

Pleural Effusion		Pleural Effusion (cont)	Tests + Treatment
Pathophysiology	Caused by increased drainage of fluid into the pleural space , increased production of fluid by cells in the pleural space, or decreased doing of fluid from the pleural space.	Exudative Effusions	CXR
Causes	• CHF is most common cause. • Bacterial pneumonia, malignancies (36% of lung, 25% of breast, 10% of lymphoma), PE, viral diseases, and cirrhosis with ascites.	Caused by increased permeability of pleural surfaces or decreased lymphatic flow from the pleural surface because of damage to pleural membranes or vasculature. • Causes are bacterial pneumonia, TB, malignancy, metastatic disease, PE, viral infection, and collagen vascular diseases. • Exudates must have >1 of the following. Protein pleural/p-rotein serum >0.5. LDH pleural/LDH serum >0.6. LDH > 2/3 upper limit of normal serum LDH. • pH is 7.3-7.45. If <7.3, empyema, tumor, fibrosis.	• Look for blunting of the costophrenic angle. • 250mL must accumulate before an effusion can be detected. • Lateral decubitus films are more reliable for detecting small pleural effusions. • Can also determine if the fluid is free or located.
Symptoms	Often asymptomatic. Dyspnea on exertion, peripheral edema, orthopnea, and PND.		CT Scan
Signs	Dullness to percussion , decreased breath sounds, and decreased tactile fremitus.		More reliable than CXR.
Transudative Effusions	Pathophysiology is due to either elevated capillary pressure in the visceral or parietal pleura (as in CHF), or decreased plasma oncotic pressure (hypoalbuminemia). • Causes include CHF, cirrhosis, PE, nephrotic syndrome, peritoneal dialysis, hypoalbuminemia, and atelectasis. • pH is normally 7.4-7.55.		Treatment
			• For transudative, diuretics, sodium restriction, and therapeutic thoracentesis if massive and causing dyspnea. • For exudative, treat underlying disease. • For parapneumonic effusions, antibiotics alone if uncomplicated. • Complicated effusions or empyema require chest tube drainage, intracellular injection of thrombolytic agents (streptokinase or urokinase) to accelerate drainage, and/or surgical lysis of adhesions.
		Empyema	
		Causes	• Exudative pleural effusions left untreated can lead to empyema. • Most cases occur as a complication of bacterial pneumonia, but other foci of infection can spread to the pleural space (mediastinitis, abscess).
		Diagnosis	CXR and CT
		Treatment	• Aggressive drainage of the pleura via thoracentesis and antibiotic therapy. • Very difficult to eradicate and recurrence is common. • If severe and persistent, rib resection and open drainage may be necessary.



By xkissmekatex (kissmekate)

cheatography.com/kissmekate/

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Tests + Treatment (cont)

Thorac entesis

- Useful if etiology is not obvious.
- Provides a diagnosis in 75% of patients.
- Drainage provides relief of symptoms for large effusions.
- Pneumothorax is a complication in 10-15% of cases, but requires treatment with a chest tube in <5%.
- Do not perform if effusion is <10mm thick on lateral decubitus CXR.
- Send fluid for CBC, protein, LDH, pH, glucose, gram stain, and cytology, Chemistry, cytology, cell count, and culture.

Pleural Fluid Tests

- CBC, glucose, pH, amylase, TGs, microbiology, and cytology.
- **Elevated pleural amylase** is associated with esophageal rupture, pancreatitis, and malignancy.
- Milky, opalescent fluid is a chylothorax.
- Frankly purulent fluid is empyema.
- Bloody effusion is associated with malignancy.
- Exudative effusions that are primarily lymphocytic are associated with TB.
- pH<7.2 is associated with parapneumonic effusion or empyema.
- If glucose<60, rule out RA. Can also be low in other causes.

Pneumothorax

Traumatic

- Often iatrogenic.
- Always obtain a **CXR after transthoracic needle aspiration, thoracentesis, and central line placement.**

Pneumothorax (cont)

Spontaneous

- Occur without underlying lung disease.

Primary

- Caused by **spontaneous rupture of subpleural blebs** (air-filled sacs on the lung) at the apex of lungs.
- Escape of air from the lung into the pleural space causes lung to collapse.
- More common in tall, lean young men.
- Patients have sufficient pulmonary reserve, so severe respiratory distress does not occur in most cases.
- Recurrence rate is 50% in 2 years.

Spontaneous Secondary

- Occurs as a complication of underlying lung disease, most commonly **COPD**.
- Smoking leads to chronic airway inflammation and formation of respiratory bronchiolitis.
- The chronic destruction of alveoli leads to large alveolar blebs in the upper lobes, which can rupture and leak air into the pleural space.
- Other conditions include asthma, ILD, neoplasms, CF, and TB. **More life-threatening because of lack of pulmonary reserve.**

Symptoms

Ipsilateral chest pain, usually sudden in onset. Dyspnea, cough.

Pneumothorax (cont)

Signs

Decreased breath sounds, hyperresonance, decreased/absent tactile fremitus, **mediastinal shift toward the side of the pneumothorax.**

CXR

Shows visceral pleural line.

Treatment

- If small and asymptomatic, observation as it should resolve spontaneously in ~20days.
- Small chest tube with one-way valve may benefit some patients.
- If pneumothorax is larger or symptomatic, supplemental oxygen and chest tube insertion.
- If secondary, chest tube drainage is always indicated.

Tension Pneumothorax

Pathophysiology

- Accumulation of **air within the pleural space** such that tissues surrounding the opening into the pleural cavity act as valves, allowing air to enter but not to escape.
- The accumulation of **air under positive pressure in the pleural space collapses the ipsilateral lung** and shifts the mediastinum away from the side of the pneumothorax.

Causes

Trauma, CPR, mechanical ventilation with associated barotrauma.



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Tension Pneumothorax (cont)

Signs Hypotension (**cardiac filling is impaired due to compression of the great veins**), distended neck veins, **shift of trachea away from pneumothorax**, decreased breath sounds, hyper resonance to percussion.

Treatment Do not order CXR. Medical emergency. The patient is likely to die of hemodynamic compromise. **Immediately decompress with large-bore needle** or chest tube.



By **xkissmekatex** (kissmekate)

cheatography.com/kissmekate/

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