ORIGINAL RESEARCH

Pulmonary resection for the treatment of massive hemoptysis in a resource-limited setting: Experience from Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia

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Abstract

Background
There are limited publications regarding patients operated for massive hemoptysis from developing countries. We reviewed a series of patients with massive hemoptysis who are treated surgically in Tikur Anbessa specialized hospital (TASH), Addis Ababa, Ethiopia.

Methods
A retrospective study of 22 patients referred for massive hemoptysis and operated over a period of five years (January 1, 2013-January 31, 2018) was done.

Results
Pulmonary resection for massive hemoptysis was done for 22 patients with mean age of 31.4 +/- 11.4 years. Male to female ratio was 2.1:1. Patients presented after 111.8 +/- 89.7 hours of symptom onset. Post tuberculosis aspergiloma and bronchiectasis were the main cause of massive hemoptysis seen in 16(72.2%) and 5(22.7%) patients respectively. The right lung in 12(54.5%) and left lung in 10(45.5%) patients were involved. In both sides of the lung, upper lobe, 20(90.9%), was the main source of hemoptysis. Pulmonary isolation with double lumen endotracheal tube was used in only14 (63.6%) patients. Upper Lobectomy was done in 12 patients (54.5%), wedge resection in 5 patients (22.7%), pneumonectomy in 4 patients (18.2%) and bi-lobectomy in one (4.5%) patient.
Twelve (54.5%) patients developed one or more complications following surgery. Five (22.7%) patients had to be on prolonged chest tube drainage for air leak, 4(18.2%) patients developed empyema which subsided later with drainage, 4(18.2%) patients had post operative pneumonia, one (4.5%) patient had post thoracotomy neuralgia, one patient had to be re-operated for recurrence, and three (13.6%) had major wound infections. There was one death (4.5%) due to severe postoperative bleeding and coagulopathy. Twenty-one patients were discharged home after an average hospital stay of 15.5 +/-8.5 days.

Conclusions
Since majority of patients with massive hemoptysis in developing countries are post tuberculosis and affect primarily young population, pulmonary resection is still safe and effective life saving procedure that should be performed in selected patients with good lung reserve.

Keywords: hernia repair, surgical mesh, mosquito net, metal content, tearing force

Introduction

The definition of massive hemoptysis varies in the literature. It used to be defined as expectoration of blood exceeding 100 to 1000 mL over 24 hours period. [1-4] Currently, there is no universally accepted definition for massive hemoptysis that defines on the expectorated amount of blood alone. Rather, a sufficient amount of blood that threatens patient's life is considered as massive. [5] Majority of hemoptysis incidents

are self-limiting, however in about 5% of cases it could be life threatening which demanded urgent management. [2] The significance of massive hemoptysis is two folds: it is often a sign of an important underlying disease, and the hemoptysis itself may be life threatening. [2,3]

The causes for massive hemoptysis are largely dependent on geographic distribution and socioeconomic level of the society. In low-income countries, pulmonary tuberculosis, with its chronic sequel is the most common cause of massive hemoptysis. [6] In Ethiopia, Abebe etal [7,8] reported that cough and hemoptysis were the two most common presenting symptoms found during the analysis of surgically treated pulmonary tuberculosis and Aspergiloma.

Until the late 1940's, massive hemoptysis had long been recognized as an emergent and incurable disease. [2] Without appropriate treatment, massive hemoptysis still has a mortality rate up to 25-50%. [9] Now, there are different therapeutic alternatives available with variable results. Some of the options for treatment of massive hemoptysis include conservative medical therapy, lung resection, endobronchial control balloon tamponade and bronchial artery embolization.

Currently, the practice of pulmonary resection for the management of massive hemoptysis has significantly improved the clinical outcome. [9,10] Specially following the advent of a multidisciplinary approach by integrating ICU physician, pulmonologist, intervention radiologist and the thoracic surgeon has resulted a significant reduction in mortality. [10,11, 12]

The objective of this study is to review our experience with patients who underwent surgical treatment in the form of pulmonary resections for massive hemoptysis done over five years.

Methods

This was a cross-sectional hospital based longitudinal case series analysis of patients admitted and operated for massive hemoptysis over a period of five years done at TASH. We reviewed the clinical presentation, basic and radiological investigations utilized causes of hemoptysis, operative techniques used, postoperative outcome, and follow-up of the 22 cases with massive hemoptysis treated surgically between January 1,2013-January 31,2018.

The cardio-thoracic surgery unit is part of the department for general surgery and is located with in TASH of the Addis Ababa University. The hospital serves as a central referral hub that receive most of the cardio-thoracic patients from different regions of the country. Eight consultant cardiothoracic surgeons and nine anesthesiologists work together in the hospital. The hospital has 14 operating rooms of which one is dedicated for cardiothoracic procedures. About 600 cardiothoracic procedures are done every year, for both emergency and elective cases; of which one fifth was major lung resections. The hospital has 12 beds ICU that serves for all surgical patients.

All patients above 12 years of age admitted to the hospital on emergency condition with a diagnosis of massive hemoptysis for whom lung resection were done are included in the study. Patients less than 12 years, elective cases who were on a waiting list before admission and operation were excluded from the study.

Operative technique

Informed consent was obtained from patients or their guardian before surgery. All patients were operated under general anesthesia. In 14 patients, double lumen endo-bronchial intubation was performed while the remaining eight patients were intubated with a single lumen tube since proper size double lumen endo-bronchial intubation was not available. After anesthesia, the patient was positioned to a lateral position with the operated side up. Standard postero-lateral thoracotomy incision was made, and the thorax was entered through the fifth or sixth intercostal space. After pulmonary mobilization, the affected segment of the lung was identified. Wedge resection, lobectomy or pneumonectomy was done based on the intra-operative finding. After completion of the procedure, one or two chest drains were inserted and incision was closed in layers. Most of the patients were extubated in the operating room and transferred to the Intensive Care Unit as appropriate and some patients required ventilator support.

Postoperative care

On the day of operation, the patients were administered intravenous fluid for 24 hours postoperatively, following which they were allowed oral diet. From the first postoperative day, the patients were encouraged to do breathing exercises. Postoperative chest X-ray was done on the second postoperative day. Chest drains were usually removed by 24 h after pneumonectomy and after the lungs are satisfactorily inflated and air leak was controlled for post lobectomy patients. Intravenous antibiotics continued for 5-7 days postoperatively. After discharge, follow-up was done at the outpatient clinic after 2 weeks, 1 month and 6 months after surgery.

Operational definitions:

Adverse out comes - Patients who developed either one or more post-operative complications including death following surgery.

Elective surgery – After patients first seen in surgical referral clinic, surgery is scheduled in advance where they will put on a waiting list before admission and operations.

Emergency surgery – Patients who are hospitalized with in few hours of arrival to the ER, and operated after resuscitation and stabilization of the patient either the same day or the coming few days.

Statistical Analysis

Structured formats were used to collect relevant information from medical records of eligible patients on demographic characteristics, relevant history, physical findings, investigations, intra-operative and post-operative course of the management. The outcome of the surgery after patients discharged from hospital was collected from the follow up visit

Table 1. Analysis of demographics, presenting symptoms, signs, and investigations in relation to adverse outcomes

Characteristics	Adverse outcome		Total	*P* value
	Yes (%)	No (%)		
Sex				
Male	9 (64.2)	6(35.7)	14 (63.6)	0.490
Female	5(71.4)	2 (28.6)	7 (31.8)	
Mean age (years)	31.45 +/- 11.4			0.296
Age range (years)				
18-25	3(60)	2(40)	5 (22.7)	0.738
26-49	10(62.5)	6(37.5)	16 (72.7)	
≥50	1(100)	0(0)	1 (4.5)	
Mean hospital stay (days)	15.5+/-8.6			0.305
Estimated blood loss (mL)				
<600	3(75)	1(25)	4 (18.1)	
600-999	5(45.5)	6(54.5)	11 (50)	0.319
1000-1500	4(80)	1(20)	5 (22.7)	
>1500	2(100)	0(0)	2 (9)	
Interval between hospital arrival and surgery (hours)				
<24	4(66.7)	2(33.3)	6 (27.3)	0.180
24-48	7(87.5)	1(12.5)	8 (36.4)	
48-72	2(50)	2(50)	4 (18.2)	
>72	1(25)	3(75)	4 (18.2)	
Cough	14(63.6)	8(36.4)	22 (100)	
Pain				
Yes	7(77.8)	2(22.2)	9 (40.9)	0.246
No	7(53.8)	6(46.2)	13 (59)	

Continued

records. Data are expressed as median with ranges, or as percentages. Pearson Chi-Square test is used for comparisons of the parameters responsible for adverse outcomes. P-value of less than 0.05 was considered as the level of significant. All data were stored and analyzed using SPSS 24.0 for Windows. Ethical clearance was obtained from the research and publication committee of the department of surgery, while the need for individual patient consent was waived.

Results

Out of the 22 patients included in this study, there were 15 males (68.2%) and 7 females (31.8%). The mean age of the study population was 31.45 +/- 11.4 years. (Range, 18-65 years). Majority of patients, 16 (72.7%), were between 25-49 years. Only one patient was aged greater than 50 years (Table 1).

All patients had initially visited other regional facilities and then referred to our hospital. The average duration of symptom before arrival to the hospital was 111.8+/-89.75 hours (range, 16-432 hours). Only 3 (13.6%) patients reach to the hospital with in 48 hours of onset of hemoptysis. Time-to-surgery from arrival to hospital was <24h in six (27.3%), 24–48h in eight (36.4%), 48–72h in four (18.1%), and >72h in four (18.1) patients.

Previously, all of the patients have been diagnosed with pulmonary TB and completed the course of treatment and were declared cured. The average time of onset of hemop-

Table 1. Continued

Characteristics	Adverse outcome		Total	*P* value
	Yes (%)	No (%)		
Smoking	14(63.6)	8(36.4)	22 (100)	
Vital signs				
Normal	8(66.7)	4(33.3)	12 (54.5)	0.546
Abnormal	6(60)	4(40)	10 (45.5)	
Conjunctiva				
Pale	5(55.6)	4(44.4)	9 (40.9)	0.416
Normal	9(69.2)	4(30.8)	13 (59)	
Hematocrit (%)				
<25	1(50)	1(50)	2(9)	0.686
25-35	6(75)	2(25)	8(36.4)	
>35	7(53.8)	5(46.2)	13(59)	
White blood cell count (cells/μL)				
<4000	1(33.3)	2(66.7)	3 (13.6)	
4000-10,000	12(66.7)	6(33.3)	18(81.8)	0.400
>10,000	1(100)	0(0)	1 (4.5)	
Liver function tests				
Normal	13(61.9)	8(38.1)	21(95.5)	0.636
Abnormal	1(100)	0(0)	1(4.5)	
Serum creatinine				
Normal	12(66.7)	6(33.3)	18(81.8)	0.465
Abnormal	2(50)	2(50)	4(18.2)	
Bronchoscopy				
Done	1(3%)	6(20.7%)		0.044
Note done	32(97%)	23(79.3%)		

tysis in relation to the duration after their completion of anti-tuberculosis treatment was 5.91 +/- 2.95 years (range, 1-12 years).

Hemoptysis was the main symptom seen with estimated blood loss of < 600ml in four (18.2%) patients; 600-999ml in eleven (50%) patients; 1000-1500ml in five (22.7%)and >1500ml in two (9.1%) patients. Other symptoms seen were cough with expectoration, 22 patients, chest pain, 13 (59.1%), fever 3 (13.6%) and weight loss, 5 (22.7%). All patients are non-smokers. During presentation at emergency OPD, 12 (54.5%) patients had unstable vital sign. (Table 1)

Initial laboratory result showed a hematocrit of < 25 in two (9.1%) patients and 25-30 in eight (36.4%) patients. The rest, 12(54.5%) had normal hematocrit value. No patient tested positive for HIV. Only one patient had leukocytosis. Abnormal Liver function test and elevated creatinine level was found in one and four patients respectively. Arterial blood gas test is not done since it is not available in the hospital. In 20 (90%) patients, the Chest X-ray gave a clue to the site of the affected lung. Further imaging with CT scan was useful in properly locating the involved lobe, the size and nature of the disease and the condition of the rest of the lung parenchyma. (Table 2)

Fiberoptic bronchoscopy was done in 9 (40.9%) patients and has assisted in identifying the site of bleeding. Right and left lung was involved in 12(54.5%) and 10 (45.5%) patients

Table 2. Computed tomography results of the 22 patients who underwent procedures for massive hemoptysis

Findings	n (%)
Left fibrotic lung collapse & bronchiectasis with super infection	3 (13.6)
Left upper lobe fungal ball, bronchiectasis, fibrosis	1 (4.5)
Left lung collapse with bronchiectasis	2 (9.1)
Left lung volume loss with old fibro-cavitary lesion	1 (4.5)
Right upper lobe Aspergiloma and bronchopneumonia	8 (36.4)
Right lower lobe lung mass with air bronchogram	1 (4.5)
Right destroyed lung	2 (9.1)
Bilateral apical segment multiple cavity	1 (4.5)
Right upper lobe bronchiectasis	2 (9.1)
Left upper lobe complicated hydatid	1 (4.5)

Table 3. Analysis of lung pathologies, involved lobe, and procedures in relation to adverse outcomes

Variables	Adverse outcome		Total	*P* value
	Yes (%)	No (%)		
Pathology				
Aspergilloma	11(64.7)	6(35.3)	17(77.3)	0.620
Bronchiectasis	3(60)	2(40)	5(22.7)	
Involved lung				
Right	7(58.3)	5(41.7)	12 (54.5)	0.454
Left	7(70)	3(30)	10 (45.5)	
Involved lobe				
Upper	12(60)	8(40)	20(90.9)	0.533
Lower	1(100)	0(0)	1 (4.5)	
Both	1(100)	0(0)	1(4.5)	
Procedure				
Pneumonectomy	3(75)	1(25)	4 (18.2)	0.505
Lobectomy	6(50)	6(50)	12 (54.5)	
Wedge resection	4(80)	1(20)	5 (22.7)	
Bilobectomy	1(100)	0(0)	1 (4.5)	

respectively. In both sides of the lung, upper lobe, 20(90.9%), was found the primary source of hemoptysis.

Immediately after patient arrived to the hospital, conservative treatment was initiated in the ER. After adequate vascular accesses and blood sample taken for investigation, oxygen therapy was initiated. Anti-tussives and broad-spectrum antibiotics were given to all patients. Subsequently, only six (27%) patients before surgery and 13(59%) patients following surgery could be admitted to ICU.

The underlying disease causing hemoptysis was found to be Aspergiloma in seventeen (77.3%) and bronchiectasis in five (22.7%) patients. Upper Lobectomy was done in 12 (54.5%), wedge resection in 5 (22.7%), pneumonectomy in 4 (18.2%) and bi-lobectomy in one (4.5%) patient. (Table 3)

The average operation time was 174.6 +/-60.6 minutes (range, 60-300minutes). The average intra-operative blood loss was 786 ml (ranging from 500 ml to 1500 ml). Fifteen patients (68.2%) required one or more units of blood trans-

Table 4. Frequencies of different adverse outcomes

Adverse outcome	No. (%)
In hospital	
Massive bleeding	10(45.5)
Lung Laceration	1(4.5)
Arrhythmia	2(9.1)
Death	1(4.5%)
After discharge from hospital	
Empyema	4(18.2)
BPF	5(22.7)
Delayed wound healing	2(9.1)
Wound infection	3(13.6)
Post Thoracotomy neuralgia	1(4.5)
Recurrence	1 (4.5)
Pneumonia	4(18.2)

fusion. The average amount of blood transfused was 1.68+/- 1.2 units (range, 1-4units). Thirteen (59%) patients transferred and stayed in the ICU for an average of 1.32+/- 1.39 days, (range, 0-5 days).

Twelve (54.5%) patients developed one or more complications following surgery. persistent air leak in Five (22.7%) patients who required chest tube drainage for more than two weeks, four (18.2%) patients developed empyema which subsided later with drainage, four (18.2%) patients had post operative pneumonia, one (4.5%) patient developed post thoracotomy neuralgia, one patient had to be re-operated for recurrence, and three (13.6%) had major wound infections. (Table 4)

There was one death (4.5%) due to severe intraoperative bleeding and subsequent arrhythmia. A 32 years old man admitted with massive hemoptysis secondary to right upper lobe bronchiectasis and fibrosis was operated after double lumen endotracheal tube placed. During operation dissection was difficult due to dense adhesions. While dissecting the vascular structure at the hilum, there was inadvertent injury to the major vessels resulting in massive hemorrhage.

Bleeding was eventually controlled and patient transferred to ICU with crystalloid infusion and blood transfusion. Later, patient develops intractable shock and arrhythmia and died after 12-hour stay in the ICU.

Histopathological examination showed aspergiloma with squamous metaplasia in 11 (50%) patients. The rest of the biopsy results showed Cystic bronchiectasis in 7(31.8%) cases and chronic pneumonitis with interstitial fibrosis and chronic abscess in 4(18.2%) cases. (Table 5)

Twenty-one patients were discharged home after an average hospital stay of 15.5 +/-8.5 days, (range 1-31days). Follow-up was complete for all the patients except for the one patient who died in the first postoperative day. The average follow-up period was 11.5 months, during which there was neither mortality nor recurrence of hemoptysis seen.

Discussion

Massive hemoptysis is always a medical emergency, which needs immediate investigation and treatment. It can be life threatening because of hypovolemic shock or, more often, because of aspiration. Some of the different modalities of treatment used for massive hemoptysis included conservative medical therapy, endobronchial control measures, endovascular intervention, and surgical treatment.[1] Different literatures showed that the therapeutic effect of conservative medical therapy was not satisfactory with a mortality ranging from 11.5% to 29.1% [5,12,13] For treatment of massive hemoptysis, specially in benign conditions like TB, aspergiloma, and bronchiectasis surgery remains to be the procedure of choice .[1-5]

In a resource-limited set up, it is perhaps widely believed that death is a common phenomenon that follows massive hemoptysis. Such believe is now challenged with this study where there was only one death (4.5%). This low mortality could be attributed because majority of patients were operated after 3 days of onset of hemoptysis in which time the patients were relatively stable than the initial condition.

The frequencies of massive hemoptysis vary according to geographical location, socio-economical status of the patients and the time period at which the study was conducted. Its incidence among patients visiting our hospital is not yet studied. However, literatures done in other countries showed that it is responsible for 6.8% of chest clinic visit, 11% of admissions to hospital for pulmonary service and 38% of referral to thoracic surgery clinic [1(8-10)]. Similar studies also showed that, 4.8-14% of them have presented with features of massive hemoptysis.[1 (8-13)] In our study, 22 patients were

Table 5. Histopathological results of the 22 patients who underwent procedures for massive hemoptysis

Biopsy Result	n (%)
Cystic bronchiectasis due to none specific erosive inflammation	7 (31.8)
Right lung chronic pneumonitis with interstitial fibrosis and chronic abscess	4 (18.2)
Aspergiloma with squamous metaplasia	11 (50)
Total	22 (100)

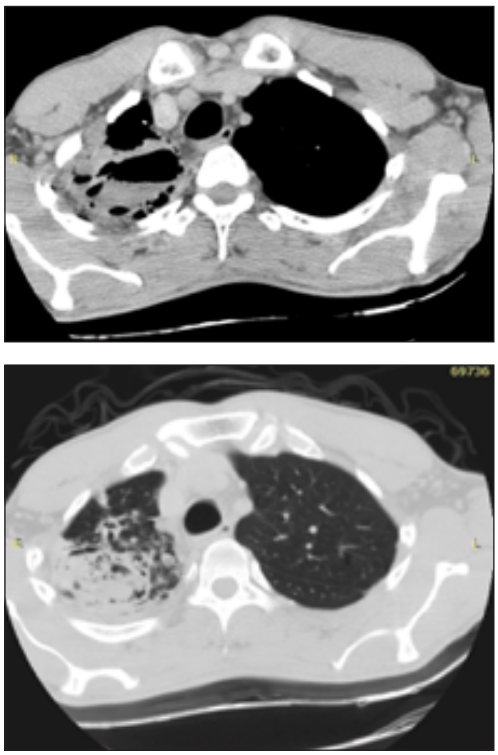

Figure 1. RUL fibro-cavitary lesion with fungal ball and air fluid level due to hemorrhage in the adjacent cavity

operated over a period of five years. This does not indicate the actual incidence of massive hemoptysis, because a significant number of patients are not timely referred or were treated conservatively in medical words.

In this study, Males are affected two times than females and younger age group (mean, 31.4 years) are predominantly affected. A study done on surgically treated pulmonary tuberculosis at TASH by Abebe etal has reported a male to female ratio of 4.2:1 with a median age affected be 30.8 years. Similar studies that examined the pattern of age and sex distribution showed a similar pattern. [6,7(12-17)]. Recently done studies rather showed a mean age of presentation in the fourth and fifth decade. [12-17]. Bo Ram Lee[18] found a mean age of presentation at 57.9 years.

The most common cause of massive hemoptysis seen in this study was aspergiloma

(17, 77.3%) followed by bronchiectasis (5, 22.7%). Both conditions are seen in those patients who are previously treated for TB. Similarly, Garzon etal.[19] published their ten-year experiences, and showed that TB was the most common etiological factor (70.5%) followed by bronchiectasis (11%). Conlan et al. [20] reported that TB was still the most common cause seen in 73.3%. However recent studies showed a change in this trend where TB was not any more the leading etiological factor. Lee et al [24], in their retrospective review, found out that bronchiectasis was the most common cause (57.4%) followed by TB (16.7%). In a retrospective study done over 14-years at a tertiary university hospital in Paris, investigators[30] showed that of 1,087 patients, bronchiectasis (20%), cryptogenic (18%), cancer (17%), active TB (12%), and sequelae of TB (13%) were the most common causes of massive hemoptysis.

Initial laboratory work-up to ascertain hematocrit and platelet count was done for all 22 patients. In order to improve their hemodynamics, of the patients, the hematocrit was corrected to over 30% before surgical intervention. Even though coagulopathy and thrombocytopenia were not identified in this study, such kind of correctable medical conditions need to be investigated all the time. Unlike the present study, previous studies done by Abebe etal [6,7] use Chest X-ray as main imaging modality for diagnosis of chest pathology. In their study, CT scan was used for only 2/26 and 3/10 patients[6, 7]. In this study CT-scan was done for all patients and has helped us to identify the site of bleeding and the status of other lung function too. (Fig1, 2)

Similar to Dweik and Stoller, [21] fiberoptic bronchoscopy was done in 9 (40.9%) patients who are relatively in stable condition with lesser active bleeding. This also has assisted us to localize the bleeding site and diagnose the specific cause. In cases of massive or life-threatening bleeding, we have completely avoided bronchoscopy. However, Dweik and Stoller [21] used bronchoscopy even for unstable patients for the purpose of maintaining ventilation and to apply endobronchial blockade.

Unlike most of the studies done in developed countries like Ong and Eng, [22], where every patient with massive hemoptysis are being admitted to ICU, it was only 6(27%) and 13(59%) of our patients were admitted to ICU prior and the following surgery consecutively. The other patients were admitted and treated in a general ward because of lack in unoccupied ICU beds. In TASH, for a hospital of 800 beds, there is only 12 ICU bed available. The hospital management needs to work further to establish more ICU service comparable to its tertiary care.

In our series, the commonest lung pathology causing massive hemoptysis was Aspergilloma (77.3%) followed by Bronchiectasis (22.7%). However, the mortality or morbidity rate of these two pathologies showed no statistically significant difference (P=0.620). (Figure 1) Similar findings were also reported from both developed and developing countries. Upper lobe (90.9%) was predominantly affected and the right lung (54.5%) has slightly more predominance than the left lung. Many works of literatures showed that upper lobes are prone for the cavitary lesion, which is a requirement for subsequent development of aspergiloma.[6-12]

Double lumen endobronchial tube intubation and independent lung ventilation prevented blood and fluids flooding of the good lung. Unfortunately, intubating patients with massive hemoptysis is technically difficult and misplacement of the double lumen tube is a serious error that requires a well-trained anesthesia provider. To make sure that the double lumen is in the correct position, fiberoptic bronchoscopy is used in conjunction with the double lumen tube (Klein et al,) [23]. We did pulmonary isolation with a double lumen endotracheal tube for 14 (63.6%) patients.

The major surgical procedure for massive hemoptysis is an anatomical resection that includes lobectomies, bi-lobectomies, pneumonectomy, and segmentectomy. Similar to Metin et al. [29] who treated more than 96% of their massive hemoptysis patients with anatomical lung resections, we have performed anatomical resections to 91.9% of cases; Non-anatomical wedge resections could be performed due to insufficient respiratory functions.

After the surgical procedures, postoperative complications such as bronchopleural fistula, empyema, respiratory insufficiency due to poor respiratory functions, wound infection and postoperative hemorrhage was seen. Ayed et al. [28] mentioned surgical complications after resection for massive hemoptysis and calculated this as 24.5%. In our series, the postoperative morbidity was calculated as 24.3% and is very similar to Ayed and colleagues' published series.

Different literatures reported that lung resection done for massive hemoptysis is associated with a high mortality. Garzon et al. [26] and Conlan et al. [20] treated massive hemoptysis with surgery and had a mortality rate of 17.6%. Knott-Craig et al. published mortality rates as 7.1%; whereas Joughon et al. [26] mentioned 19%. Lee et al. [24] published an in-hospital mortality rate of 15% after various kinds of anatomical lung resections. In our series, the mortality rate of 4.5% is lower than some of the published series.

Surgical resection of the bleeding source is definitively a curative procedure with excellent long-term results. Many studies showed a recurrence rate of only 2.2 to 3.4%. Similarly, we followed our patients for an average of 11.5 months and there was neither mortality nor recurrence of hemoptysis identified.

Conclusions

Although this was a small series, it includes a wide variety of procedures that were done to deal with massive hemoptysis. In this study, patients with massive hemoptysis were found to be post tuberculosis and the young population was primarily affected. After lung resection, Aspergiloma (77.3%) and Bronchiectasis (22.7%) were the major causes identified by histopathological examinations. As a life saving procedure, in selected patients with good lung reserve, emergency or elective lung resections could safely and effectively performed with acceptable adverse outcome. We recommend that the hospital need to establish a dedicated multidisciplinary team involving ICU physician, pulmonologist, interventional radiologist and surgeon that will help to achieve and maintain a better standard for treatment of massive hemoptysis.

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