

Study of patients with active hemoptysis in a tertiary care teaching hospital at Eastern India

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Abstract

Background: Hemoptysis is one of the common symptoms for which patients' attending hospital. The etiology should be established. An early intervention will save life of patients. The spectrum of diseases presents with hemoptysis is vast. If the etiology is identified early, this will help in prompt management. This study was conducted to find out the etiological diagnosis of hemoptysis. **Methods:** This study was conducted in IQ City Medical College and Hospital, Durgapur, West Bengal. We started the study on December 2019 and continued till November 2020 over a period of one year. It was a cross sectional observational study. This study was institution-based study. The study population was patients attending the hospital with the complaints of active hemoptysis. The sample size for this study was 110. **Results:** Total 110 patients were included in the study. Out of which, there were male 72 and female 38. Average age of the patients was 48.2 years. About 78 patients came from rural area while 32 patients were from urban area. The result of this study showed, 57(52%) patients had active pulmonary tuberculosis, 24 (22%) patients had bronchiectasis, 9 patients had malignancy, 6 patients were suffering from pneumonia, 2 patients had fungal ball, 2 patients had collagen vascular diseases, 1 patient was found to be having mitral stenosis related complication, 1 patient had pulmonary embolism, 2 patients presented with hemoptysis due to chest trauma, the etiology of hemoptysis for 6 patients could not be identified. According to the severity of active hemoptysis, 55 patients presented with mild hemoptysis, 30 patients presented with moderate hemoptysis, while 25 patients had come to the emergency with complaints of massive hemoptysis. **Conclusion:** A wide spectrum of diseases may present with hemoptysis. The most common cause of hemoptysis is active pulmonary tuberculosis. The second common cause is bronchiectasis. Most of the cases presented with massive hemoptysis are due to pulmonary tuberculosis. The bronchogenic carcinoma patients presented mostly with streaky hemoptysis.

Keywords: Haemoptysis, Etiology, Diagnosis, Severity, Eastern India

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Introduction

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Haemoptysis, the expectoration of blood from the respiratory tract, can arise at any location from the alveoli to the glottis [1]. It is one of the commonest symptoms for which patient visits hospital. It is an alarming and worrisome symptom [2]. Every physician does come across this symptom in their practice. It

creates a great burden on the health care system. Many patients get admitted in hospital, resulting in loss of daily wages.

Managing a patient of hemoptysis requires a team effort, comprising a dynamic medical team. The care givers have to be well trained. A wide spectrum of disease can present with hemoptysis [3]. It is a distressing condition for the patient. This is also a challenge situation for the health care facility. Patients fail to give a proper history sometime. Patients are confused most of the time because of hemoptysis. They cannot differentiate between hemoptysis and hematemesis. So, it is necessary to take a proper history and proper investigation to differentiate between a bleeding from respiratory tract and from upper respiratory tract or a gastrointestinal bleed. A careful history may help to minimize the differential diagnosis. A bleeding which is associated with froth, associated with cough, bright red in color indicates a bleed from the respiratory tract. While, a blood mixed vomitus, with food particle, and altered blood indicate upper gastrointestinal bleed. A bedside litmus test is sometime helpful for differentiating a pulmonary pathology from a gastrointestinal pathology.

Hemoptysis can occur from anywhere in the respiratory tract. More precisely, from alveoli to the glottis, any area can bleed and give rise to a situation called hemoptysis [1]. When there is an injury to the blood vessel by inflammation or infection or by trauma, it starts bleeding. The amount of bleeding varies from a mild to moderate and massive hemoptysis. Any amount of bleeding in the respiratory tract should be taken seriously and sick medical attention. Although massive hemoptysis occurs in less than 20% of patients [4], mild or heavy, both are equally life threatening for the patient. More than 50% of the untreated massive hemoptysis patients die [5]. In another study it is found that, untreated case of massive hemoptysis the mortality rate can be up to 80% [6-10]. If we look into the anatomy of lungs, we can see that, the airway is accompanied by blood vessels. Among the blood vessels, both systemic and pulmonary blood vessels are present [11]. When there is an insult to the airway involving the vasculature, it starts bleeding. The bronchial circulation is a high-pressure zone. So, most of the time, we see that, on erosion of the vessel wall, there is bleeding from systemic vessels. There is an exhaustive list of etiology of hemoptysis. The causes may vary over geographical areas and among age group. Worldwide infection is the most common cause of bleeding accounting for 60-70 % of hemoptysis cases [12]. Worldwide tuberculosis is the common cause for hemoptysis in most of the studies conducted

[13-17]. Other than tuberculosis, bronchitis, bronchiectasis, malignancy, pneumonia, collagen vascular diseases, trauma chest, bleeding diathesis, fungal infection, drug induce, iatrogenic all contributes to the etiology of hemoptysis [18]. There are few cases, where, we fail to establish a definitive diagnosis even after battery of tests. It is very important to know the common causes, as it will help for management. Once the etiology is confirmed, prompt steps can be taken to arrest the bleeding. It will help us for better management of the patient.

Due to availability of advanced diagnostic modality like CT scan, it is easier to quickly evaluate the chest and find a diseased part. Now, with the availability of bronchoscope, it is possible to directly visualize the bronchus and bleeding lobe or segment. With the advancement of technology, we can now, do a therapeutic balloon tamponade to stop the bleeding and prevent the drowning of the healthy lung. Bronchoscopy guided procedures are now gaining popularity for management [19]. Bronchial artery embolization is again a sophisticated procedure to embolize a bleeding vessel, by applying gel foam. Bronchial artery embolization (BAE) is available in most of the hospital now a day. It can be performed on an emergency basis to arrest the bleeding or hemoptysis [20-22]. The spectrum of diseases that presents as a hemoptysis, in this part of the world has not been studied extensively. In this study, our aim is to find the common causes of hemoptysis. This knowledge will further help other patients. Lifesaving procedure may be performed to save life. A prompt preparedness will surely cut short the time for diagnosis. This will ensure a quick management without wasting much time. In our study we tried to focus on the etiological diagnosis of hemoptysis. The valuable result observed will directly or indirectly going to boost the knowledge for patient care and preparedness. The information available from this study may be used to formulate a management protocol for hemoptysis patients. The health resources and manpower may be driven to the patient who is having highest mortality risk.

Materials and Methods

This study was conducted in IQ City Medical College and Hospital, Durgapur, West Bengal. We started the study on December 2019 and continued till November 2020 over a period of one year. It was a cross sectional observational study. Study population was patients attending the OPD or casualty with the complaints of active hemoptysis. The sample size for

this study was 110. An informed consent was taken from all the participants before including in the study. Patients who refused to give consent were not included in this study. The parameters used are, detailed history, duration of hemoptysis, amount, severity, frequency, history of trauma, history of smoking, history of hematuria, any regular medication used, color of the expectorant, any history of upper GI bleed, any history of bleeding from upper respiratory tract, any history of bleeding diathesis, history of childhood pneumonia, history of immunosuppression, history of fever, chest pain, cough, wheeze, frothy expectoration were noted. History of evening rise of temperature, loss of weight, decreased appetite, contact with TB patients were also noted. History of smoking, streaky hemoptysis, change in voice, swelling of face was identified. Any feature of vasculitis in the body like rash, purpura, ulcer, gangrene was noted. Patients pulse, blood pressure, respiratory rate, oxygen saturation, temperature was monitored. A detailed general physical examination and respiratory system examination was done.

After a complete history and physical examination, investigations were sent. Routine blood investigations including Hb%, complete blood count, PT-INR, Bleeding time, clotting time were sent. Blood for connective tissue disorder like, ANA profile was also sent. In special situation, fungal stain and serum antibody was also sent. Urine microscopy was sent to rule out hematuria. Radiological investigations like X-ray and CT thorax was done. X-ray was done to diagnose any pulmonary abnormality or localization of the lesion. It is very helpful regarding the management of active hemoptysis. The patients were advised to keep the diseased side in the dependent position. It prevents the drowning of the healthy lung. X-ray could help us for emergency purpose for any rib fracture, pneumothorax. The signs of tuberculosis in the chest x-ray, like nodules, military mottling, infiltration, consolidation, effusion, cavitory lesion, fibrosis was noted [23-26].

CT thorax was done for all the patients. CT confirms the presence of bronchiectasis. The location of the bronchiectasis was also noted. The amount of lung involvement was assessed. The radiological signs of bronchiectasis were observed. CT scan is also helpful for the diagnosis of any space occupying lesion. The lesion can be in the lung parenchyma or endobronchial. It also helps us differentiating a benign from malignant lesion. CT scan is also very important before doing fibro-optic bronchoscopy. Ct scan can help us localizing a lobe or a segment to take bronchial lavage or bronchial brushing or therapeutic balloon tamponade.

Sputum test was done for all the patients. The sputum test included sputum microscopy by Ziehl-Neelsen staining, CB-NAAT, fungal staining, BACTEC culture, gram staining and culture sensitivity. The patient with active hemoptysis, who gave blood mixed sputum, could not be sent for CB-NAAT test. We had to wait for the production of blood free sputum for doing the CB-NAAT. The sputum processing was done as per the guideline of the TB control programmed in India (NTEP) [27]. Acid fast bacilli isolated either microscopy, genetic testing or culture was labelled as an active sputum positive pulmonary tuberculosis. If Acid fast bacilli is not isolated either microscopy, genetic testing or culture was labelled as sputum negative. Microorganisms isolated by gram staining were noted. The antibiotic sensitivity pattern was registered. Sputum samples were processed for fungal stain and culture. The fungal organism isolated by fungal staining was noted. Further, samples were processed for fungal culture for the confirmation and species identification. The sputum microscopy was also done to look for any malignant cell.

Blood investigations were done to look for any anemia, severity of anemia and followed by its correction by blood transfusion or by giving hematinic. Bleeding time, clotting time was done to look for any bleeding diathesis. PT-INR was sent to look for any propensity to bleed further. The platelet count was a reliable indicator, to transfuse platelet to the patient. The total leucocyte count was helpful for the criteria to fulfill for the diagnosis and severity of pneumonia. Fibro-optic bronchoscopy was done for all the patients with hemoptysis. It was done with the purpose to localize the bleeding site, lobe or segment involved. Biopsy was taken from endobronchial visible mass lesion and subsequently sent for histopathological examination. A bronchial brushing or bronchoalveolar lavage (BAL) fluid was taken from the affected site and sent for cytology and microbiological examination.

To summarize, patient presented to hospital with active hemoptysis, a proper history was taken. Patients were resuscitated with immediate use of emergency medication. After stabilizing the patient, other investigations were sent. Patients' reports were reviewed and a definitive etiological diagnosis of the hemoptysis were made. A comprehensive report from sputum, radiology, bronchoscopy, blood reports were all helpful for the diagnosis and further treatment plan. The etiological diagnosis was then registered for further use in our study. Data collected from this study were scientifically processed. The valuable result of the study was expressed in percentage.

Results

Total 110 patients were included in the study. Out of that male were 72 and female 38. Average age of the patients was 48.2 years. About 78 patients came from rural area while 32 patients were from urban area. All the patients presented to the hospital with the complaints of active hemoptysis. After proper clinical history, routine blood investigation, radiological study and fibro-opticbronchoscopy the results were scientifically tabulated. The result of this study is shown in table 1. The results obtained from this study was, 57(52%) patients had active pulmonary tuberculosis, 24 (22%) patients were suffering from bronchiectasis, 9 patients had malignancy, 6 patients were suffering from pneumonia, 2 patients had fungal ball, 2 patients had collagen vascular diseases, 1 patient was found to be having a mitral stenosis related complication, 1 patient had pulmonary embolism, 2

patients presented with hemoptysis due to chest trauma, the etiology of hemoptysis for 6 patients could not be identified. According to the severity of active hemoptysis, as shown in table 2, 55 patients presented with mild hemoptysis, 30 patients presented with moderate hemoptysis, while 25 patients had come to the emergency with complaints of massive hemoptysis. Among the mild hemoptysis group, 22 patients had tuberculosis, 11 had bronchiectasis, 8 had malignancy, 6 had pneumonia, mitral stenosis 1, one patient had pulmonary embolism, 6 patients' etiology could not be identified. Among the patients presented with moderate hemoptysis 20 patient had tuberculosis, 5 had bronchiectasis, 1 had malignancy, fungal ball 2, 2 patients had collagen vascular diseases. Among the massive hemoptysis patients, 15 patients had tuberculosis, 8 had bronchiectasis, 2 patients presented with trauma chest.

Table 1: Clinical cases with complaints of active hemoptysis

Diseases	Number of patients	Percentage
Tuberculosis	57	52 %
Bronchiectasis	24	22%
Malignancy	9	8%
Pneumonia	6	5%
Fungal ball	2	2%
Vasculitis	2	2%
Mitral stenosis	1	1%
Pulmonary embolism	1	1%
Trauma	2	2%
Non specific	6	5%

Table 2: Severity of active hemoptysis in different clinical cases

Diseases	Mild	Moderate	Massive
Tuberculosis	22	20	15
Bronchiectasis	11	5	8
Malignancy	8	1	-
Pneumonia	6	-	-
Fungal ball	-	2	-
Vasculitis	-	2	-
Mitral stenosis	1	-	-
Pulmonary embolism	1	-	-
Trauma	-	-	2
Non-specific	6	-	-

Discussion

In this cross-sectional observational institution-based study comprising 110 patients, we have found that 52% of the patient is suffering from active tuberculosis. Bhalla et al, in his study in India found that 65% of the

patient is suffering from TB [28]. His study population was 64 patients. Our result is corroborating with his study. Fartoukh et al, in his study in France, found that 25% of the patients of hemoptysis is suffering from TB. His sample size was 1087 patients. Our result is not corroborating with his study. This difference may

be due to a geographical variation or the magnitude of TB in that particular place. The difference of result may also be due to a huge number of sample sizes [29]. Kirl et al, in his study in Turkey, found that 21% of the patient is suffering from tuberculosis. His sample size was 203 patients. Our result is not corroborating with his study [30]. Chan et al, in his study in Hongkong, found that 42% of the patients suffering from TB. His study population was 251 patients. Our result varies from his study. This may be due to different prevalence of TB in that particular place [31]. Shigemura et al, in his study in China, found that 55% of the patients suffering from TB. His study population was 62 patients. Our result is corroborating with his study [32]. Ong and Eng et al, in their study in Singapore, found that 10% of the patients suffering from TB. His study population was 29 patients. Our result varies from his study. This may be due to small sample size [33]. Valipour et al, in his study in Austria, found that 23% of the active hemoptysis patients were suffering from TB. His study population was 57 patients. Our result is not corroborating with his study.

Our result varies from his study [34]. Revel et al, in his study in France, found that 19% of the active hemoptysis patients were suffering from TB. His study population was 80 patients. In our study on 110 patients, we have found that 52% of the patients having hemoptysis are suffering from active tuberculosis. This variation of result may also be described by a difference in demography and a spectrum of disease prevalence [35]. Lee et al, in his study in Hongkong, found that 17% of the patients of active hemoptysis were suffering from TB. His study population was 54 patients [36]. Hsiao et al, in his study in USA, found that 7% of the patients of active hemoptysis were suffering from TB. His study population was 28 patients [37].

As discussed, it is evident that, tuberculosis as a cause for active hemoptysis varies over different studies conducted in different region and time. But in most of the study, tuberculosis remains an important etiology for hemoptysis. The evaluation of hemoptysis is meaningless without investigating for TB. Although, plenty of cause is there for hemoptysis, tuberculosis as an etiology should be excluded.

In this cross-sectional institution-based observational study on 110 patients, we have found that 22% of the patients having hemoptysis is having underlying bronchiectasis. Bhalla et al, in his study in India found that 9% of the patients suffering from bronchiectasis [28]. His study population was 64 patients. Our result is not corroborating with his study. This difference may be attributed to sample size, place of study, study

population. Kirl et al, in his study in Turkey, found that 15% of the patients suffering from bronchiectasis [30]. His study population was 203 patients. Fartoukh et al, in his study in France, found that 20% of the patients suffering from bronchiectasis [29]. His study population was 1087 patients. Chan et al, in his study in Hongkong, found that 32% of the patients suffering from bronchiectasis [31]. Shigemura et al, in his study in China, found that 23% of the patients suffering from bronchiectasis [32]. Valipour et al, in his study Austria, found that 8.5% of the patients suffering from bronchiectasis [34]. Ong and Eng et al, in their study in Singapore, found that 66% of the patients suffering from bronchiectasis [33]. Revel et al, in his study in France, found that 31% of the patients suffering from bronchiectasis [35]. Hsiao et al, in his study in USA, found that 57% of the patients suffering from bronchiectasis [37]. Lee et al, in his study in Hongkong, found that 57% of the patients suffering from bronchiectasis [36]. So, it is clear that, the prevalence of hemoptysis due to bronchiectasis varies from 8.5% to 66%, over different part and different study conducted over the period of time. The value we got from our study is 22%. This difference may be due to different of diseases prevalence. As discussed, bronchiectasis remains an important etiological factor in causing active hemoptysis. The evaluation of hemoptysis patient should comprise a thorough workout for bronchiectasis. Early detection of bronchiectasis will lead to a prompt action to control bleeding.

The occurrence of bronchogenic carcinoma presenting as hemoptysis varies in different studies. In few studies it's uncommon. But in other studies, the magnitude is very high. The occurrence is as high as 35% [34]. So, ideally, we should exclude lung carcinoma in active hemoptysis patients. Specially, elderly male with history of smoking, presenting with weight loss, cough, chest pain, superior vena-cava obstruction syndrome, with streaky hemoptysis, a possibility of malignancy should be excluded. Similarly, fungal infection causing hemoptysis varies over different geographical areas and in different studies. It is a common cause of hemoptysis in few studies [31]. So, a fungal disease should be excluded in an active hemoptysis patient. Pneumonia as a cause of hemoptysis was found as a common disease in few studies [28]. In our study also pneumonia is a significant disease to cause hemoptysis. Pneumonia should be excluded in evaluating a patient of hemoptysis on a routine basis. Other common diseases like, trauma chest, pulmonary embolism, vasculitis,

bleeding diathesis, cardiac causes should be looked for. In a few instances, the cause cannot be determined even after doing exhaustive diagnostic procedures. This indicates a further study on hemoptysis.

Conclusion

From this cross sectional observational institutional based study we can conclude that, a wide spectrum of diseases may present with hemoptysis. The most common cause of hemoptysis revealed in our study is active pulmonary tuberculosis. The second common disease is bronchiectasis. Other common causes are lung cancer pneumonia, pulmonary embolism, fungal infection, connective tissue disorder, cardiac cause, chest trauma. Etiology of hemoptysis may not be established even after doing all possible tests. On the other hand, most of the cases presented with massive hemoptysis is tuberculosis. In our study, bronchogenic carcinoma commonly presents with streaky hemoptysis. The fungal ball grown in a cavity may bleed and present with active hemoptysis. In this part of the world, tuberculosis remains the most common cause of active hemoptysis. So, any patient of hemoptysis should be evaluated for active pulmonary TB. Chest x-ray, HRCT, bronchoscopy, microscopy, culture or molecular method like CB-NAAT may be used to detect tuberculosis. The evidence found in different centers may be collaborated to enrich the knowledge to manage hemoptysis. The evaluation of hemoptysis requires a laborious workup and a dynamic medical team for managing the active hemoptysis patient.

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