

NURS 821 Alterations in Respiration and Ventilation

Lecture 7

Part 2 Alterations in Ventilation-Lower Airway Obstruction

Alterations in Perfusion

Lower Airway Obstruction

Bronchiectasis

- **Definition**-Chronic disease of bronchi and bronchioles
- **Incidence**-M=F, usually starts in childhood
- **Etiology**-Usually preceded by URI progressing to bronchopneumonia; CF; mucus plugs; foreign body; congenital wall weakness

Bronchiectasis

- **Pathophysiology**-plugging of smaller bronchioles by secretions or obliteration by fibrosis
 - Fibrous scarring leads to irreversible bronchiole destruction and dilation, chronic stasis, infection-cycle
 - Combined bronchospasm and copious purulent secretions
 - Large anastomoses develop between bronchial and pulmonary blood vessels leading to increased blood flow through bronchial circulation
 - Manifestations-hemoptysis, VQ abnormalities

Bronchiectasis

- | | |
|---|--|
| • Areas affected -
Increased incidence in lower lobes, then spreads | Manifestations <ul style="list-style-type: none">- Infection S+S- Clubbing- Hypoxemia- Cor pulmonale |
| • Manifestations - <ul style="list-style-type: none">- expectorant -voluminous yellow-green- Cough- Hemoptysis | |

Atelectasis

- Definition-lung tissue collapse
 - Types
 - **Compression**-external pressure causes collapse
 - **Absorption**-removal of air from obstructed or hypoventilated alveoli; inhalation of concentrated oxygen or anesthetics
- Hypoventilation**-pore of Kohn closes not allowing collateral ventilation leading to lung collapse
- Manifestations**-D, cough, F, leukocytosis

Pneumothorax

- **Definition:** Atmospheric air in pleural space causing increased intrapleural pressure and altered lung mechanics
- **Open or communicating pneumothorax**-atmospheric air can enter and exit lung
- **Tension pneumothorax**-air enters but can not exit pleural space causing increased pressure and lung collapse with mediastinal shift toward unaffected lung
 - Decreases venous return to heart
 - Life threatening

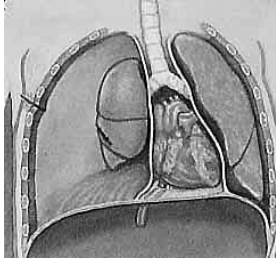
Pneumothorax

- Etiology
 - Ruptured emphysematous bleb
 - Trauma, knife, gunshot
 - Fractured rib
 - Spontaneous-increased incidence in tall, long-waisted athletes; usually recurrent.

Pneumothorax Pathophysiology

- Chest wall and parietal pleura disruption causing atmospheric air to enter
- Lung air enters due to disruption of visceral pleura
- Causes affected lung to collapse around hilus
- May push mediastinum toward other lung, causing decreased venous return, shock
 - Tension pneumothorax-air enters pleura on inspiration but check-valve deformity blocks escape

Pneumothorax



Pneumothorax Manifestations

- Depends on whether tension or not
- Tension-severe pain and may go into shock rapidly
- Open pneumothorax-allows entry and exit of atmospheric air-may be relatively asymptomatic

Etiologies of Pleural Effusion

- **Transudate**
- **Exudate**
- **Empyema**
- **Hemothorax**
- **Chyllothorax**
- Watery fluid diffusing out of capillaries beneath pleurae
- Fluid rich in proteins
- Infectious byproducts dumped into pleural space blocked lymphatic vessels
- Hemorrhage into pleural space
- Chyle dumped by lymphatic vessels into pleural space

Pleural Effusion

- Effusion into pleural cavity causes compression of affected lung
- May progress without symptoms until large enough volume to cause s.o.b
- Symptom of another problem

Alterations in Perfusion

Pulmonary Embolism

- Definition-pulmonary blood vessel occlusion by matter traveling to lungs
- Etiology-usually deep vein thromboemboli; air, metastases, catheter tips
- Population at risk-anyone with venous stasis, dehydration, hypercoagulability disorders, birth control pills

PE Pathophysiology

- Matter travels to right lung, lodging in pulmonary capillary bed leading to blood flow obstruction, ischemia, and may infarct
- Decreased pulmonary perfusion leads to hypoxic vasoconstriction, may cause VQ abnormalities
- Decreased surfactant, neurohumoral substances release, pulmonary edema, atelectasis
- Results in increased pulmonary artery pressure, RV workload, RHF

PE Manifestations

- Vary with embolus size
- May be silent
- Pain-mild, moderate, severe; pleural, deep, crushing, like MI
- Fever, cough, hemoptysis, tachypnea, tachycardia with S3 or S4 gallop, anxiety, restlessness; rales, wheezing, diminished breath sounds on affected side

Genetic Basis of Primary Pulmonary Hypertension Identified

- **Definition**-increased pulmonary artery pressure leading to increased right-sided heart workload
- **Rare**, usually fatal lung disorder primarily affecting women of child bearing age
- Untreated leads to death in 3-5 years
- Two groups of independent investigators identified the gene responsible for PPH
- BMPR2 gene regulates lung growth; abnormalities lead to abnormal proliferation of cells in pulmonary vasculature (NHLBI, 2000)