lymphatics (parasite)



Increase pulmonary
capillary pressure (left side
heart failure)



Decrease oncotic pressure
(kidney failure / liver
cirrhosis)

TYPES OF PLEURAL EFFUSIONS

Transudates *pleural fluid*
proteins < 30 g/L

Exudates *pleural fluid*
proteins > 30 g/L

CAUSES OF PLEURAL EFFUSION

- Transudates
 - **Very Common causes:**
 - Heart failure
 - Liver cirrhosis

TRANSUDATES

- **Less Common causes:**
- Hypoalbuminaemia
- Peritoneal dialysis (result from the migration of dialysis fluid under pressure from the peritoneal cavity into the pleural space)
- Hypothyroidism (hypothyroidism led to significantly increased VEGF level, rapid and reversible increase in capillary permeability)
- Nephrotic syndrome
- Mitral Stenosis
- PE

CAUSES OF PLEURAL EXUDATES

- **Common causes**
- Malignancy
- Parapneumonic effusions
- Tuberculosis

EXUDATES

- *Less Common causes*
- Pulmonary embolism
- Rheumatoid arthritis and other autoimmune pleuritis
- Benign Asbestos effusion
- Pancreatitis
- Post-myocardial infarction
- Post CABG

EXUDATES

- **Rare causes**
- Yellow nail syndrome (and other lymphatic disorders)
- Drugs (Cisplatin / Hydralazine / NSAIDs)
- Fungal infections

Amiodarone

Bromocriptine

Carbamazepine

Cyclophosphamide

Ergots

Granulocyte Colony –Stimulating Factor

Methotrexate

Nitrofurantoin

Penicillamine

Phenytoin

Procainamide

Propylthiouracil

Radiation therapy

Sulfamides

SYMPTOMS



Asymptomatic if
less than 300 ml



Breathlessness



Chest pain (sharp
pain) in
inflammation



Dry Cough



Fever (pneumonia)

- Approximately 75% of patients with pulmonary embolism and pleural effusion have a history of pleuritic pain.
- Dyspnea is often out of proportion to the size of the effusion

HISTORY

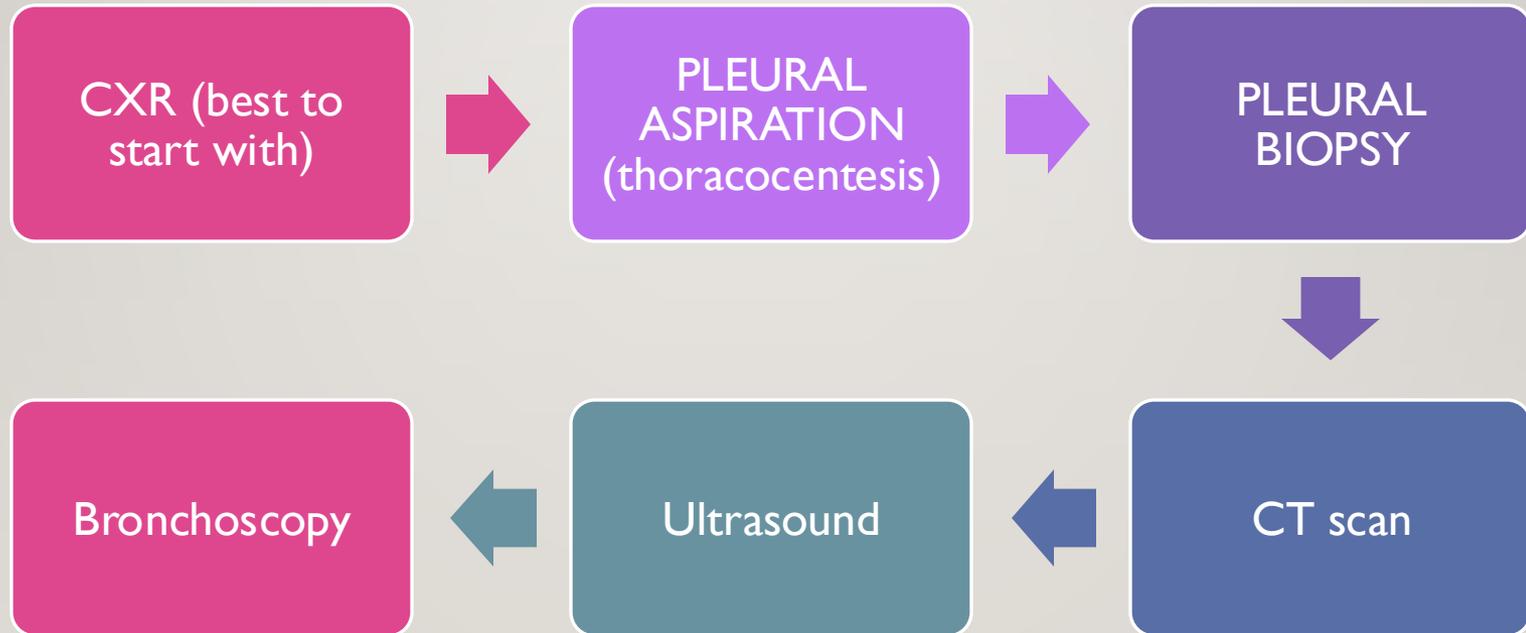
THE DRUG HISTORY IS IMPORTANT. ALTHOUGH UNCOMMON, A NUMBER OF MEDICATIONS HAVE BEEN REPORTED TO CAUSE EXUDATIVE PLEURAL EFFUSIONS. (CISPLATIN / HYDRALAZINE / NSAIDS) **>100 CASES REPORTED GLOBALLY**

AN OCCUPATIONAL HISTORY INCLUDING DETAILS ABOUT KNOWN OR SUSPECTED ASBESTOS EXPOSURE AND POTENTIAL SECONDARY EXPOSURE VIA PARENTS OR SPOUSES SHOULD BE DOCUMENTED.

SIGNS

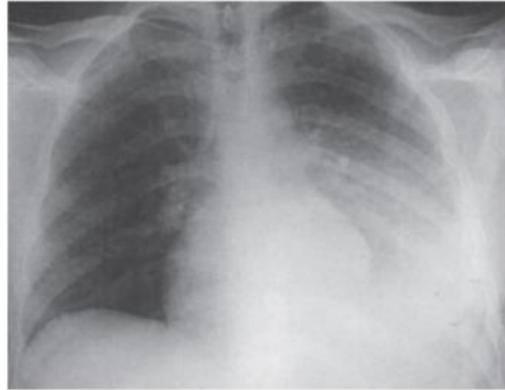
- Decrease chest expansion
- Dull on percussion
- Mediastinal and tracheal shift away from affected side
- Decrease vocal fremitus (TVF)
- Decrease air entry

DIAGNOSIS





A

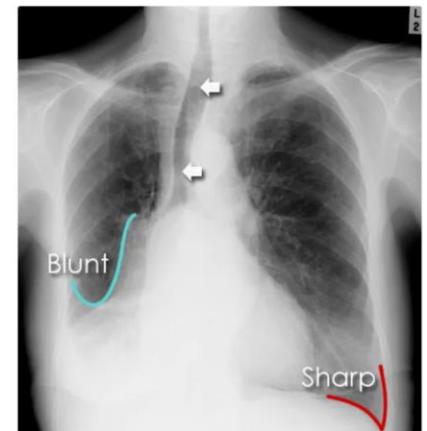


B

FIGURE

2-7 **A:** Upright chest radiograph showing blunting of the right costophrenic angle, typical of a small right pleural effusion (this patient had chronic liver disease). **B:** Chest radiograph showing left pleural effusion.

(Reprinted with permission from Stern EJ, White CS. *Chest Radiology Companion*. Lippincott Williams & Wilkins; 1999:375, Figure 22-1A; 376, Figure 22-2A.)

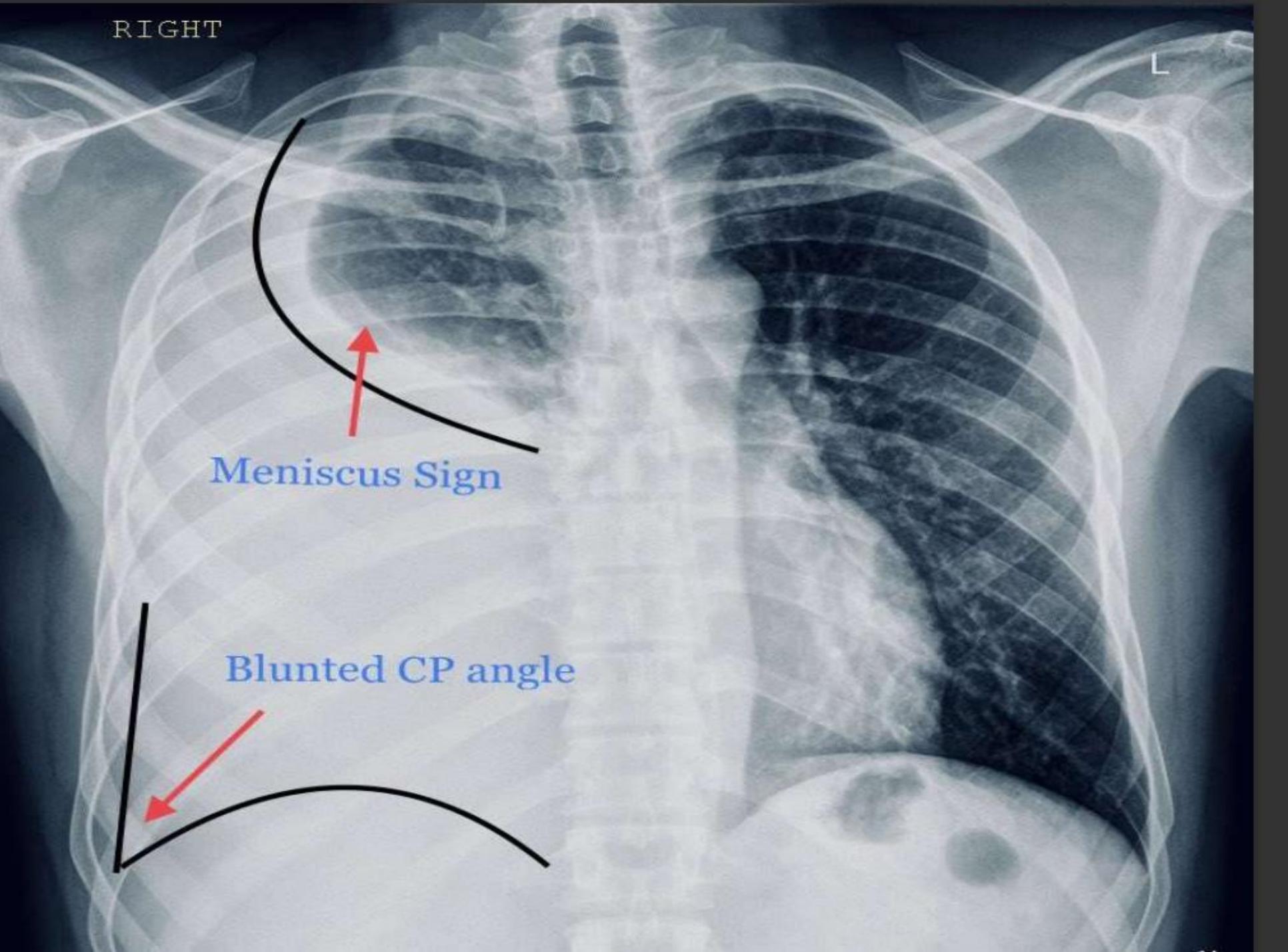


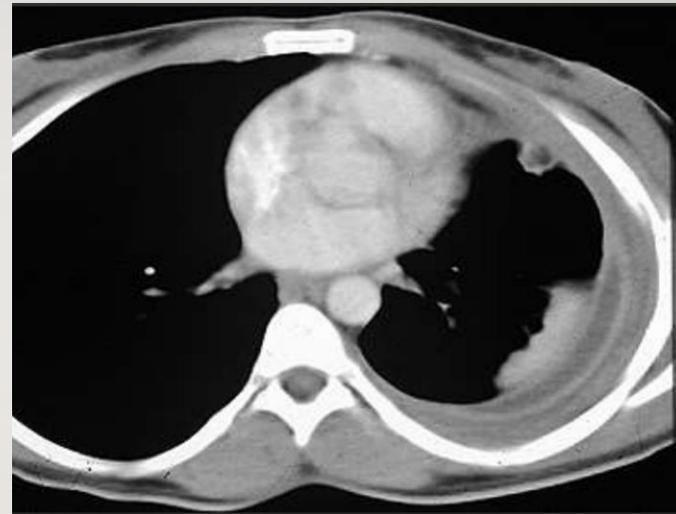
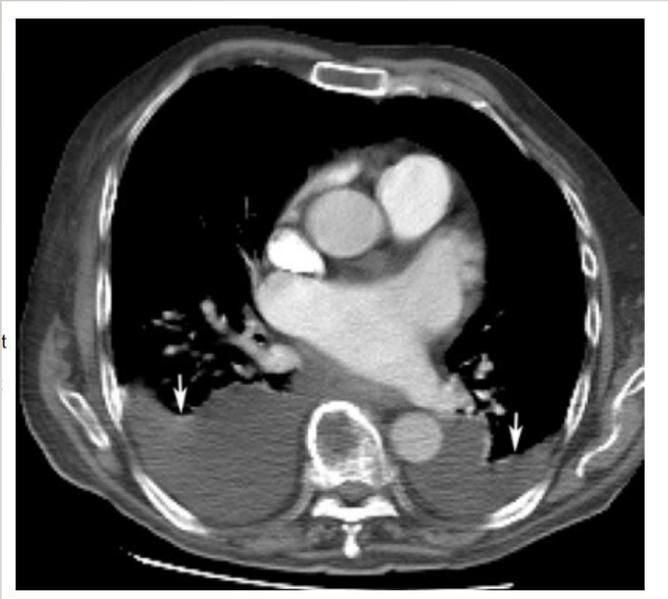
RIGHT

L

Meniscus Sign

Blunted CP angle

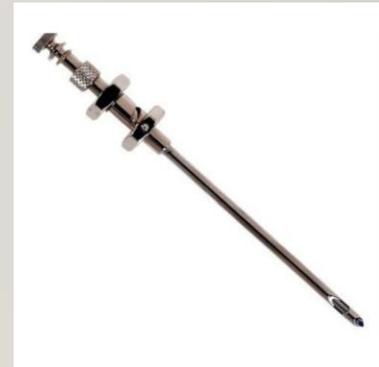




PLEURAL ASPIRATION

- The initial step in assessing a pleural effusion is to ascertain whether the effusion is a **transudate** or **exudate**
- Aspiration should not be performed for bilateral effusions in a clinical setting strongly

suggestive of a transudate, unless there are atypical features, or they fail to respond to therapy



PLEURAL ASPIRATION

- A diagnostic tap, with a fine bore (21G) needle and a 50mL syringe
- Bedside ultrasound guidance is recommended for all diagnostic aspirations
- Send for protein, LDH, pH, Gram stain, cytology and microbiological culture.
- Up to 50ml pleural fluid should be sent for cytological examination.



FIGURE

2-8 Ultrasound demonstrating pleural effusion. D, diaphragm; PE, pleural effusion. Pleural fluid appears anechoic (*black*). The “spine sign” is present, as the spine is visible extending behind the effusion (normally, spine is not visible distal to aerated lung tissue on ultrasound due to artifact). (Reprinted with permission from Bornemann P. *Ultrasound for Primary Care*. Wolters Kluwer; 2020. Figure 13-6.)



PLEURAL ASPIRATION

- Aspirated fluid should immediately be drawn into a blood gas syringe
- Biochemical (2-5 ml)
- Gram-stained is necessary for all fluids and particularly when pleural infection is suspected (microbiology 5ml)
- 50ml for cytological examination

PLEURAL EFFUSION

- appearance and odour should be noted
- Smell, unpleasant odor of **anaerobic infection**
may guide antibiotic
- (colour usually Straw colour -normal)
- The appearance may be serous blood tinged or frankly bloody

APPEARANCE

- **Milky fluid:**
 - Empyaema
 - Chylothorax
 - PesudChylothoraxl

- Centrifuging turbid or milky pleural fluid will distinguish between empyema and lipid effusions.
- If the supernatant is clear, then the turbid fluid was due to empyema(infection-related)
- If it is still turbid
 - -chylothorax **OR**
 - -pseudochylothorax



APPEARANCE

- Grossly bloody pleural fluid is usually due to; malignancy, pulmonary embolus with infarction, trauma, benign asbestos pleural effusions or post- cardiac injury syndrome
- A hemothorax can be distinguished from other blood- stained effusions by performing a hematocrit on the pleural fluid. A pleural fluid hematocrit is **greater** than 50% of the patient's peripheral blood hematocrit, is diagnostic of a hemothorax

FLUID SUSPECTED DISEASE

Putrid odor Anaerobic empyema

Food particles Oesophageal rupture

Bile stained Cholothorax (biliary fistula)

Milky Chylothorax/Pseudochylothorax

Anchovy sauce' like fluid Ruptured amoebic abscess

DIFFERENTIATING BETWEEN A PLEURAL FLUID EXUDATE AND TRANSUDATE

- Protein of $> 30\text{g/l}$ an exudate
- Protein of $<30\text{ g/l}$ a transudate.

- When
protein is close to 30g/l

LIGHT'S CRITERIA



- **Light's criteria are used to differentiate between exudative and transudative pleural effusions based on the levels of protein and lactate dehydrogenase (LDH) in the pleural fluid compared to serum levels.**
-

- **According to Light's criteria, a pleural effusion is classified as an exudate if one or more of the following conditions are met:**

- 1. The ratio of pleural fluid protein to serum protein is greater than 0.5.**
- 2. The ratio of pleural fluid LDH to serum LDH is greater than 0.6.**
- 3. The pleural fluid LDH is more than two-thirds the upper limit of the normal value for serum LDH.**

However, the accuracy of Light's criteria can be compromised in certain clinical contexts, particularly in patients with congestive cardiac failure (CCF) who are undergoing diuretic therapy.

Effect of Diuretic Therapy: Diuretic therapy in CCF patients can increase the concentration of protein, LDH, and lipids in pleural fluid. This can lead to a misclassification of the effusion as an exudate rather than a transudate.

- it is important for clinicians to use their judgment and consider the overall clinical context when interpreting pleural fluid analysis results.**
- NT-pro-BNP Measurement: To improve diagnostic accuracy, the measurement of NT-pro-BNP (N-terminal pro b-type natriuretic peptide) can be useful. Elevated levels of NT-pro-BNP are indicative of heart failure, which can help differentiate between transudative and exudative effusions in patients with CCF.**

Other tests

Lab test	cause
Glucose < 3.3	infection
PH <7.2	empyema
Amylase	pancreatic ca ,ruptur-esophagus
Rheumatoid factor	RA
ANA	SLE
Complement level	(reduced in SLE,RA,Ca)

The types of cells found in pleural effusions and their associated conditions:

1. Neutrophils:

Conditions linked to neutrophil presence in pleural effusions include:

- parapneumonic effusions (effusions associated with pneumonia)
- Pulmonary embolism
- Acute tuberculosis (TB)
- Benign asbestos-related effusions

2. Eosinophils:

- Eosinophils are defined as eosinophilic effusion when they make up more than 10% of the cells in the pleural fluid.
- The most common causes of pleural eosinophilia are the presence of air or blood in the pleural space.
- Pleural eosinophilia is considered fairly non-specific.

Lymphocytic pleural effusions

are characterized by the presence of lymphocytes accounting for more than 50% of the nucleated cells in the pleural fluid. The primary causes of lymphocytic pleural effusions include:

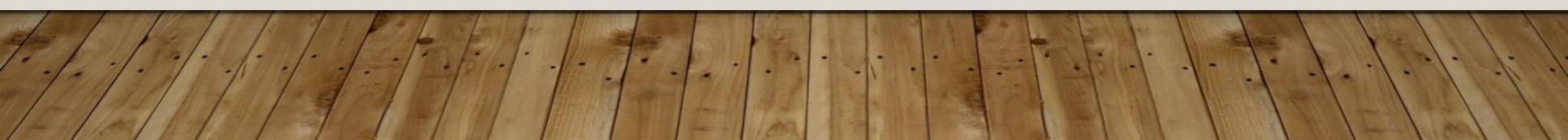
- **Malignancy** (*including metastatic adenocarcinoma and mesothelioma*)
- **Lymphoma**
- **Tuberculosis**

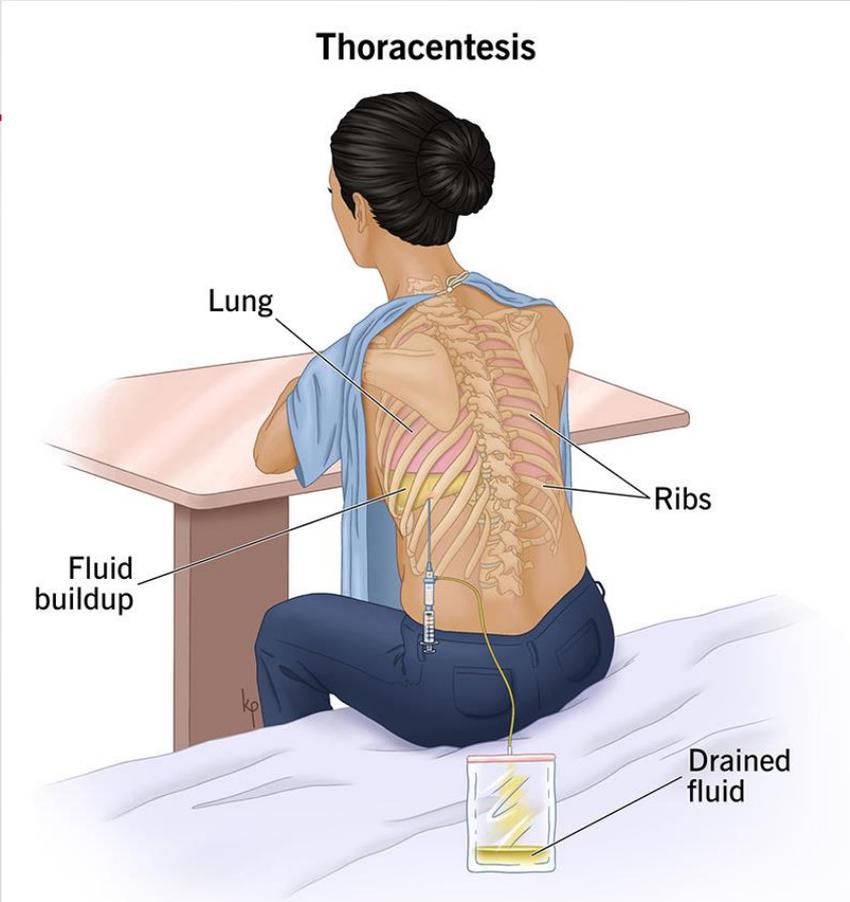
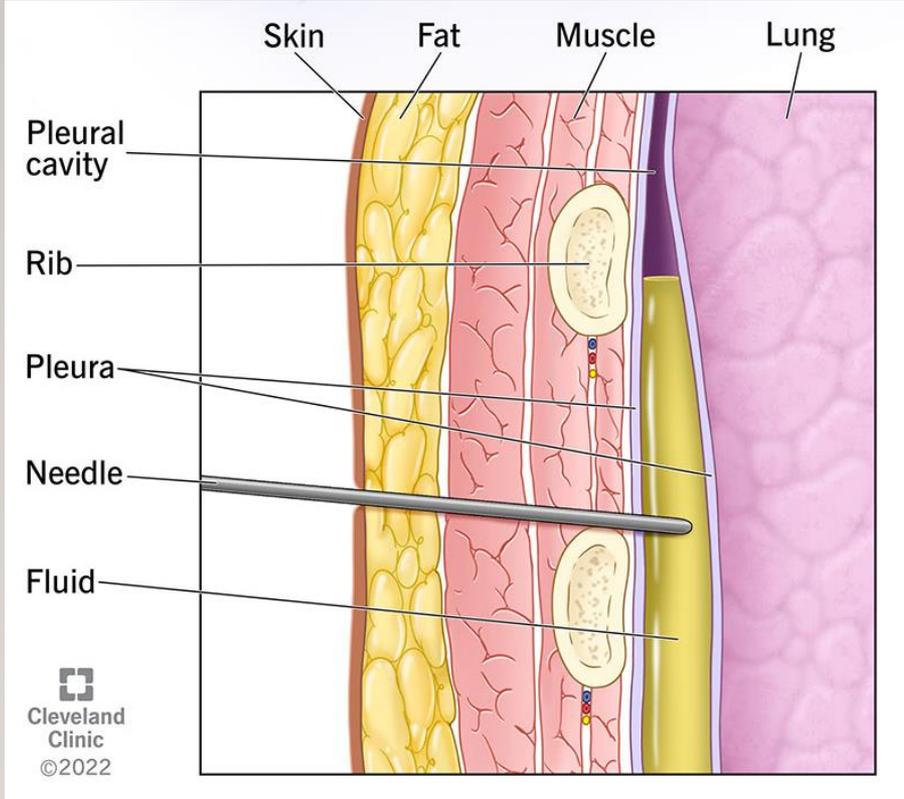
MANAGEMENT STRATEGIES FOR PLEURAL EFFUSION

1. Thoracentesis (Pleural Aspiration)

- 1. Indications:** This procedure is indicated for patients experiencing respiratory distress due to pleural effusion.
- 2. Purpose:** The primary goals are to relieve symptoms and to obtain fluid for diagnostic analysis.
- 3. Procedure:** A needle is inserted into the pleural space to drain the accumulated fluid, which can provide immediate relief of symptoms.

2. Diuretics

- 1. Indications:** Diuretics are often used for patients with congestive heart failure.
 - 2. Purpose:** The use of diuretics helps to reduce fluid overload in the body, thereby decreasing the size of the pleural effusion.
- 



3. Antibiotics:

1. Indications: Antibiotics are used when the pleural effusion is caused by an infection.
2. Purpose: The primary goal of using antibiotics is to treat the underlying infection that is responsible for the effusion, thereby helping to resolve the fluid accumulation.

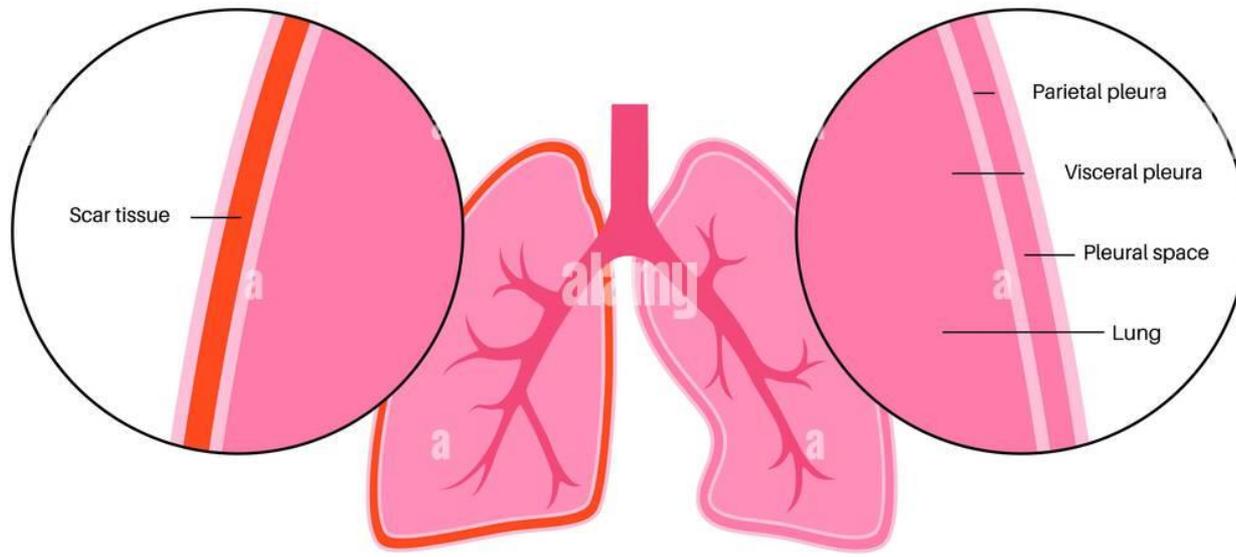
4. Corticosteroids:

1. Indications: Corticosteroids are indicated for pleural effusions associated with rheumatoid arthritis or systemic lupus erythematosus (SLE).
2. Purpose: The purpose of corticosteroids is to reduce inflammation and fluid accumulation in the pleural space, which helps alleviate symptoms and manage the effusion.

5-Pleurodesis

- **Indications:** Recurrent pleural effusions, especially from malignancies.
- **Procedure:** A sclerosing agent (e.g., talc, doxycycline) is introduced into the pleural space to induce adhesion of the pleural layers, preventing future fluid accumulation.
- **Methods:** Can be performed via thoracoscopic surgery or during a thoracentesis.

- **6-Management of Underlying Causes**



Lungs after Pleurodesis

Normal lungs

THE END.

