General

- The terms COPD or COAD are applied to patients with chronic bronchitis and/or emphysema

Aetiology

- Environmental factors:
  - Tobacco smoke
  - Air pollution
- Host factors:
  - Balance between circulating proteases and antiproteases (e.g., alpha 1 antitrypsin deficiency)
  - Antioxidants (vitamins A, C, & E)

Differential Diagnosis

- 1. Chronic asthma
- 2. Bronchiolitis obliterans
- 3. Bronchiectasis
- 4. CCF

Causes of Exacerbation

- Uncontrolled oxygen administration:
  - May precipitate acute hypercapnia in patients with more severe COPD due to:
    - Shunting to low VQ units and decreasing dead space
    - Loss of hypoxic drive
    - Dissociation of CO2 from Hb molecule (Haldane effect)
    - Anxiolysis and reduction in tachypnoea
- Bronchodilators:
  - Bronchodilators are routinely given in all exacerbations of COPD because a small reversible component of airflow obstruction is common & bronchodilators improve mucociliary clearance
  - Anticholinergic agents:
    - Ipratropium bromide 500mcg neb initially 2 hourly & then 4-6 hourly
  - Beta agonist:
    - Combination with ipratropium has been shown to be more effective than either agent alone
  - A weak bronchodilator in COPD
- Steroids:
  - In acute exacerbations of COPD, short-term steroids have been shown to improve airflow obstruction in those patients requiring mechanical ventilation for COPD; they should be avoided if the exacerbation is clearly due to pneumonia without bronchospasm

Antibiotics

- Antibiotics have an accepted role in the treatment of infection-induced exacerbations of COPD

Secretion clearance techniques:

- Chest physiotherapy
- Nebulised mucolytic agents
- Oral or nasopharyngeal suctioning
- Bronchoscopy (indicated for complications)

Clinical Features

- Mild disease (e.g., FEV1 50-70% predicted):
  - An expiratory wheeze on forced expiration and mild exertional dyspnoea may be the only symptoms
- Moderately severe COPD (e.g., FEV1 30-50% predicted):
  - Moderate to severe exertional dyspnoea is associated with clinical signs of hyperinflation & increased work of breathing
- Severe COPD (e.g., FEV1 <30% predicted normal):
  - Marked accessory muscle use is associated with tachypnoea at rest, pursed lip breathing, hypoxaemia & signs of pulmonary hypertension and cor pulmonale

Mechanical ventilation technique:

- Goals of mechanical ventilation are to support ventilation while reversible components improve, to allow respiratory muscle to rest and recover whilst preventing wasting from total inactivity and to minimise dynamic hyperinflation
- Excessive dynamic hyperinflation must be avoided by using a low minute ventilation & allowing time for expiration
- Dynamic hyperinflation can be assessed by:
  - Clinical judgement
  - Visualisation of the expiratory flow curve
  - Measurement of plateau pressure (end inspiratory pause of 0.5s) - if >2.5cmH2O then there is likely to be dynamic hyperinflation if chest wall compliance is low
- Measurement of intrinsic PEEP (prolonged expiratory pause) - provides a direct assessment of dynamic hyperinflation

Mechanical Ventilation Technique

- Indications for invasive mechanical ventilation include:
  - The clinical appearance of fatigue & impending respiratory collapse despite non-invasive ventilatory support
  - Deterioration of consciousness state due to fatigue, hypercapnia or both
  - Hypoxia refractory to high levels of inspired oxygen
  - Deterioration due to failure of secretion clearance
  - Respiratory arrest

Investigations

- Spirometry - allows confirmation of clinical diagnosis & determining severity of disease
- Flow-volume loops - demonstrate reduced expiratory flow rates at various lung volumes & show characteristic 'concave' expiratory flow pattern
- CXR - will commonly show hyperinflated lung fields, flattened diaphragms & a paucity of lung markings; pulmonary hypertension is manifest by enlarged proximal & attenuated distal lung markings
- HRCT - can demonstrate characteristic appearances; HRCT scans are less sensitive than standard CT scans for detecting pulmonary lesions such as neoplasms

Echocardiography

- ECG - commonly normal but may show features of right atrial or RV hypertrophy & RV strain, including P pulmonale, right axis deviation, RBBB & ST depression or inversion in V1-V3