

HEMOPTYSIS

Definition

- Expectoration of blood from the respiratory tract
- The word “Hemoptysis” comes from the greek word “Haima” , meaning “Blood” , and “Ptysis” , which means the spitting.

Definition

- Bleeding that results in respiratory distress and altered gas exchange is life-threatening, regardless of amount of blood loss.
- *Amount of blood expectorated not necessarily represents the total amount lost into the airspaces*

Definition

➤ Assessment of severity of hemoptysis can be based on amount of blood lost during episode

- MILD: <5cc in 24h
- MODERATE: 5-600cc in 24h
- MASSIVE :
 - >600cc in 24h
 - 100cc <24h to 1000 cc over several days
 - >50cc in single expectoration

When blood originates outside of the respiratory tract, the

"pseudohemoptysis."

Pseudo-hemoptysis

- ❖ Every patient with problem of hemoptysis should receive a careful evaluation of origin of bleeding from outside of the respiratory tract.
- ❖ Blood from the throat which comes in contact with larynx can cause coughing and seemingly hemoptysis

Where is it from?

Clinical Features	Hemoptysis	Pseudo Hemoptysis
Origin of blood	Respiratory tract	Oral cavity, Larynx, esophageus, stomach, Factitious
Cough	More likely	Less likely
Respiratory symptoms	More likely	Less likely
Esophagogastric Symptoms	Less likely	More likely
Alcohol use, hepatic disease	Less likely	More likely
Vomiting, Nausea	Less likely	More likely
Hematemesis and malena	Less likely	More likely
Colour of expectorated blood	Bright red	Brown or black
Consistency of expectorate	Clotted or liquid	Coffee ground appearance
Frothiness of expectorate	Usually	Never or seldom
pH of expectorate	Alkaline	Acidic
Alveolar macrophages in sputum	Present	Absent
Food particles in expectorate	Absent	Present
Asphyxia	Common	Unusual

- Rarely , hemoptysis may be self inflicted as a form of malingering .
- Patients may seek hospital admission late at night by claiming hemoptysis (“Midnight hemoptysis)

- Serratia Marcescens is an aerobic microorganism
- Which characteristically produces a red pigment insoluble in water.
- Broad spectrum antibiotics may so alter the environment that this organism will grow in the respiratory tract producing a “red-sputum” simulating hemoptysis.

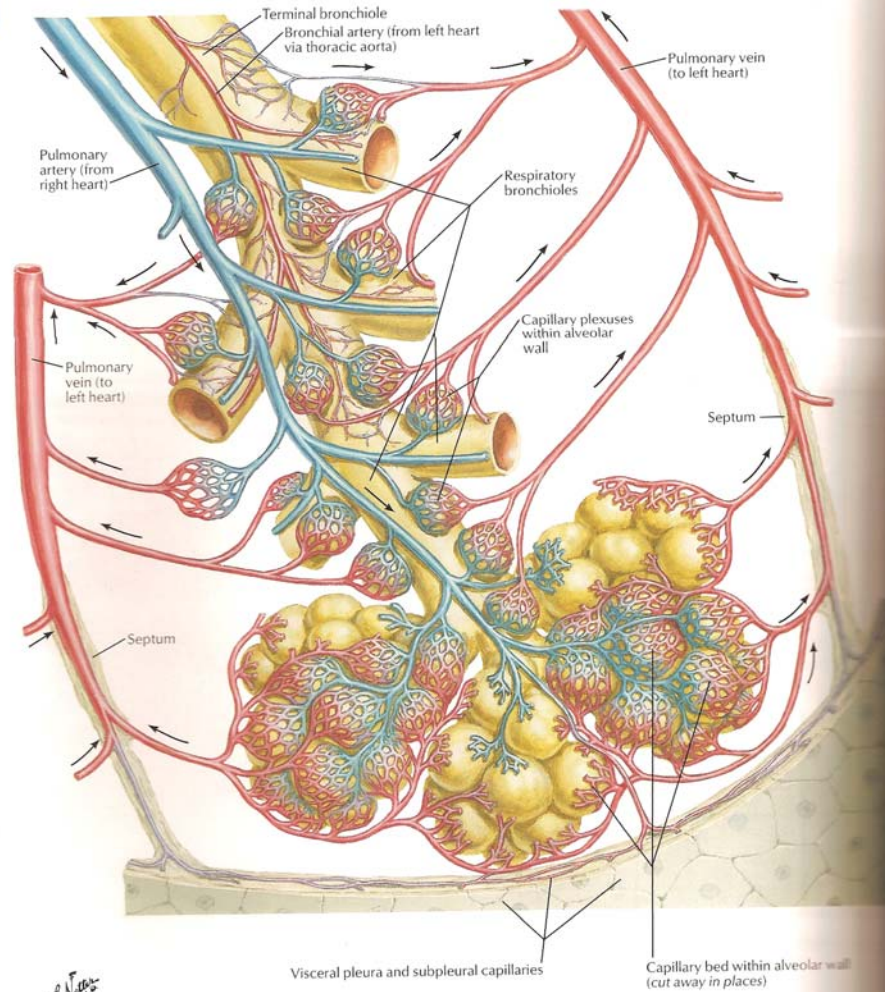
***Gate and Lord – JAMA 164:1328,1957

*Robinson and Woolley – Lancet

Where is it from?

- **Blood from the upper GIT can be aspirated and coughed up**
- **Blood from the lungs can be swallowed and vomited**

Intrapulmonary Blood Circulation: Schema



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IGEN
LONDON

VASCULAR ORIGIN OF HEMOPTYSIS

- Blood traversing the lungs can arrive from
 - pulmonary arteries(arise from rt.ventricle)—98%
 - bronchial arteries(arise from desending aorta & intercostal arteries)---1-2%

VASCULAR ORIGIN OF HEMOPTYSIS

- Virtually the entire cardiac output courses through the low-pressure pulmonary arteries and arterioles en route to being oxygenated in the pulmonary capillary bed
- In contrast, the bronchial arteries(1-2%), are under much higher systemic pressure but carry only a small portion of the cardiac output

VASCULAR ORIGIN OF HEMOPTYSIS

- Despite the quantitatively smaller contribution of the bronchial circulation to pulmonary blood flow, the bronchial arteries are generally a more important source of hemoptysis.
- In addition to being perfused at a higher pressure, they also supply blood to the airways and to lesions within the airways

Significance

- Hemoptysis is an important sign of an underlying disease
- Massive hemoptysis is life threatening due to Asphyxia
- Mortality rate can be as high as 30%

Airways diseases

- The most common source of hemoptysis is airways disease
 - **Inflammatory diseases**- bronchitis , bronchiectasis
 - **Neoplasms**- 1° bronchogenic carcinoma, endobronchial metastatic carcinoma or bronchial carcinoid
 - **AIDS**- Kaposi's sarcoma involving the airways or the pulmonary parenchyma
 - Foreign body & Airway trauma
 - Fistula between a vessel and the tracheobronchial

Pulmonary parenchymal diseases

- **Infection**-tuberculosis, pneumonia, aspergilloma, lung abscess
 - Hemoptysis, which can be life-threatening, complicates the course of 50 to 85 percent of patients with an aspergilloma
 - Active disease can cause sudden rupture of a Rasmussen's aneurysm (aneurysm of the pulmonary artery that slowly expands into an adjacent cavity because of inflammatory erosion of the external vessel wall until it bursts)
- **Tuberculosis** can cause massive hemoptysis through multiple mechanisms -active cavitory or noncavitory lung disease can cause small or large amounts of

Pulmonary parenchymal diseases

- **Inflammatory or immune disorders**
 - Goodpasture's syndrome, idiopathic pulmonary hemosiderosis, and Wegener's granulomatosis
- **Coagulopathy**
 - thrombocytopenia or use of anticoagulants
- **Iatrogenic** - percutaneous or transbronchial lung biopsy
 - Hemoptysis, which is usually minor and transient, occurs in five to 10 percent of percutaneous lung biopsies, but massive hemorrhage and death have also been reported

Miscellaneous causes of pulmonary parenchymal hemorrhage

➤ Cocaine-induced pulmonary hemorrhage

- Hemoptysis has been described in six percent of habitual smokers of free-base cocaine ("crack") and has been associated with diffuse alveolar hemorrhage

➤ Catamenial hemoptysis

- hemoptysis that is recurrent and coincident with menses. The cause is intrathoracic endometriosis, usually involving the pulmonary parenchyma but occasionally affecting the airways

Pulmonary vascular disorders

- Pulmonary embolism
- Pulmonary AV malformation -either with or without underlying Osler-Weber-Rendu syndrome
- Elevated pulmonary capillary pressure
 - mitral stenosis
 - significant left ventricular failure
 - Congenital heart disease
 - severe pulmonary hypertension
- Iatrogenic
 - pulmonary artery perforation from a Swan-Ganz catheter

Cryptogenic

- Depending upon the study, up to 30 percent of patients with hemoptysis have no cause identified even after careful evaluation
- In a series of 67 patients with cryptogenic hemoptysis, the prognosis was generally good, and most patients had resolution of bleeding within six months of evaluation

Adelman, M, et al. Cryptogenic hemoptysis. Clinical features, bronchoscopic findings, and natural history in 67 patients. *Ann Intern Med* 1985; 102:829

Causes of Massive Hemoptysis (<5%)

- Tuberculosis
- Bronchiectasis
- Fungal Infections
- Other Lung Infection
- Bronchogenic Carcinoma
- Chemotherapy and Bone Marrow Transplantation
- Immunologic Lung Disease
- Cardiac or Vascular Disease

Bronchitis and bronchiectasis

➤ Bronchitis - mild hemoptysis

Inflammation of the airways leads to mucosal hyperemia, and disruption of small mucosal vessels blood-streaked sputum.

BRONCHIECTASIS

Dry Bronchiectasis attributed to chronic granulation or ulcer of bronchi.

Moist bronchiectasis are associated chronic inflammation of the lung, with local bronchial arterial proliferation and increased blood flow.

Inflammation leading to erosion of these bronchial vessels can result in severe hemorrhage.

Lung cancer

- Hemoptysis is usually mild, resulting in blood-streaked sputum.
- Cause - erosion of small, friable mucosal vessels in airways involved by tumor.
- Massive hemoptysis in patients with lung cancer is typically caused by malignant invasion of central pulmonary vessels by large central tumors.

Causes of hemoptysis in pulmonary tuberculosis

- Bleeding from cavity wall
- Rupture of rasmussen's aneurysm.
- Direct erosion of capillaries/arteries by granulomatous inflammation.
- Tuberculosis endobronchitis.
- Post –tuberculosis bronchiectasis aspergilloma.
- Broncholith,cavernolith
- Scar carcinoma.

Tuberculosis

- Endobronchial tuberculosis may cause local airway bleeding.
- Calcified tuberculous lymph nodes can compress and erode lobar and main stem bronchi, causing local bleeding and expectoration of gritty calcified debris called broncholiths in the sputum.

Tuberculosis

- Large cavitary lesions in patients with advanced tuberculosis often do not fully close despite successful antituberculosis treatment; these lesions sometimes are colonized by *Aspergillus*.
- Bronchial arterial bleeding from inflammation in the walls of cavities containing aspergilloma can be massive.

Other causes

- Chronically elevated pulmonary venous pressure.
- Inflammation in areas of necrotizing pneumonia, such as invasive aspergillosis
- Immunologically mediated alveolar hemorrhage syndromes- Goodpasture's syndrome, Wegener's granulomatosis, SLE, and pulmonary hemosiderosis

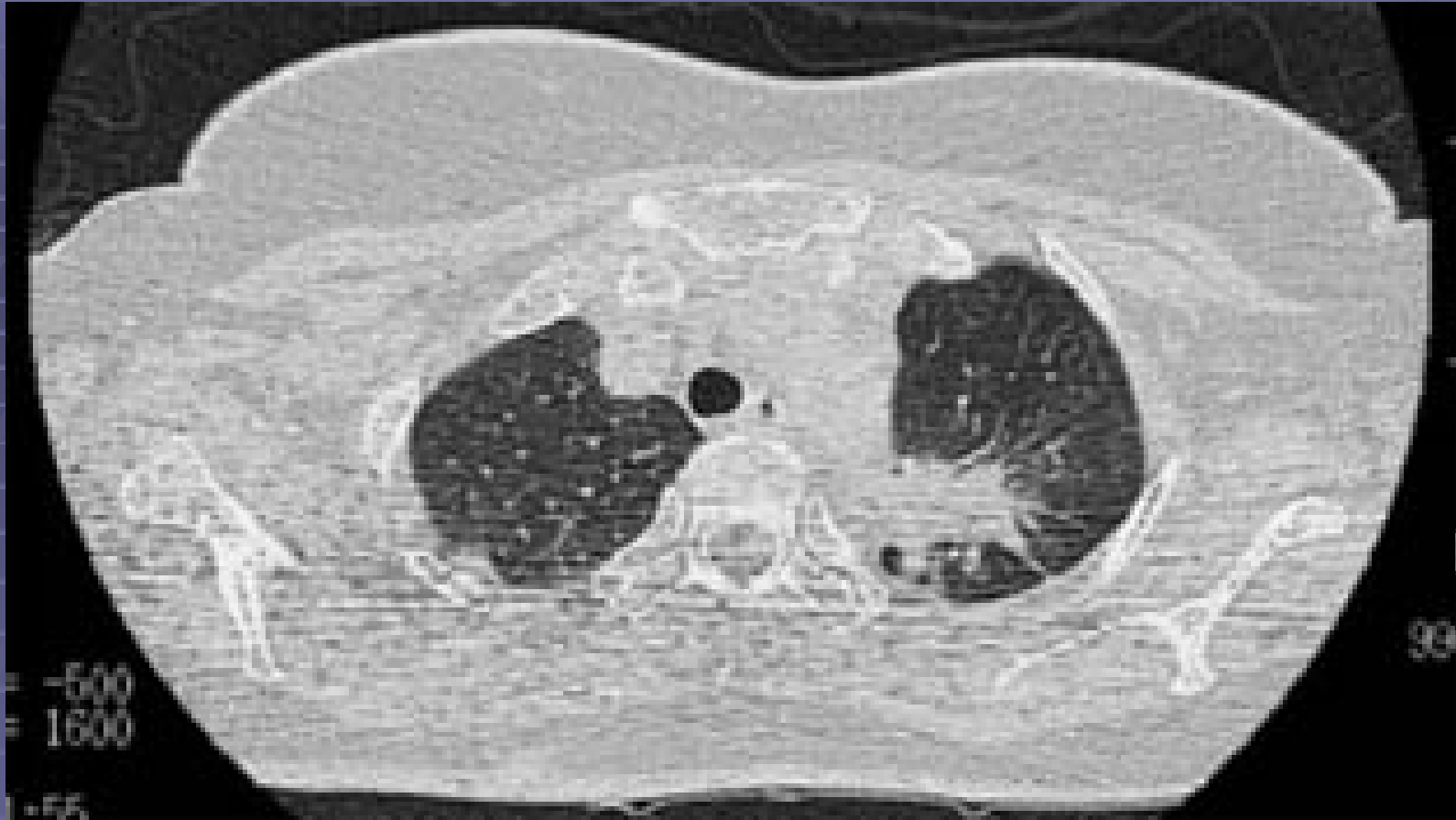
SUMMARY OF TYPES OF HEMOPTYSIS

DISEASE	BLEEDING		TYPE		ANATOMICAL SOURCE		
	Recurrent	Episodic	Streaking	Profuse	Bronc Artery	Pulm Artery	Pulm. Vein
Tuberculosis	X	X	X	X	X	X	X
Bronchiectasis Sicca		X	X		X		
Bronchiectasis Suppurative	X		X		X		
Pulmonary Abscess		X	X	XXX	X	XX	
Chronic Bronchitis		X	X		X		
Mediastinal Neoplasms		X	X	X		X	X
Trauma	X	X	X	X	X	X	X
Empyema	X		X			X	X
Cardiac		X			X	X	X
Adenoma		X	X	X	X		
Pneumonia	X		X		X		
Pneumonitis		X	X			X	X
Idiopathic	X	X	X	X	X	X	X

Hemoptysis with Normal Chest Film



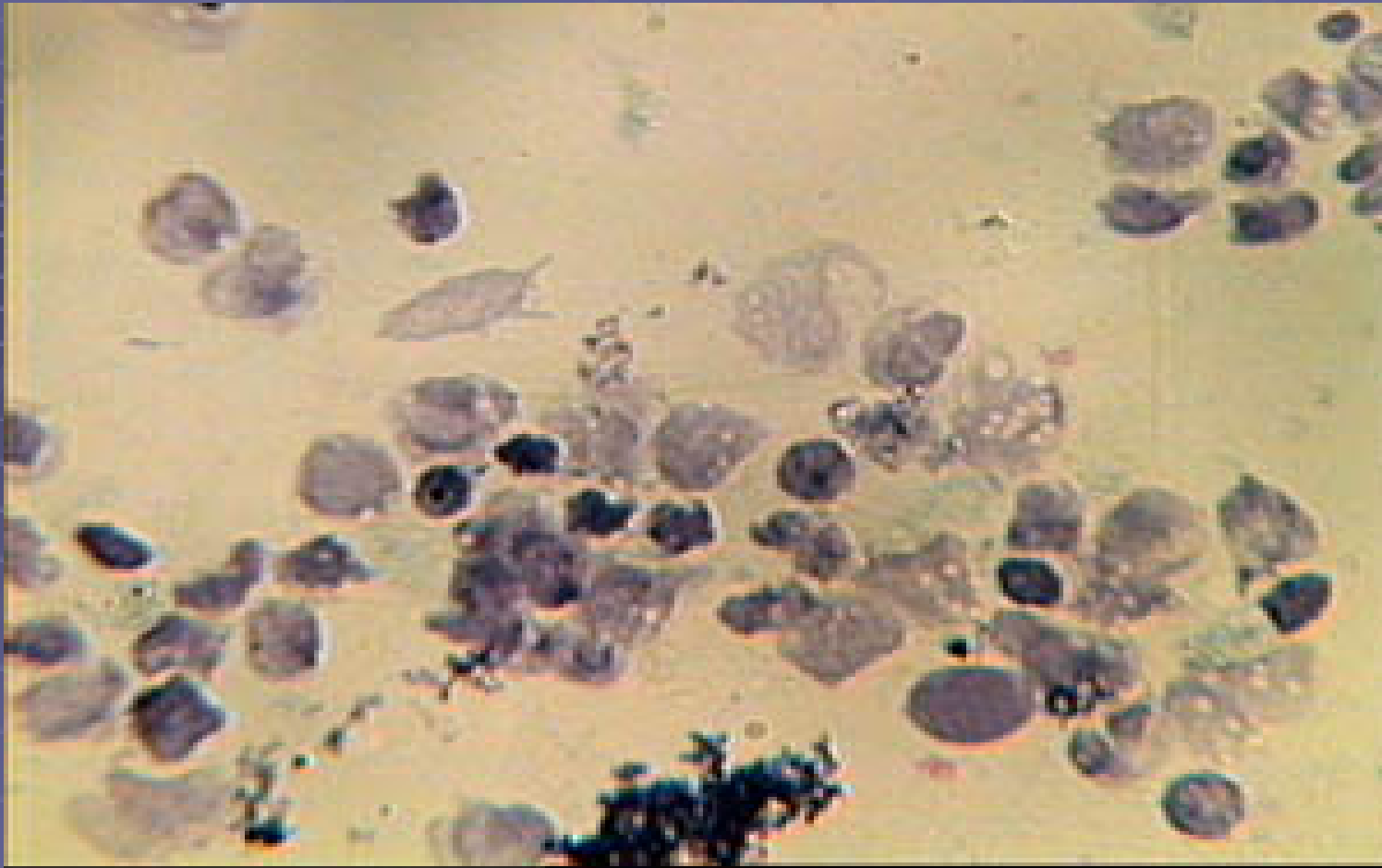
Case 1: Female 55-year-old, cough with hemoptysis infrequently for some months.



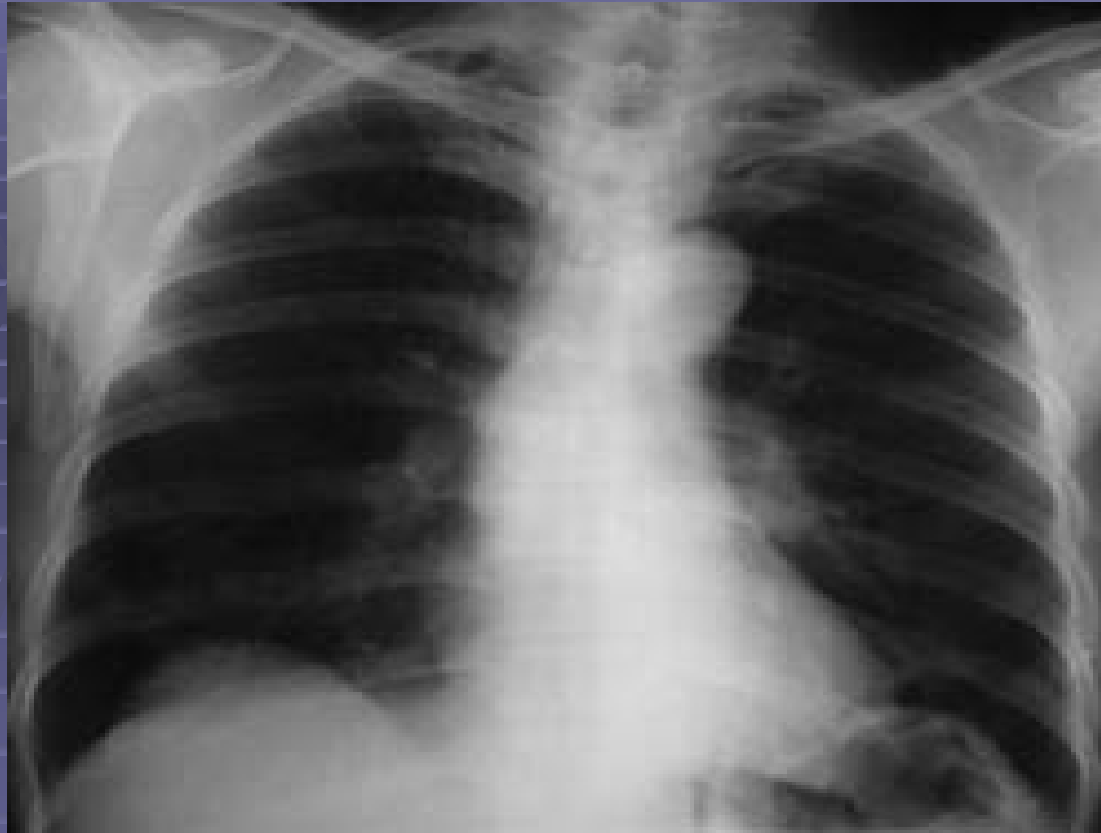
A chest CT scan is performed, L apical mass found, confirmed by endoscopic BAL (bronchoalveolar lavage) examination



No mass found in the bronchial lumen,
only hemorrhage detected on L upper lobe bronchus (arrow).
BAL was done



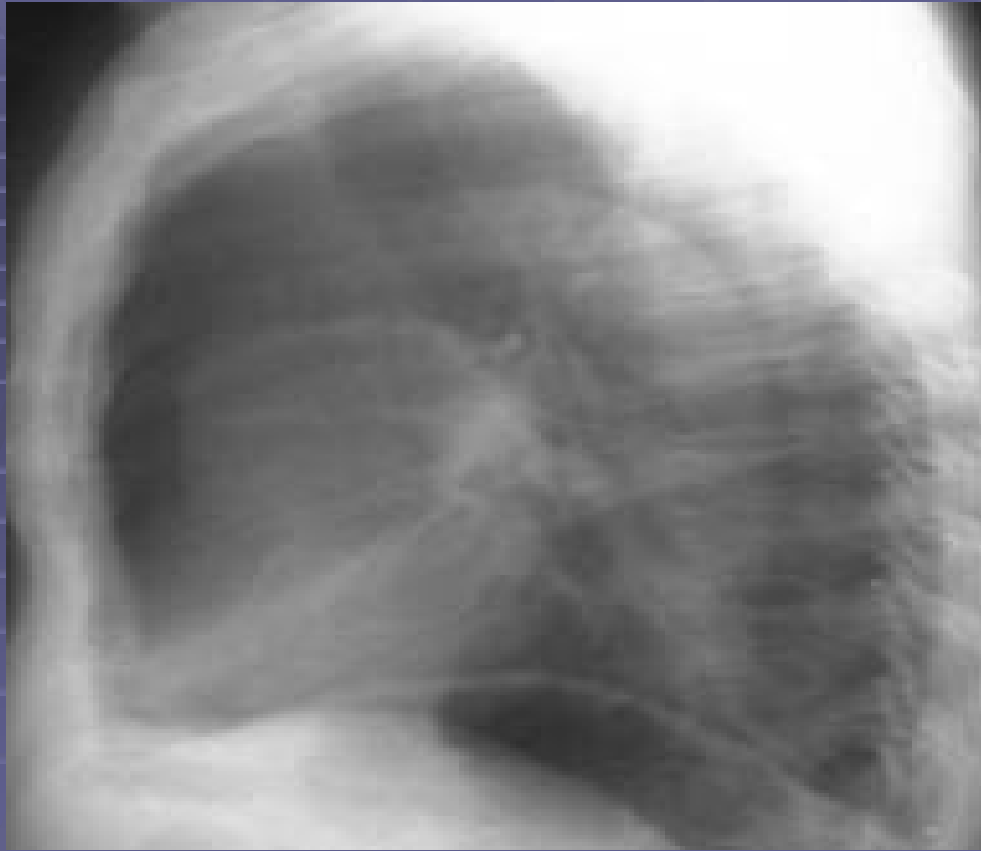
Pulmonary Adenocarcinoma



Case 2:

Male 70-year-old, heavy smoker, cough with wheezing, expiratory rale, hemoptysis for some month.

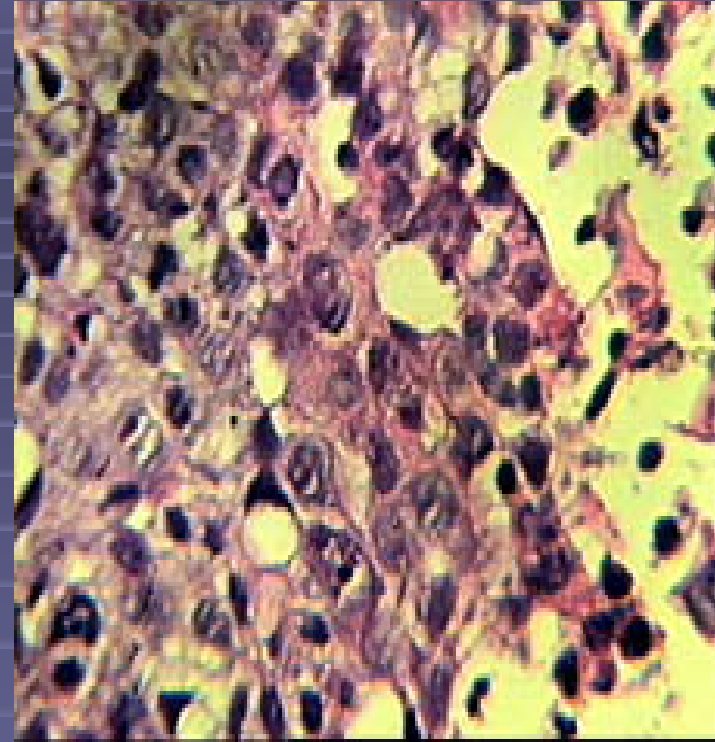
Spirometry: Obstructive syndrome improving after bronchodilator



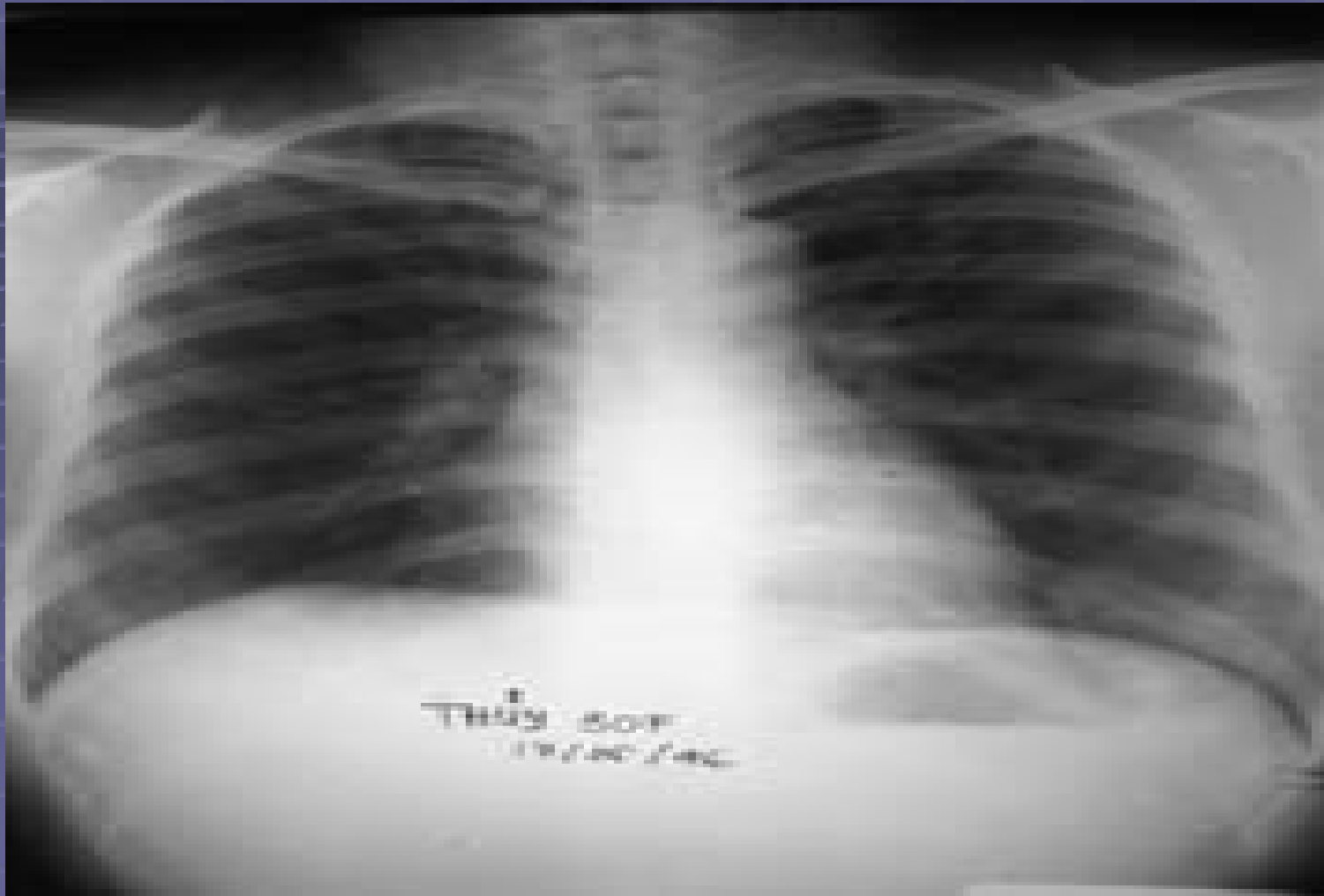
Case 2: lateral chest film: normal



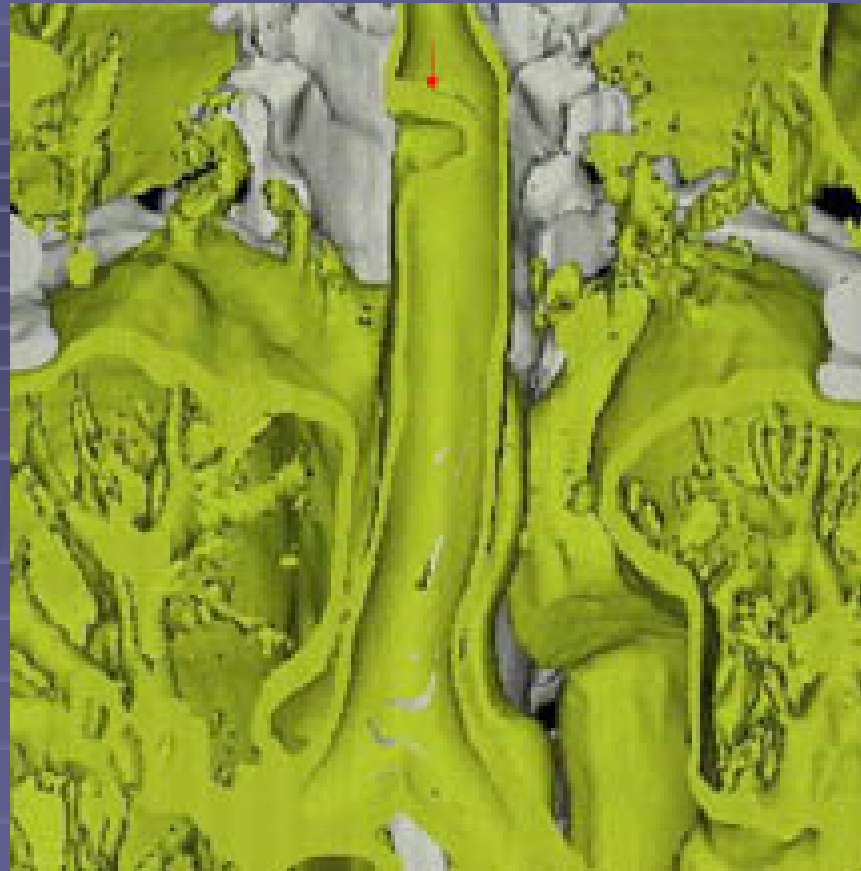
Case 2: Chest CT scan performed: Narrowing of the L main bronchus noted, may be due to a parahilar mass



Case 2 : L main bronchus stenosis due to submucosal induration confirmed by pathological result: adenocarcinoma



Case 3: female patient 31-year-old, small amount hemoptysis for 5 years. Normal chest XR



Case 3 : CT scan 3D reconstruction give a nice picture of intraluminal mass (red arrow) confirmed by endoscopic examination



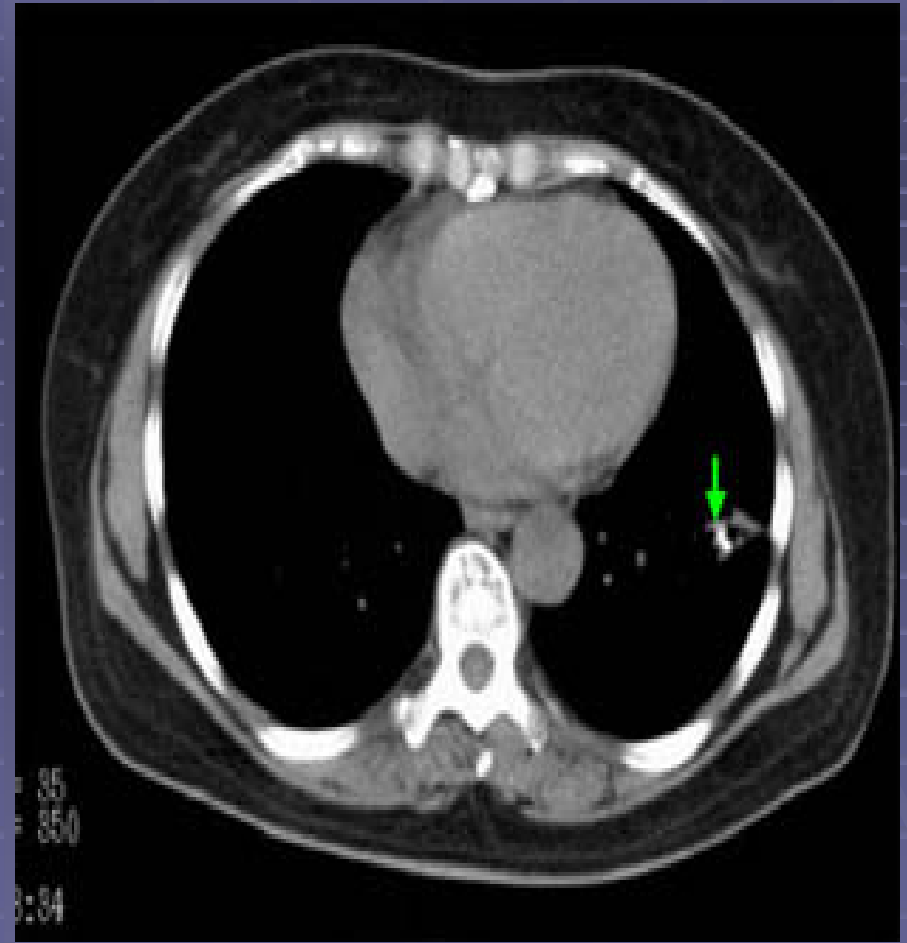
Case 3 : Endoscopic picture of intraluminal mass proved by pathological result as adenoma



Case : Female patient 57-year-old with long lasting moderate hemoptysis.



lateral chest film : No abnormality detected



A Helical CT scan demonstrated metallic FB
in L 6th segment

Best of Luck..