Pleural Aspiration/Thoracocentesis Procedure

Pleural aspiration, or thoracocentesis, is a procedure to remove fluid from the pleural space (pleural effusion) for diagnostic or therapeutic purposes.

Indications

Diagnostic

- Evaluation of unilateral exudative pleural effusions
- Suspected malignancy
- Suspected infection (e.g., empyema)
- Cytological analysis (e.g., for malignancy)
- Microbiological studies (gram stain, culture, acid-fast bacilli)
- Biochemical analysis (protein, glucose, LDH, ADA)

Therapeutic

- Relief of dyspnea due to moderate to massive effusions
- Management of pyothorax
- Recurrent malignant effusions
- Instillation of agents (e.g., chemotherapy, sclerosing agents)

?? **Note:** Do not aspirate bilateral or known transudative effusions unless atypical features or treatment failure is observed.

Contraindications

Absolute

- Local skin infection at puncture site
- Uncorrected coagulopathy or platelet count <20,000/?L

Relative

- Very small volume of fluid
- Anticoagulant therapy (e.g., warfarin)
- Mechanical ventilation (? risk of tension pneumothorax)
- Known bleeding diathesis

Site of Aspiration

- **6th intercostal space** (mid-axillary line)
- **7th intercostal space** (posterior axillary line)
- **8th intercostal space** (scapular line)

Choose the site 1–2 intercostal spaces below the upper level of dullness, and always **above the 8th rib** to avoid injury to abdominal organs.

Equipment

- Sterile gloves and field
- Ultrasound with sterile probe cover
- Chlorhexidine or povidone-iodine
- Local anesthetic (e.g., 1–2% lignocaine, max dose: 3 mg/kg)
- 50 mL syringe
- Pleural aspiration needle (with 3-way stopcock)
- Specimen containers (for cytology, biochemistry, microbiology)

Procedure Overview

1. **Positioning:** Patient seated upright, leaning slightly forward with arms resting on a table or pillow.
2. **Ultrasound guidance** to locate fluid and avoid injury.
3. **Aseptic technique** and skin preparation.
4. **Local anesthesia** infiltration to skin and pleura.
5. **Needle insertion:** Just above the superior border of the rib to avoid intercostal neurovascular bundle.
6. **Aspirate fluid** using a syringe via a 3-way stopcock.
7. **Fluid examination:**
    - **Odor:** Putrid (anaerobic infection), milky (chylothorax), bloody (hemothorax)
    - **Color:** Serous, cloudy, purulent

Sample Volume

- **Diagnostic:** ~50 mL is sufficient
- **Therapeutic:** Do **not exceed 750–1000 mL** per session to prevent reexpansion pulmonary edema

? If the patient develops cough or respiratory distress, stop the procedure immediately.

Post-procedure

- Monitor for complications (e.g., pneumothorax)
- Chest X-ray if clinically indicated
- Repeat aspiration every 3–4 days if necessary

Complications

- Pneumothorax / Hydropneumothorax
- Reexpansion pulmonary edema
- Hemothorax
- Pleural infection (pyothorax)

- Injury to intercostal vessels or nerves
- Air embolism
- Intercostal artery aneurysm
- Pleural shock

Dry Tap (No fluid aspirated)

Causes:

- Thick pus (empyema)
- Lung parenchymal lesion simulating effusion (e.g., tumor, consolidation)
- Loculated effusion
- Pleural thickening or fibrosis
- Subpulmonic or interlobar effusion

Cytology and Laboratory Processing

- Immediate submission of unfixed specimen
- **Wet mount technique:** Toluidine blue stain for cell morphology
- Preparation of **cell blocks** for histochemistry or immunohistochemistry
- Ancillary tests: Flow cytometry, electron microscopy