Singapore Med J 1999; Vol 40(2):67-69

Cause, Treatment and Outcome of Patients with Life-Threatening Haemoptysis

A E L Stebbings, T K Lim

ABSTRACT

Background: Massive haemoptysis is a life-threatening situation which requires immediate medical attention and intervention. We reviewed 23 patients with life-threatening haemoptysis to document the cause, describe the treatment of these patients and to determine which form of treatment had a better outcome.

Design: Retrospective case study.

Methods: Consecutive patients were reviewed and data collected for the underlying cause, treatment and outcome of patients with life-threatening haemoptysis.

Results: Out of 23 patients, nine patients had active pulmonary tuberculosis and nine patients had post-tuberculous lung disease. Fifteen patients underwent bronchial embolisation, one patient had surgical resection and seven patients had received medical treatment. Five patients required intubation. Bronchial embolisation was significantly better than medical treatment at immediate cessation of haemoptysis ($p < 0.05$). Three (13%) patients died from haemoptysis. Follow-up duration averaged 16 months.

Conclusions: The most common causes of haemoptysis were pulmonary tuberculosis and post-tuberculous bronchiectasis. Urgent bronchial artery embolisation was better at immediate cessation of haemoptysis than medical treatment.

Keywords: pulmonary tuberculosis, bronchiectasis, mortality, bronchial angiography, bronchial embolisation.

INTRODUCTION

Massive haemoptysis is an alarming and life-threatening illness associated with a mortality of up to 78%[1]. It requires immediate medical attention to prevent asphyxiation with vigilant monitoring of patients and emergent treatment if active bleeding into the airways persists. Earlier studies have demonstrated an improved outcome in patients who were treated with surgical resection of the affected lobe of the lung compared with medical treatment alone[1,2]. Over the past decade, bronchial embolisation has been considered the treatment of choice, especially in patients who are not surgical candidates, with success rates of up to 90%[3]. However, there is no recent data from Singapore on the efficacy of this treatment modality.

Earlier studies have documented the aetiology of massive haemoptysis to be mostly due to tuberculosis and post-tuberculous bronchiectasis[1,2]. More recent reviews have documented a change in this pattern with lung cancer and bronchiectasis as the predominant cause of massive haemoptysis in Western countries. With decreasing incidence of tuberculosis in Singapore over the past 30 years, it would be interesting to find out whether the cause of massive haemoptysis in this country has remained similar to earlier reports 30 years ago, or is comparable to the causes observed in Western countries.

The aim of our study was therefore to evaluate the cause, treatment and outcome of patients with life-threatening haemoptysis in order to determine the efficacy of various treatment modalities.

MATERIALS AND METHODS

We describe 23 consecutive patients with life-threatening haemoptysis (acute haemorrhage which was immediately life-threatening or at least 300 mL per day) who presented to the Department of Medicine between June 1995 and March 1997. There were 16 males and 7 females, with a mean age of 56 years (range 17 to 85 years). The ethnic breakdown is 14 Chinese, 7 Malays, 1 Philippino and 1 Javanese.

We collected data on the amount and frequency of the haemoptysis, smoking status, previous lung disease, previous history of haemoptysis and the aetiology of the haemoptysis. Clinical parameters at the time of haemoptysis, chest radiographic abnormalities, changes in haemoglobin level and the presence of respiratory failure were documented. Results of other investigations such as fibreoptic bronchoscopy, bronchial angiography and computed tomography (CT) of the thorax were noted. The efficacy of different treatment modalities, duration of follow-up and recurrence of haemoptysis was also collated.

RESULTS

The cause of haemoptysis was identified in all the patients and is listed in Table I. Active pulmonary tuberculosis and post-tuberculous lung disease (usually bronchiectasis) accounted for 83% of patients.

Department of Medicine
National University Hospital
5 Lower Kent Ridge Road
Singapore 119074

A E L Stebbings, MRCP (UK)
Registrar

T K Lim, MMed (Int Med), FRCP (Edin)
Associate Professor

Correspondence to:
A/Prof T L Lim

Table I – Cause of massive haemoptysis in 23 patients

Cause	Number	
Active pulmonary tuberculosis	9	
Bronchiectasis	9	(6)
Cryptogenic fibrosing alveolitis	1	(1)
Lung cancer	1	
Post-tuberculous lung fibrosis	2	(2)
Bleeding from operation stump	1	(1)
Total	23	(10)

Numbers in parenthesis indicate number of patients in each category who had a previous history of pulmonary tuberculosis.

Table II – Outcome of treatment

Treatment	Number	No. of patients with cessation of haemoptysis within 48 hours after treatment (%)
Medical treatment	7	3 (43%) *
Embolisation	15	13 (87%) *
Surgical resection	1	1 (100%)

* (χ^2 test $p < 0.05$)

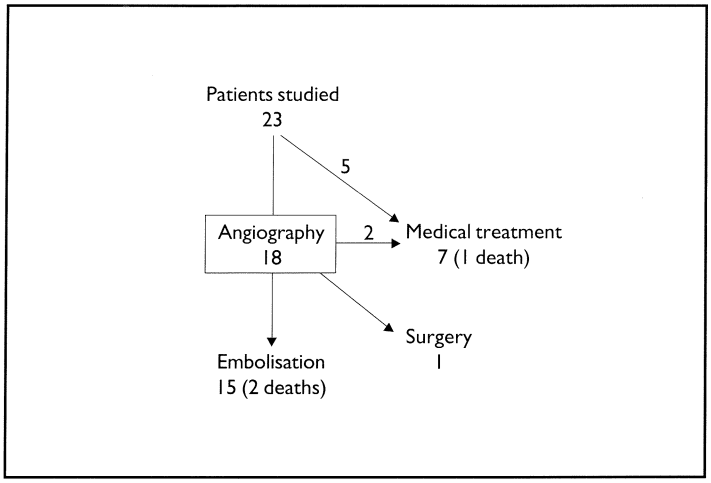

Fig 1 – Diagram to show patients studied, their treatment and outcome.

Nine patients had fibreoptic bronchoscopy, 19 patients had bronchial angiography and 12 patients had CT of the thorax. The site of bleeding of the thorax was identified in all 19 patients who had bronchial angiography and chest radiography; whereas the site of bleeding was identified in 8 out of 9 patients who had fibreoptic bronchoscopy.

Treatment modalities were identified and divided into three main groups (Table II & Fig 1): medical treatment alone (cough suppressants and antibiotics) (7), bronchial embolisation (15) and open surgery (1). Embolisation was not performed in six patients for the following reasons: in two patients, a spinal artery was a branch of the bronchial artery, bronchial angiography was technically not successful in one patient, one patient refused angiography, in another patient, angiography was not available and in one patient, hypertrophied vessels or bleeding points were not identified. Bronchial angiography was not carried out in two patients because it was not indicated (the haemoptysis stopped spontaneously in one patient, and cerebral hypoxia occurred in the second patient at the time of haemoptysis). Immediate cessation of haemoptysis was achieved in 87% of patients who underwent bronchial artery embolisation (Table II). This result was significantly better than medical treatment alone (χ^2 test, $p < 0.05$). No patient developed transverse myelitis, a known complication from bronchial artery embolisation. Ten patients were given blood transfusions; all patients received antibiotics or anti-tuberculous treatment and cough suppressants. Five patients required intubation for airway control, of which three patients subsequently died. Eight patients required monitoring in the medical intensive care unit.

Recurrence of haemoptysis occurred in eight patients, the details of which are listed in Table III. This group had a mortality of 25% but recurrence was not identified as a risk factor for death. Four patients had recurrent haemoptysis which occurred on more than two occasions.

Duration of follow-up of all patients from the initial presentation of haemoptysis ranged from three days to 7.5 years with a mean follow-up of 16.2 months. Out of 23 patients, three patients (13%) died as a direct result of haemoptysis (Fig 1): two patients suffered cardio-respiratory arrest on arrival at the Emergency Department and one patient died in the ward. The cause of haemoptysis was pulmonary tuberculosis in two patients and bronchiectasis in one patient. All three patients were intubated.

DISCUSSION

This report describes a series of patients with life-threatening haemoptysis managed in our hospital. This is a very serious condition with a potential mortality rate of up to 78%[1]. Careful documentation of causes, treatment and outcomes in a consecutive group of well defined patients may provide a basis for implementing more effective treatment protocols.

Massive haemoptysis is a life-threatening condition of which the definition in previous reports has been somewhat arbitrary. Previous reports have defined massive haemoptysis as between 150 mL to 600 mL per day[1,2,4]. The cause of death is due to asphyxia and respiratory compromise, usually due to sudden expectoration of large amounts of blood into the airways. Therefore, it is important to ensure adequate airway control, usually by endotracheal intubation[5]. In this study, five patients were intubated; of which three died.

The cause of haemoptysis in this study was predominantly pulmonary tuberculosis and post-tuberculous lung disease. This is comparable with previous studies by Crocco et al[1] in 1968 and Knott-Craig[2] in 1993 in which the aetiology of haemoptysis for both active and inactive tuberculosis was 73%. Our report suggests that active tuberculosis and post-tuberculous lung disease accounts for the majority of causes of submassive haemoptysis, despite a declining

Table III – Patients with recurrent haemoptysis

Patient No	Age (years)	Aetiology	Duration between recurrence	Previous treatment	Outcome
5	78	Bleeding from operation stump	14 years	Open surgery	Survived
12	49	Cryptogenic fibrosing alveolitis	1 day	Bronchial embolisation	Survived*
14	62	Active pulmonary tuberculosis	2 months 7 years	Bronchial embolisation	Survived Survived
15	49	Post-tuberculous bronchiectasis	2 years	Bronchial embolisation	Survived*
16	50	Bronchiectasis	4 years, 7 years	Bronchial embolisation	Survived*
17	66	Post-tuberculous bronchiectasis	3 years, 5 years	Cough suppressants, antibiotics	Survived
19	40	Active pulmonary tuberculosis	1 day, 1 month	Bronchial embolisation	Died
23	81	Bronchiectasis	3 days	Bronchial embolisation	Died

This table describes the diagnoses and outcomes of patients who had both early (within 48 hours) and late recurrent haemoptysis. Patients with * required emergency bronchial embolisation for treatment of recurrent haemoptysis.

incidence of tuberculosis in Singapore over the past 30 years[6].

It is important to localise the site of bleeding in patients with life-threatening haemoptysis in order to optimise treatment and decrease mortality. Both bronchoscopy and bronchial angiography are able to do this. However, fibreoptic bronchoscopy is potentially risky as the initial investigation, as it may cause hypoxia in an unstable patient; administration of local anaesthesia of the central airways causes loss of the gag reflex and the suction channel of the instrument is not wide enough to allow rapid suction of aspirated blood. The advantage of bronchial angiography is that the airway is not affected by the procedure and therapeutic embolisation can be performed at the same sitting[3]. CT is able to identify structural abnormalities such as tumour or cavitation, but it may not be able to directly identify the site of bleeding unless the structural abnormality is the sole cause of bleeding.

Bronchial embolisation was the preferred treatment in this study, accounting for 65% of patients treated. In this study, this treatment was significantly better at immediate cessation of haemoptysis than medical treatment alone. In a recent review of this technique, immediate control of haemoptysis was achieved in between 73% and 90% of patients with a recurrence rate of 20% within two months[3,7,8]. Our study had similar results with immediate control of haemoptysis in 87% of patients and a recurrence rate of 27% within two months. This technique requires experienced, skilled radiologists who are able to perform this investigation at short notice. Randomised controlled clinical trials with large numbers of patients comparing medical treatment alone, surgery and bronchial embolisation would provide a definitive answer to the ideal treatment modality which is the most efficacious and appropriate. However, this to our knowledge has not been done and it may not be ethical to manage patients with medical treatment alone when historic evidence has shown a high fatality with medical treatment and significantly decreased mortality in patients who have undergone bronchial embolisation or surgery. Therefore, despite the lack of "hard" evidence from randomised controlled studies, urgent bronchial angiography with a view to embolisation appears to be the first choice intervention for patients with active life-threatening haemoptysis.

The mortality rate of our patients was 13%. This is comparable to other studies which reported mortality rate of 15% at six months' follow-up[2]. We identified previous intubation (mortality 60%) as an important risk factor. Mortality has improved since initial reports from 1968[1], presumably due to improved resuscitation techniques and faster access to healthcare and specialised treatment. However, the aetiology remains the same as in third world countries, with tuberculosis and post-tuberculous lung disease as the main cause.

We conclude that pulmonary tuberculosis and post-tuberculous lung disease account for the majority of causes of submassive haemoptysis despite a declining incidence of tuberculosis in Singapore[6] and was associated with a mortality of 13%. The preferred treatment was bronchial artery angiography-embolisation. With this approach we can both rapidly localise and attempt to obliterate the site of bleeding at the same time.

ACKNOWLEDGEMENT

The authors wish to thank Dr Lenny Tan and the Department of Diagnostic Imaging, National University Hospital for helping in the management of patients studied.

REFERENCES

1. Crocco JA, Rooney JJ, Fankushen DS, DiBenedetto RJ, Lyons HA. Massive haemoptysis. Arch Int Med 1968; 121:495-8.
2. Knott-Craig CJ, Oostuizen JG, Rossouw G, Joubert JR, Barnard PM. Management and prognosis of massive haemoptysis. J Thorac Cardio Surg 1993; 105:394-7.
3. Marshall TJ, Flower CDR, Jackson JE. Review. The role of radiology in the investigation and management of patients with haemoptysis. Clin Radiol 1996; 51:391-400.
4. Ramakantan R, Bandekar VG, Gandhi MS, Aulakh BG, Deshmukh HL. Massive haemoptysis due to pulmonary tuberculosis: control with bronchial artery embolisation. Radiol 1996; 200:691-4.
5. Communicable Disease Surveillance Report 1995; 2:9-21. Published jointly by Tan Tock Seng Hospital and Ministry of Health, Singapore.
6. Remy J, Arnaud A, Fardow H et al. Treatment of haemoptysis by embolisation of bronchial arteries. Radiology 1977; 122:33-7.
7. Uflacker R, Kaemmerer A, Picon PD et al. Bronchial artery embolisation in the management of haemoptysis: technical aspects and long-term results. Radiol 1985; 157: 637-44.
8. Cahill BC, Ingbar DH. Massive haemoptysis, assessment and management. Clin Chest Med 1994; 15:147-67.