## SPECIAL PROCEDURES

# TUBE THORACOSTOMY (CHEST TUBE)

### Definition:

- It is the insertion of a tube into the pleural space through a small incision.

### Indications:

- Chest tube insertion and drainage is commonly used:
  1. For spontaneous or traumatic pneumothorax involving > 25% collapse or enlargement, especially if it causes respiratory distress or a serious gas exchange abnormality;
  2. For massive or recurrent benign pleural effusions not responding to thoracentesis;
  3. For empyema;
  4. For hemothorax; and
  5. For malignant effusions (before intrapleural chemotherapy and/or sclerosing agents are used and briefly afterward, to drain the weeping pleura).
- Sometimes, loculated empyemas (Pus in a body cavity) are effectively treated by instilling fibrinolytic agents into the pleural space through the chest tube, thus avoiding surgical lysis of the loculations
- In patients with clotting abnormalities, tube thoracostomy drainage may be necessary for the above indications, but special care must be taken.

### Procedure:

- For pneumothorax, the tube is usually inserted in the anterior 2nd or 3rd intercostal space at the midclavicular line and is directed toward the apex of the lung.
- For pleural effusions and other fluids in the thorax, the tube is inserted in the midaxillary line of the 5th or 6th intercostal space and is directed posteriorly.
- Tubes for loculated effusions or empyemas are positioned as required.
- Lidocaine is used as for thoracentesis
- A purse-string suture is made around the skin incision.
- After the subcutaneous tissue and intercostal muscles are separated with a clamp down to the parietal pleura, the tube is introduced through the parietal pleura, preferably with a clamp grasping the tip.
- The tip is introduced into the pleural space and directed as described above.
- The purse-string suture is closed, and the tube is sutured to the chest wall.

- The tube is connected to simple underwater drainage (for effusions or empyema) or placed in line with a negative suction pump.
- In some cases, pneumothoraces can be reinflated without suction using a one-way Heimlich valve.
- A chest x-ray is obtained after tube insertion to check the tube's position and function.
- When the situation resolves, the tube is removed.
- If pneumothorax was the reason for insertion, the tube is clamped for several hours before removal, and before the tube is removed, a chest x-ray is obtained to verify that the pleural leak has stopped.
- For patients receiving ventilatory support with positive pressure, the tube is often left in place until weaning is accomplished.
- More than one chest tube is sometimes required.
- For pleural effusions, a small-bore chest tube or pigtail catheter is usually placed and fluid is removed by negative suction until the drainage is under 100mL per 24 hours and the lung has expanded

### Complications:

- Include hemorrhage from intercostal vessel injury,
- Subcutaneous emphysema,
- Injury due to a malpositioned tube (e.g. into the major fissure, and occasionally into the lung), and
- Local infection or pain
- Reexpansion pulmonary edema due to increased capillary permeability may occur in the reexpanded lung, especially after prolonged lung collapse and rapid reinflation.
- Tube insertion may be difficult because of adhesions or a very thick pleura
- Other problems include inadequate drainage of the pleural space due to clots or gelatinous inflammatory material and plugging or kinking of the tube.

## THORACOTOMY

### Definition:

- Incision through the chest wall into the pleural space.

### Indications

- Thoracotomy for open biopsy of lung, pleura, hilum, and mediastinum is the diagnostic gold standard to which all other procedures must be compared.

- ✍ Exploratory thoracotomy is required in < 10% of cases to establish the diagnosis and resectability of lung cancer.
- ✍ Thoracotomy is most helpful in patients with undiagnosed focal or diffuse pulmonary problems, in which definitive diagnosis is likely to improve the management plan.
- ✍ It is used in patients with pulmonary problems of unknown etiology when less invasive procedures have not yielded a diagnosis or when other procedures are more dangerous or unlikely to yield a diagnosis.
- ✍ An emergent thoracotomy may be necessary to repair a traumatic aortic disruption

## Contraindications:

- ✍ Include unstable systemic status (e.g. cardiopulmonary, nutritional, metabolic, renal), i.e. inability to tolerate the injury of major surgery.

## Procedure:

- ✍ Three basic approaches are used.
- ✍ Each requires a general anesthetic in an operating room.
    1. In **limited anterior or lateral thoracotomy**, a 6- to 8-cm intercostal incision is made; after a large tidal volume, the lung is popped out to be biopsied through the incision. When this approach is used to diagnose diffuse interstitial lung disease, localized peripheral lung disease, or infectious diseases in immunosuppressed hosts, morbidity and mortality are very low. Patients require a chest tube for 24 to 48 h and can often leave the hospital in 3 to 4 days.
    2. **Full wide incision thoracotomy** gives access to pleura, hilum, mediastinum, and the entire lung. It is most useful when a neoplasm is suspected or when multiple sites in one lung require biopsy.
    3. **Median sternotomy** is used when lesions in both lungs require biopsy.

## Complications

- ✍ Are greater than those for any other pulmonary biopsy procedure because of the risks of general anesthesia, surgical trauma, and a longer hospitalization with more postoperative discomfort.
- ✍ Hemorrhage, infection, pneumothorax, bronchopleural fistula, and reactions to anesthetics are the greatest hazards.