SAS Journal of Medicine
Abbreviated Key Title: SAS J Med
ISSN 2454-5112
Journal homepage: https://saspublishers.com

OPEN ACCESS

Pneumology

Hemoptysis: Epidemiological, Clinical and Etiological Aspects

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DOI: 10.36347/sasjm.2023.v09i11.001 | **Received:** 16.09.2023 | **Accepted:** 24.10.2023 | **Published:** 02.11.2023

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Abstract **Original Research Article**

***Introduction*:** Hemoptysis is the expectoration of blood from the subglottic airways following a coughing effort. ***Objective*:** To determine the epidemiological, clinical and etiological aspects of hemoptysis. ***Material and Methods*:** This was a prospective descriptive study from April 2020 to April 2022, including patients hospitalized for hemoptysis or who presented with hemoptysis during hospitalization in the Pneumology Department. Results: 63 patients were included, mean age 44.6± 9.6y [21-77y], predominantly male (sex ratio: 2.3). Hospitalization rate was 9.9%. Comorbidities were dominated by diabetes (28.6%). Past history was dominated by active smoking (52.4%). Hemoptysis was of low (52.4%), medium (33.3%) and high (14.3%) abundance. The main etiologies were active pulmonary tuberculosis (28.6%) and lung cancer (20.6%). ***Conclusion*:** Hemoptysis is a frequent symptom of hospitalization and constitutes an emergency. In our study, young adults were predominantly male. Low-abundance hemoptysis was in the majority. Etiologies were dominated by infectious causes, including tuberculosis, as well as tumoral causes.

Keywords: Hemoptysis, incidence, Marrakech, Morocco.

1. INTRODUCTION

Hemoptysis is the expectoration of blood from the subglottic airways following a coughing effort [1]. It is an alarming symptom and a frequent reason for consultation in pneumology, accounting for around 9% of referrals in developed countries [2], with similar hospital frequencies in Africa [3, 4]. Hemoptysis is easy to diagnose when witnessed.

Studies estimate that 4.8% to 14% of patients with hemoptysis will have a recurrence in the form of massive hemoptysis [5, 6]. The aetiological profile of hemoptysis varies from study to study, depending on geographical location. In Western countries, cancer and inflammatory diseases of the bronchi are the main etiologies. In Africa, pulmonary tuberculosis and cancer are the main etiologies [7-9].

The present study was initiated to update epidemiological data on hemoptysis in hospitals in Marrakech (Morocco). The overall aim of the study was to determine the epidemiological, clinical and etiological aspects of hemoptysis in the Pneumology Department of the Centre Hospitalier Universitaire (CHU) Mohammed VI Marrakech, Morocco.

2. MATERIAL AND METHODS

Study setting:

Our study took place in the Pneumology Department of the Centre Hospitalier Universitaire (CHU) Mohammed VI Marrakech, Morocco. This is the department responsible for the management of respiratory pathologies in the Marrakech region.

Type, period and setting of study:

This is a prospective descriptive study, from April 2020 to April 2022, conducted in the Pneumology Department of the Mohammed VI University Hospital in Marrakech, Morocco.

Study method:

The study included all patients admitted for haemoptysis or who presented with haemoptysis during their hospitalization. Patients who had not undergone a complete paraclinical work-up were not included.

The sampling method was an exhaustive non-probabilistic draw, taking into account all patients who met our criteria. Patients meeting the inclusion criteria constituted the study sample after a simple random draw.

The minimum expected sample size for a representative population was calculated using Schwarz's formula [8]:

$n = z2 \times p \times (1-p)/\alpha 2$

Where,

n: minimum sample size representative of the study population
z: 95% confidence level = 1.96
α: margin of error set at 5%
p: disease prevalence.

Data collection and sources:

Data were collected from hospitalization registers. Data were collected using the computerized electronic data recording system.

Practical details:

The positive diagnosis was confirmed by a department physician. An interview was carried out to ascertain sociodemographic characteristics and history, followed by a complete physical examination. A radiological work-up was carried out before each hospitalization. The rest of the paraclinical work-up systematically included a blood count, a renal work-up, a liver work-up, a haemostasis work-up and HIV serology. Tests for Mycobacterium tuberculosis, bronchoscopy, thoracic CT and/or thoracic angioscanner and other specialized investigations were requested depending on the etiological orientation. All patients discharged from hospital, apart from any early recurrence, were systematically reviewed for follow-up at 01 month and then at 06 months, in order to assess short-, medium- and long-term recurrence.

Variables Studied:

The following variables were studied: Epidemiological (gender, age, diabetes, hypertension, neoplastic background, history of tuberculosis, tuberculosis infection, smoking), clinical (cough, dyspnea, chest pain, fever, night sweats, pallor, altered general condition), paraclinical (direct examination for acid-fast bacilli, histopathological examination) and etiological.

Operational Definitions:

- Low-abundance hemoptysis: When the amount of blood released is < 50 ml/24h
- Medium-abundance hemoptysis: When the amount of blood released per day is between 50 and 200 ml.
- Severe hemoptysis: when the amount of blood released is > 200 ml/24h; or when hemoptysis is accompanied by signs of severity such as hemorrhagic shock.
- The diagnosis of pulmonary tuberculosis was based either on the detection of alcohol-acid-resistant bacilli (AARB) by direct examination, or on the positivity of the Tuberculosis Genexpert or the isolation of a strain of Mycobacterium tuberculosis by culture of sputum or bronchial aspiration fluid on a specific medium, or the existence of gigantoepitheliocellular granuloma with caseous necrosis on histological examination of bronchial biopsies.
- The diagnosis of bronchopulmonary cancer was based on histopathological examination of bronchial biopsy bronchial biopsy specimens.
- Bronchopulmonary metastases of neoplasia were evoked on radiographic aspects of a balloon release with the existence of known or unknown neoplasia without other compatible etiologies.
- Aspergillus grafting was considered on the basis of the suggestive scannographic appearance (graft image) and/or the demonstration of aspergillus on culture of bronchial aspiration fluid or positive aspergillus serology.

Data processing and analysis:

Data were entered into Excel 2016 and analyzed using Epi info version 7. Qualitative variables were expressed as numbers and percentages, quantitative variables as means and standard deviations. The Chi2 or Fisher exact test (depending on numbers) was used to compare percentages, and the Mann-Whitney/Wilcoxon Two-Sample Test (Kruskal-Wallis test) to compare means. Anonymity and confidentiality were rigorously respected.

3. RESULTS

A total of 63 patients were included. During the study period, 635 patients were hospitalized in the department, representing a hospital frequency of 9.9%.

The mean age of the patients included was 44.6 ± 9.6 years, with extremes ranging from 21-77 years. Males predominated, with a sex ratio of 2.3.

The patient histories shown in Table 1 were dominated by active smoking (52.4%), diabetes (33.3%), tuberculosis infection and previous tuberculosis (28.6%).

A total of 41 patients (65.1%) had acute symptoms, versus 22 patients (34.9%) with chronic symptoms.

Table 2 shows the clinical examination data. The main general signs were altered general condition (57.1%), fever (44.4%), night sweats (36.5%), pale mucous membranes (33.3%). The predominant functional respiratory signs were cough (96.8%), dyspnoea (80.9%) and chest pain (61.9%). Pulmonary condensation syndrome was present in 57.1% of cases. Physical examination was normal in 12.7% of cases.

In terms of abundance, 33 patients (52.4%) presented with low-abundance hemoptysis, 21 patients

(33.3%) with medium-abundance hemoptysis, and 9 patients (14.3%) with high-abundance hemoptysis.

All patients had undergone imaging (chest X-ray, thoracic CT or thoracic angioscan). Alveolar syndrome was present in 49.2% of cases. Table 3 shows the distribution of patients according to the type, site and location of radiographic lesions.

Bronchial fibroscopy was performed in 37 patients (58.7%). BAAR testing and sputum culture were performed systematically in all patients, and Genexpert was performed in 51 patients (80.9%). Cytobacteriological examination of sputum was carried out in 47 patients (74.6%), and pneumococcal and Legionella antigenuria in 37 patients (58.7%).

The various paraclinical examinations made it possible to establish the etiological diagnoses (Table 4). The main etiologies were: active pulmonary tuberculosis (28.6%), bronchopulmonary cancer (20.6%), Bronchestasis secondary to tuberculosis (17.5%), acute bacterial pneumonitis (9.5%), pulmonary embolism (6.3%), Diffuse interstitial pneumopathy (6.3%), COPD (4.8%), pulmonary metastases (3.2%) and aspergillosis graft (3.2%).

The majority of patients received haemostatic therapy (93.6%) and oxygen therapy (88.9%). Specific treatment data were oriented towards etiology. This mainly involved anti-tuberculosis treatment (28.6%), non-specific antibiotic therapy (31.8%), anticoagulant therapy (7.9%) and antifungal treatment in 3.2% of cases.

Table 1: Distribution of patients by history

	Workforce	Percentage
Smoking	33	52,4%
Diabetes	21	33,3%
Tuberculosis contage	18	28,6%
Arterial hypertension	15	23,8%
Anterior tuberculosis	11	17,5%
HIV	4	6,3%
Asthma	2	2,2%

Table 2: Distribution of patients according to clinical examination data

	Workforce	Percentage
Functional symptoms		
Cough	61	96,8%
Dyspnea	51	80,9%
Chest pain	39	61,9%
General symptoms		
Altered general condition	36	57,1%
Fever	28	44,4%
Nocturnal sweats	23	36,5%
Pale mucosa	21	33,3%
Physical symptoms		
Lung condensation syndrome	36	57,1%
Pleural effusion syndrome	9	14,2%
Normal exam	8	12,7%
Air effusion syndrome	3	4,8%

Table 3: Distribution of patients according to radiological lesions

	Workforce	Percentage
Location of lesions		
Bilateral	33	52,4%
Right	19	30,1%
Left	11	17,5%
Type of lesions		
Alveolar syndrome	31	49,2%
Bronchial syndrome	13	20,6%
Normal	8	12,7%
Interstitial syndrome	6	9,5%
Alveolo-interstitial syndrome	3	4,8%
Pneumothorax	2	3,8%
Location		
Apical	24	38,1%
Basal	18	28,6%
Diffuse	13	20,6%
Mid-thoracic	8	12,7%

Table 4: Distribution of patients by etiology

	Workforce	Percentage
Pulmonary tuberculosis	18	28,6%
Lung cancer	13	20,6%
Bronchestasis on sequelae of tuberculosis	11	17,5%
Bacterial pneumonia	6	9,5%
Pulmonary embolism	4	6,3%
Diffuse interstitial pneumopathy	4	6,3%
COPD	3	4,8%
Lung metastasis	2	3,2%
Aspergillus graft	2	3,2%

4. DISCUSSION

The aim of our study was to provide an overview of hemoptysis in Morocco (Marrakech) and highlighted several epidemiological, clinical and etiological aspects.

We included 63 patients. The size of our study sample was representative of the general population.

Hemoptysis is a frequent symptom of hospitalization in Respirology. In our study, we found a hospital frequency of 9.9%. Our frequency is similar to that of several African series, including those from Senegal and Togo, which were 12% and 8.08% respectively [10, 3].

The mean age was 44.6 ± 9.6 years [21-77 years]. A result close to that of the series by Adjoh *et al*., Rakotondrabe ID *et al*., [3, 11].

The male predominance of our study has been found in several studies [3, 11, 12]. This predominance of hemoptysis could be explained by greater smoking in men.

Active smoking was noted in 52.4% of cases, and seemed to predispose to the risk of hemoptysis. P. Efalou *et al*., Tsoumakidou and al reported smoking rates of 25.8% and 78.8% respectively [12, 13]. Tuberculosis, in particular contagious tuberculosis, was also found (28.6%). This reflects the fact that tuberculosis infection remains a major public health problem in Africa. Rakotondrabe ID made the same observation [11]. Tuberculosis most often leads to bronchopulmonary sequelae, notably bronchial dilatation which can become infected, neoplasia, and sequelae which can also lead to mycotic grafting [1].

Altered general condition (57.1%) and fever (44.4%) were the main general signs. Efalou P *et al*., noted fever in 79.9% and AEG in 68.1% [12]. In contrast, Gagara noted fever in 63.9% and AEG in 54.6% [14]. Fever is the body's defense mechanism, especially against attacks by pathogenic germs. In our African environment, there is a delay in consultation, and patients often arrive in a serious condition, which would explain the deterioration in general condition. The paleness of the mucous membranes (33.3%) reflects the impact of hemoptysis on the body, reflecting the ever-dreaded nature of bleeding, which can rapidly become life-threatening.

Hemoptysis is an alarming symptom, a source of anxiety. In our series, hemoptysis was predominantly of low abundance (52.4%). This finding is identical to that of the series by Rakotondrabe *et al*., (48.6%), P. Efalou *et al*., (56%), Gagara Issoufou MA *et al*., (73%) [11, 12, 14].

Paraclinical investigation of hemoptysis relies above all on imaging and bronchial fibroscopy to localize the etiology and guide appropriate treatment.

In our series, the etiologies of hemoptysis were dominated by infectious causes, including tuberculosis (28.6%). This finding is identical to that of the series by Adjoh K. S *et al*., [3], Rakotondrabe ID [11] and P. Efalou *et al*., [12]. In Africa, tuberculosis remains the leading cause of haemoptysis. This condition is thought to be associated with several factors, notably smoking and promiscuity. In this meta-analysis, the authors identified infectious and inflammatory causes as being at the forefront in the genesis of hemoptysis.

The second most common cause of haemoptysis in our series was bronchopulmonary cancer (20.6%). In Africa, the proportion of haemoptysis due to bronchopulmonary cancer is low compared with Western countries. This could probably be explained by delayed diagnosis, under-diagnosis and the still moderate recent nature of the smoking epidemic in most countries on the African continent, as well as by the high cost of paraclinical investigations, especially in sub-Saharan African countries with low incomes.

The majority of patients received haemostatic treatment (93.5%), chest physiotherapy (90.2% of patients) and oxygen therapy (80.4%).

5. CONCLUSION

The frequency of hemoptysis is not negligible in Africa. Etiologies are dominated by infectious causes, with tuberculosis in the forefront. Radiological lesions are often extensive and bilateral, reflecting the severity of the conditions involved. It is important to raise awareness of this frequent symptom, which should not

be overlooked regardless of its abundance. This underscores the importance of monitoring patients who have experienced an episode of hemoptysis.

Compliance with ethical standards

Acknowledgments

The author appreciates and acknowledges the support provided by her colleagues in helping with writing this article.

Disclosure of Conflict of Interest: No conflict of interest to disclosed.

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