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 – O_2 – 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:

i) Affected lung in down position to maximize gas exchange
ii) **Large bore** 8.0 ETT into "good" lung
    - Attempt right mainstem intubation if left lung is bleeding using 90 degree twist to the right
iii) 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

- Thrombocytopenia

- **Systemic**
  - **Congenital heart disease** (kids)
  - Valvular heart disease
  - SLE, vasculitis, goodpastures syndrome

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*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**