BRONCHOPLEURAL FISTULA

Introduction
- Defined as a communication between the bronchial tree and pleural space. Clinically seen as a persistent air leak 24 hours after pneumothorax
- How to identify
  - Failure to reinflate lung despite chest tube drainage or continued air leak after evacuation fo the PTX in the setting of chest trauma
  - Complication of diagnostic or therapeutic procedure eg thoracic surgery
  - Complication of mechanical ventilation eg for ARDS
- Problems with a large BPF
  - Failure of lung re-expansion
  - Loss of delivered tidal volume
  - Inability to apply PEEP
  - Inappropriate cycling of ventilator
  - Inability to maintain alveolar ventilation with resultant hypoxia, hypercapnia
  - Problems of weaning
  - Attributable mortality

Management of BPF

General
1. Conservative
   - Large size chest tube (multiple if necessary)
   - Use drainage system with adequate capabilities
   - Mechanical ventilation that can minimize air leaks
     - Adjust conventional ventilator settings (see below)
     - HFV
     - Independent lung ventilation
   - Fibreoptic bronchoscopy and direct application of sealant (cyanoacrylate, fibrin agents, absorbable gelatin sponges eg Gelfoam)
2. Invasive
   - Mobilization of intercostal or pectoralis muscle
   - Thoracoplasty
   - Bronchial stump stapling
   - Pleural abrasion and decortication

Mechanical ventilation in BPF - principles
- BPF provides an area of low resistance to flow; conduit for escape of a variable % of delivered tidal volume
• Fistula flow theoretically delay healing of fistulous site
• **Goal** is to maintain adequate ventilation and oxygenation while reducing the fistula flow and allow the repair to occur
• Lowest effective VT
• Fewest mechanical breaths per minute
• Lowest level of PEEP – reduce airway pressure
• Shortest inspiratory time
• Use greatest number of spontaneous breaths per minute
• Intermittent mandatory ventilation better than control ventilation
• Permissive hypercapnia and accept a lower arterial oxygenation

*High Frequency ventilation*
• No experience in this ICU
• Remains controversial in terms of benefit
• However, better at controlling pO\textsubscript{2} and pCO\textsubscript{2} than conventional ventilation

*Independent Lung Ventilation*
• Limited experience in this ICU
• For unilateral BPF
• Patient intubated with **double lumen tube**
• Need 2 ventilators (synchronous or asynchronous)
• Conventional ventilation of unaffected lung, affected lung either ventilated with lower pressures and volumes or with CPAP alone
• Guided by volume of air leak, haemodynamic and gas exchange stability
• Short term solution, bridge to surgical intervention