Pneumothorax

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Introduction

- **Pneumothorax**

- **Air in pleural space**
  - Air can enter from the outside
    - Injury penetrated the chest wall
  - Air can enter from inside
    - if the lung is torn or ruptured
    - E.g. (pulmonary bleb).
High Risk Patients for Pneumothorax

- Acute Respiratory Distress Syndrome
- Hemodynamically unstable who may require
  - Invasive Procedures
  - Ventilator
  - Resuscitations
- Postoperative Patients
- Trauma
  - Penetrating Injury of Chest
  - Rib Fracture
- Procedures
  - Thoracentesis
  - Central Venous Catheter placement
  - Bronchoscopy
  - Pericardiocentesis
  - Tracheostomy
Types/ Etiology

Etiology

- Spontaneous
  - Primary
  - Secondary
- Iatrogenic / Traumatic

Type

- Open Pneumothorax
- Close Pneumothorax
- Tension Pneumothorax
Spontaneous Pneumothorax

- Condition in which the lung collapses with no apparent injury or trauma
- Primary
  - Rupture of apical subpleural bleb
- Secondary
  - COPD = Emphysematous Bullae
  - Bacterial pneumonia
  - Lung abscess
  - Whooping cough
  - Asthma
  - AIDS/ Lung Tumor
  - Infective or Infiltrative Lung Disease
  - Pulmonary infarct
How Mechanical Ventilation Responsible for Pneumothorax?

**Biotrauma**

- Barotrauma
- Atelectrauma
- Volutrauma

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Barotrauma & Volutrauma & Atelectrauma

**Barotrauma & Volutrauma**
- Ventilator-induced lung injury by high levels of mechanical stress and strain that occur
  - When high airway pressures (Barotrauma) delivered.
  - When high volumes (Volutrauma) delivered.
- This stress and strain can disrupt the pulmonary fibroelastic skeleton and trigger a secondary inflammatory response.

**Atelectrauma**
- Stress and strain due to cyclic opening & closing of Alveoli.
- Directly induce the release of inflammatory mediators and noxious proteinases.
Tension Pneumothorax

- When the pleural pressure is positive throughout respiratory cycle
- “Ball-valve mechanism”
- Injury to pleura creates a tissue flap that opens on inspiration and closes on expiration
Tension Pneumothorax
Open Pneumothorax

Inspiration

Expiration
Close Pneumothorex
Clinical Feature - Symptoms

• Pain
  • Sharp Stabbing chest pain
  • Radiating to the shoulder and or back
• Acute Breathlessness - Respiratory Distress
• Dry coughing
  • Because of irritation of the diaphragm.
• Palpitation
• Shock
  • Vaso vagal effect due to Mediastenal shifting
• Syncope
Clinical Feature - Sign

- Marked tachycardia
- Hypotension
- 
  **Inspection**
  - Diminised chest expansion on affected site.
  - Bulging on affected side
  - Displaced apex beat
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  **Palpation**
  - Trachea displaced
- Percussion
  - Tympanic
- 
  If Lt side
  - Cardiac dullness diminished
- If Rt side
  - Reduce upper level of liver dullness
Auscultation

- **Close Pneumothorax**
  - Decrease Air entry

- **Open Pneumothorax**
  - To and Fro Air sound
  - Voice and coughing heard with echo

- **Tension Pneumothorax**
  - Same as close pneumothorax
  - Mediastinal shifting more
  - Cynosis
  - Distended neck vein
  - Widening intercostal space.
Investigations

Investigation to Diagnose Pneumothorax
- X-Ray Chest
- CT-Scan

Investigation to Find Cause of Pneumothorax
- CBC
- Sputum Culture & Sensitivity
- CT-Scan
X- Ray Finding

• Relative Hyperlucency Shadow
• Broncho-Pulmonary marking absent
• Contralateral Mediastinal Shifting
• Obliterated costophrenic angle (the deep sulcus sign)
• Raised Hemi-diaphragam
CT Thorax
Treatment

• **Small pneumothorax**
  • Resolve over days to weeks
  • Supplemental oxygen and observation

• **Spontaneous pneumothorax**
  • Asymptomatic – Follow up with serial CXR
  • Symptomatic – Tube Thoracostomy

• **Tension Pneumothorax**
  • Tube Thoracostomy
  • Until the lung leak seals on its own
  • This usually occurs within two to five days.
Treatment Options for Pneumothorax

- Observation
- Needle aspiration
- Surgical Closure of bronchopleural fistula
- Percutaneous catheter to drainage
- Tube thoracostomy
- Tube thoracostomy with instillation of pleural irritant
- Segmental resection
- Thoracotomy
Thoracostomy (Chest tube)
Indications for Surgical Intervention

- Second episode
- Persistent air leakage for greater than 7-10 days
- First episode with unexpanded, “trapped” lung
- History of contralateral pneumothorax
- Bilateral pneumothorax
- Occupational risk (driver, airplane pilot, living in a remote area)
- Large bulla
- Large undrained hemothorax
- First episode in a patient with one lung
- First episode in a patient with severely compromised pulmonary function
A GRIM FAIRY TALE