

Hemoptysis

Take Home Points:

1. Most hemoptysis is not massive, but true massive hemoptysis is a medical emergency. Patients die from asphyxiation or exsanguination.
2. The top 3 causes of massive hemoptysis are TB, bronchiectasis, and carcinoma. The mnemonic "BATTLE CAMP" may help you remember others.
3. Remember the 3 principles of management: 1) maintain airway patency and oxygenation, 2) localize the source of bleeding, 3) control hemorrhage.

Overview

- Definition of massive hemoptysis is unclear: criteria range from 100cc q day to 1000cc over a few days, and patient quantitation of blood loss is typically inaccurate.
- Massive hemoptysis can be fatal, with deaths occurring by exsanguination or asphyxiation from flooding of the alveoli with blood and intractable hypoxemia.
- Risk of death correlates strongly with amount of blood expectorated, rate of bleeding, amount of blood within the lungs, and underlying pulmonary reserve.
- Fewer than 5% of patients with hemoptysis expectorate large volumes of blood, but those who do have acutely fatal bleeds between 7 and 32% of the time.

Vascular Anatomy

- *The pulmonary circulation* carries deoxygenated blood from the right ventricle across the pulmonary capillary bed and returns oxygenated blood via the pulmonary veins. This is a low pressure circuit with normal pressures of 15-20/5-10 mmHg.
- *The bronchial circulation* is a nutritional source for the structural elements of the lung. Bronchial arteries branch from the aorta and are at systemic pressure. They can bleed profusely when airways are diseased.

Etiologies of Hemoptysis

"BATTLE CAMP": *Bronchitis, bronchiectasis, aspergilloma, tumor, tuberculosis, lung abscess, emboli, coagulopathy, autoimmune disorders, AVM, alveolar hemorrhage, mitral stenosis, pneumonia*

- *Tuberculosis* may cause hemoptysis either in active disease (cavitary lesions, rupture of pulmonary artery aneurysms) or as late sequelae (rupture of aneurysms or secondary to bronchiectasis). Rupture of *Rasmussen's aneurysm* can occur with active disease or as a late finding. It occurs when there is rupture of ectatic portions of the pulmonary arteries traversing thick-walled cavities.
- *Bronchiectasis* is due to destruction of the cartilaginous support of the bronchial wall by infection or bronchial dilatation owing to parenchymal retraction from alveolar fibrosis. This causes bronchial artery hypertrophy and augmentation of anastomoses with the pulmonary artery bed.
- *Fungal infection* (mycetomas) forms in patients with preexisting cavitary disease.
- *Lung abscess* causes hemoptysis, probably because of necrotizing effects of the primary infection on lung parenchyma and vasculature.
- *Mitral Stenosis or congenital heart disease* cause hemoptysis via pulmonary hypertension, which lead to varices in the submucosa of the bronchial walls.
- *Carcinoma* 7-10% of patients with bronchogenic carcinoma present with blood streaked sputum; massive hemoptysis is rare. Vast majority of primary lung cancers associated with hemoptysis are squamous in origin. In metastatic lung disease, hemoptysis is most often attributable to endobronchial lesions. Among patients with hematologic malignancies, hemoptysis is most often secondary to fungal infection.
- *Iatrogenic hemoptysis* results from bronch., transthoracic needle bx or PA cath. use.
- *Autoimmune disorders* accounts for a spectrum of disease, most related to vasculitides (ie Behcet's, PAN, SLE)

Management (3 principles)

- ***Maintain of airway patency.*** Asphyxiation is the most frequent complication of massive hemoptysis. Obtain urgent **CXR** and **ABG** to assess the status of oxygenation and the amount of blood in the lung. If emergent intubation needed, use a **8mm catheter or larger** (so that bronchoscopy can be performed). Monitor pts in the **ICU**. If bleeding site is known, place pt. in the **lateral decubitus position** with the affected lung in the dependent position. Obtain good venous access.
- Routine lab data includes **CBC, BUN/CR, PT/PTT and U/A.**
- ***Localize the source of the bleeding.*** If there is any doubt, the source of the bleeding (pulmonary vs GI vs ENT) should be ascertained. Hematemesis tends to be darker (hemoptysis is bright red). In addition, hemoptysis will be alkaline, whereas hematemesis is usually acidic. If needed, indirect visualization of the pharynx and larynx can be done to determine an ENT source.
- In general, early **bronchoscopy** is the procedure of choice. **Flexible bronch.** should be performed on patients (who should be intubated prior to this). If bleeding is so rapid to make visualization difficult, then **rigid bronch.** can be used (more effective suction). If bronchoscopy is unsuccessful, **angiography** can be performed.
- ***Control the hemorrhage.*** Correct **coagulopathy**. Bronchoscopic techniques include: *irrigation with cold saline, topical administration of vasoconstrictive agents, endobronchial tamponade, and unilateral lung ventilation.* If bleeding is severe, place a **double lumen endotracheal tube** (permits ventilation of both lungs, while preventing aspiration from one lung to another).
- **Pulmonary angiography and embolization** is an increasingly popular method of controlling bleeding, and has replaced the need for emergent surgery in many patients. Used principally for bleeds involving high pressure bronchial circulation (accounts for most cases of massive hemoptysis anyway). If bleeding persists after bronchial and collateral systemic arteriography, the pulmonary arteries should be examined. Alveolar hemorrhage, particularly in autoimmune diseases, may need high steroid doses for management.
- **Consider surgery** for lateralized uncontrollable massive hemoptysis unresponsive to other measures or as a definitive therapy in patients whose hemoptysis and general medical condition have stabilized.

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UpToDate 10.2 on hemoptysis

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