Chapter 24 – Hemoptysis

Episode overview:

1) Describe the management of massive hemoptysis
2) List the 12 causes of hemoptysis

Wisecracks:

1) How do you tease out other hemoptysis mimics?

Rosen’s in Perspective

- Expectoration of blood arising from the respiratory tract below the cords
- Most cases this is a small amount of blood tinged sputum, due to bronchitis
- 1-5% of patients have massive hemoptysis:
  - >100-600mL of blood in 24 hours (Rosen’s)
  - Can lead to shock, impaired gas exchange, with mortality >80%

Uptodate: “In our clinical practice, we define massive hemoptysis as either ≥500 mL of expectorated blood over a 24 hour period or bleeding at a rate ≥100 mL/hour, regardless of whether abnormal gas exchange or hemodynamic instability exists.”

Pathophysiology

Caused by a vascular disruption within the trachea
- Involving bronchi, small, airways, and/or lung parenchyma
- Vascular structures involved include capillary beds, bronchial arteries and/or the pulmonary arteries

Related Anatomy

I. Trace Hemoptysis (capillary beds)
II. Massive Hemoptysis (bronchial or pulmonary arteries)

**Bronchial arteries:**
- Direct branches from the thoracic aorta
  - Supply oxygenated blood to the lung parenchyma
  - They are smaller in caliber, but are HIGH PRESSURE
- Disruptions due to arteritis, trauma, bronchiectasis, or malignant erosion results in sudden, massive hemorrhage
- They are the culprit vessels in **90% of hemoptysis** requiring embolization

**Pulmonary arteries**
- Transmit large volumes of blood, but at lower pressures
- LESS likely to be the cause of hemoptysis
1) Describe the management of massive hemoptysis

Rapid assessment and stabilization:
- **Most lethal sequelae is hypoxia** (V/Q mismatch)

Identify Massive Hemoptysis
RIGHT SETTING – CALL FOR HELP
ABC – IV – O₂ – MONITORS – Advanced Airway to Bedside
- Need to identify massive hemoptysis
- Attempt to recognize which lung is the source of bleeding
- Seriously consider early intubation

Initial Steps:
1. Affected lung in down position to maximize gas exchange
2. **Large bore 8.0 ETT** into “good” lung
   - Attempt right mainstem intubation if left lung is bleeding using 90 degree twist to the right
3. Double lumen ETT
   - If unable to oxygenate patient, for lung isolation ventilation

Get them to CT Scan once airway is secured

2) List 12 causes of hemoptysis

**MNEUMONIC TO HELP WITH THIS LIST**

“SPITS”
- **Structural**
  - Neoplasm
  - Trauma
  - Foreign body
- **Pulmonary**
  - Bronchitis, bronchiectasis, tuberculosis,
  - Pneumonia, lung abscess, fungal infection
- **Iatrogenic**
  - Post-lung core biopsy
  - Aorto-tracheal fistula post aneurysm repair
- **Thrombosis**
  - Pulmonary embolism
  - Coagulopathy from cirrhosis or warfarin
  - DIC
  - Platelet dysfunction
Systemic
- Congenital heart disease (kids)
- Valvular heart disease
- SLE, vasculitis, goodpastures syndrome

In essence the causes are vessel injury due to:
- Acute and chronic inflammation (bronchitis / arteritis)
- Local infection (lung abscesses, TB, aspergillosis)
- Trauma
- Malignant invasion
- Infarction - pulmonary embolus
- Fistula formation

Some Key Etiologies to Remember
- Bronchiectasis
  - Chronic necrotizing infection
    - This leads to bronchial wall inflammation and dilation
    - One of the most common causes of massive hemoptysis
    - Can complicate necrotizing pneumonia, TB, CF
  - Hemorrhage control requires SURGERY
- Iatrogenic hemoptysis
  - Complicates 2-10% of procedures, especially lung biopsies
- Diffuse alveolar hemorrhage
  - Can be seen with autoimmune vasculitides
    - Wegener’s, SLE, Goodpasture’s syndrome
- Uncommon causes:
  - Catamenial hemoptysis - ectopic endometrial tissue within the lung leads to episodes of bleeding

Another recap:
- Most cases are due to:
  - Tuberculosis (TB)*
  - Bronchiectasis * or bronchitis
  - Cancer
  - Cystic fibrosis
  - AV malformations
  - Post-procedural complications

Massive hemoptysis in kids
- Infection
- Congenital heart disease
- Cystic fibrosis
- Bleeding from tracheostomy
Wisecracks:

1) How do you tease out other hemoptysis mimics?

Differential considerations:
- Must inquire about:
  1) Nasal, oral, hypopharyngeal bleeding
     - Mimickers of hemoptysis
       - Requires a thorough inspection of those tissues for potential contribution to hemoptysis
  2) Gastric or duodenal bleeding (GI)
     - Can be differentiated based on:
       - pH testing
       - Inspection:
         - Acidification of blood in the stomach - results in fragmentation: brown and black material “coffee grounds”

- Pulmonary blood:
  - Is bright red
  - Slightly darker clots
  - ALKALINE