Chest Drainage

Critical Care Monitoring

Indications

1-
2-

Pleural Space
- Potential space
- Contains fluid lubricant
- Can fill with air, blood, plasma, serum, lymph, pus
Pleural Space

Problems when contain abnormal substances:

- Compresses underlying lung tissue → atelectasis
- ↓ intrapleural pressure → ↓ ventilation
- Infection

Detection

- 1-
- 2-

Methods of Drainage

- Thoracentesis -
- Thoracostomy (Closed, Tube) -
Chest Drainage

Pleural Effusion

Associated with:

- Systemic edema
- Pulmonary edema
- Infection
- Infarction
- Lung CA
- Pneumonia

If fluid becomes infected → inflammatory process → creates abscess in pleural space = empyema

Rx -

Chest Drainage
Chest Drainage

Pneumothorax
- May occur after trauma, after surgery, spontaneously, from underlying lung disease, after activities (diving, high altitudes, activities that require stretching chest and rib cage)
- Rx -
  - If leak is major or prolonged →
  - Categorized as spontaneous or traumatic

Spontaneous Pneumothorax
- Occurs in apparently healthy, young adult males, ages 20-40
- Smoking increases risk
- May occur in patients with chronic or acute lung disease

Traumatic Pneumothorax
- May be a complication of a medical or therapeutic procedure:
  - Subclavian IV, CVP, etc.
  - Pleural, transbronchial biopsy
  - CMV
  - CPR
- May be caused by penetrating or blunt chest trauma
Open Pneumothorax
- Comes from opening in chest wall
- May see mediastinal shift to affected side (insp)
- “Sucking”

Non-Tension Pneumothorax

Closed Pneumothorax
- Communication of air from pleural space to lung (no air movement with atmosphere)
- Can develop into tension pneumothorax
Chest Drainage

### Pneumothorax

![Image of Pneumothorax](image)

- Air enters pleural space during inspiration with no way to escape during expiration.

### Pneumothorax with Pleural Effusion

![Image of Pneumothorax with Pleural Effusion](image)

### Tension Pneumothorax

- Causes 2 problems:
  - Cardiac tamponade → decreasing cardiac output
  - Tearing of aorta secondary to mediastinal rotation can occur.
Tension Pneumothorax

- Mediastinal shift away from affected side
- Hyperresonant to percussion
- BS ↓ or absent
- ↑ RR, HR, pain
- Lethal if not treated
Chest Drainage

**Signs & Symptoms**

- SOB, tachypnea
- Sharp chest pain
- Dry hacking cough
- Cyanosis
- Hemoptysis
- Tachycardia
- Fainting and shock
- Decreased or absent BS
- Hyper-resonance to percussion

**Chest Tube Placement**

One tube for pneumothorax

- 2nd - 3rd intercostal space
- Mid-clavicular line
- Directed towards lung apex

One tube for pleural effusion

- 6th - 9th intercostal space
- Mid-axillary line
- Directed posteriorly
Chest Drainage

Chest Tube Placement

- Two tubes for fluid and air
- Placed as previous tubes
- Connected to separate drainage systems

Chest Tube Insertion

- Local anesthetic
  - 1% Xylocaine
  - 2% Procaine
- Sterile field
- Incision
  - Large enough to insert 1 finger
  - Made 2 intercostal spaces below point where tube will enter pleural space
  - Over top of rib

- Sub-q tissues & muscle bluntly dissected with forceps or scissors
- Tube advanced with hemostat to desired position
- Hemostat removed
- Tube attached to drainage system
- Tube sutured to skin
- Sterile dressing applied to site
Chest Drainage

Radiographs of Chest Tubes

Complications

- Excessive bleeding
- Infection of skin site
- Pain
- Subcutaneous emphysema
Chest Drainage

Subcutaneous Emphysema

Chest Tubes
- Fenestrated
- Fairly stiff
- Trocar

Trocar Insertion
Drainage Systems

1 Bottle Water-Seal Drainage

2 Bottle Water-Seal Drainage
Chest Drainage

3 Bottle Water-Seal Drainage

Disposable

Care of Patient & System
- Apparatus must be lower than patient’s chest
- Avoid kinking or compressing tubing
- Keep airtight
- Aseptic technique
Chest Drainage

Care of Patient & System

- Appropriate length of tubing
- Check tubes for patency
- Tubing must be "stripped" to prevent clot formation
- Drainage measured for “output”
- Kelly clamps available at bedside

Care of Patient & System

- Drainage bottle
  - Free drainage
  - Measured for I & O

Care of Patient & System

- Water-seal bottle
  - Water level in “straw” fluctuating with respiration
    - Spontaneous breathing:
      - ↑ inspiration
      - ↓ expiration
    - Mechanical ventilation:
      - ↓ inspiration
      - ↑ expiration
Chest Drainage

Care of Patient & System

- Water-seal bottle
  - Tip of tube 2-5 cm below water surface
  - Intermittent bubbling from straw if lung has an air leak
    - Spontaneous breathing: expiration
    - Mechanical ventilation: inspiration

- Suction control bottle
  - Straw at least 10 cm below water level
  - Constant bubbling from straw

No fluctuations in water-seal tube ---

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Chest Drainage

No air bubbling in water-seal ---

■ Good deal !!! ➔

No bubbling in Sx control ---

■

■

Chest Tube Removal

■ When lung fully re-expanded

■ Fluid drainage has ceased or < 75 cc/day
Chest Drainage

Chest Tube Removal

- Patient placed on side
- Dressing removed
- Sutures cut
- Valsalva maneuver

Sterile Vaseline gauze held firmly over site as tube withdrawn
- Press to seal skin site, tape in place
- Dressing changed q3-4 days