

# Management of Hemoptysis

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## Definition

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- Coughing up of blood or bloody sputum.
- Frightening event: Patients &  $\pm$  Doctors
- Manifestation of underlying disease process.
- Amount varies: Trivial  $\rightarrow$  large amount.

# Causes of hemoptysis

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

# Causes of hemoptysis

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- **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
- FB aspiration
- Endometriosis

## Approach to management

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

# Does the patient truly have hemoptysis?

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Hemoptysis

- **Upper airways:** *Spurious hemoptysis*

Spurious hemoptysis above vocal cords

- Teeth / Gums / mouth *Factitious hemoptysis*
- 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?

## – GIT: Hematemesis

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

→ Endoscopy

# Does the patient truly have hemoptysis?

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- **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?

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{ 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)?

Hemoptysis

Category	Feature	Disorder
History	Smoking Asbestos exposure	<b>Bronchogenic carcinoma</b>
	Risk factors for aspiration (alcohol,swallowing disorder, loss of consciousness)	<b>Lung abscess, Pneumonia, FB aspiration</b>
	Recent chest trauma or procedure	<b>Traumatic or Iatrogenic lung injury</b>
	Medication & drug use	<b>Drug toxicity</b>
	Previously diagnosed Pulmonary, Cardiac or Systemic disease	<b>Important clue</b>

# Presenting Clinical manifestation (s)?

Hemoptysis

Category	Feature	Disorder
Symptoms	Hoarseness of voice	<b>Bronchogenic carcinoma</b>
	Purulent-appearing sputum	<b>Pneumonia</b> <b>Lung abscess</b> <b>Bronchiectasis</b> <b>Bronchitis</b>
	PND / Orthopnea	<b>MS/LVF</b>
	Dyspnea & Pleuritic chest pain	<b>Pneumonia</b> <b>Pulmonary embolism</b>
	Weight loss, Night sweats, Cough, Fever	✓ <b>TB</b> <b>Bronchogenic carcinoma</b>

# Presenting Clinical manifestation (s)?

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Hemoptysis

## Physical examination:

- Hemodynamic state
- Examination of Oropharynx & nasopharynx
- Careful cardiac auscultation
- Abdominal examination
- Local chest examination

# Presenting Clinical manifestation (s)?

Category	Feature	Disorder
Signs	Localized decrease in intensity of breath sounds, Localized wheeze	<b>Bronchogenic carcinoma,</b> <b>FB aspiration</b>
	Bronchial breath sounds	<b>Pneumonia</b>
	Pleural rub	<b>Pneumonia,</b> <b>Pulmonary embolism</b>
	Diastolic murmur	<b>MS</b>
	Clubbing of fingers	<b>Suppurative lung disease</b>
	S3 gallop	<b>LVF</b>

Hemoptysis

# Diagnostic tests?

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Hemoptysis

## Chest x-ray

Localizing site & cause

→ 60% Abnormal & Localizing

→ 40% Normal or non localizing

<b>Radiographic findings</b>	<b>Disorder (s)</b>
<b>Nodule(s) or Mass (s)</b>	<b>Bronchogenic carcinoma, Wegner`s granulomatosis, Fungal infection</b>
<b>Atelectasis</b>	<b>Bronchogenic carcinoma, FB aspiration</b>
<b>Dilated peripheral airways</b>	<b>Bronchiectasis</b>
<b>Hilar / Mediastinal adenopathy</b>	<b>Bronchogenic carcinoma, Fungal infection, Sarcoidosis</b>
<b>Recticulonodular densities</b>	<b>TB, Sarcoidosis</b>
<b>Cavity / Cavities</b>	<b>TB, fungal infection, Mycetoma Lung abscess, Bronchogenic carcinoma</b>
<b>Air space consolidation</b>	<b>Pneumonia, Alveolar hemorrhage, Pulmonary contusion</b>

# Hemoptysis





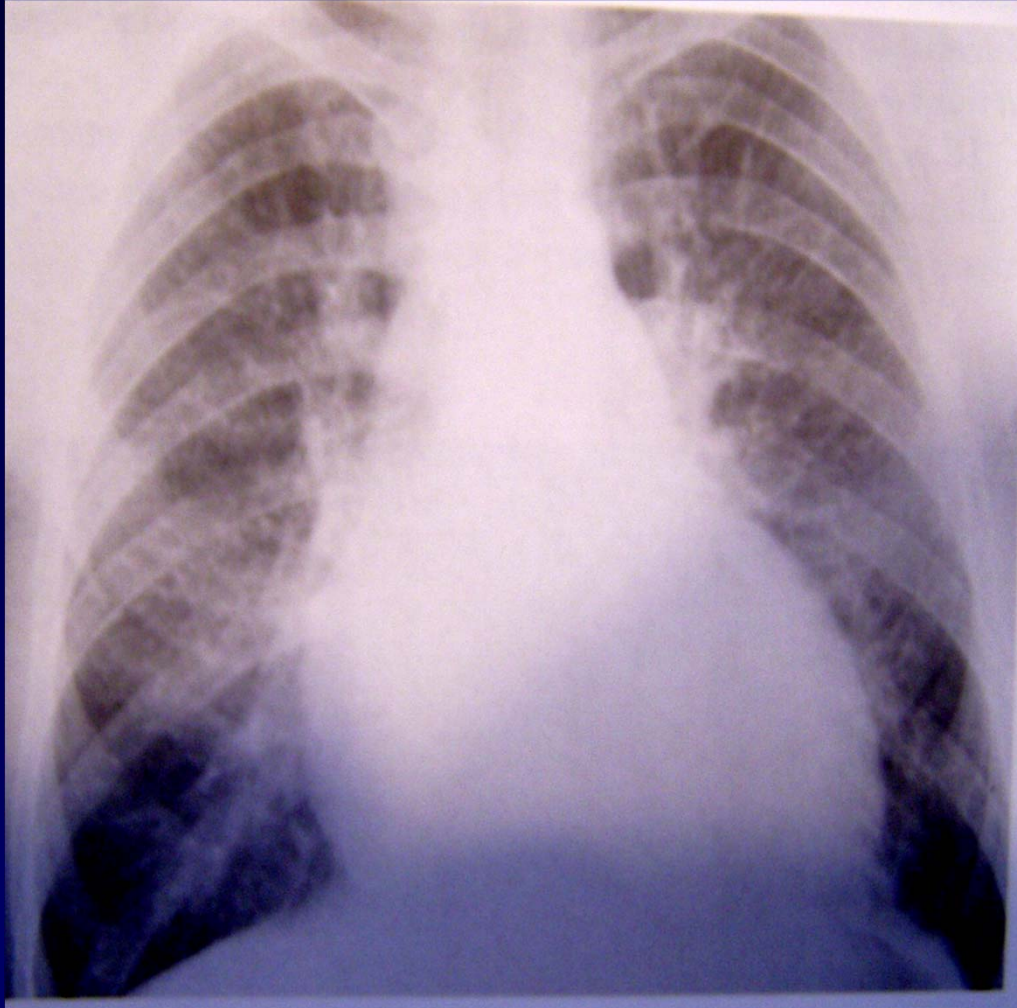
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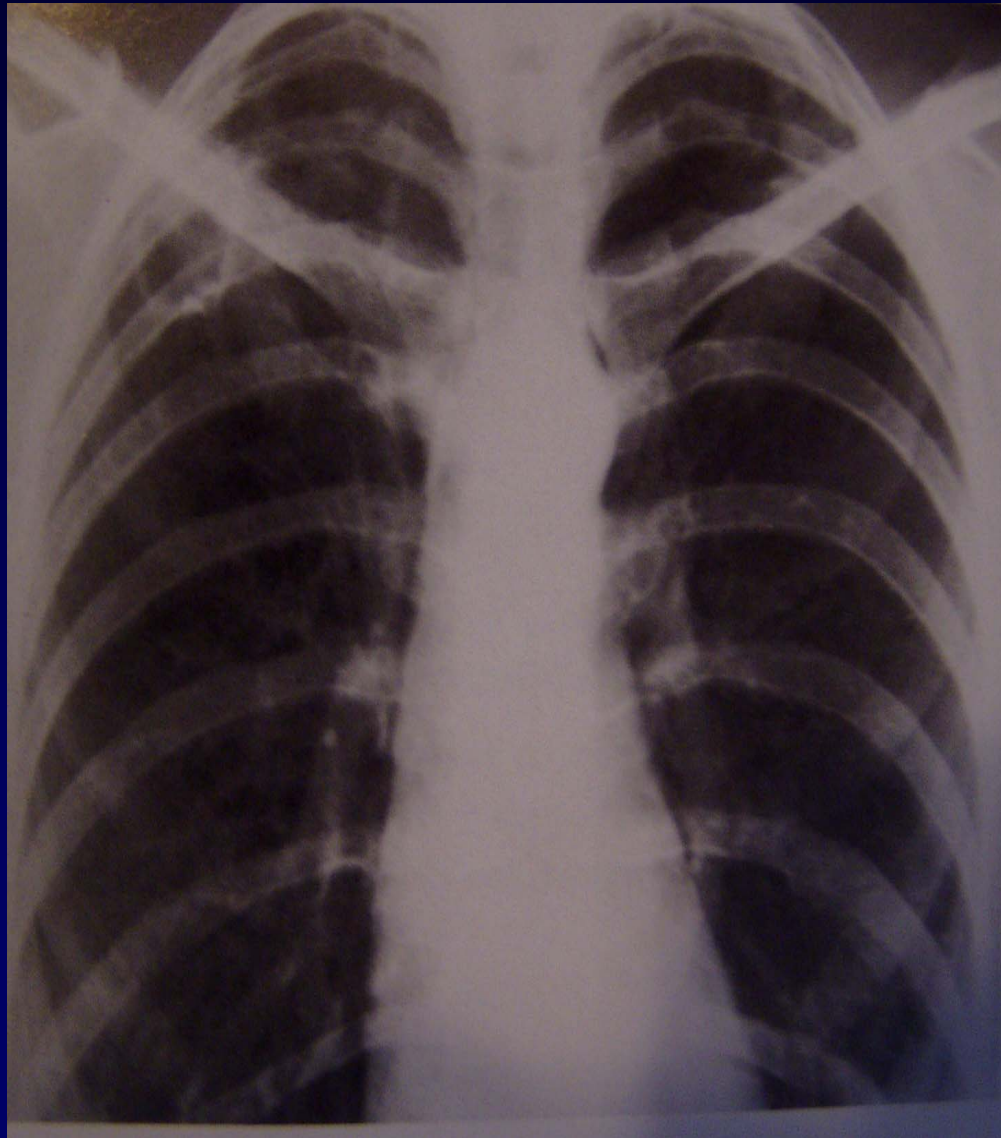
# Hemoptysis



# Hemoptysis



# Hemoptysis



# Hemoptysis



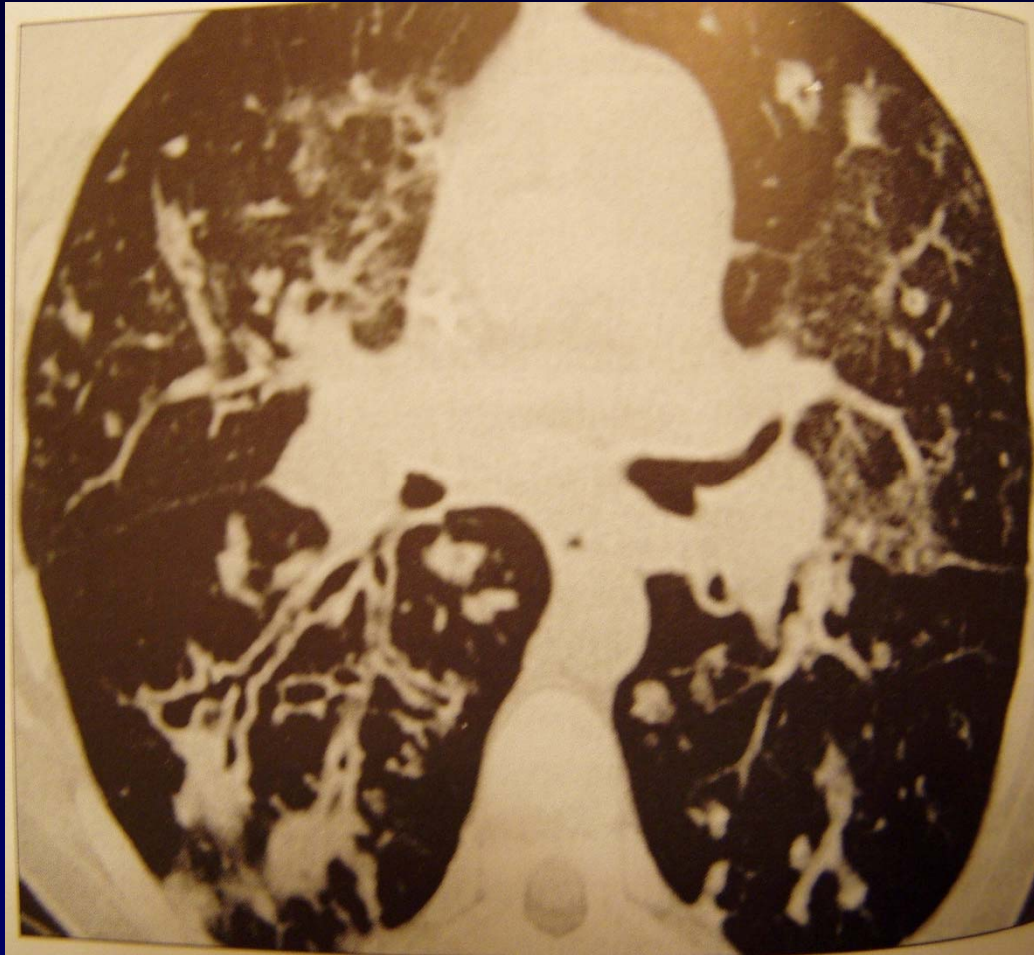
# Diagnostic tests?

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## 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



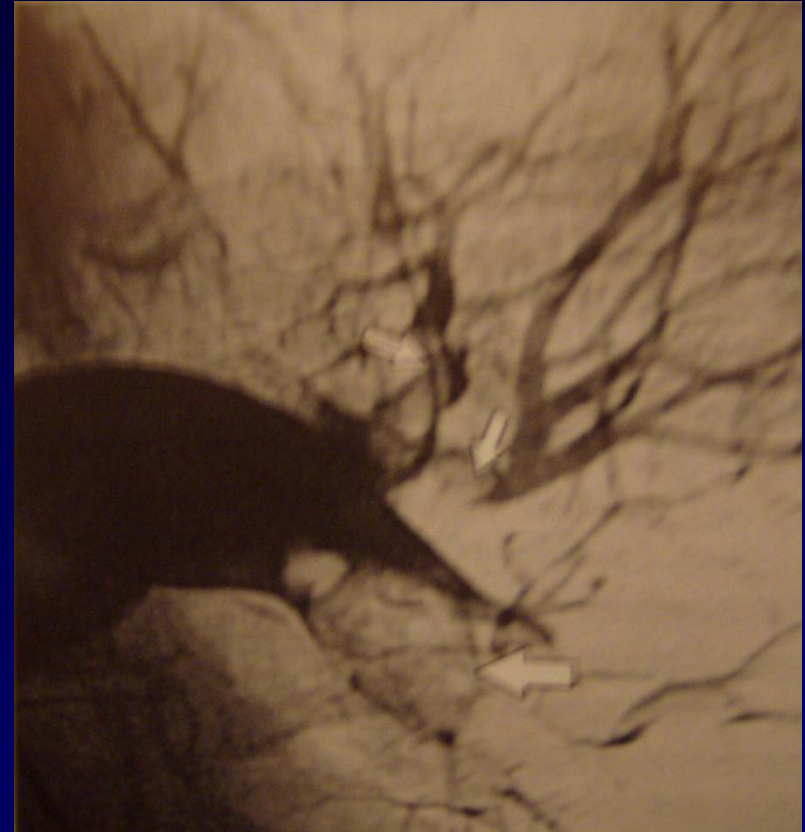


# Hemoptysis





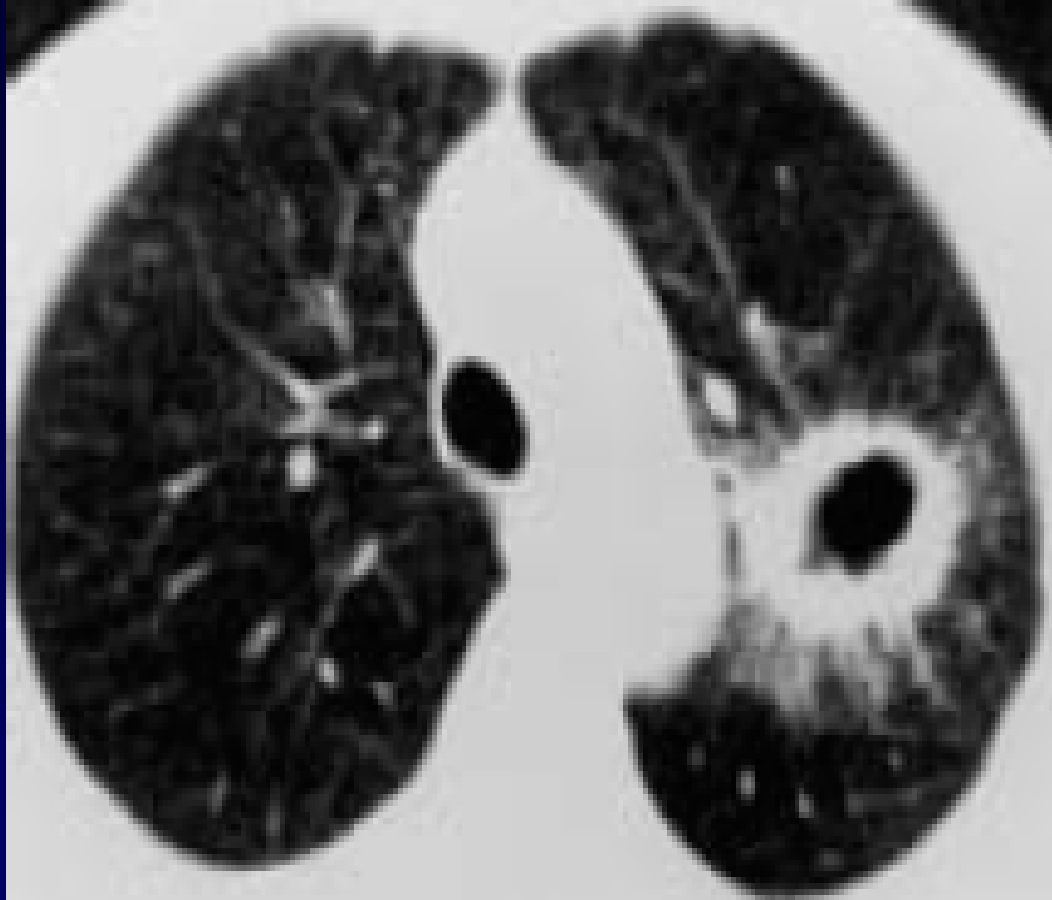
# Hemoptysis



# Hemoptysis



# Hemoptysis



## Diagnostic tests?

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### 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?

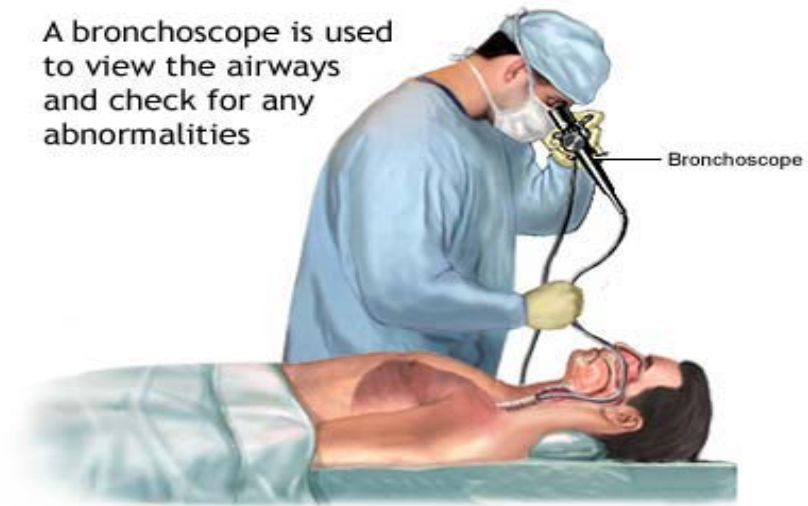
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## Fiberoptic bronchoscopy (FOB)

- 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%



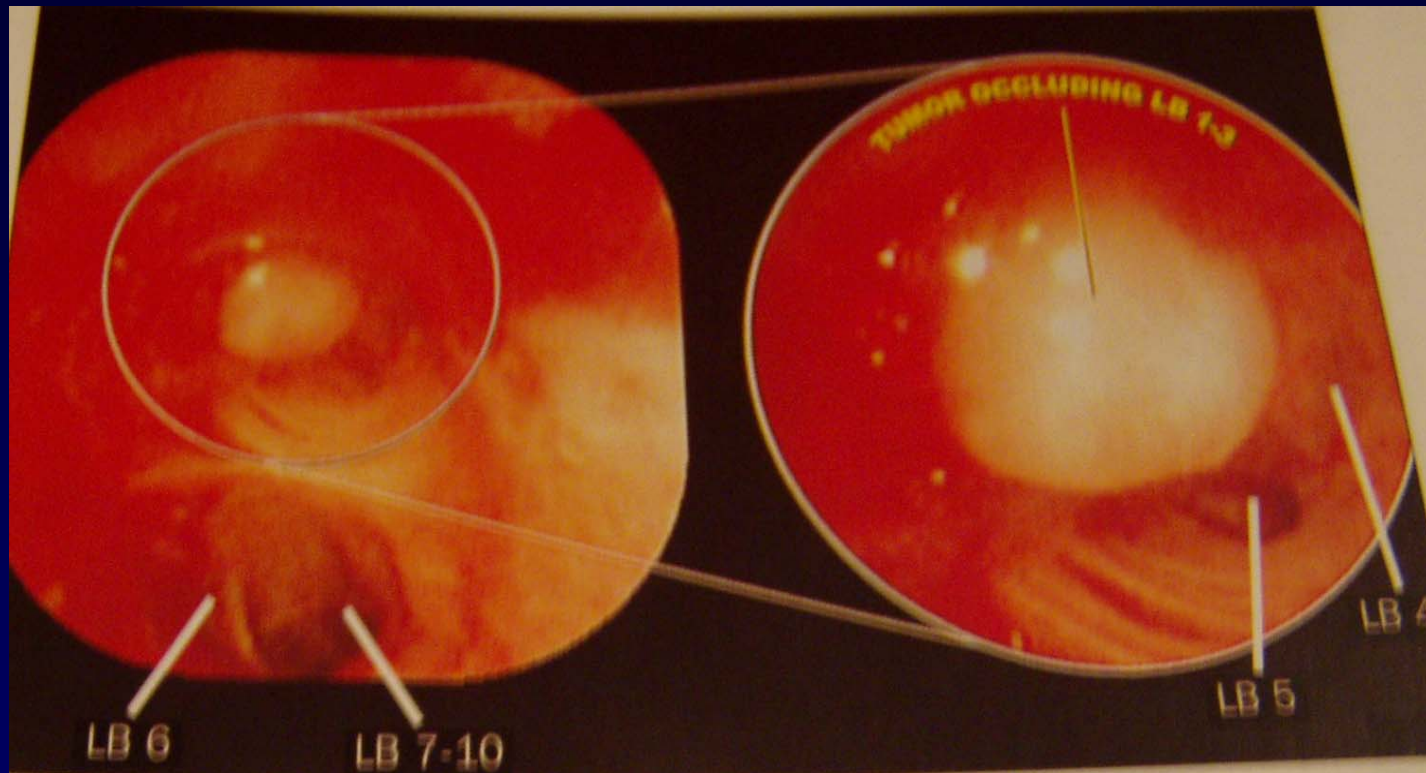
A bronchoscope is used to view the airways and check for any abnormalities



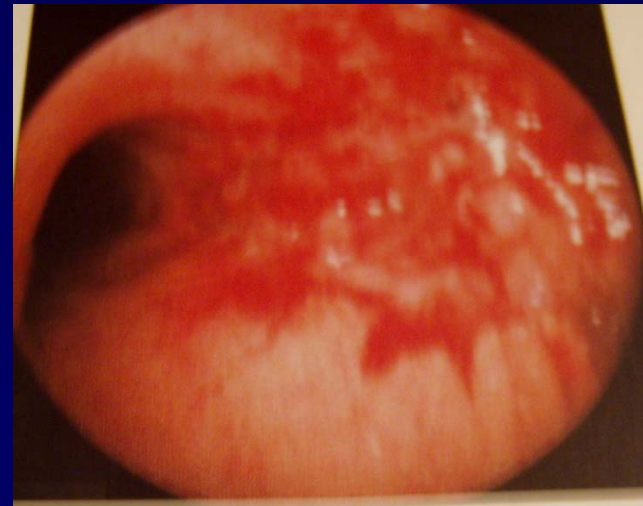
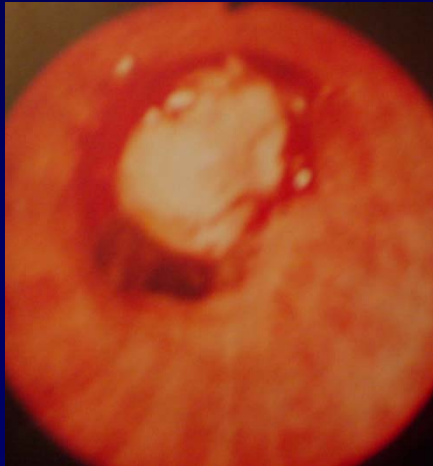
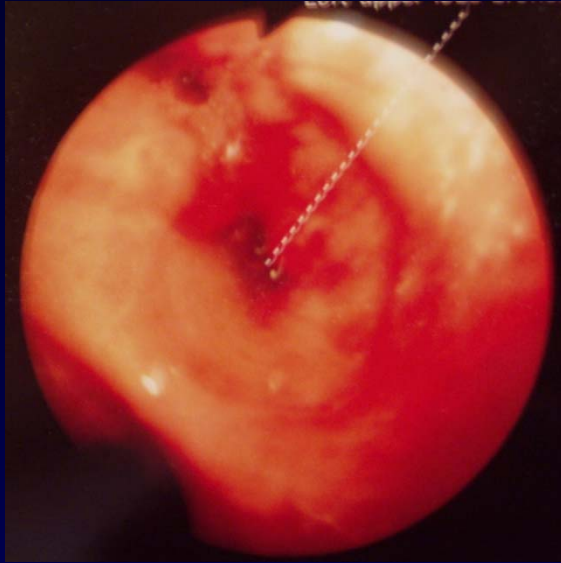
Hemoptysis



# Hemoptysis



# Hemoptysis





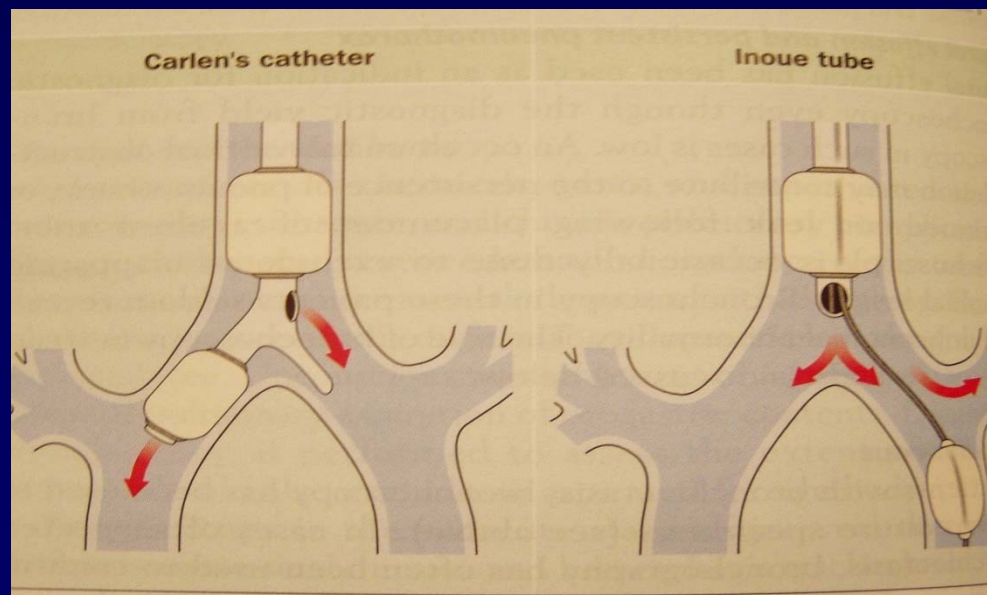
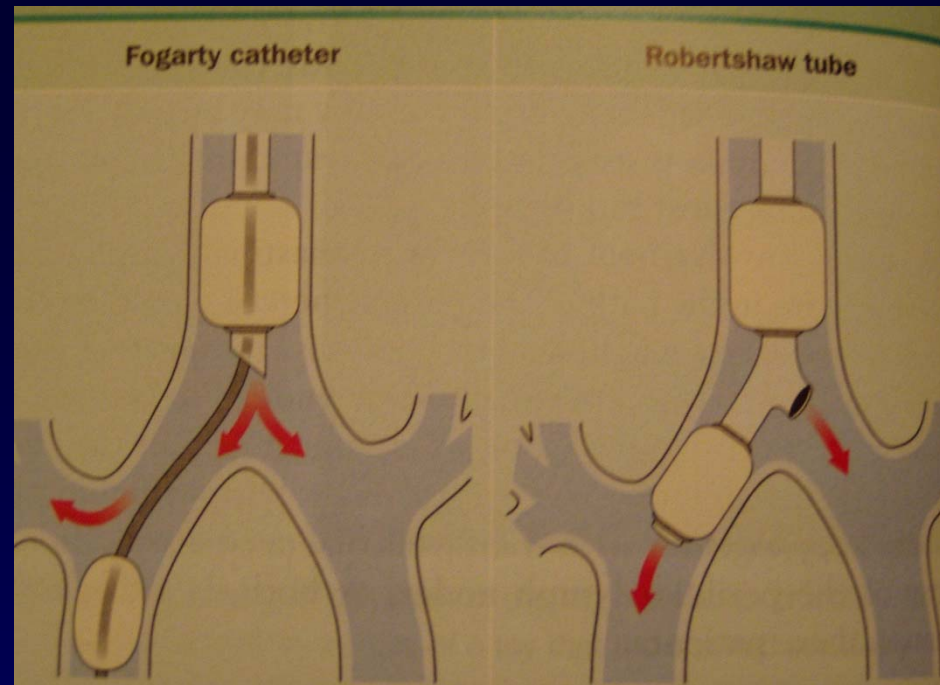
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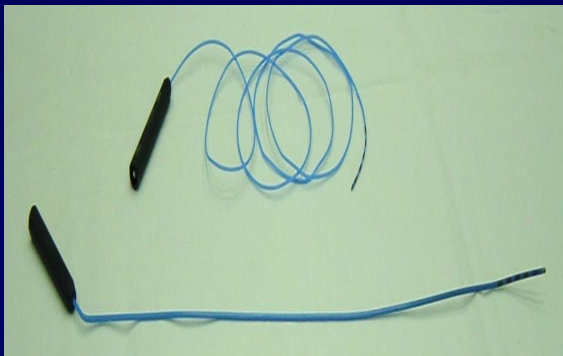
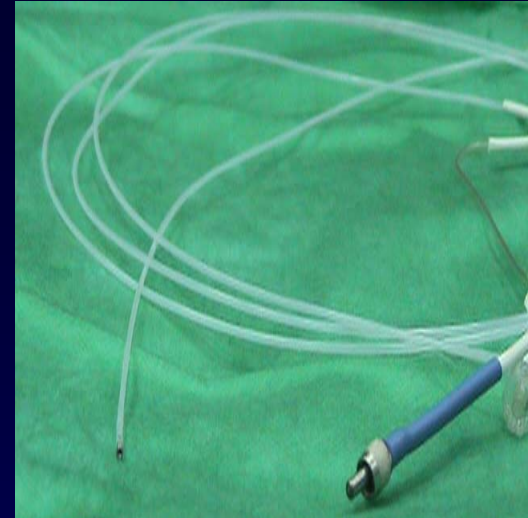
# Hemoptysis





# Hemoptysis

- **Interventional equipments:**
  - Laser.
  - Cryotherapy.
  - Electrocautery.



# Hemoptysis

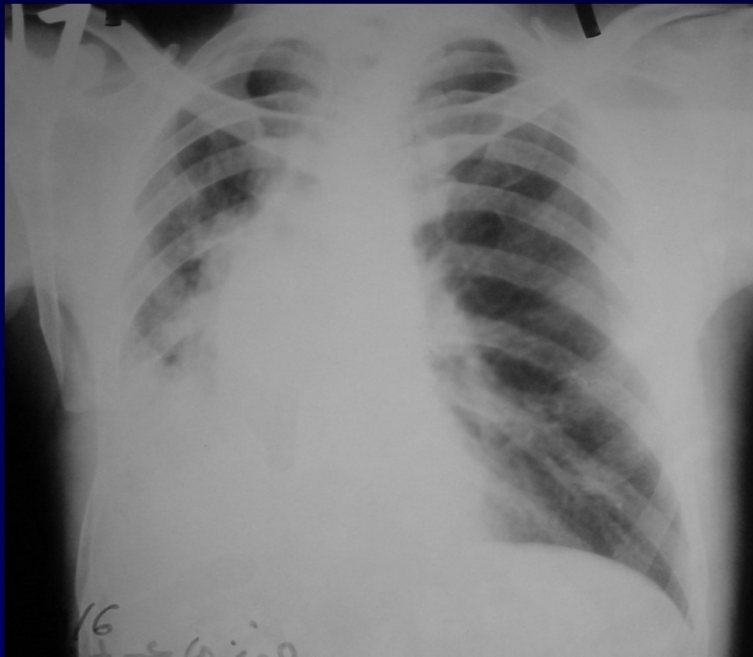


**Before**

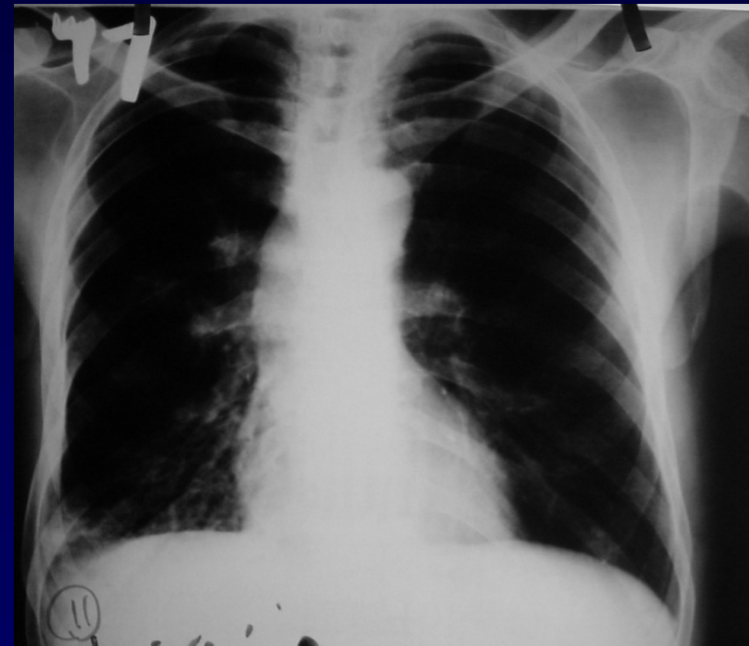


**After**

# Hemoptysis



**Before**



**After**

## Diagnostic tests?

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### Laboratory examination

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

## Diagnostic tests?

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### Sputum examination

- Gross blood → infectious conditions
- Acid fast bacilli
- Culture
- Cytology
- PH

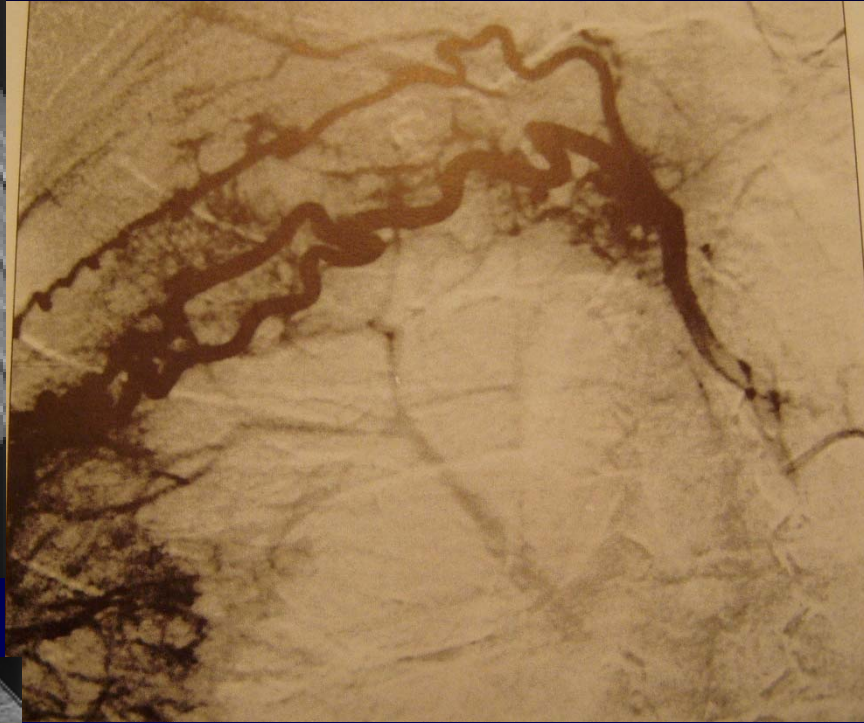


## Diagnostic tests?

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### 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?

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- Severity of hemoptysis
- Specific cause of hemoptysis
- Goals
  - Protect airways
  - Identify bleeding site & protect uninvolved lung
  - Control bleeding
  - Treat primary cause

# Therapy of hemoptysis?

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## 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?

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## 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
- Benzodiazepime
- Treatment of Coagulopathy if present
- Pitressin (Vasopressin)??

# Therapy for hemoptysis?

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## **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

History & physical  
examination

Establish true  
hemoptysis

Exclude  
Hematemesis  
ENT source

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

Severity of hemoptysis



# Severity of hemoptysis

Mild Intermittent  
bleeding

Moderate

Actively bleeding

Massive

*Admit for observation*  
*Conservative therapy*

*Emergency ICU admission*

## Elective work up

- Sputum studies
- CT scan chest
- Other laboratory invest.
- Fiberoptic bronchoscopy

- Sputum studies
- CT scan chest
- Other laboratory invest.
- Treat infection, if present

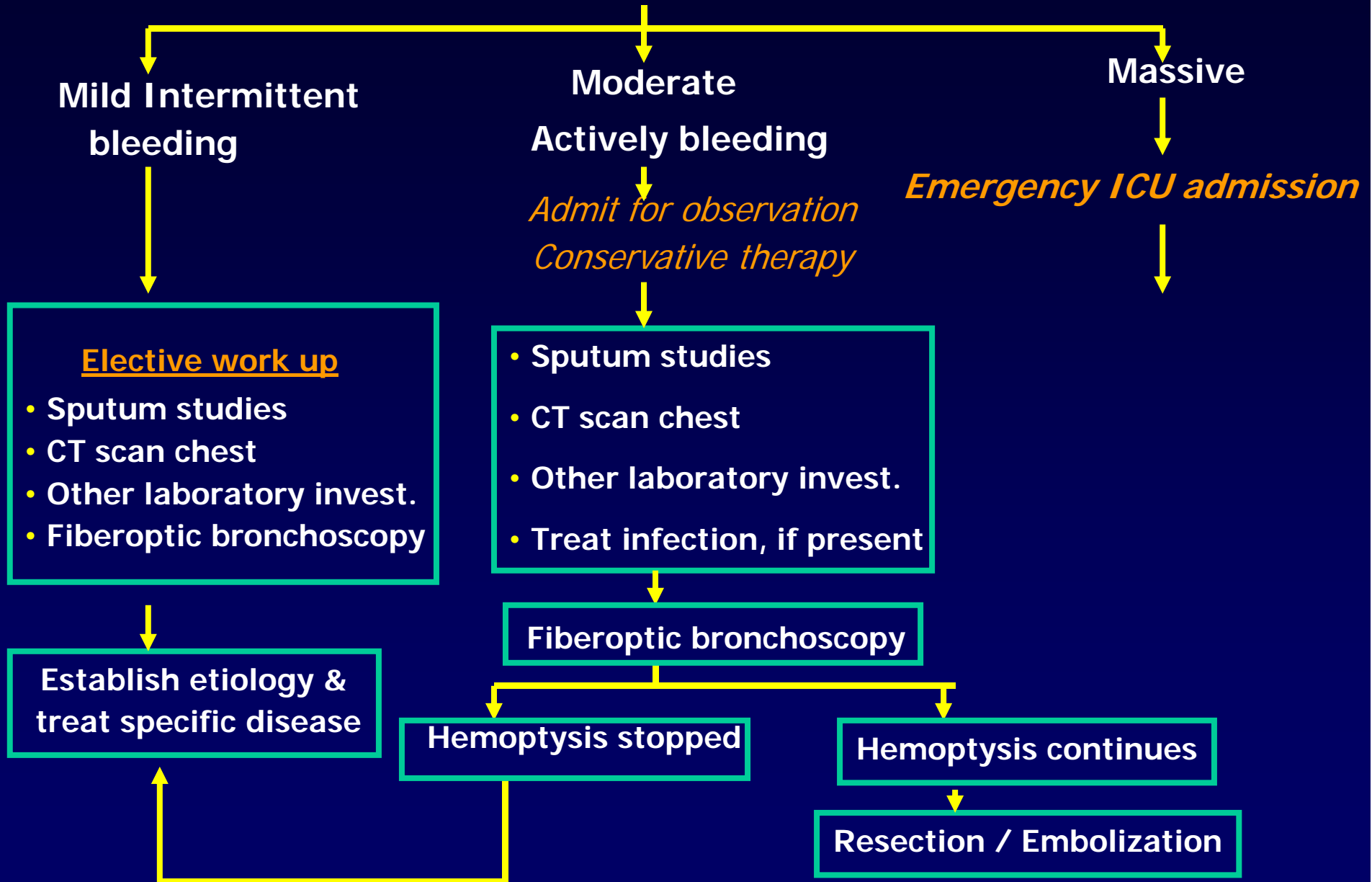
Establish etiology &  
treat specific disease

Fiberoptic bronchoscopy

Hemoptysis stopped

Hemoptysis continues

Resection / Embolization





# 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, Fogarty
  - Wash, suction , iced saline, diluted adrenaline
- Interventional procedure: laser,electro, Cryo

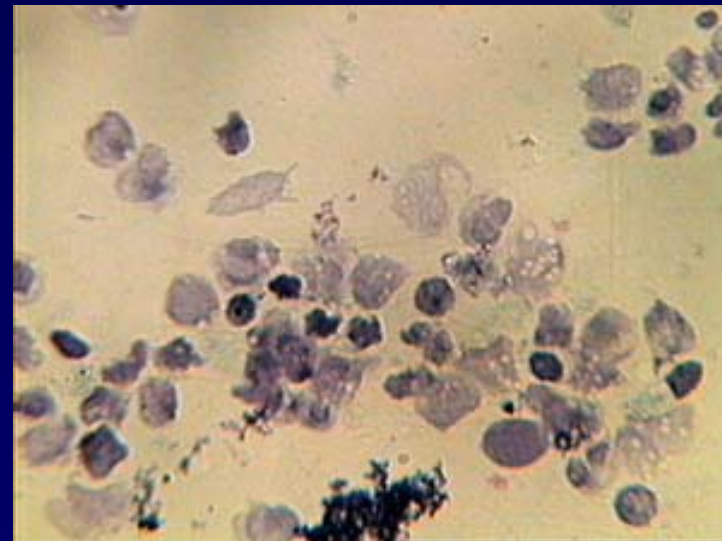
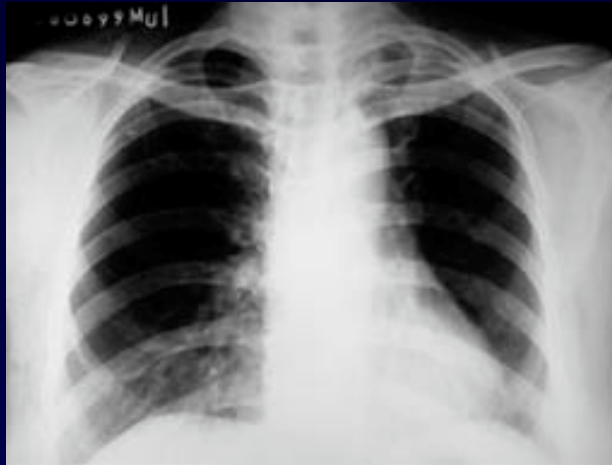
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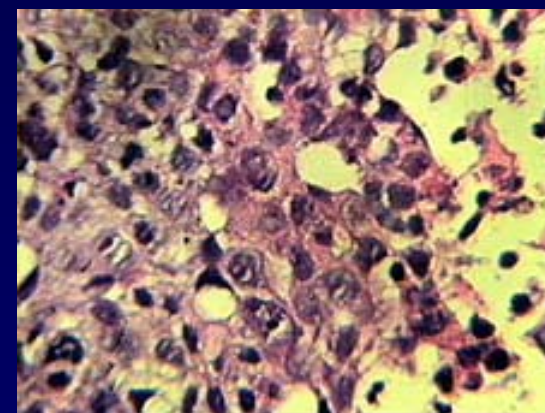
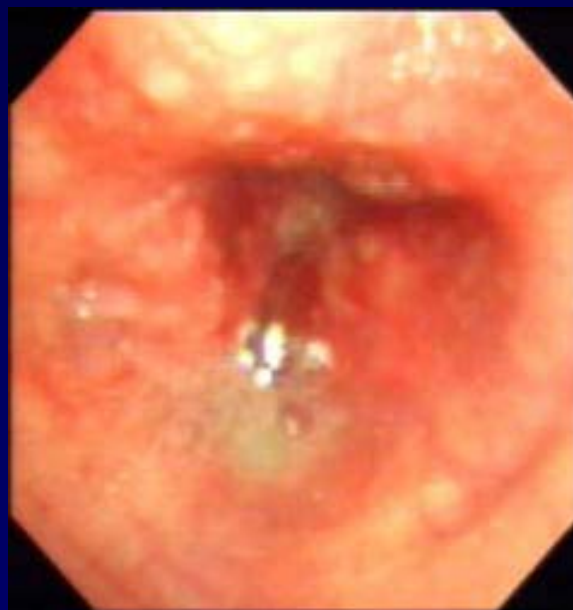
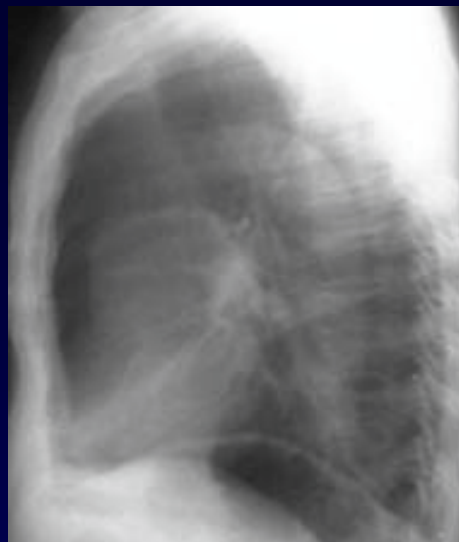
- Sputum studies
- CT scan chest
- Other laboratory invest.

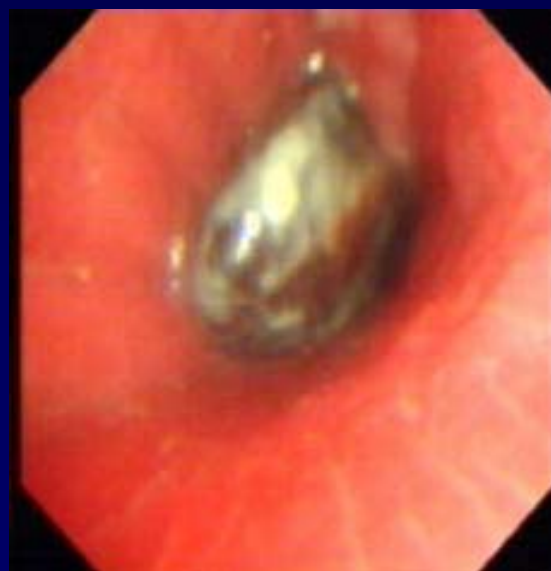
Establish etiology &  
treat specific disease

Hemoptysis continue

Resection / Embolization







**Thank You**