Pleural Effusion : Causes, Types, Symptoms and Treatment

Pleural effusion refers to the **accumulation of excess fluid in the pleural space** , potentially impairing lung expansion and gas exchange.

Anatomy Review

- **Pleura** : Double-layered serous membrane:
  - **Visceral pleura** (covers lungs)
  - **Parietal pleura** (lines thoracic wall)
- **Pleural space** : Normally contains <15 mL of lubricating fluid, maintained by hydrostatic and oncotic pressure gradients.

Classification

1. **Transudative** : Caused by systemic factors (e.g., imbalance in Starling forces)
2. **Exudative** : Caused by local inflammation or malignancy

Pathophysiology

- **Transudative Effusion** :
  - ? oncotic pressure (e.g., nephrotic syndrome, cirrhosis)
  - ? hydrostatic pressure (e.g., CHF)
  - **Biochemistry** : SG < 1.016, protein < 3 g/dL
- **Exudative Effusion** :
  - ? vascular permeability due to inflammation
  - **Biochemistry** : SG > 1.016, protein > 3 g/dL

Etiologies

- **Transudate** :
  - CHF (most common), cirrhosis, nephrotic syndrome, hypoalbuminemia, peritoneal dialysis
- **Exudate** :
  - TB, pneumonia (parapneumonic effusion), malignancy (lung, breast, lymphoma), pancreatitis, PE, trauma

Special Types

- **Empyema** : Pus in pleural space
- **Chylothorax** : Milky fluid due to thoracic duct injury
- **Hemothorax** : Gross blood in pleural space

Clinical Features

- Dyspnea
- Dry or productive cough
- Pleuritic chest pain
- Orthopnea (in large effusions)
- Hemoptysis (in malignancy)

Physical Examination

- Dullness to percussion
- ? breath sounds
- ? tactile fremitus
- Asymmetric chest expansion

Investigations

- **Chest X-ray** :
    - Blunting of costophrenic angles
    - Meniscus sign in upright films
- **Ultrasound** : Detects small effusions
- **CT Chest** : Identifies loculations, underlying causes
- **Thoracentesis** : Diagnostic and therapeutic
- **Pleural fluid analysis** :
    - Color, clarity, pH, protein, glucose, LDH, cell count, cytology
    - **Light's Criteria** for exudate:
        - Pleural/serum protein ratio > 0.5
        - Pleural/serum LDH ratio > 0.6
        - Pleural LDH > 2/3 of upper normal serum LDH

Differential Diagnosis

- CHF
- Liver cirrhosis
- Nephrotic syndrome
- Malignancy
- TB
- Pulmonary embolism

Management

1. **Treat the underlying cause** :
    - CHF: Diuretics
    - Infection: Antibiotics
    - Malignancy: Chemotherapy/radiotherapy
2. **Drainage** :
    - **Thoracentesis** : First-line for symptomatic or large effusions
    - **Chest tube** : Empyema, chylothorax, hemothorax
3. **Surgical options** :
    - VATS (Video-assisted thoracoscopic surgery)
    - Pleurodesis (for recurrent malignant effusions)

4. **Nutritional support** :
    - No-fat diet in chylothorax

Complications

- Re-expansion pulmonary edema
- Pneumothorax
- Infection (empyema)
- Fibrosis (from unresolved empyema)