

CHAPTER

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Hemoptysis and Normal X Ray

Chest

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Hemoptysis i.e. blood stained sputum could range from minimal blood streaks to the loss of large quantity of blood with systemic collapse and associated mortality.

Hemoptysis is defined as expectoration of blood that originates from tracheo bronchial tree or pulmonary parenchyma. Bronchial artery is responsible for hemoptysis unless proved otherwise.

Blood in sputum could come from upper respiratory tract i.e. mouth or pharynx or may be that of Hematemesis which is misinterpreted as hemoptysis. Careful history in most of the cases helps to differentiate these.

Rarely is it solitary event and in most of the cases it is followed by production of further blood stained sputum and may be associated with other respiratory symptoms. This symptom must always be taken seriously as each episode of a simple streaky hemoptysis has a potential to lead to a serious consequences, if left untreated.

Even after vigorous attempts to identify the cause of it in almost 30% of the cases no definite etiology can be found.¹ With underlying abnormality etiological analysis gets easier, but time and again, hemoptysis patients may have completely normal X ray chest.

The common causes of hemoptysis in practice are Tuberculosis (endobronchial), CA lung, tracheitis, bronchitis, bronchiectasis, lung infarcts, trauma and pneumonia.

Lungs are the mirror of systemic diseases and variety of extra pulmonary disease has potential to present with hemoptysis. Mitral valve disease, Vasculitis, antiplatelet drugs, anticoagulant drugs, Reno pulmonary diseases, foreign body, aspergilloma, AV malformation and primary bleeding disorders would be some less common causes.

Thrombocytopenia due to cytotoxic drugs used in cancer or reduced platelets due to dengue fever or leptospirosis or pneumocystis carinii are becoming more common now a days.

Chest radiograph is mandatory for patients with hemoptysis and it often shows abnormality. Difficulties increase when there is no abnormality found on X ray.

Choice of investigations in Hemoptysis with normal X-ray chest

1. Bronchoscopy
2. CT scan chest (HRCT)
3. Sputum cytology and microbiology
4. USG abdomen pelvis / PR – proctoscopy to look for primary malignancy.

5. Bleeding and coagulation profile.

Supportive treatment

Mild or blood tinged sputum cases are managed with only observation, sedation and cough suppressants. Whereas more severe forms require more aggressive approach. These patients are kept NBM as deglutition stimulates cough reflex. They are given adequate IV fluids to maintain hydration and blood replacements if situation demands. Along with centrally acting or peripherally acting cough suppressants and sedations, anxiolytic therapy also may be required.

There are three main groups of drugs available to cease bleeding i.e.

- Local coagulants : snake venom derivatives
- Peripheral vasoconstrictors : ethamsylate
- Hemostatic: ferracrylum and others.

A small proportion of patients 2 to 3 % in moderate to severe variety of bleeding (departmental figures) require more intense approach like bronchial artery remobilization. And hence this technique must be available with teaching hospitals at least. Nonsurgical interventions for hemoptysis may be used as an interim solution before surgery or may constitute definitive therapy in a patient who is not a candidate for surgery. In over 90% of cases of hemoptysis requiring intervention with arterial embolization or surgery, the bronchial arteries are responsible for the bleeding. Failure to recognize the presence of a nonbronchial systemic arterial supply in patients with massive hemoptysis may result in recurrent bleeding after successful bronchial artery embolization.

For patients who fail to bronchial artery embolization or who are not suitable for bronchial artery embolization or where facilities are not available are subjected to resectional surgery like lobectomy or pneumonectomy.

Imaging

The imaging modalities pertinent to the evaluation

of hemoptysis include chest radiograph, CT, multidetector CT (MDCT), and thoracic aortography–bronchial artery embolization. There is uniform recognition of the efficacy of chest radiograph in the initial stages of evaluation. Radiography can help lateralize the bleeding with a high degree of certainty and can often help detect underlying parenchymal and pleural abnormalities.

Conditions such as bronchiectasis, lung malignancy, tuberculosis, and chronic fungal infection, some of the most common underlying causes of hemoptysis, are easily detected with CT.

MDCT angiography permits noninvasive, rapid, and accurate assessment of the cause and consequences of hemorrhage into the airways and helps guide subsequent management. Contrast-enhanced MDCT can demonstrate the site of bleeding as accurately as bronchoscopy and detect underlying disease with high sensitivity. MDCT provides for high-resolution angiographic studies of the thoracic and upper abdominal vasculature, which are useful prior to anticipated bronchial artery embolization or surgical intervention.

Bronchoscopy versus CT scan chest

There is inadequate data to support the choice of investigation in presence of hemoptysis with normal X ray chest, when further investigations are needed. The controversy regarding use of CT scan of chest v/s bronchoscopy is further complicated by lack of consistent clinical approach in evaluating this patients.²

Bronchoscopy with the use of either rigid or flexible endoscope is useful in identifying a specific site of bleeding, diagnosing active hemorrhage and controlling the airways in patients with catastrophic hemorrhage. Bronchoscopy does not have any major advantage over CT scan in localizing the site of bleeding and it is often less useful in detecting an underlying disease process in presence of active bleeding, as evaluation of distal airways may be difficult in such situations.

Many cases of hemoptysis with normal X ray chest and negative bronchoscopy were proved to be malignancy or bronchiectasis on CT scan. Where as endobronchial diseases were better evaluated and dealt with bronchoscopy, especially rigid.

Several articles have addressed the need for further evaluation when chest X ray is inconclusive in cases of hemoptysis. Though overall diagnostic yield is low, there could be 3 to 10 % incidence of malignancy in this population. One study reported that almost one quarter of patients presenting with acute hemoptysis secondary to malignancy had normal chest X ray.

A review of 119 cases of hemoptysis with negative chest radiographs recommended that patients younger than 40 years old who had negative radiographs be managed with observation only as possibility of malignancy in this group of patients is negligible. The authors recommended to reserve bronchoscopy for persistent hemoptysis, development of focal chest radiograph findings or those at risk for malignancy.²

Another study with 196 patients with negative chest radiographs and subsequent bronchoscopy recomanded three predictors of malignancy, sex (male), age 50 years or older, and > 40 pack year smoking history , meaning may be younger patients with less smoking carries much smaller risk of malignancy.

Smokers with hemoptysis of unknown origin who are > 40 years of age, approximately 6% of them will have a lung cancer that manifests within 3 years and additional follow-up testing in patients presenting with hemoptysis in which the underlying cause was not detected at initial radiography, is worth while. It may be useful or even necessary to perform follow-up CT several months after the episode of hemoptysis to study the evolution of underlying parenchymal lung abnormalities or to exclude the possibility that a small malignancy may have been missed at initial CT.

Frequency of lung cancer in women is also on rise (the chance that a man will develop lung cancer is 1 in 13 and for a woman, it is 1 in 17).

Diseases like bronchiectasis and tuberculosis or malignancy are better picked up on radioimaging than bronchoscopy as FOB can not detect peripheral airway disease or mediastinal lesions whereas endobronchial pathologies are better dealt with, with scopy than CT. scopy also has the absolute advantage of clearing airways of its secretions and collecting material for biopsy and cyto - microbiological purposes and also to deal with active bleeding site with procedures like cryo or instillation of local coagulants. Balloon catheter may be left behind in the affected segment to prevent aspiration of blood into other parts of the lung and hence to prevent asphyxiation. There can not be any debate between the choice of investigation as both have individual role to play, both tests are complimentary to each other and choice between which test to perform first depends on the availibility of the facility and general condition of the patients.

At the department of chest and TB at K. J. Somaiya medical college, we use local coagulant ferracrylum. We used it through the bronchoscope to cease bleeding and the results are really encouraging. The study of nebulised delivery of the same molecule is also ongoing and it appears promising.

We use following diagnostic protocol

1. Each case of hemoptysis is admitted for observation for atleast 24 hrs.
2. Along with clinical evaluation and routine blood biochemistry, all patients are subjected to X ray chest and sputum evaluation of TB.
3. Patients with active bleeding and hemodynamic instability are subjected to scopy first for both diagnostic and therapeutic purposes. If it is inconclusive then CT scan chest is advised. It has the absolute advantage of being bed side procedure.
4. Hemodynamicaaly stable patients are subjected to CT scan with contrast and then are taken up for bronchoscopy later for collecting specimen and to plan therapy.

5. bleeding or coagulation profile, 2 D echo, USG abdomen, sputum malignant cell cytology in specific group of patients.
6. patients with negative scopy and normal CT scan, if has higher risks for malignancy, are subjected to bronchoscopy and CT scan on follow up evaluation after 3 to 6 months. High risk cases are : Elderly patients with significant smoking habits and patients with CA lung in past, or patients with family history of CA lung or patients with occupations known to be having higher risks of lung.

With the advances in bronchoscopy it would be possible to pick up very early stages of malignancy may be at carcinoma at situ stage, even before CT scan pick it up. Autofluorescent endoscopy will be soon available at our department and managing hemoptysis with electrocautery, cryo probe or even with laser would be much easier. Bronchoscopy

than will surely replace CT scan in majority of cases till then we strongly endorse performing HRCT and FOB together as first investigations of choice in patients with hemoptysis and normal chest radiograph.

Guide lines differ from center to center and from department to department and hence each center from cottage hospital to urban five star hospital need to develop their own protocol under global universal guidance.

Reference

1. Jackson CV, Savage PJ, Euinn DL. Role of fiberoptic bronchoscopy in patients with hemoptysis and normal chest radiograph. *Chest* 1985; 97: 192-4
2. National guideline clearinghouse; Winer-Muram HT, Kahn A, Aquino SL, Batra PV, Gurney JW, Haramati LB, MacMahon H, Mohammed TL, Rozenshtein A, Vydareny KH, Washington L, Woodard PK, Kaiser L, Raoof S, Expert Panel on Thoracic Imaging. Hemoptysis. [online publication]. Reston (VA): *American College of Radiology (ACR)*; 2006. 6 p. [18 references]