



Hemoptysis

Focus on airway and stop the bleeding

BY MOHIT BHUTANI, MD

Hemoptysis is the expectoration of blood from the respiratory tract. This potentially serious symptom can range from mild blood-streaking of sputum to the coughing up of frank blood. Generally, massive hemoptysis is defined as the expectoration of 100-1,000 mL of blood in 24 hours. The differential diagnosis is quite broad. In children, lower respiratory tract infection or foreign body aspiration is often the culprit. In adults, the most common causes are acute bronchitis, bronchogenic carcinoma, bronchiectasis and pneumonia. The initial approach is to ensure cardiopulmonary stability, assessing the patient with the ABCs (airway, breathing, circulation). In massive hemoptysis, airway protection is of prime concern and may require the expertise of physicians trained in this area. While mild hemoptysis is often due to bronchitis or infection, continual or massive bleeding requires localization of the source, using bronchoscopy or computed tomography (CT).

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Physical exam

- vital signs: heart rate, blood pressure (postural drop), temperature, respiratory rate, O₂ saturation
- head and neck: sinus tenderness, epistaxis, nasal ulcerations, telangiectasias, lymph node enlargement
- cardiovascular: jugular venous pressure, heart murmur, cardiomegaly, leg swelling
- respiratory: accessory muscle use, crackles, wheezes, bronchial breath sounds
- abdominal: hepatosplenomegaly
- integument: petechiae, bruising, rash
- musculoskeletal: clubbing, joint inflammation

Differential diagnosis

Tracheobronchial source

- acute or chronic bronchitis
- bronchogenic carcinoma
- bronchiectasis, including cystic fibrosis
- non-iatrogenic or iatrogenic trauma
- foreign body aspiration

Pulmonary vascular origin

- pulmonary thromboembolism
- pulmonary arteriovenous malformations, e.g. hereditary hemorrhagic telangiectasia
- mitral valve disease, especially stenosis
- congestive heart failure (CHF)
- aortic aneurysm
- anatomical variations

Pulmonary parenchymal source

- infection — bacterial, fungal, tuberculosis (TB), lung abscess
- pulmonary hemorrhage syndromes — e.g. Wegener's granulomatosis, microscopic polyangiitis, pulmonary capillaritis, Goodpasture's syndrome

Other

- coagulopathy
- drugs, e.g. ASA, cocaine, thrombolytics
- epistaxis
- catamenial hemoptysis
- idiopathic

Medical history

- epistaxis and hematemesis
- foreign body aspiration
- duration and quantity of hemoptysis
- age
- smoking history
- symptoms of respiratory tract infection
- history of recurrent infections
- chest pain
- cardiac risk factors
- change in colour of urine
- new rashes
- new joint inflammation
- immune compromise risk factors
- medications, especially anticoagulants
- history of coagulation disorders
- travel history
- TB risk factors or symptoms, e.g. fever, night sweats, weight loss
- trauma
- recent medical procedures

Cancer

- suspect cancer if there's no acute infection or if risk factors exist, even if chest x-ray is normal
- risk factors: male, age > 40, hemoptysis > one week, significant smoking history, previous malignancy
- further investigations: bronchoscopy, chest CT
- refer to pulmonary specialist

Bronchial artery angiography

- in rare cases of massive or continual hemoptysis
- consider as therapy, e.g. multi-detector row helical CT angiography
- reduces need for surgical intervention

References:

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- Remy-Jardin M et al. *Radiology* 2004;233(3):741-9.

Investigations

Routine tests

- guided by history and physical examination
- may include complete blood count, electrolytes, creatinine, chest x-ray, sputum gram stain and culture (including TB and fungal), electrocardiogram, urinalysis, international normalized ratio, prothrombin time

If clinically warranted

- arterial blood gases
- bronchoscopy or CT chest
 - case dependent, if there's no clear diagnosis
 - if there are risk factors for cancer
 - if hemoptysis is ongoing
- sputum cytology
- vasculitis: titres for antinuclear antibody, antiglomerular basement membrane antibody, antineutrophil cytoplasmic antibody (cANCA and pANCA); urinalysis
- liver disease: liver enzyme and function tests
- CHF or valvular disease: echocardiogram
- pulmonary embolism: D-dimer, Doppler leg ultrasound, ventilation/perfusion lung scan, CT chest with pulmonary embolism protocol
- pulmonary arteriovenous malformation: shunt study

Management

- ensure cardiopulmonary stability, assess the ABCs
- maintain airway — asphyxiation and not exsanguination is of prime concern
- if massive hemoptysis
 - establish large bore intravenous access for potential fluid resuscitation
 - if location of bleed is known, place patient with the bleeding side in the dependent position to protect non-bleeding lung
 - reverse anti-coagulation
- when suspecting TB, isolate patient immediately
- treat infections as per community acquired pneumonia protocols