Management of Hemoptysis
Definition

• Coughing up of blood or bloody sputum.
• Frightening event: Patients & ± Doctors
• Manifestation of underlying disease process.
• Amount varies: Trivial → large amount.
Causes of hemoptysis

• **Common:**
  - Bronchitis
  - Tuberculosis
  - Bronchiectasis
  - Bronchogenic carcinoma
  - Pneumonia / Lung abscess
  - Pulmonary embolism & infarction
  - Left ventricular failure / MS
Causes of hemoptysis

- **Uncommon:**
  - Other 1ry lung neoplasm / Metastatic malignancy
  - Traumatic or Iatrogenic lung injury: Chest injury/ Bronchoscopy/ Lung biopsy/ Pulmonary artery catheterization.

- **Rare:**
  - Fungal & parasitic infections
  - Alveolar hemorrhage syndromes
  - Sarcoidosis
  - A-V malformation
  - Idiopathic Thrombocytopenia / Coagulopathy
  - Drug induced: Thrombolytics/Penicillamine/ Amiodarone
Approach to management

• Does the patient truly have hemoptysis?
• Severity of hemoptysis?
• Presenting Clinical manifestation(s)?
• Diagnostic tests?
• Therapy of hemoptysis?
Does the patient truly have hemoptysis?

- **Upper airways:** *Spurious hemoptysis*
  
  *Spurious hemoptysis* above vocal cords
  
  • Teeth / Gums / mouth
  
  • Nose / Pharynx / larynx

**History:**

Feeling of blood pooling in the mouth

The need to clear the throat

Epistaxis

Not preceded by cough

→ Rhinoscopy / Laryngoscopy
### Does the patient truly have hemoptysis?

**GI T:**

<table>
<thead>
<tr>
<th></th>
<th><strong>Hemoptysis</strong></th>
<th><strong>Hematemesis</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History</strong></td>
<td>Chest or Cardiac disease</td>
<td>✓ Dyspepsia, Vomiting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Retching, Epigastric pain</td>
</tr>
<tr>
<td><strong>Blood</strong></td>
<td>Bright red, alkaline with froth &amp; sputum</td>
<td>Coffee-ground, acidic +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Food particles of vomitus</td>
</tr>
<tr>
<td><strong>Sputum</strong></td>
<td>Remains blood tinged for few days after the attack</td>
<td>No sputum</td>
</tr>
<tr>
<td><strong>Stools</strong></td>
<td>Usually normal</td>
<td>Melena</td>
</tr>
<tr>
<td><strong>Examination</strong></td>
<td>Evidence of chest or cardiac disease</td>
<td>Epigastric tenderness, Liver cirrhosis, splenomegaly</td>
</tr>
</tbody>
</table>

→ *Endoscopy*
Does the patient truly have hemoptysis?

- **Lower airways & Lung parenchyma**

  *True hemoptysis* below vocal cords

  Hemoptysis → Lesions receive blood supply from

  - Bronchial arteries and other systemic arteries
  - Pulmonary circulation
  - Communication between bronchial & pulmonary circulation.

**Mechanisms:**

- Inflammation → congestion → erosion → bleeds
- Engorged Vessels → bleeds
- Erosion or Rupture of Vessels → bleeds
Severity of hemoptysis?

- **Volume of hemoptysis**: >200 ml / day, large
- **Respiratory reserve**: Respiratory function & Gas exchange ↓

Massive hemoptysis: > 600 ml / 24 hour.

**Severe hemoptysis** → **Emergency intervention needed**
## Presenting Clinical manifestation (s)?

<table>
<thead>
<tr>
<th>Category</th>
<th>Feature</th>
<th>Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>Smoking, Asbestos exposure</td>
<td>Bronchogenic carcinoma</td>
</tr>
<tr>
<td></td>
<td>Risk factors for aspiration (alcohol, swallowing disorder, loss of consciousness)</td>
<td>Lung abscess, Pneumonia, FB aspiration</td>
</tr>
<tr>
<td></td>
<td>Recent chest trauma or procedure</td>
<td>Traumatic or Iatrogenic lung injury</td>
</tr>
<tr>
<td>Medication &amp; drug use</td>
<td>Previously diagnosed Pulmonary, Cardiac or Systemic disease</td>
<td>Drug toxicity</td>
</tr>
<tr>
<td></td>
<td>Important clue</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Feature</td>
<td>Disorder</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Hoarseness of voice</td>
<td>Bronchogenic carcinoma</td>
</tr>
<tr>
<td></td>
<td>Purulent-appearing sputum</td>
<td>Pneumonia</td>
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<tr>
<td></td>
<td></td>
<td>Lung abscess</td>
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<tr>
<td></td>
<td></td>
<td>Bronchiectasis</td>
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<tr>
<td></td>
<td></td>
<td>Bronchitis</td>
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<tr>
<td></td>
<td>PND / Orthopnea</td>
<td>MS/LVF</td>
</tr>
<tr>
<td></td>
<td>Dyspnea &amp; Pleuritic chest pain</td>
<td>Pneumonia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pulmonary embolism</td>
</tr>
<tr>
<td></td>
<td>Weight loss, Night sweats, Cough, Fever</td>
<td>✓ TB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bronchogenic carcinoma</td>
</tr>
</tbody>
</table>
Presenting Clinical manifestation (s)?

Physical examination:

- Hemodynamic state
- Examination of Oropharynx & nasopharynx
- Careful cardiac auscultation
- Abdominal examination
- Local chest examination
### Presenting Clinical manifestation (s)?

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<th>Disorder</th>
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<tbody>
<tr>
<td>Signs</td>
<td>Localized decrease in intensity of breath sounds, Localized wheeze</td>
<td>Bronchogenic carcinoma, FB aspiration</td>
</tr>
<tr>
<td></td>
<td>Bronchial breath sounds</td>
<td>Pneumonia</td>
</tr>
<tr>
<td></td>
<td>Pleural rub</td>
<td>Pneumonia, Pulmonary embolism</td>
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<tr>
<td></td>
<td>Diastolic murmur</td>
<td>MS</td>
</tr>
<tr>
<td></td>
<td>Clubbing of fingers</td>
<td>Suppurative lung disease</td>
</tr>
<tr>
<td></td>
<td>S3 gallop</td>
<td>LVF</td>
</tr>
</tbody>
</table>
Chest x-ray

Localizing site & cause

→ **60%** Abnormal & Localizing

→ **40%** Normal or non localizing
<table>
<thead>
<tr>
<th>Radiographic findings</th>
<th>Disorder (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodule(s) or Mass (s)</td>
<td>Bronchogenic carcinoma, Wegner`s granulomatosis, Fungal infection</td>
</tr>
<tr>
<td>Atelectasis</td>
<td>Bronchogenic carcinoma, FB aspiration</td>
</tr>
<tr>
<td>Dilated peripheral airways</td>
<td>Bronchiectasis</td>
</tr>
<tr>
<td>Hilar / Mediastinal adenopathy</td>
<td>Bronchogenic carcinoma, Fungal infection, Sarcoidosis</td>
</tr>
<tr>
<td>Recticulonodular densities</td>
<td>TB, Sarcoidosis</td>
</tr>
<tr>
<td>Cavity / Cavities</td>
<td>TB, fungal infection, Mycetoma Lung abscess, Bronchogenic carcinoma</td>
</tr>
<tr>
<td>Air space consolidation</td>
<td>Pneumonia, Alveolar hemorrhage, Pulmonary contusion</td>
</tr>
</tbody>
</table>
Diagnostic tests?

**Computed Tomographic (CT) scan:**
- Normal or non localizing C-XR → **CT diagnose 50%**
  e.g. (SPN, Bronchiectasis or cavity)
- After non diagnostic bronchoscopy → **CT diagnose 30%**
- Localizing C-XR → **CT provides new source / additional information**
- Special imaging techniques
  - **High resolution CT** (1-3mm thickness section)
    Bronchiectasis
  - **Spiral CT with pulmonary angiography** →
    Pulmonary embolism
Hemoptysis
Diagnostic tests?

Bronchoscopy

Fiberoptic bronchoscopy (FOB)

- Localizing & Diagnosing source of hemoptysis.
- Central airways lesions → Direct visualization
- Peripheral lesions → Blood emerging from a segmental bronchi.
- Timing is debatable → within 24 hour of onset of bleeding.
Diagnostic tests?

**Fiberoptic bronchoscopy (FOB)**

- Non massive hemoptysis →
  - Instillation of diluted adrenaline.
  - Iced cooled saline.
  - Wedging and temponade → Fogarty catheter balloon

- Bronchogenic carcinoma
  - Localizing CXR → FOB  80% of malignancies
  - Non Localizing CXR + CT → FOB  60% of malignancies
- Non malignant cause → FOB  < 10%
A bronchoscope is used to view the airways and check for any abnormalities.
Hemoptysis
Interventional equipments:

- Laser.
- Cryotherapy.
- Electrocautery.
Diagnostic tests?

Laboratory examination

- Coagulation studies
- Arterial blood gasses (ABG)
- Complete blood picture (CBC) & ESR
  - Urine analysis & renal function
  - Collagen profile
Diagnostic tests?

Sputum examination

- Gross blood → infectious conditions
- Acid fast bacilli
- Culture
- Cytology
- PH
**Diagnostic tests?**

**Angiography & Endovascular embolization**

- Localizing site → bleeding blush or abnormal vasculature
  - Pulmonary embolism
- Endovascular Embolization Bronchial artery & related collateral vasculature
- Embolization of Spinal arteries → paralysis
- Indications:
  - Not responding to conservative measures.
  - Recurrent or persistent hemoptysis
Therapy of hemoptysis?

- Severity of hemoptysis
- Specific cause of hemoptysis

Goals

- Protect airways
- Identify bleeding site & protect uninvolved lung
- Control bleeding
- Treat primary cause
Therapy of hemoptysis?

Non massive hemoptysis

Initial evaluation

- **Sputum studies**: gram, ZN, Culture
- **CT scan chest**: Conventional, HRCT, with pulmonary angiography
- **Laboratory investigations**: Coagulation studies, ABG, CBC, ESR, Urine analysis, renal function & Collagen profile
- **Echocardiography**
- **Fiberoptic bronchoscopy**

Treatment is Directed to underlying cause
Therapy of hemoptysis?

Massive hemoptysis

I. Conservative Medical treatment

- **Endotracheal tube**: risk of asphyxiation
  - Single wide bore or double lumen
- **IV line**: Blood, plasma transfusion, fluids
- **Positioning**: sitting or disease site down most
- **Cough suppressant**: Codeine sulphate 15 mg
- **Oxygen supplementation / Assisted ventilation**
- **Benzodiazepine**
- **Treatment of Coagulopathy** if present
- **Pitressin (Vasopressin)??**
Therapy for hemoptysis?

II. Endobronchial treatment
Aim: identify Source, Rate & to Slow or Stop bleeding

Rigid bronchoscopy

III. Endovascular Angiography embolization

IV. Surgical
- Lung resection (emergency) Mortality 30%
- Elective surgery after stabilization

V. Collapse therapy
Patient with hemoptysis

Establish true hemoptysis
- Exclude
  - Hematemesis
  - ENT source

History & physical examination

Chest x-ray
- CBC, Coagulation studies
- Blood transfusion matching
- ABG

Severity of hemoptysis
Severity of hemoptysis

Mild Intermittent bleeding
- Elective work up
  - Sputum studies
  - CT scan chest
  - Other laboratory invest.
  - Fiberoptic bronchoscopy

Moderate Actively bleeding
- Admit for observation
- Conservative therapy
- Sputum studies
- CT scan chest
- Other laboratory invest.
- Treat infection, if present
- Fiberoptic bronchoscopy

Massive
- Emergency ICU admission

Hemoptysis stopped
- Hemoptysis continues
  - Resection / Embolization

Establish etiology & treat specific disease
Massive hemoptysis

Emergency ICU admission

Conservative medical treatment
- IV line
- Positioning
- Cough suppressant
- Oxygen supplementation / Assisted ventilation
- Benzodiazepine
- TTT of Coagulopathy if present

Rigid bronchoscopy
- Special catheters & tubes: ET, double lumen ET, Fogerty
  - Wash, suction, iced saline, diluted adrenaline
  - Interventional procedure: laser, electro, Cryo

Hemoptysis stopped
- Sputum studies
- CT scan chest
- Other laboratory invest.

Establish etiology & treat specific disease

Hemoptysis continue

Resection / Embolization
Thank You