

Characteristics of Patients Admitted with Hemoptysis to an Inner City Hospital

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Abstract

Introduction: Hemoptysis is defined as the expectoration of blood from the lungs or tracheobronchial tree. There is a wide variation in its severity and etiology. In this study we aimed to determine the characteristics of patients admitted with hemoptysis to an inner city hospital. **Methods:** This was a retrospective review of all patients admitted to Bronx-Lebanon Hospital Center from January 2006 to July 2009 with the diagnosis of hemoptysis. Data regarding demographic characteristics, severity and etiology of hemoptysis and management of those patients was obtained. **Results:** 95 patients with hemoptysis were identified, 22 were excluded due to incomplete data and 73 were included in the final analysis. Males accounted for 48% of the cohort. Common comorbid diseases found were hypertension (60%), obstructive airway disease (47%), HIV infection (26%) and diabetes mellitus (17%). Twenty-three (32%) patients had normal chest imaging, either chest roentgenogram (CXR) or CXR and chest CT. Forty-six patients underwent CXR and chest CT, in 37% of those, either/both test revealed some findings. In 19 (51%) of patient who underwent CXR and chest CT for hemoptysis evaluation, the CXR was normal and the chest CT revealed abnormalities. Mild hemoptysis was seen in 79% of the patients with only one patient presenting with severe hemoptysis. Etiology was identified in 85% of the cases, infectious etiology being the most common (75%). *Pneumocystis jiroveci* was identified as a cause in 5.5% of the cases and no source in 15%. Invasive procedures were performed in 35% of patients, including flexible fiberoptic bronchoscopy in 23(31%) patients, bronchial artery embolization in 2(3%) patients and thoracotomy in one. Bronchoscopy identified source in 30% patients. **Conclusion:** Mild hemoptysis was the most common presentation in our inner city cohort. In patients presenting with hemoptysis and a normal CXR, chest CT should be considered as it is more sensitive to detect abnormalities leading to bleeding. In addition, infectious etiologies remain the most common etiology for hemoptysis. Clinicians should be aware that infection with *Pneumocystis jiroveci* can present with hemoptysis in HIV infected patients.

INTRODUCTION

Hemoptysis is defined as the expectoration of blood from the lungs or tracheobronchial tree. There is a wide variation in the medical literature regarding the etiology which is highly dependent on the geographical location of the study cohort; non tubercular infection, bronchogenic carcinoma and bronchiectasis are the most common etiology in the western hemisphere and tuberculosis in Africa and Asia.

(1)(2)(3)(4)(5)(6)(7). Despite the extensive literature available on hemoptysis, few studies are based in inner city hospitals (8). The inner city of any major metropolis has unique demographics with a higher immigrant population. Our hospital serves the South and Central Bronx communities of New York City where we find predominantly the Hispanic and African American population, with a higher rate of immigrants, uninsured and low/very low income patients with a different case mix.

Additionally, the incidence of human immunodeficiency virus (HIV) / acquired immunodeficiency syndrome (AIDS) is higher in this population with the inherent risk for opportunistic infections (9)(10). We report the characteristics and outcome of patients admitted with hemoptysis to our inner city hospital.

METHODS

This was a retrospective review of all patients admitted to Bronx-Lebanon Hospital Center from January 2006 to July 2009 with the diagnosis of hemoptysis.

Definition of hemoptysis: hemoptysis was defined as bleeding originating from the lower respiratory tract. The severity was classified as mild (<50ml/24h) and moderate (50-300ml/24h). Severe hemoptysis was defined as more than 300ml/24h or any amount of blood with concurrent cardio-respiratory compromise. There is no consensus on the

categorization on severity of hemoptysis. Reported volumes to define severe hemoptysis range from 100 to 600 mL of expectorated blood over a 24-hour period (2)(11)(12)(13)(14).

Baseline demographics, data on pre-existing conditions like hypertension, diabetes mellitus, infection with HIV, obstructive airway disease, chronic kidney disease, liver cirrhosis and congestive heart failure were obtained. History of tobacco, alcohol and substance use was extracted. The radiological findings from the chest roentgenogram (CXR) and computed tomogram (CT) of the chest when available were obtained. The cause of hemoptysis was obtained from either the pulmonary consultation or when this not available, inferred based on medical record documentation and radiological findings by expert opinion. In patients with hemoptysis without a definite cause the term cryptogenic hemoptysis was used. The diagnostic and therapeutic procedures like bronchoscopy, bronchial artery embolization and thoracotomy were noted.

The primary outcome measure was prevalence of the severity and etiology of hemoptysis. The study was approved by the hospital institutional research review board, and the need for informed consent was waived.

RESULTS

A total of 95 patients with hemoptysis were identified. Twenty-two of these patients were excluded due to incomplete data and 73 were included in the final analysis. Characteristics of the study group are seen in table 1. The mean age was 53 years of age (range 19-88), with males accounting for 48% of the cohort. Hispanics and African Americans accounted for 97% of the patients. History of tobacco use was found in 49%, alcohol in 30% and recreational drugs in 34% of the patients.

The presence of comorbid conditions was a common finding in our patients, with hypertension present in 60% of the patients, followed by obstructive airway disease (47%), HIV infection (26%) and diabetes mellitus (17%) (Table 2). The chest imaging details are presented in table 3. Twenty-three (32%) of the 73 patients with hemoptysis had normal imaging of the chest. Abnormal radiographic findings were present in the remaining 50 patients. Twenty-seven patients had only CXR done with 13 (48%) being abnormal. Forty-six (63%) patient had CXR and chest CT performed for evaluation of hemoptysis, 9 (20%) had both test normal, 18 (39%) had abnormal CXR and chest CT and 19 (41%) had normal CXR and abnormal chest CT. The most common

radiological findings missed by CXR were ground glass opacities (GGO) followed by masses and infiltrates (Table 3).

Majority of the patients (79%) had mild hemoptysis with only one patient presenting with severe bleeding.

A definitive etiology for the hemoptysis was identified in 62 (85%) patients. Infectious conditions were the most frequent causes, accounting for 55 (75%) of cases. Community acquired pneumonia followed by acute bronchitis, healthcare associated pneumonia, tuberculosis and bronchiectasis accounted for 70% of the 55 patients. *Pneumocystis jiroveci* (PJP) and malignancy were identified as cause of hemoptysis in 5.5% cases. Of the 19 HIV-infected patients in our study, 21% had PJP as etiology of hemoptysis. In 11 patients (15%), no obvious source of hemoptysis was found and was labeled cryptogenic (Table 4).

Diagnostic and therapeutic interventions were performed in 26 (35%) of patients. Fiberoptic bronchoscopy (FFB) was performed in 23 (31%); all patients with moderate and severe hemoptysis and some patients with mild hemoptysis and localizing signs in radiographic studies suggestive of malignancy or opportunistic infections underwent the procedure. Bronchoscopy revealed the source/etiology for bleeding in 7 (30%) patients. Bronchial artery embolization was performed in 2 (3%) patients and one patient required thoracotomy. The time of FFB ranged from less than 1 day to 3 days from presentation of hemoptysis.

Figure 1

Table 1. Characteristics of patients with hemoptysis

Characteristics		n = 73
Age mean (range)		53 (19 – 88)
Gender	Male	35 (48%)
	Female	38 (52%)
Race	Hispanic	39 (53%)
	African American	32 (44%)
	White	1 (1.3%)
	Asian	1 (1.3%)
Substance abuse	Alcohol abuse	22 (30%)
	Cigarette Smoking	36 (49%)
	Recreational drugs	25 (34%)

Figure 2

Table 2 Comorbid conditions of patients with hemoptysis

Comorbidities	N=73 (%)
Hypertension	44 (60)
Diabetes	17 (23)
HIV	19 (26)
Obstructive airway disease	34 (47)
Chronic kidney disease	5 (7)
Heart Failure	4 (5)
Cirrhosis	5 (7)

Figure 3

Table 3 Imaging characteristics of patients with hemoptysis

	Only CXR available n=27 (%)	CXR and chest CT available n=46 (%)		Total n=73 (%)
Normal Radiology	14 (52%)	9 (20%)		23 (32)
Positive Radiological Findings	CXR n=13 (48%)	Positive CT and CXR n = 18	Positive CT and normal CXR n = 19	n=50 (%)
Unilateral Infiltrate	7	4	2	13 (18)
Bilateral Infiltrates	3	4	3	10 (14)
Mass	1	5	3	9 (12)
Ground Glass Opacification	0	0	5	5 (7)
Cavity	1	3	0	4 (5)
Pleural effusion	1	1	2	4 (5)
Atelectasis / Collapse	0	0	2	2 (2.7)
Other	0	1	2	3 (4)

Figure 4

Table 4 Etiology of hemoptysis

Disease Process	Number=73 (%)
Community acquired pneumonia	22 (30)
Health care associated pneumonia	7 (9.6)
Tuberculosis	7 (9.6)
Pneumocystis jiroveci	4 (5.5)
Acute bronchitis	10 (14)
Bronchiectasis	5 (6.8)
Diffuse alveolar hemorrhage	1 (1.3)
Malignancy	4 (5.5)
Pulmonary emboli	2 (2.7)
Unknown	11 (15)

DISCUSSION

Contrary to earlier reports showing a prevalence for severe hemoptysis of 1.5 to 4%, our study shows that in our inner city population, mild and moderate hemoptysis is more prevalent than severe hemoptysis. (2)(15)(16).

Most cases of hemoptysis were benign and self-limited with life-threatening hemoptysis being rare. The causes of hemoptysis in our study mirror the findings by other authors in the western hemisphere; with inflammatory and infectious process being the most common etiologies for bleeding. No

cause for hemoptysis was seen in 15% of our cases. The rate of cryptogenic hemoptysis is variable in literature ranging from 6% to 30% even after extensive evaluation (2)(8)(22)(23)(24)(28). Of the 19 HIV-infected patients in our study, 21% had PJP as etiology for hemoptysis; rate being much higher than the 5% reported in the literature. PJP is a frequent manifestation of the AIDS syndrome. It commonly presents with nonproductive cough, fever, and dyspnea. Radiographic manifestations are protean and range from a normal CXR to infiltrates, cyst and occasional cavities. In Nelson's study looking at 50 HIV-infected patients with hemoptysis, the definite diagnosis of PJP was made in 1 out of 20(5%) of cases (16). We could speculate that this increase may be a consequence of a changing virulence of PJP. Our 9.6% incidence of tuberculosis as a cause for hemoptysis in our group was lower than the 16% reported by McGuinness et al with a similar catchment area. (8). This is probably due to the decreasing incidence of tuberculosis (17)(18). Contrary to other reports the incidence of malignancy induced hemoptysis was lower in our cohort (2)(15)(19). The cause of this is unclear and could be to the lower use of FFB and failure to detect endobronchial lesions in some patients with mild bleeding.

Currently, there is no consensus on what is the best workup for hemoptysis. A complete evaluation includes patient history and physical examination, bronchoscopy, laboratory tests, and imaging studies. Imaging studies that are helpful include CXR, chest CT conventional and angiography when indicated. The low sensitivity of CXR in hemoptysis has been reported in literature by multiple studies showing low yield and a high false negative rate (2)(20)(21). In as many as 40% of cases of hemoptysis, the findings on chest radiography are normal or do not reveal the source of the bleeding (8)(26).

Approximately 5% to 6% of patients with hemoptysis and normal results on radiography are eventually found to have lung cancer (17). Thus, it is recommended that a normal or non-localizing finding on CXR warrants further evaluation by other means, including chest CT and possible inspection FFB.

Our study is consistent with the above mentioned studies showing a normal CXR in 41% of patients who had an abnormal chest CT. We had 14 (52%) patients who had only CXR performed as part of the investigation for hemoptysis and this was normal. We could only assume that that at least 5 patients had some missed pulmonary abnormalities. Some studies consider CT superior to FFB in finding a cause of

hemoptysis, its main advantage being its ability to show distal airways beyond the reach of the bronchoscope, and the lung parenchyma surrounding these distal airways (8)(26)(28).

In most studies the diagnostic yield of FFB varies from 10% to 50% consistent with the findings in our study with a diagnostic yield of 30%. The diagnostic yield of FFB for massive hemoptysis is higher by almost 30% as compared to mild or moderate bleeding (8)(25).

Limitations of our study include single institution study and the few patients with moderate and severe hemoptysis. However our study gives valuable insights on hemoptysis in our inner city institution with patients with multiple comorbidities and a large number of HIV-infected patients.

In conclusion, most of the patients presenting with hemoptysis to our inner city hospital have mild or moderate bleeding. Infections account for the majority of cases and there is a need for increased awareness of PJP causing hemoptysis in HIV-infected patients. This could lead to early diagnosis and specific treatment in this vulnerable population. We recommend that in patients with hemoptysis and normal CXR, a chest CT should be considered, as almost half of those patients will have an abnormal finding in CT scan.

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