

Tanaffos (2005) 4(15), 43-48

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Short Outcome and Evaluation of Hemoptysis in Patients with Old Pulmonary TB

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ABSTRACT

Background: Data concerning the evaluation of hemoptysis in patients affected by Tuberculosis backs to 1940-1960. Remarkable advances in anti TB agents together with effective treatment strategies such as DOTS (Directly Observed Treatment Short Course) has made the feature of the disease to be less associated with severe complications like hemoptysis due to bronchiectasis or fibrocavernous lesions.

The objective of this study was to evaluate the short outcome of the patients with hemoptysis due to old tuberculosis and also the relation of the severity of hemoptysis with length of stay (LOS) in hospital and the severity of the pulmonary lesion in high quality imaging techniques.

Materials and Methods: Forty-five patients with old TB and cardinal sign of hemoptysis were evaluated and after excluding the mycetoma and suggestive tumor formation, the coefficient correlation between the severity of hemoptysis and the LOS and also the correlation of the severity of hemoptysis and different pictures of pulmonary lesions in CT- scan were evaluated with Spearman's rho statistical analysis.

Results: All patients were discharged except one who had died because of the reasons other than asphyxia due to hemoptysis. One patient had undergone bronchial artery embolization. Pulmonary resection had been performed in none of the patients.

According to the non-parametric coefficient correlation analysis, there were significant correlations between age and the first evidence of residual TB in the lung parenchyma ($P=0.00$, Spearman rho 0.00) and also between severity of hemoptysis and pulmonary lesions in CT scan at the level of 0.05; but no correlation was observed between the LOS and the severity of hemoptysis ($P=0.0769$)

Conclusion: Hemoptysis due to old destructive pulmonary TB usually has a benign course. This is probably due to lung fibrosis and scarring caused by a prolonged inflammatory process which has led to an increase in vascular anastomosis. In old TB the source of bleeding is usually bronchiectatic lesions which are directly correlated with the radiologic features found in chest- x- ray.

The authors believe that although pulmonary resection in patients with life threatening hemoptysis is of considerable attention, conservative management of hemoptysis associated with arrested pulmonary TB is the first option. (*Tanaffos* 2005; 4(15): 43-48)

Key words: Pulmonary tuberculosis, Hemoptysis, Outcome

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INTRODUCTION

Hemoptysis is a non-specific respiratory symptom and its relationship to pulmonary tuberculosis is highly accepted by the public. It is a clinical feature of the disease which alarms both the patient and the physician (1). When present in patients with arrested TB, hemoptysis is, for the patient, a matter of concern, and, for the doctor, a misleading in the process of decision making. Several mechanisms are involved in hemoptysis in either active or old complicated tuberculosis. Rupture of necrotic vasculature and terminal alveoli may be the etiology of blood streaked hemoptysis; they might sometimes cause massive bleeding, as well. In the past, massive hemoptysis had often been associated with a mortality rate of greater than 50% (2).

In the late 1960, surgical intervention and resection of the bleeding part of the lung reduced mortality from 40% to 15%. Such an effective approach is still practiced worldwide but mortality after emergency surgery is still high, ranging from 10 to 38 % (3). Data and reports on evaluation of hemoptysis in patients with old TB backs to several years ago. In 1841, Fern presented a definition on rupture of aneurysm within a tuberculous cavity in the lung of a patient with tuberculosis (4). His studies were followed by the pathologic research of Rasmussen on local rupture of aneurismal arteries of the cavities having thick walls (5,6). Less extensive studies have been conducted on hemoptysis in patients with old TB from 1950 on (7,8), the last of which backs to 1970 (9).

With recent advances in diagnosis and treatment of TB, one would hardly ever face such a manifestation. Because of the development of effective anti-TB agents and applying the procedures such as DOTS in the treatment of sputum positive patients, the clinical and radiological features of old TB are rarely seen, and so is hemoptysis (10).

CT-scanning of patients presenting with

hemoptysis have shown that bleeding within the airways of tuberculosis patients were due to bronchiectasis in 25% of the cases and merely in 16% it occurred as a result of tuberculosis. Before the advent and administration of anti-tuberculosis agents, 4-7% of deaths in TB patients occurred as a result of massive hemoptysis (11, 12). Until recently, little emphasis has been laid upon prognosis and outcome of hemoptysis in old destructive pulmonary TB and is often limited to the efficacy of non-operative management compared with aggressive surgical approach.

In the present study, the outcome of hemoptysis due to arrested TB in an endemic region has been evaluated and the authors believe that such a study has never been conducted before.

MATERIALS AND METHODS

This study was conducted as a retrospective, cross-sectional analysis.

The medical records of 45 patients with hemoptysis who had been admitted to Masih Daneshvari Hospital between 1996 and 2004 were evaluated. Our selection was on the basis of the following criteria:

1. Presence of the information regarding the rate of hemoptysis
2. Presence of CT-scan report.
3. Negative sputum for BK
4. Normal ESR

Patients in whom "Fungus ball " or "Mysetoma" was suggestive or the ones with a mass consolidation suggesting lung cancer were excluded and finally, after extraction of demographic information, the following criteria were defined:

1. Massive hemoptysis: bleeding of more than 200^{cc} per 24 hours.
2. Moderate hemoptysis: bleeding of less then 200^{cc} per 24 hours.
3. Mild hemoptysis: blood streaked sputum.

CT scan features of pulmonary lesions (unilateral and/or bilateral) were classified as follows:

Severe lesions

A: Cystic and fibrodestructive changes in the upper lobes, or

B: Scar together with infiltration in upper portion of the lung with no cavity.

Moderate lesions

Prominent hilum together with localized fibrotic lesions.

Mild lesions

Calcification of hilum or lung parenchyma .

Regarding the short-term outcome, the patients were classified into 3 groups as follows:

1. Discharge from hospital in good condition and controlling of the disease by anti TB chemotherapy.
2. Pulmonary resection.
3. Death.

Determination of the difference and comparison of the findings such as the interval between the age of recent admission and the first evidence of residual TB infection in the lung parenchyma (Time of Interval), length of stay (LOS) in hospital, the amount of hemoptysis, and pulmonary lesions in CT scan were performed using "Spearman's rho" analysis test.

Medical records of all the tuberculosis patients who admitted to Masih Daneshvari Hospital from 1996 to 2004 were selected considering the "including criteria" as well as the "excluding criteria" of the study. After selecting of the patients, the test results, CT scan and bronchoscopic findings, report of the interventional operative procedure (performed only on one case), morbidity and mortality, pathological findings, and the patients' outcomes were studied. Medical records were separately evaluated by two of our colleagues and commented upon in case a controversy arose (3, 13).

Generally, hemorrhage has three non-specific features in CT-scan including alveolar consolidation,

ground glass opacity, and atelectasis.

These findings were considered to happen as a result of hemorrhage without an evidence of bleeding; especially the unilateral and localized lesions strongly showed the site of bleeding (14).

A: Abnormal chest CT scan:

Presence of mass, infiltration, atelectasis or cavity formation.

B: Questionable chest CT-scan:

Including the cases with protruding hilum, localized fibrotic changes, and pleural reactive changes.

C: Normal chest CT-scan.

Bronchoscopic assessment was performed by a standard bronchoscope manufactured by variant Olympus models through oral or nasal routes.

RESULTS

A total number of 45 patients were included in this study with the mean age of 35 ± 12.5 years ranging from 23 to 80. Twenty six patients (57.8%) were female and 19 (42.2%) were male in whom no significant difference was seen between different variables regarding their gender. Of 45 patients included in the study, 40 (88%) had brisk hemoptysis and 5 (12%) had blood streaked sputum. CT scan features of pulmonary lesions were severe in 5 patients (12%), moderate in 19 (42%) and mild in 21 (46%).

Seven patients underwent bronchoscopic assessment in 2 of whom clot had been observed without determination of its origin. The length of hospital stay (LOS) was 4 to 28 days with the average of 13 ± 5 days and the interval between the age and the first evidence of residual TB infection in the lung parenchyma (Time of Interval) was 3 to 40 years (20 ± 9.5 yrs.). Except for a case that had yielded to death, bronchial artery embolization had been performed in one patient; however, none of them had undergone pulmonary resection.

Uniformity and coefficient correlation of the patients with respect to age was performed on the basis of non-parametric coefficient analysis. Spearman's rho analysis did not reveal significant correlation between age and other variables such as duration of hospitalization, the degree of hemoptysis and severity of pulmonary lesions in CT-scan at the level of 0.05, but there was a significant correlation of the interval between the age and the first evidence of residual TB infection in the lung parenchyma. ($P=0.00$, Spearman's $\rho = 0.66$). Coefficient correlation was observed between the degree of hemoptysis and different types of pulmonary lesions ($P=0.0236$); on the otherwise, no correlation was observed between the length of stay in hospital, and the degree of hemoptysis ($P=0.0769$).

Table 1. The minimum, maximum and average values of age, length of hospital stay (LOS), the time interval between the age and the first evidence of residual TB infection in the lung parenchyma (The Time Interval).

Subject	Minimum	Maximum	Mean \pm SD
Age (yrs)	23	83	55 \pm 12.5
LOS(days)	4	28	13 \pm 5
Time of Interval (yrs)	3	40	20 \pm 9.5

DISCUSSION

The mechanism of hemoptysis in patients with old pulmonary TB has been determined (3, 15, 16). Reduction of pulmonary circulation in the areas involved by tuberculosis may result in the disruption of bronchopulmonary vascular anastomosis by both reflex spasm and anastomotic to destruction. When sequel occurs, these anastomoses are reduced but circulation of the involved areas of the bronchi is supplied by systemic blood with high pressure, resulting in increased risk of mucosal bleeding.(10,17,18) Previous studies showed focal ground glass opacities, localized lesions or both

correlated well with bronchial hypervascularity on angiography in patients with bronchiectasis and destroyed lung (19-21). In the current study, significant correlation was shown between the amount of hemoptysis and the severity of pulmonary lesions found in CT scan ($P=0.0236$). Since the risk of bleeding is at least statistically related to the size of roentgen graphically visible scars, bleeding appears to be proved by the high vasculature of parenchymal scars and bronchiectasis (19). Thus, concerning the aforementioned experiences in regard to the origin of bleeding from bronchiectatic lesions it is correlated to the severity of parenchymal scars (10, 19, 20).

The present study showed significant correlation between the age and the first evidence of residual TB infection in the lung parenchyma ($P= 0.00$, Spearman's $\rho = 0.66$) indicating that active TB was often present in the patients who were young adults or middle aged. No significant correlation was observed between the length of stay (LOS) in hospital and the amount of hemoptysis, ($P=0.0769$) which indicates that regardless of severity, the hemoptysis suddenly ceased after a few days. Hemoptysis had led to surgical interventions, asphyxia and/or death in none of our cases.

Since this study is retrospective, assessing the effect of bronchoscopy modality on patient management is difficult nevertheless, clot was seen in bronchial tree only in 2 patients of 7 undergone bronchoscopy and the site of bleeding was determined in none. As the most important objectives in patients with hemoptysis are to stabilize the vital signs, resuscitation, and conservative management, and on the other hand, the ideal time for bronchoscopy is controversial and emergency bronchoscopy with suction and probably bronchoalveolar lavage will aggravate hypoxia, clinicians preferred delayed bronchoscopy in stable

patients (21-24). Since the bleeding stopped rapidly and the underlying disease was known in the majority of patients, bronchoscopy was not performed. Thus, although bronchoscopy is generally considered as the first line screening procedure for patients with severe hemoptysis. The use of this procedure makes the bleeding site more difficult to identify in old pulmonary TB (25). Our results suggest that CT Findings can estimate the severity of hemoptysis and severity of lesions in old pulmonary TB.

Hemoptysis in spite of being severe in old TB patients, will often stop spontaneously. We emphasize that early pulmonary resection should be considered when the following clinical features are present provided that sufficient pulmonary reserve is found, 1): life threatening hemoptysis 2):recurrent massive hemoptysis with extensive Tuberculous cavitary lesions in images, and 3):destroyed lung with cavitary and persistent consolidation. In our series, non-tuberculosis infections, mainly aspergillomas in preexisting cavities, and the findings suggestive of tumors were excluded. These lesions are well known causes of hemoptysis that would be approached with aggressive surgical intervention (27).

The limitations of this study are mainly related to its retrospective nature in particular, the investigations were not standardized, some patients could not be fully examined and bronchoscopy was not performed routinely but it seems that these results could not be confirmed by multicentric prospective study.

Acknowledgment

Special thanks to Dr.Delara Faridian for her contribution in preparing the manuscript and Habib Emami for editorial assistance.

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