INVESTIGATION AND MANAGEMENT OF HEMOPTYSIS
Hemoptysis is an important sign of an underlying disease.
Mortality rate can be as high as 80%.
Upto 30% of patients have no cause identified even after careful evaluation.
Massive hemoptysis is life threatening due to asphyxia, not so much as due to hypovolemia.

Bleeding that results in respiratory distress and altered gas exchange is life threatening regardless of amount of blood.

Amount of blood expectorated not necessarily represents the total amount lost into the air spaces.
Diagnostic Approach

- **Stabilisation of Patient**
  - Patient with Massive hemoptysis need rapid establishment of airway patency, prevention of suffocation and control of bleeding.

- **Diagnosis**
  - Secondary goal is to determine the site of bleeding and cause.
## Where is it from?

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Hemoptysis</th>
<th>Pseudo Hemoptysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin of blood</td>
<td>Respiratory track</td>
<td>Oral cavity, Larynx, esophageus, stomach, Factitious</td>
</tr>
<tr>
<td>Cough</td>
<td>More likely</td>
<td>Less likely</td>
</tr>
<tr>
<td>Respiratory symptoms</td>
<td>More likely</td>
<td>Less likely</td>
</tr>
<tr>
<td>Esophagastical Symptoms</td>
<td>Less likely</td>
<td>More likely</td>
</tr>
<tr>
<td>Alcohol use, hepatic disease</td>
<td>Less likely</td>
<td>More likely</td>
</tr>
<tr>
<td>Vomiting, Nausea</td>
<td>Less likely</td>
<td>More likely</td>
</tr>
<tr>
<td>Hematemesis and malena</td>
<td>Less likely</td>
<td>More likely</td>
</tr>
<tr>
<td>Colour of expectorated blood</td>
<td>Bright red</td>
<td>Brown or black</td>
</tr>
<tr>
<td>Consistency of expectorate</td>
<td>Clotted or liquid</td>
<td>Coffee ground appearance</td>
</tr>
<tr>
<td>Frothiness of expectorate</td>
<td>Usually</td>
<td>Never or seldom</td>
</tr>
<tr>
<td>pH of expectorate</td>
<td>Alkaline</td>
<td>Acid</td>
</tr>
<tr>
<td>Alveolar macrophages in sputum</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Food particles in expectorate</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>Asphyxia</td>
<td>Common</td>
<td>Unusual</td>
</tr>
</tbody>
</table>
# Detailed History for Hemoptysis

## Pulmonary Symptoms

<table>
<thead>
<tr>
<th>Condition</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hemoptysis</strong></td>
<td>quantity, duration, number of episodes</td>
</tr>
<tr>
<td><strong>Sputum</strong></td>
<td>amount and quality</td>
</tr>
<tr>
<td><strong>Cough</strong></td>
<td>timing with respect to hemoptysis</td>
</tr>
<tr>
<td><strong>Dyspnea</strong></td>
<td>duration; at rest or with exertion</td>
</tr>
<tr>
<td><strong>Chest Discomfort</strong></td>
<td>location, quality, duration</td>
</tr>
</tbody>
</table>

## Nonpulmonary symptoms suggestive of underlying disease

<table>
<thead>
<tr>
<th>Condition</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Cardiac Disease</strong></td>
<td></td>
</tr>
<tr>
<td>Orthopnea</td>
<td></td>
</tr>
<tr>
<td>Leg edema</td>
<td></td>
</tr>
<tr>
<td>Paroxysmal nocturnal dyspnea</td>
<td></td>
</tr>
<tr>
<td>Angina</td>
<td></td>
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<tr>
<td>Renal Disease:</td>
<td></td>
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<tr>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>Hematuria</td>
<td></td>
</tr>
<tr>
<td>Edema</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Rheumatologic Disease/vasculitis:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint/muscle pains</td>
</tr>
<tr>
<td>Skin rash</td>
</tr>
<tr>
<td>Red/painful eye</td>
</tr>
<tr>
<td>Sinus congestion</td>
</tr>
<tr>
<td>Epistaxis</td>
</tr>
<tr>
<td>Weakness</td>
</tr>
<tr>
<td>Claudication</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Infectious disease or malignancy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
</tr>
<tr>
<td>Chills</td>
</tr>
<tr>
<td>Night sweats</td>
</tr>
<tr>
<td>Weight loss</td>
</tr>
<tr>
<td>Past Medical History</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td><strong>Pulmonary disease:</strong></td>
</tr>
<tr>
<td>Recurring respiratory tract infections</td>
</tr>
<tr>
<td>Chronic bronchitis</td>
</tr>
<tr>
<td>Lung Cancer</td>
</tr>
<tr>
<td>Tuberculosis (TB)</td>
</tr>
<tr>
<td>Bronchiectasis</td>
</tr>
<tr>
<td>Deep vein thrombosis (DVT)/pulmonary embolism (PE)</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
</tr>
<tr>
<td>Radiation pneumonitis/XRT</td>
</tr>
<tr>
<td><strong>Cardiac disease:</strong></td>
</tr>
<tr>
<td>CHF</td>
</tr>
<tr>
<td>Valvular heart disease</td>
</tr>
<tr>
<td>Thoracic aortic aneurysm</td>
</tr>
<tr>
<td><strong>Rheumatologic disease:</strong></td>
</tr>
<tr>
<td>Wegener's granulomatosis</td>
</tr>
<tr>
<td>SLE</td>
</tr>
<tr>
<td><strong>Renal Disease:</strong></td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Nephritis</td>
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<table>
<thead>
<tr>
<th><strong>Gastrointestinal disease:</strong></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Upper or lower gastrointestinal bleeding</td>
<td></td>
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<table>
<thead>
<tr>
<th><strong>Medications</strong></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Aspirin</td>
<td></td>
</tr>
<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
<td></td>
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<tr>
<td>Anticoagulants</td>
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<table>
<thead>
<tr>
<th><strong>Social History</strong></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Cigarette smoking</td>
<td></td>
</tr>
<tr>
<td>Drug/alcohol use</td>
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<tr>
<td>Occupational exposures</td>
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<tr>
<td>TB exposure/+ PPD</td>
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<tr>
<td>HIV testing</td>
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<tr>
<td>Travel history</td>
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</tr>
<tr>
<td>Family History</td>
<td></td>
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<tr>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>Hemoptysis</td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal bleeding</td>
<td></td>
</tr>
<tr>
<td>DVT/PE</td>
<td></td>
</tr>
<tr>
<td>Rheumatologic disease</td>
<td></td>
</tr>
</tbody>
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## Detailed Physical Examination for Hemoptysis

<table>
<thead>
<tr>
<th>Part of Physical Examination</th>
<th>Finding and Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital signs (Including orthostatics)</td>
<td>Positive orthostatic changes may suggest intravascular volume depletion, including that due to hemorrhage.</td>
</tr>
<tr>
<td>General appearance</td>
<td>Anxiety, diaphoresis as a result of the sight of expectorated blood itself or due to airway compromise. Wasting and cachexia can be present with malignancy or AIDS.</td>
</tr>
<tr>
<td>Eyes</td>
<td>Subconjunctival hemorrhage may result from retching and vomiting.</td>
</tr>
<tr>
<td>Nose</td>
<td>Close inspection of the nasal mucosa (including the septum) may reveal a nasal source of bleeding. Saddle nose deformity can be seen in Wegener’s granulomatosis.</td>
</tr>
<tr>
<td>Mouth and throat</td>
<td>Inspect the oral mucosa, tongue, and oropharynx for lesions which are actively bleeding or which appear to have bled recently oral ulcers may be seen in SLE or Behcet’s syndrome, both of which can be associated with hemoptysis due to pulmonary hemorrhage.</td>
</tr>
<tr>
<td>Part of Physical Examination</td>
<td>Finding and Relevance</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------</td>
</tr>
</tbody>
</table>
| **Cardiovascular**           | Murmur of mitral stenosis  
Left third heart sound in the appropriate setting suggests congestive heart failure  
Right ventricular gallop, a palpable pulsation at the left sound intercostal space (from a dilated left pulmonary artery), accentuation of the pulmonic component of the second heart sound all suggest pulmonary hypertension. |
| **Respiratory System**       | Generalized crackles may be heard in cases of alveolar hemorrhage  
Generalized wheezing may be heard with acute exacerbations of chronic bronchitis  
Pleural friction rub may be present in cases of pulmonary embolism with infarction  
Lung field bruit may be present in cases of AVM  
Inspiratory squeaks and rhonchi are often present with bronchiectasis  
A unilateral swollen leg is worrisome for DVT |
| **Gastrointestinal**         | Midepigastric discomfort with palpation may be present with peptic ulcer disease  
A small, nodular liver may be felt in cases of cirrhosis which may lead to the formation of esophageal varices. |
<table>
<thead>
<tr>
<th>Part of Physical Examination</th>
<th>Finding and Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genitourinary system</td>
<td>Diffuse edema (particularly scrotal edema in a man) is often present in renal disorders such as nephritis</td>
</tr>
<tr>
<td>Rheumatologic system</td>
<td>Hot, tender, erythematous joints may be present in diseases such as SLE, Behcet’s syndrome, or Wegener’s granulomatosis</td>
</tr>
</tbody>
</table>
| Skin                        | Multiple telangiectasias suggest HHT  
Palpable purpura suggest vasculitis  
Malar rash is sometimes present in SLE |
Laboratory Evaluation

- Complete blood count with platelet count
- Electrolytes, BUN and creatinine
- Liver functions
- PT, PTT
- Urine analysis
- Arterial blood gases
- Drug levels when suspected
- Blood grouping and cross matching
- Sputum stain and culture for Myc. T.B. and Fungi

- Cytology
- Bed side spirometry (Fitness of patient for surgery)
- Chest Roentgenogram
- Bronchoscopy
- Bronchography
- Computed tomography of chest
- Radio isotop scanning
- Angiography
Chest Roentgenogram

- Chest X-ray – suggestive of Pathology
- Normal Chest X-ray source of hemoptysis may be from larger bronchi, small focus within the parenchyma, or a site above the glottis.
Chest X-ray Pulmonary Tuberculosis
Bronchiectasis (Cystic Fibrosis)

- Bilateral diffuse
- Cystic Shadowes
- Peribronchial fibrosis
- Prominent hilum
- Hyperinflated chest
**Fungous Ball**

- Long standing cavity
- Containing round density (A)
- Mobile density
- Adjacent pleural reaction (B) - characteristic of aspergilloma
Old Chest X-Ray

Pulmonary Hemorrhage
- Acute onset
- Diffuse bilateral alveolar infiltrates
Chest X-ray  Pulmonary Infarction
Chest X-ray – solitary Pulmonary Nodule
Chest X-ray - Foreign Body Aspiration
Chest X-ray – Lung Cancer (Adenocarcinoma)
A CT scan of the chest revealing a tumor in the Periphery which turned out to be TB. The patient was 55 years old and presented with massive hemoptysis.
CT Scan - Fibroccavitary lung disease
CT Scan Bronchiectasis
CT Scan - ABPA

- C.T. Scan at level of inferior pulmonary vein demonstrates mucous plugging (black arrow) attenuation (straight white arrows) centrilobular nodules (arrow heads) bronchial wall thickening and bronchiectasis (curved arrows).
C.T. Scan – Bronchogenic Carcinoma

- These chest CT scan views demonstrates a large squamous cell carcinoma of the right upper lobe that extends around the right main bronchus and also invades into the mediastinum and involves hilar lymph nodes.
Chest X-ray
Pulmonary Embolism

Note enlarged right main pulmonary artery (arrows) and massive main pulmonary artery trunk (arrowheads).
CT Scan
Pulmonary Embolism
Chest X-Ray

CT Scan

Wegner’s Granulomatosis
Bronchoscopy (diagnostic)

- Fiberoptic bronchoscopy is most valuable diagnostic technique to evaluate the patient with hemoptysis.
- Bronchi two to three generations beyond the segmental level can be seen.
- Small biopsy can be obtained under direct vision from suspicious areas.
- Roentgenographic abnormalities lying in more peripheral areas can be entered using fluoroscopic guidance.
- Cytologic and bacteriologic studies can be performed on specimens obtained by brushing or lavage of deeper area.
- Many investigators have favored early bronchoscopy, that is during bleeding or within 48 hrs. of episode of hemoptysis.
- Studies have shown that bronchoscopy is more effective in localizing the site of bleeding if performed early (91% yield) than if performed late (50% yield).
- Some recommended diagnostic bronchoscopy in all smokers >40 years with hemoptysis because of high risk of lung cancer.
Diagnostic Procedures

- Bronchoscopy

**Flexible Fibreoptic Video Bronchoscope**

**Fibreoptic bronchoscopy**

**Rigid bronchoscope**

**Rigid Bronchoscopy**
Rigid Bronchoscope

- Set of stainless steel ventilating and non-ventilating rigid tubes, rigid forceps, and rigid bronchoscope with indwelling Hopkins lens 0° telescope.
Rigid bronchoscopy includes a rigid metal tube that permitted either spontaneous or mechanical ventilation.

With rigid bronchoscope, various types of telescopic rods equipped with circumferential illumination, permit direct and magnified visualization.

Various diagnostic and therapeutic accessories can be inserted through rigid bronchoscope while patient remains ventilated.

Flexible bronchoscope to a large extent has replaced rigid bronchoscope for both diagnostic and some therapeutic indication.
Although optical resolution of early fiberoptic bronchoscope was inferior to that of rigid devices. Their flexibility, ease of manipulation, and simplicity of use, under topical anesthesia, have made flexible bronchoscopy the primary endoscopic procedure in pulmonary diseases.

Flexible bronchoscopies are more fragile and more prone to damage than are rigid metal instruments.
Bronchoscopy

An actively bleeding tumor in the wall of the Bronchus seen using a fiber-Optic bronchoscope
Bronchoscopy

- Right upper lobe obstructed by extrinsic compression
- Fuzzy brush in left upper lobe
Fiberoptic bronchoscopy and HRCT are complementary studies.

HRCT demonstrates all tumors seen by bronchoscopy as well as several which were beyond bronchoscopic range.

HRCT will not detect bronchitis or subtle mucosal abnormalities seen by bronchoscopy.

HRCT particularly useful in diagnosing bronchiectasis and aspergillomas.

Bronchoscopy was diagnostic of bronchitis and mucosal lesion such as kaposis sarcoma.
Bronchography

- Bronchography is not used as frequently today as in the past for evaluating hemoptysis.
- Major value of bronchography is in establishing the presence and extent of bronchictasis.
- Clots within the bronchial lumen may cause contour irregularities and failure of normal fillings. So procedure is best performed, several weeks after bleeding has stopped.
Findings:

Normal upper and middle lobes

The branches to the lower lobe are slightly dilated and there is a lack of branch filling.
Angiography

- It is the procedure of choice for evaluation of pulmonary vascular bed.
- Important for diagnosing conditions like
  - Pulmonary embolism
  - Pulmonary AV fistula
  - Dilated and tortuous vessel
Angiography

a) Normal

b) There is a Filling defect in right and left pulmonary artery as well as blockage of their peripheral branches specially to superior lobe both sides, as well as branches to the inferior lobe at both sides. Recognize dilatation of main pulmonary artery caused by increase pulmonary artery pressure
Radioisotope Scanning

- Ventilation perfusion scanning is useful in diagnosing pulmonary embolism and infarction.
Algorithm For Evaluation of Hemothysis

ENT/GI source

Appropriate Evaluation
Consult ENT/GI

History/Physical exam

Quantity of blood

Non-massive

PE Suspected

V/Q scan or CT angiogram

CXR

massive

Ensure airway patency
Stabilize hemodynamics
Admit to hospital consider ICU monitoring consult specialty service:
- Pulmonary medicine
- Thoracic surgery
CXR

- Normal
  - Risk factors for malignancy:
    - Age > 40 + 40+ pack years smoking
    - Hemoptysis > 1 week
  - Hx consistent with bronchitis
    - NO
    - YES
      - NO
      - YES
        - Consider either bronchoscopy or HRCT

- Mass
  - NO
  - YES

- Diffuse process
  - NO
  - YES
    - HRCT
      - NO
      - YES
        - Specific diagnosis
          - NO
          - YES
            - Bronchoscopy
              - NO
              - YES

- AVM
  - Localized Bronchiectasis
  - Cavitary lesion
    - Consider immediate referral to interventional radiology for angiography and bronchial artery embolization
    - NO
    - YES
      - Rebleed
        - NO
        - YES
          - No further evaluation
          - Consider bronchoscopy
Management of Hemoptysis
Goal Of Therapy

- Stop the bleeding
- Prevent aspiration
- Treat the underlying cause
Initial Management

- Insuring adequate airway protection, ventilation and cardiovascular function.
- Patients with poor gas exchange, rapidly ongoing hemoptysis, hemodynamic instability, or severe shortness of breath should be orally intubated.

Protection of the non bleeding lung

- Placing the bleeding lung in a dependent position may prevent blood spillage into the non bleeding lung
- Placement of a single lumen endotracheal tube into opposite mainstem bronchus.
- Placement of double lumen endotracheal tube
Drugs to control hemoptysis

COAGULANTS

These are the agents which promote coagulation and are indicated in haemorrhagic states.

1. **Vitamin K**:
   - **K1** (From plants, Fat soluble) – Phytonadione (Phylloquinone)
   - **K2** (Produced by bacteria) – Menaquinones
   - **K3** (Synthetic) Fat Soluble
     - **K3a** (Fat Soluble) – Menadione
     - **K3b** (Water Soluble) – Menadione Sod Bisulfite
     - **K3c** (Water Soluble) – Menadione Sod diphosphate

2. **Miscellaneous**:
   - Fibrinogen (Human)
   - Anti Haemophilic Factor
   - Adrenochrome monosemicarbazone
   - Rutin, Ethamsylate.

3. **Local Haemostatics (Styptics)**
   - Thrombin, fibrin, gelatin foam, russels viper venom, vasoconstrictors
   - astringent
**Vitamin K** – It acts as a cofactor at a late stage in the synthesis by liver of coagulation proteins- Prothrombin, factors VII, IX, X. Vitamin K is metabolized in liver by side chain cleavage and glucuronide conjugation, metabolites are excreted in bile and urine.

**Fibrinogen** – Fibrinogen fraction of human plasma is employed to control bleeding in hemophilia, anti-hemophilic globulin (AHG) deficiency.

**Dose – 0.5 gm infused IV**

**Anti Hemophilic Factor** – It is concentrated human AHG Prepared from pooled human plasma. It is indicated in hemophilia and AHG deficiency.

**Dose – 5-10 u/kg. IV infusion repeated 6-12 hrly.**
**Adrenochrome Monosemicarbazone** – It is believed to reduce capillary fragility, control oozing from raw surfaces and prevent microvessel bleeding.

**Dose** – 1 - 5 mg. oral, IM

**Interactions**: Antihistaminics reduce the efficacy of Adrenochrome Monosemicarbazone

**Contraindications**: Hypersensitivity

**Rutin** – It is a plant glycoside claimed to reduce capillary bleeding.

**Dose** – 60mg BD – TDS along with Vitamin K which facilitate its action. Its efficacy is uncertain.

**Ethamsylate** – It reduces capillary bleeding when platelets are adequate. It inhibits prostacycline synthetase enzyme resulting in the prevention of prostacycline induced vasodilation and anti platelet aggregation.

**Contraindication**: Hypersensitivity, porphyria, h/o of Thombocytopenic purpura or hemophilia.

**Side Effects** – Nausea, Rash, Headache, Fall in BP (Only after IV Inj.)

**Dose** – 250 – 500 mg BD – TDS oral / IV
**Botropase** – it is an aqueous solution of haemocoagulase isolated from venom of *Bothrops Jararaca* or *Bothrops atorox* containing 0.9% of sodium chloride.

**Contraindication:** Arterial Thrombosis, Venous Thrombosis

**Dose** – Adult: 1ml IM SOS or upto 2-3 times a day

Children: 0.5-0.75cc according to age of child and seriousness of haemorrhage
Bronchoscopy (Therapeutic)

- Lavage with iced saline
- Application of topical epinephrine (1:20,000) vasopressin, thrombin, or a fibrinogen thrombin combination.
- None of these methods has been tested in controlled trials.
- Localized bleeding mucosal lesion - laser therapy or electrocautery.
- Balloon tamponade of the bleeding site
- Fogatry balloon catheter can be passed through the instrument, inflated and the bronchoscope removed leaving the wedged catheter in place.
Insertion of cuffed endotracheal tube into the non bleeding lung. (inflation of balloon protects the lung from aspiration)

A double lumen carlen’s type endotracheal tube is used for simultaneous lavage of bleeding site and maintainence of ventilation, in other lung.
Bronchoscopy

• Primary Squamous Cell Carcinoma in Trachea
• During Laser Therapy
• Adeno Carcinoma in Distal Trachea
• Endobronchial Tumor in left main bronchus
Arteriographic Embolization

Bronchial arteriography with embolization is another alternative under selected circumstances.

Small pieces of gelfoam are introduced into bronchial vessels.

Long term success is variable, as even with complete occlusion of bleeding artery recanalization of vessel or development of collateral blood supply may occur with resulting relapse.

Arteriographic embolization stops bleeding in more than 85% of the time.

Embolization is only “semi definitive” because rebleeding occurs in 10-20% of patients over next 6 to 12 months.
Surgery

- Surgical resection is the final alternative.
- Patients pulmonary functions must permit resection.
- Relative contra indications
  - Sever underlying pulmonary disease, active TB, diffuse underlying lung disease (cystic fibrosis, multiple AVM’s, multifocal bronchiectasis and diffuse alveolar hemorrhage)
  - Morbility and mortality are significantly greater with emergency surgery for persistent massive bleeding compared with elective surgery.
Management of Minor Hemoptysis

Patient presenting with minor hemoptysis

Chest radiograph

Abnormal

Further workup based on findings
- Sputum acid-fast bacillus smear and culture
- Sputum cytologic examination
- High-resolution chest CT scan
- Fiberoptic bronchoscopy
- Other studies

Normal

Treat for bronchitis
- Oral broad-spectrum antibiotic
- Mild antitussive agent
- Sputum cytologic examination if cough is productive

Consider chest CT scanning and fiberoptic bronchoscopy if:
- Hemoptysis lasts longer than 1 or 2 weeks
- Hemoptysis is recurrent
- Volume of hemoptysis is >30 mL/day
- Patient is smoker >40 years old
- Bronchiectasis is suspected
Management of Massive Hemoptysis

Patient presenting with massive hemoptysis

Admit to intensive care unit

Perform the following as needed:
- Stabilize airway
- Monitor oxygenation
- Intubate for acute respiratory failure
- Correct coagulopathy or thrombocytopenia
- Obtain cardiothoracic surgical consultation
- Perform emergency bronchoscopy
- Consider endobronchial techniques
- Consider bronchial arterial embolization

Bleeding uncontrolled
- Perform emergency surgical treatment

Bleeding controlled
- Consider elective resection if patient is surgical candidate
Recommendations

1. First stabilize the patient and then perform early bronchoscopy along with other appropriate diagnostic studies.
2. If the patient continues to bleed aggressively, arteriography is most reasonable for localization and therapy.
3. If bleeding persists despite embolization or if patient is too ill to go to arteriography, then blockade therapy or double lumen tube should be considered.
4. While surgery remains the only truly definitive therapy. It should not be used in the acute emergent setting unless it cannot be avoided.
Complications

- As little as 150ml of blood is enough to cause asphyxation and death.
- Mortality is due to asphyxation, not exsanguination
- Hypotension
- Anemia
Special Circumstances

- Warn patient who have had multiple episodes of hemoptysis just because one episode was self limited, does not mean that next episode will behave same. Patients with AVM and telangiectasia are at risk of recurrence and should be advised.

- Patient with CF and chronic bronchiectasis should be advice to contact physician with any bout of hemoptysis.

- Pregnancy and its associated increase in blood volume can exacerbate condition associated with hemoptysis.
Follow Up

If no cause is found and malignancy or systemic disease is not suspected, instruct in patient to return in 2 to 4 week to be reevaluated.
Self Care Instructions

- Contact your physician whenever you cough up blood.
- Remember each episode of coughing of blood is unpredictable and next episode may be much more difficult to control than any previous episode.
All the best..