Pathogenesis

There are two types of effusions: transudates and exudates. A **transudate** is a lot of **fluid** and not much else. It's caused by **intravascular pathology;** either an **↑Hydrostatic Pressure** (CHF) or **↓Oncotic Pressure** (Nephrotic syndrome or cirrhosis) from within the blood vessels. These are usually distributed evenly across the lungs and are thus **bilateral**. An **exudate** is a lot of **stuff** in the parenchyma drawing the fluid out. It's caused by **inflammation** – the capillaries become leaky, and protein and fluid leak out. There's "Stuff" in the space. Since this doesn't necessarily distribute evenly it may be **unilateral**.

Diagnosis

Pleural effusion is on the differential for shortness of breath or pleuritic chest pain. However, the diagnosis does not become apparent until the **Chest X-ray.** Once **blunting of the costovertebral angles** (which requires at least 250cc) is seen the diagnosis is made. If more than that is present the **air-fluid level** (the meniscus) rises. After the chest X-ray perform a **recumbent X-ray** to assess if the fluid is **free moving** (not loculated) and in sufficient quantity (**>1cm** from chest wall to fluid level) to do a **thoracentesis**. A loculated effusion can't be safely tapped; it needs surgical intervention. With thoracentesis the **Light's Criteria** (comparing the **Serum Protein** and **Serum LDH** to the **Pleural protein** and the **Pleural LDH**) can be performed. It shows the exudates vs transudates (see the table to the right). The next need is to get a complete characteristic of the pleural fluid for definitive diagnosis (**WBC**, **RBC**, **pH**, and **Glucose**).

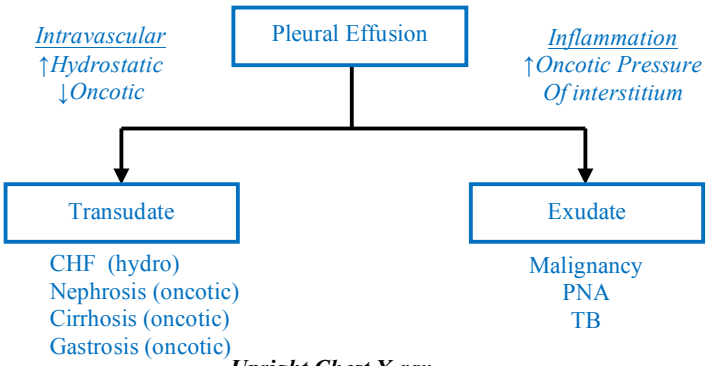
CT scan or **bedside ultrasound** can also assess for loculation. The CT may also give insight into the cause of the effusion. You really can't be asked to choose between them on a test. In life the ultrasound is the most reliable because you see it + do the tap under imaging guidance. If **CHF**, **diurese only** unless it fails to resolve with diuresis.

Treatment

If there's a loculated effusion a **thoracostomy** (chest tube) is required. Parapneumonic effusions that are loculated may form a rind, called **empyema**. This requires **thoracotomy** (surgery) with decortication. Repeat effusions may be treated with **pleurodesis -** a chemical or surgical elimination of the pleural space. If a pathology is identified on the thoracentesis, treat the underlying condition. If the condition is already known, no tap need be done (for example, **CHF getting diuresis only**).

Overview

1) Find an effusion on CXR → Determine **Tappability**
2) a. If loculated, **thoracotomy** … failure… **thoracotomy**
   b. If not loculated >1cc **Tap**, if <1cc **Observe**
3) If they have CHF diurese and monitor - do **NOT tap**
4) Light Criteria for **Transudate vs Exudate**
5) If transudate treat the underlying disease
6) If exudates get complete workup, tx as diagnosed



Upright Chest X-ray

< 250cc	Not visible
250cc	Blunting of the costovertebral angle
>250cc	Meniscus line rises, air-fluid level

Recumbent Chest X-ray

Free fluid vs loculated (Layers out or doesn't)
Volume required for thoracentesis (>1 cm)

Thoracentesis Findings

Transudate	LDH < 2/3 Upper Limit of Normal (~200) and Total $Protein_{effusion}$ / Total $Protein_{serum}$<0.5 and $LDH_{effusion}$ / LDH_{serum} < 0.6
Exudate	LDH > 2/3 Upper Limit Normal (~200) or $LDH_{effusion}$ / LDH_{serum} > 0.6 or Total $Protein_{effusion}$ / Total $Protein_{serum}$>0.5

CT Scan

If underlying conditions require for evaluation or diagnosis