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Review

A study of the pathophysiology, causes and management of hemoptysis with emphasis on differential diagnosis and appropriate management

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Hemoptysis is the expectoration of blood from the respiratory tract. It occurs in many clinical entities. In our primary care setting, treatment of many patients with hemoptysis begins with the administration of anti- tuberculosis drugs without investigation. The aim of this study is to review the relevant literature on the pathophysiology, causes and management of hemoptysis; with emphasis on differential diagnosis and appropriate management. Literature review was carried out on the pathophysiology, differential diagnosis, patient evaluation and management of hemoptysis using computerized search including Google, PubMed and African Journal Online. Additional information was obtained by cross referencing and using texts and journals in the medical libraries of Federal Medical Centre and University of Nigeria Enugu. Most of the literatures were from developed countries. Comprehensive management plan was lacking in many text books. However, we were able to explore the main differential diagnoses of hemoptysis and discuss their management within the limits of our literature search. Hemoptysis is a common presenting symptom in our chest clinics. Though pulmonary Tuberculosis tops the list of differential diagnosis of hemoptysis in most developing countries; we advice that all cases of hemoptysis should be well investigated as accurate diagnoses will ensure correct treatment.

Key words: Hemoptysis, differential diagnosis, investigations, management.

INTRODUCTION

Hemoptysis is the expectoration of blood from the respiratory tract (Weinberger et al., 2008; Stedman, 2000). It ranges from insignificant to massive life-threatening condition. In many primary care setting in our environment and many other developing nations of the world, hemoptysis is almost synonymous with pulmonary tuberculosis (PTB) and many patients with this symptom are first administered anti TB without proper work up (Prasad et al., 2009).

Hemoptysis can occur in many clinical entities and does not only reflect underlying PTB (Weinberger et al., 2008; Prasad et al., 2009). Hemoptysis can occur during and after treatment of TB. Therefore a proper screening for the cause of the hemoptysis is required before initiating treatment.

This clinical review therefore intends to remind doctors and general practitioners practicing in the developing nations of the list of differential diagnosis of hemoptysis

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and the need to investigate the patient appropriately before commencing treatment; especially regarding use of anti-TB regimen.

DISCUSSION

Hemoptysis is defined as expectoration of blood from the respiratory tract, a spectrum that varies from blood-streaked sputum to coughing up of large amount of blood or massive hemoptysis (100-600 mls of blood in 24 h) (Weinberger et al., 2008; Stedman, 2000). It could be a marker for potentially serious disease (bronchogenic carcinoma), a life threatening condition (massive hemoptysis) or a treatable condition as in acute pneumonias (Weinberger et al., 2008; Santiago et al., 1991, Johnson, 2000). Expectoration of a relatively small amount of blood is an alarming symptom. Therefore, hemoptysis, no matter the amount involved requires thorough investigation.

PATHOPHYSIOLOGY

The lung has a dual circulation – bronchial and pulmonary. Bleeding in the lungs could be from the tracheo-bronchial tree, the lung parenchyma or primarily from the pulmonary vasculature. When bleeding occurs in any of the three sites, it irritates the sensory receptors which are innervated by the afferent limb of the cough reflex (cranial nerves v, xii, x and the superior laryngeal nerves). Through the efferent limb (recurrent laryngeal and spinal nerves) the blood is expectorated with or without other secretions (Weinberger et al., 2008).

DIFFERENTIAL DIAGNOSIS

Hemoptysis is non-specific symptom and can occur in up to 100 clinical conditions (Weinberger et al., 2008; Prasad et al., 2009; Abal et al., 2001; Stabbings and Lim, 1999). The differential diagnosis of hemoptysis includes (Weinberger et al, 2008):

1. Trachea-bronchial source as in bronchiectasis, neoplasms, Kaposi's sarcoma, bronchial carcinoid, acute and chronic bronchitis, airway trauma, and foreign body.

2. Bleeding from pulmonary parenchyma source as in pneumonias (viral and bacterial), lung abscess, aspergillosis, tuberculosis, actinomycosis, Goodpasteurs syndrome, Wegener's granulomatosis lupus pneumonitis, idiopathic pulmonary haemosiderosis, parasitic infections such as hydatid cysts and paragonimiasis. Others include sarcoidosis, cystic fibrosis, HIV associated pneumonitis and mycobacterium avium intercellulare.

3. Bleeding from pulmonary vasculature such as pulmonary embolism, elevated pulmonary venous pressure (mitral stenosis, left ventricular failure and aortic aneurysm) are also causes of hemoptysis. Others include polyarteritis nodosa, arteriovenous malformation and in pulmonary artery rupture following balloon-tip pulmonary artery catheter manipulation.

4. Miscellaneous as well as rare causes of hemoptysis include pulmonary endometriosis, systemic coagulopathy as in leukemia, hemophilia, disseminated intravascular coagulation, thrombocytopaenia, anticoagulant/ thrombolytic agents. Other rare causes include schistosomiasis and mixed cryoglobulinaemia due to hepatitis C viral infection.

5. Other differential diagnosis include bleeding from the lower respiratory tract (upper airway bleed) or upper gastro-intestinal tract.

However, making the correct diagnosis depends on a good history, clinical examination and prompt targeted investigation.

PATIENT EVALUATON

A history of chronic cough, weight loss, drenching night sweats and contact with TB patient may suggest the diagnosis of TB. In a setting of immunosuppression and HIV; TB, neoplasm and Kaposi's sarcoma may be suspected. Acute onset with fever, cough and chest pain will suggest a viral or bacterial pneumonia while history of copious purulent sputum may suggest bronchiectasis or lung abscess. Pleuritic chest pain and calf tenderness may be a pointer to pulmonary infarction or embolism. Tobacco use may suggest bronchial Ca, chronic bronchitis or other forms of COPD. Occupational history, for example exposure to asbestor, may suggest bronchial Ca. Dyspnoea on exertion, orthopnoea, paroxysmal nocturnal dyspnoea with frothy pink sputum suggests heart failure or mitral stenosis. Travel history may suggest TB or parasitic infection while anticoagulant use may be pointer to iatrogenic cause. Nausea, vomiting, alcoholism or chronic NSAID use suggests upper GI bleeding rather than hemoptysis.

Clinical examination revealing cachexia, clubbing, hoarse voice or Cushing's syndrome would suggest a lung malignancy. Digital clubbing is a pointer to bronchiectasis, lung abscess or severe chronic lung disease. Fever, tachypnoea, hypoxia, barrel chest, pursed lips breathing, wheeze tympanitic percussion notes and distal heart sounds would suggest acute exacerbation of chronic bronchitis. The finding of mulberry gingivitis, saddle nose and nasal septum perforation suggests Wegener's granulomatosis. Violaceous tumours on the skin are pointer to Kaposi's sarcoma associated with HIV infection. Tachycardia, elevated JVP, and S3 gallop, heart murmurs and bilateral fine rales suggest heart failure or mitral stenosis. Tachycardia dyspnoea, fixed split S2, pleural friction rub, unilateral calf tenderness and oedema suggest pulmonary embolism. Oropharyngeal and mucous

membrane telangectasia and epistaxis suggest Osler-Weber- Rendu disease while dull percussion notes over lung apices and cachexia would suggest TB.

INVESTIGATIONS

The common investigative procedure for hemoptysis in our environment is sputum culture, gram stain, Ziehl Neelsen stain for acid fast bacilli and the use of chest X-ray. In a significant number of patients this will be able make a diagnosis, but when this fails to happen additional investigations need to be done. The old method of culture using Lewensen Jensen medium takes at least twelve weeks. The newer method Bactec 460 (Weinberger et al., 2008) will take about six weeks, and patient cannot wait this long for definitive treatment to take place. Hence, the introduction of the Gene Xpert machine (Gaffen, 2010, 2011; Jean-Baptiste, 2000) for the diagnosis of TB and drug resistant TB is a laudable approach as it could readily diagnose TB as the cause of hemoptysis. The Gene Xpert machine uses polymerase chain reaction (PCR) for the rapid diagnosis of TB within 90 min with sensitivity of 92, 96 and 98% for one, two and three sputum specimen, respectively (Gaffen, 2010, 2011). The specificity on non-TB cases is 99% with one sample, declining marginally to 98% with three sputum samples. The disadvantage is high cost. Sometimes invasive approach such as bronchoscopy, bronchial lavage and lung biopsy may be necessary for diagnosis of neoplasm and other conditions. Pulmonary angiogram may be required for diagnosis of pulmonary embolism while computerized tomography may be necessary for diagnosis of bronchiectasis.

Even after extensive evaluation, a sizable proportion of patients (up to 30% in some series) have no identifiable etiology for their hemoptysis (Weinberger et al., 2008). These patients are classified as having idiopathic or cryptogenic hemoptysis; and subtle airway or parenchymal disease is presumably responsible for the bleeding (Weinberger et al., 2008).

Confusion may arise as to whether the bleeding is from gastrointestinal or the respiratory tract. Pointers that the blood is originating from the gastrointestinal tract include a dark red appearance and an acidic pH, in contrast to the typical bright red and an alkaline pH of the hemoptysis (Weinberger et al., 2008).

MANAGEMENT

The overall management of patients with hemoptysis is aspiration prevention, bleeding cessation and treatment of underlying cause. Most of the patients with mild to moderate hemoptysis can be successfully managed conservatively. This involve absolute bed rest, use of cough suppressants like codeine, mild sedation and treating the underlying disease with antibiotics and antifungal agents. Furthermore, bleeding stopped in 91.8% of the patients who were managed conservatively with death attributable to hemoptysis in only 5.3% and these were patients with massive hemoptysis (Prasad et al., 2009). Many of the patients with massive hemoptysis will require surgical intervention and prompt appropriate intervention will improve survival in these patients (Weinberger et al., 2008; Jean-Baptiste, 2000). With massive bleeding, endotracheal intubation may be required. This controls the airway, maintains adequate gas exchange while providing mechanical ventilation. Another option involves inserting a balloon catheter through a bronchoscopy by direct visualization and inflating the balloon to occlude the bronchus leading to the bleeding site. Other available techniques for control of significant bleeding include laser phototherapy, electocautery, bronchial artery embolization and surgical resection of the affected area of the lung (Weinberger et al., 2008; Jean-Baptiste, 2000; Bidwell et al., 2005).

CONCLUSION AND RECOMMENDATIONS

Hemoptysis is a common presenting symptom in our chest clinics. Though tuberculosis tops the list of differential diagnosis of hemoptysis in most developing countries, we advice that all cases of hemoptysis should be well investigated as accurate diagnosis will ensure correct treatment.

We recommend that all cases of hemoptysis should be well investigated before initiating treatment and that the use of Gene Xpert machine and diagnostic culture and sensitivity testing for *Mycobacterium tuberculosis* should be made available by all regional governments in the developing nations where tuberculosis is still endemic.

We also suggest that more specialist doctors should be trained in the surgical management of massive hemoptysis across the African sub-region and other developing nations.

REFERENCES

Abal AT, Nair PC, Cherjan J (2001). Hemoptysis: Etiology, evaluation and outcome – A prospective study in a third-world Country. Respir. Med., 95: 548-552.

Bidwell JL, Pachner RW (2005). Hemoptysis: Diagnosis and management. Am. Fam. Phys., 72: 1253-1260.

Gaffen N (2011). Gene Xpert demonstrates good sensitivity and specificity but at high cost. HTB South February 2011.

Geffen N (2010). Cepheid Gene Xpert diagnostic technology for TB. HTB South April 2010.

Jean-Baptiste E (2000). Clinical assessment and management of massive hemoptysis. Crit. Care Med., 28: 1642.

Johnson JL (2000). Manifestation of hemoptysis. Postgrad. Med., 112: 101-113.

Prasad R, Garg R, Singhal S, Srivastava P (2009). Lessons from patients with hemoptysis attending a chest clinic in India. Ann. Thoracic Med., 4: 10-12.

Santiago S, Tobias J, Williams AJ (1991). A reappraisal of the causes of hemoptysis. Arch. Internal Med., 151: 2449-2451.

Stabbings AE, Lim TK (1999). Cause, treatment and outcome of patients with life-threatening hemoptysis. Singapore Med., 40: 67-69.

Stedman TL (2000). Stedman's medical dictionary. 27th ed. Philidephia: Lipincott Williams and Wilkins, 2000.

Weinberger SE, Lipson DA (2008). Cough and Hemoptysis. (17) Fausi AS, Kasper DL, Braunwald E, Hauser SL, Longo DL, Loscalzo J. In Harrisons Principles of Internal Medicine. New York. Mc Graw-Hill, pp. 227-228.