# Hemoptysis

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PULMONOLOGIST

- ***Hemoptysis*:** is the expectoration of blood from the respiratory tract.
- The first step in evaluation is to ascertain whether the bleeding is coming from the respiratory tree or instead originating from the nasal cavities (i.e., **epistaxis**) or the gastrointestinal tract (i.e., **hematemesis**) as the therapies for these etiologies will be significantly different.

# ANATOMY AND PHYSIOLOGY OF HEMOPTYSIS

- Hemoptysis can arise from anywhere in the respiratory tract; from the **glottis to the alveolus**. Most commonly, bleeding arises from the **bronchi or medium sized airways,** but a thorough evaluation of the entire respiratory tree is often necessary

- A unique feature of the lung that predisposes to hemoptysis of varied severity is its **dual blood supply**—the pulmonary and bronchial circulations. The former is a low-pressure system that is essential to gas exchange at the **alveolar** level; in contrast, the **bronchial** arteries originate from the aorta and are under systemic pressure

# ETIOLOGY

- Infection
- vascular disease
- malignancy
- Pulmonary endometriosis
- Foreign body aspiration
- Diagnostic and therapeutic procedures
- thrombocytopenia, coagulopathy, anticoagulation, or antiplatelet therapy, even minor

# Infections

- Patients with **chronic bronchitis** are at risk for bacterial superinfection with organisms such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, or *Moraxella catarrhalis,* increasing airway inflammation and potential for bleeding.

- Due to **recurrent bacterial infection**, bronchiectatic airways are dilated, inflamed, and highly vascular, supplied by the bronchial circulation. In several case series, bronchiectasis is the leading cause of massive hemoptysis and subsequent death

- **Tuberculosis** had long been the most common cause of hemoptysis worldwide, In patients with tuberculosis, development of cavitary disease is frequently the source of bleeding but rarer complications such as the erosion of a pulmonary artery aneurysm into a preexisting cavity (i.e., **Rasmussen's aneurysm**) can also be the source

- **Other infectious :**
- endemic fungi
- *Nocardia,*
- nontuberculous mycobacteria
- *Aspergillus*
- Pulmonary abscesses
- necrotizing pneumonia *Staphylococcus aureus, Klebsiella pneumoniae*, and oral anaerobes

# Vascular

- **pulmonary edema** due to elevated left ventricular end-diastolic pressure. While the classic description of the sputum expectorated in pulmonary edema is "pink and frothy," a spectrum of hemoptysis including frank blood can be seen.

- A **pulmonary embolism** with parenchymal infarction can present with hemoptysis
  **pulmonary arteriovenous malformation**
  rupture of an aortobronchial fistula
  **aneurysm or pseudoaneurysm**
  and can cause small bleeding episodes that herald massive hemoptysis

# Diffuse alveolar hemorrhage (DAH)

- **immune-mediated capillaritis** from diseases such as systemic lupus erythematosus, **toxicity from cocaine** and other inhalants, and **stem cell transplantation**. The so-called "**pulmonary-renal" syndromes**, including granulomatosis with polyangiitis and anti-glomerular basement membrane disease, may lead to both hemoptysis and hematuria

- DAH more commonly presents with **diffuse ground glass opacities** on imaging and **anemia**, so the absence of hemoptysis should not exclude the diagnosis.

# Malignancy

- Bronchogenic carcinoma
- Small cell and squamous cell carcinomas
- Pulmonary metastases from distant tumors (e.g.,melanoma,sarcoma,adenocarcinoma as of the breast and colon)
- Kaposi's sarcoma

# Mechanical and Other Causes

- **Pulmonary endometriosis** causes cyclical bleeding known as catamenial hemoptysis.
- Foreign body aspiration can lead to airway irritation and bleeding
- pulmonary vein stenosis
- Finally, in the setting of thrombocytopenia, coagulopathy, anticoagulation, or antiplatelet therapy, even minor insults can cause hemoptysis.

# EVALUATION AND MANAGEMENT

- **History** The first step in evaluating hemoptysis is to determine the amount or severity of bleeding

- The first step in evaluating hemoptysis is to determine the **amount or severity of bleeding.** A patient's description of the sputum (e.g., flecks of blood, pink-tinged, or frank blood or clot) is helpful if you cannot examine it

- **Careful history** may point to the cause of hemoptysis. **Fever, chills, or antecedent cough may suggest infection.** A history of **smoking or unintentional weight loss makes malignancy** more likely. Patients should be asked about inhalational exposures.

- ***massive hemoptysis :*** blood loss of **400 mL in 24 hours** or **100–150 mL expectorated at one time**. These numbers derive from the volume of the tracheobronchial tree (generally 100–200 mL). This determination is clinically important as patients rarely die of exsanguination and, instead, are at risk of death due to **asphyxiation** from blood filling the airways and airspaces

- Most patients cannot describe the volume of their hemoptysis in mL, so using referents like **cups**
- Fortunately, massive hemoptysis only accounts for **5–15%** of cases of hemoptysis

# Physical Examination

- **vital signs** :hypoxemia, tachypnea, and tachycardia
  **examine the nasal and oral cavities**; observe the patient's breathing pattern, with careful attention to any respiratory distress; and **auscultate** the lungs

- **Clubbing** can suggest underlying lung disease such as lung cancer or cystic fibrosis. Signs of bleeding diathesis (e.g., skin or mucosal ecchymoses and petechiae) or teleangectasias may suggest other predispositions to hemoptysis

# Diagnostic Studies

- Measurement of a **complete blood count** to assess for infection, anemia, or thrombocytopenia, coagulation parameters,
- measurement of **electrolytes and renal function**, as well as urinalysis to exclude pulmonary-renal disease

- All patients with hemoptysis need **chest imaging**. A chest radiograph is usually obtained first, though it frequently does not localize bleeding and can appear normal

- In patients without risk factors for malignancy and with a normal chest radiograph, treating for **bronchitis** and ensuring close follow-up is a reasonable strategy, with further diagnostic workup if bleeding persists.

- patients with risk factors for malignancy (i.e., **age >40 or a smoking history**) should undergo additional testing. First, chest computed tomography **(CT)** should be obtained to better identify masses, bronchiectasis, and parenchymal lesions.

- Following CT, a **flexible bronchoscopy** should be performed to exclude bronchogenic carcinoma unless imaging reveals a lesion that can be sampled without bronchoscopy. Small case series show that patients with hemoptysis and unrevealing bronchoscopies have good outcomes

# Interventions

- hemoptysis is massive:
- **first**, protect the non-bleeding lung
- **second**, locate the site of bleeding
- **third**, control the bleeding

- If the side of bleeding is known, the patient should be positioned with the **bleeding side down**, to use gravitational advantage to keep blood out of the non bleeding lung.

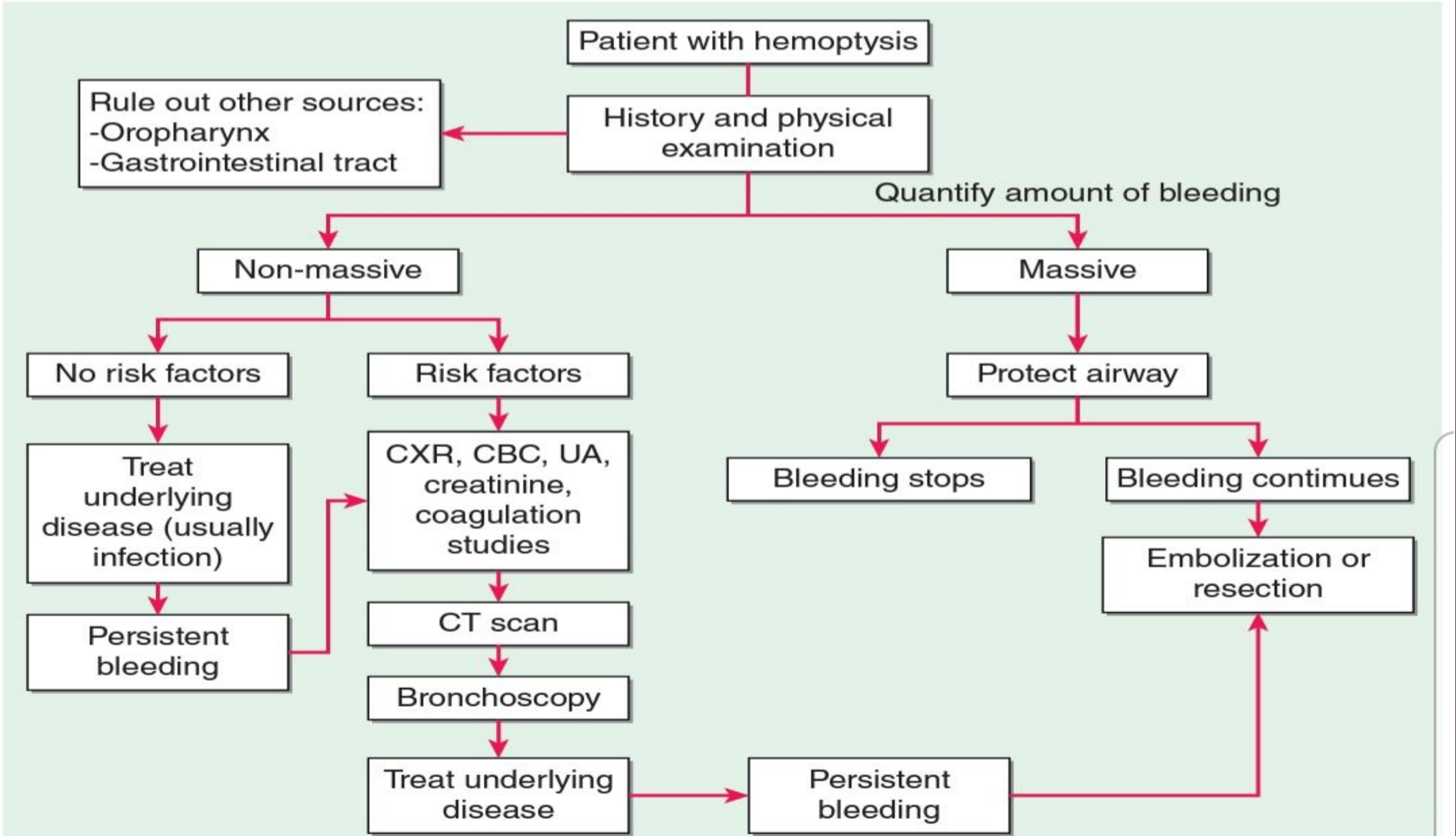
- **Endotracheal intubation** should be avoided unless truly necessary, since suctioning through an endotracheal tube is a **less** effective means of removing blood and clot than the cough reflex.

- If intubation is required, take steps to protect the non-bleeding lung either by **selective intubation of one lung** (i.e., the non-bleeding lung) or insertion of a **double-lumen** endotracheal tube

- A chest radiograph, if it **shows new opacities**, can be helpful in localizing the side or site of bleeding, though this test is not adequate by itself. **CT angiography** helps by localizing active extravasation.

- **Flexible bronchoscopy** may be useful to identify the side of bleeding (although it has only a 50% chance of locating the site).

- **Rigid bronchoscopy**, done by an interventional pulmonologist or thoracic surgeon,may allow therapeutic interventions of bleeding airway lesions such as **photocoagulation and cautery.**


Patient with hemoptysis
History and physical examination
Rule out other sources:
-Oropharynx
-Gastrointestinal tract
Quantify amount of bleeding
Non-massive
Massive
No risk factors
Risk factors
Protect airway
Treat underlying disease (usually infection)
Persistent bleeding
CXR, CBC, UA, creatinine, coagulation studies
CT scan
Bronchoscopy
Treat underlying disease
Persistent bleeding
Bleeding stops
Bleeding contimues
Embolization or resection

# summary

- ***Hemoptysis*:** is the expectoration of blood from the respiratory tract.
- **ETIOLOGY**infection,malignancy Vascular disease
- **Careful history**
- **Physical Examination**
- **Diagnostic Studies: complete blood count electrolytes and renal function**
- CXR for all patiants.computed tomography **(CT) age >40 or a smoking history**
- **flexible bronchoscopy**

# THANKS FOR ATTENTION