

Management of massive haemoptysis

V. O. Adegboye and A. O. Adebo

Cardiothoracic Unit, Department of Surgery, University College, Hospital, Ibadan and the University of Ibadan, Nigeria.

Reprint requests to: Dr. V. O. Adegboye, Department Of Surgery, University College Hospital, Ibadan, Nigeria. adegboyetrij@hotmail.com

ABSTRACT

Background: This study compares two management techniques in the treatment of massive haemoptysis.

Method: All patients with massive haemoptysis treated between January 1969 and December 1980 (group I) were retrospectively reviewed and those prospectively treated between January 1981 and August 1999 (group II) were analysed. Group I patients had emergency bronchoscopy and surgery while group II patients had interval conservative care before bronchoscopy and definitive surgical management.

Results: Both groups have comparative age and sex distribution and infective pulmonary diseases dominated as causes of massive haemoptysis. Recurrent haemoptysis occurred in 15 patients (22.7%) of group II during preoperative waiting period. In group I, bronchoscopy was abandoned in 5 patients and was immediately fatal in 1 patient. No such experiences in group II. The number of pneumonectomies were 12 out of 18 procedures (66.7%) for group I and 19 out of 68 procedures (27.9%) in group II. There were 5 lobectomies (27.8%) in group I and 49 (72.5%) in group II. Operative mortality was 72.2% for group I and 7.4% for group II.

Conclusion: Initial unduly prolonged, conservative therapy followed by appropriately timed operative intervention produced the best outcome.

Keywords: Massive haemoptysis, treatment.

Introduction

Massive haemoptysis is an imminent threat to life because of the possibility of asphyxiation. Exsanguination is rarely the cause of death¹. Massive haemoptysis has been variably defined from 100 to 1000 mls. of blood expectorated from the lung over 24 to 48 h¹⁻⁴. More precise definitions are misleading as the mortality has and even a small quantity of blood in the tracheobronchial tree can lead to acute airway obstruction and asphyxiation⁶.

been shown to be related to the rate of bleeding⁵. Many patients cough-up only small amounts of blood and yet aspirate massively. Also, expectorated blood is often swallowed and cannot be measured. In evaluating these patients, it is important to emphasize the presence or risk of aspiration rather than the volume expectorated. Many patients with haemoptysis have compromised lung function. The working definition of massive haemoptysis in our practice is any pulmonary haemorrhage, which is severe enough to pose a

definite threat to patient's life either by suffocation or exsanguinations⁷. This accords with the proposed division of massive haemoptysis into qualitative and quantitative group already described elsewhere¹. In the majority of reports, an aggressive surgical approach with immediate pulmonary resection is recommended, with a better salvage rate compared to conservative or medical treatment^{2, 3, 6, 7}. Our previous experiences with aggressive surgical approach^{7, 8} has prompted an initial conservative method and later surgical intervention. This study is a comparison of our management techniques and their outcome.

Materials and Methods

The case notes, unit's record, postoperative and postmortem records of patients treated for massive haemoptysis by the cardiothoracic surgical unit of the University College Hospital between January 1969 and December 1980 were reviewed retrospectively. The patients were analysed for age, sex, indications for surgery, complications and outcome of surgery. This constitute group I patients. All the patients treated prospectively between January 1981 and August 1999 for massive haemoptysis were documented and relevant data recorded. They formed group II patients. They were analyzed also for age, sex, methods of management and outcome.

The amount of bleeding was estimated by the referring units by gross measurement. The aetiology of bleeding was either determined at surgery, autopsy, from chest radiograph, bronchography, or bronchoscopically from biopsied or aspirated specimens. Rigid bronchoscopy was also performed to determine source of bleeding prior to anaesthesia for the immediately operated group I patients. Surgical procedures and anaesthesia were along standardized techniques^{1, 7}.

Conservative management entailed placing the patient in head down position with the suspected side of bleeding dependent. One or more wide-bore intravenous cannula was inserted and usually 4 units of whole blood were kept on

standby. Mild sedation was achieved with diazepam 5 to 10 mg every 6 hours and antitussive was administered to prevent violent coughing which may aggravate the haemoptysis. Supplemental oxygen through a facemask was routine. All patients were commenced on intravenous broad-spectrum antibiotics combination and triple antituberculous drugs (Intramuscular streptomycin, oral isoniazid and rifampicin) before causes were known more so since tuberculosis was endemic and compliance to treatment was low. When bleeding reduced, the patients had rigid bronchoscopy. Bronchoscopy was done to obtain biopsies and washings for investigation and also with the intention of finding the sources of bleeding.

Appropriate definitive management was undertaken which consisted of lung resection or medical treatment. The determinants for the times of conservative management were: Conversion from massive to mild streaking of the sputum with blood or no-haemoptysis status; acceptable clinical/radiological improvement of pulmonary status to warrant safe, pulmonary resection; localization of bleeding area to definite anatomical area(s). The type of surgery depended on the extent of pulmonary parenchymal disease and envisaged source(s) of bleeding at bronchoscopy.

Results

There were 20 patients with massive haemoptysis in Group I and 75 in Group II. The groups of patients are compared on Table I. The 2 groups are comparable with respect to sex ratio of male: female of 1.5:1 and 1.7:1 respectively for Group I and II, and to age of the patients.

The comparison of the two groups with respect to causes of haemoptysis, highlight of definitive management, surgical procedures, timing of surgical intervention and outcome of management are shown on Table 2. Infective pulmonary diseases dominated as causative factors in both groups.

Table 1: Comparison of 2 groups of patients treated

Group	Number of patients		Age (Years)	
	Male	Female	Range	Mean
I	12	8	10 – 67	33
II	48	27	15 – 75	29

Table 2: Causes, management and outcome of massive haemoptysis

Group I								
Causes	No.	Definitive management		Timing of procedure		Procedure (n)	Outcome	
		cons	surg	EM	EL/SE		died	satisfactory
Tuberculosis (PTB)	5	-	5	5	-	Pn (5)	5	-
Bronchiectasis	-	-	-	-	-	-	-	-
Lung abscess	10	-	10	10	-	Pn (4) L (5) B (1)	4 2 1	- 3 -
Pulmonary aspergilosis	3	-	3	3	-	Pn (3)	1	2
Aortopulmonary fistula	2	-	-	-	-	-	2	-
Total	20	-	18	18	-	18	15	5

cons: conservative, surg: surgical, EM: emergency, EL/SE: elective/semielective, Pn: pneumonectomy, L: lobectomy, B: bronchoscopy.

Group II								
Causes	No.	Definitive management		Timing of procedure		Procedure (n)	Outcome	
		cons	surg	EM	EL/SE		died	satisfactory
Tuberculosis (PTB)	19	6	13	-	13	Pn (13)	2	11
Bronchiectasis	15	-	15	-	17	L (17)	1	16
Lung abscess	25	-	25	-	25	L (19) Pn (6)	2	23
Pulmonary aspergillosis	7	-	7	-	7	L (7)	-	7
Bronchial adenoma	6	-	6	-	6	L (6)	-	6
Aortopulmonary fistula	3	-	-	-	-	-	3	-
Total	75	6	66	-	68	68	8	63

Group I

While surgery was the definitive management, it was performed as an emergency procedure in 18 patients. Two patients with aortopulmonary fistula exsanguinated in bed. Twelve patients had pneumonectomy (66.7%), 5 had lobectomy (27.8%) and 1 patients who had rigid bronchoscopy as the only procedure exsanguinated during the procedure.

Out of the patients who had pneumonectomy, bronchoscopy was abandoned in 5 patients because of excessive in determinate bleeding. On the whole, thirteen of the 18 patients (72.2%) who had various emergency procedures died. Ten of 12 pneumonectomies (83.3%) had fatal outcome.

Group II

Surgery was the definitive management in 66 patients after an interval of conservative/medical treatment. Out of 9 patients who were not operated, 6 had bilateral pulmonary tuberculosis, which precluded surgery. These had complete resolution of haemoptysis on antituberculous drugs until lost to follow-up within 9 to 21 months. Three patients with aorto-bronchial fistula were on antituberculous therapy at the time of referral. Two of these patients exsanguinated during medical conservative treatment and diagnoses were at postmortem. Carcinoma of the left main bronchus (1 patient) and carcinoma of middle third thoracic oesophagus (1 patient) were the causes of haemoptysis and aorto-bronchial fistula. The third patient died on the operation table during an attempt to repair the posttraumatic fistula.

All surgical procedures in 66 patients were performed at 3 to 29 months after initial episode of massive haemoptysis. The mean duration of conservative management was 3.8 months (15 weeks) for suppurative lung disease and 7.5 months for pulmonary tuberculosis. Recurrent haemoptysis of various severity recurred in 15 patients (22.7%) during the waiting period in spite important as a cause of bleeding from the lungs. However, active or inactive disease with cavities is still one of the most common aetiological factors in massive haemoptysis⁵.

In the series of 123 patients with massive haemoptysis⁹, 4, 7 patients were diagnosed as

of complete courses of antituberculous drugs and/or antibiotics. The recurrence of massive haemoptysis was twice in 6 patients and once in 9 patients. The recurrences were treated conservatively in each instance, with no mortalities.

Nineteen patients had pneumonectomies (27.9% of operative procedures) and 47 patients had 49 lobectomies (72.5% of operative procedure) 2 of which were bilobectomies. On the whole 68 operative procedures were performed in 66 patients.

Among the 66 patients surgically treated, the mortality was 7.4% (5 patients). The causes were pulmonary embolism (2 patients), intraoperative endotracheal tube blockage (1 patient) and aspiration (2 patients) from bronchopleural fistula complicating pneumonectomy.

Six patients had streaky haemoptysis postoperatively which stopped on completion of antituberculous drugs. They were operated within 3 to 6 months of commencement of antituberculous drugs. Five out of 15 patients with bronchiectasis who had lobectomies had continued mild to moderate haemoptysis, which were controlled on intermittent antibiotics. They have remained asymptomatic over the past 5 to 18 years of follow up. All patients with resected lung abscess, bronchial adenomas and pulmonary aspergilloma have remained asymptomatic during 3 to 21 year follow-up.

Discussion

The most common causes of massive haemoptysis in our experience are acute or chronic suppurative lung diseases and pulmonary tuberculosis. Malignancy, as a cause of massive haemoptysis featured as aorto-pulmonary fistula in our study. Lung cancer is not a frequent cause of massive haemoptysis in our environment. In developed countries, tuberculosis is becoming less having pulmonary tuberculosis. The other important causes of life-threatening haemoptysis in the literature¹⁻⁵, which include bronchiectasis, aspergilloma and lung abscess were further corroborated by this study. Primary or secondary malignancy is a less common cause of massive

haemoptysis. It constituted 7% of patients with malignancy (32 of 456 patients) who had massive haemoptysis in one series¹⁰ and 3.3% (29 patients of 877 patients with lung cancer) had massive haemoptysis in a retrospective review¹¹. In the later study, it was found to be significantly associated with cavitated squamous cell carcinoma, arising in either left or right main bronchi. While traumatic causes have not featured significantly in most series, adjacent main bronchus and left pulmonary trunk have been reported most frequently injured in blunt trauma⁶. In our experience there has been the association of injury of the isthmus of the descending aorta and massive haemoptysis from the left main bronchus. The involvement of this location has also been reported as a usual site for traumatic aorto-bronchial fistula¹².

Patients with either acute or chronic inflammatory disease have been shown to develop increased vascularity in the involved areas⁹. This increased vascularity has been documented by injection studies of the lung in tuberculosis¹³, bronchiectasis and lung abscess¹⁴. Primary malignant growths of the bronchus have also been shown to have an increased blood supply from the bronchial arterial system¹⁵. Non-bronchial systemic arterial system blood supply to the inflamed lung has also been implicated in massive haemoptysis¹⁶.

Reported treatment modalities for massive haemoptysis have included conservative medical therapy, methods of control of bronchial bleeding (ice cold saline lavage, balloon tamponade, pulmonary isolation, tampons with vasoconstrictor drug and selective coagulative treatment) and surgical therapy^{1, 5, 6}. Although there have been no prospective clinical trials, the accepted treatment for massive haemoptysis has been rapid localization of the site of bleeding and nor from this study where more than 87% of massive haemorrhage decrease or stop within 4 days of conservative medical care^{1, 9, 22}.

Accurate localization of the site of bleeding requires bronchoscopy. The considerations have been the type of bronchoscope and the optimum time for the procedure. Opinions have shifted between rigid or flexible scopes and various timing^{5, 9, 10, 21}. Our preference has been in favor of

its surgical resection¹⁷. This is supported by studies, which showed that surgical, rather than medical management has provided superior results in the management of massive haemoptysis^{2, 18, 19}. However other studies have disputed these reports^{4, 9, 20}. In both groups many of the mortalities were either in patients with inoperable conditions, cases succumbing too rapidly for surgery to be an option. Our current study, show the superior outcome of the group II patients compared to the group I who had aggressive care mostly pneumonectomy with a high mortality. Surgical mortality was related to ongoing haemorrhage at the time of pulmonary resection.² Surgery remains the definitive mode of management in the majority of our patients but with better outcome after an interim of conservative medical control of haemoptysis.

There is clear advantage to operate between episodes of tracheobronchial hemorrhage in patients with massive haemoptysis^{9, 21}. The cessation of haemorrhage may occur naturally, or in response to conservative medical therapy or following various methods of control. Operating during bleeding crises may precipitate emergency pneumonectomy^{7, 8}. Absence of ongoing tracheobronchial haemorrhage allows for safe operative intervention and precise resection of the diseased pulmonary parenchyma⁹. As in our study, mortality and morbidity of such resection is low. The recurrence of haemoptysis is not predictable and our experience has reinforced the fact that protracted delay of surgical resection could be fatal. We have found recurrences of massive haemoptysis in medically treated patients. There is a place for aggressive surgical approach in instances of persistent, profuse bleeding in spite of conservative medical approach. This status has not been considered frequent in the literature rigid bronchoscopy to localize and diagnose the cause; it also affords quick clearance of airway at the time when the haemoptysis is subsiding.

Our patients were maintained on antibiotics and/or antituberculous drugs as integral part of the initial management of massive haemoptysis. This is an acceptable starting point in the literature¹. After the exclusion of pulmonary tuberculosis (PTB) as the cause of haemoptysis,

antituberculous medications were discontinued and the patients were maintained on the relevant antibiotics. Antibiotics were administered in patients with PTB caused haemoptysis if superinfection was proven and such treatment was continued until the suppuration was treated. Patients were discharged to follow-up only after total cessation of haemotysis and were followed up every 2 weeks until surgical intervention. Follow-up entails adequate documentation of the stability of their clinical conditions.

We agree that aggressive surgery may be necessary in the setting of unabating massive haemoptysis under adequately supervised early conservative medical care in a high dependency unit or intensive care unit^{1, 5,9,22}. Surgery should be limited to patients with localized, identified site of bleeding, who have no medical contraindication, and have adequate pulmonary function²². Where a patient has bilateral disease with haemoptysis from a lesion on one side and less disease is evident contralaterally, resection of the lesion can be done²².

In conclusion, in our environment, an initial period of conservative therapy followed by appropriately timed operative intervention produces the best outcome. The optimum duration of conservative management prior to surgery needs to be evaluated.

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