Pneumonectomy for tuberculosis

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Abstract

Objective: Surgery for tuberculosis has been of major concern because of its associated morbidity and mortality, particularly with respect to pneumonectomy. Methods: Over a period of 11 years, between January 1985 and December 1995, pneumonectomy was performed for 20 patients with documented history of mycobacterium tuberculosis (TB). There were 12 male and eight female patients with an average age of 28.7 years. All patients had productive cough for an average duration of 12.8 years, while ten (50%) had an additional hemoptysis for an average duration of 3.9 years. Four patients (20%) were still with positive acid-fast bacilli due to drug resistance and four (20%) had aspergilloma complex. Preoperatively, all patients showed radiological evidence of unilateral destroyed lung with no perfusion. Results: Among the 20 patients with post-tuberculosis lung destruction, 16 had left lung destruction and four had the right lung destroyed. In this series, there was no mortality and morbidity accounted for 15% (n = 3). Two patients required re-exploration for bleeding, while one patient developed post-pneumonectomy empyema without bronchopleural fistula, for which drainage with rib resection was performed. All patients were found to be symptom free during the follow up period which averaged 93.7 ± 23.9 months (range between 12 and 124 months). Conclusions: In this series of 20 patients, pneumonectomy for TB and post-tuberculosis lung destruction was performed with no mortality and acceptable morbidity. Meticulous surgical technique is mandatory to avoid operative complications. Persistent positive sputum for acid-fast bacilli should not be considered as contraindication in symptomatic patients. © 1997 Elsevier Science B.V.

Keywords: Pneumonectomy; Tuberculosis; Complications

1. Introduction

The role of surgery in the management of mycobacterium tuberculosis (MTB) is still a debate. After the introduction of Rifampin, the indications for surgery were limited to multidrug-resistant MTB and to complicated cases including hemoptysis, bronchiectasis, or secondary infection [12]. On the other hand, pneumonectomy for chronic infection has been avoided because of its potential associated post-operative complications [10]. Although many authors have advised against pneumonectomy for MTB, the operation is unavoidable in selected patients [8]. In this paper, we retrospectively reviewed our pneumonectomies for post-tuberculosis lung destruction and drug resistant MTB to address the current indications and outcome of this procedure.

2. Materials and methods

Over a period of 11 years, between January 1985 and December 1995, pneumonectomy was performed for 20 patients with post-tuberculosis lung destruction. There were 12 male and eight female patients with an average age of 28.7 ± 13.2 years (range between 14 and 15 years). All patients had a history of chronic productive cough for an average duration of 12.8 ± 4.3 years (range between 2 and 40 years). Additional indications
for surgery included multidrug-resistant MTB in four patients (20%), aspergilloma complex in four patients (20%), and hemoptysis in ten patients (50%). The hemoptysis represented the commonest indication for both hospital admission and surgery: patients had been complaining of hemoptysis for a duration of between 2 months and 30 years (average 3.9 ± 1.7 years). The four patients with resistant MTB had a history of the disease for an average duration of 9 years (range between 8 and 12 years) with more than one course of drug therapy. Preoperatively, all patients had full pulmonary function tests, arterial blood gases analysis, electrocardiograms, computerized tomography of chest (CT) and ventilation perfusion lung scan (VQ). Bronchoscopy was done routinely in all patients to rule out endobranchial tuberculosis.

The average pre-operative FEV1 and FVC was 40.2 ± 7.2% and 41.7 ± 7.6% of the predicted value, respectively. The CT examinations showed a unilateral destroyed lung with cystic bronchiectatic changes and extensive pleural thickening in all patients (Fig. 1). A ventilation-perfusion lung scan revealed a matched ventilation-perfusion defect in the destroyed lung. In two patients with destroyed left lung, radiological examinations revealed evidence of right upper lobe fibrosis also. Bronchoscopy examination yielded endobranchial tuberculosis in one patient and stenosis in another.

Pre-operative preparation included chest physiotherapy and nutritional support as the majority of these patients were debilitated and belonged to the poorer sector of society. Prophylactic antibiotics were administered based on sputum culture and sensitivity results. Apart from one patient with massive hemoptysis who required emergency procedures, all operations were performed electively. All cases were operated by using double-lumen endobranchial tube and approached through muscle sparing posterolateral thoracotomy. As intrapleural fibro-vascular symphysis was frequently encountered, extrapleural dissection was adopted and pleuropneumonectomy was performed routinely for all patients. The bronchial stump was closed using staples. The stump was covered with an intercostal muscle flap in three cases. During dissection, the pulmonary artery was injured in two patients. The mean operative time was 4.5 ± 0.6 h (range between 3 and 8 h) and the blood loss averaged 1150 ± 0.8 ml (range between 200 and 2800 ml). Statistical analysis was performed using the Student’s t-test. A P value of less than 0.05 was considered significant.

3. Results

Left pleuropneumonectomy was performed in 16 patients while right pleuropneumonectomy was performed in four patients. There was no mortality in this series and morbidity accounted for 15% (three cases). Two patients required re-exploration for bleeding. One of those patients had chest wall invasion by aspergilloma complex. The third patient developed post-pneumonectomy empyema with no bronchopleural fistula. Drainage with rib resection was performed with satisfactory results. None of the patients required post-operative assisted mechanical ventilation. An average of 1.9 ± 0.4 units were transfused during the pre-operative period (range between 0 and 5 units). The post opera-
tive hospital stay averaged $15.1 \pm 4.2$ days (range between 10 and 23 days). One patient developed late empyema in the pneumonectomy space 3 months after surgery following misdiagnosis of pleural effusion and the insertion of a needle into the space. The mean follow up period was $93.7 \pm 23.9$ months (range between 12 and 124 months). All patients remained symptom free with no evidence of infection in the contralateral lung (Figs. 2 and 3) and the four cases with positive sputum for acid-fast bacilli were sterilized after surgery.

4. Discussion

Pulmonary resection for chronic infection remains a common procedure in the Middle East. Tuberculosis continues to account for the majority of these cases [5]. Although the indications for surgery has decreased after the development of more effective anti-tuberculosis therapy, the true incidence is not available in our area. In the US, the incidence of tuberculosis was 9.25/100 000 nationally in 1987, which is higher than what was previously noted [7]. Similarly, more cases of drug resistant MTB have been observed [4].

In this series, 16 out of 20 (80%) patients had left lung destruction, a phenomenon recognised previously by the author as the left bronchus syndrome [2,3]. All our patients were from the Middle East Region and had documented history of tuberculosis in the past. All patients also experienced more than one course of anti-tuberculosis multiple drug therapy. The majority of these patients were weak and debilitated, not only because of their chronic illness, but also because they belonged to the poorer sector of the society. Keeping this in mind, we believe that paying attention to the nutritional support of these patients is an integral part of the management plan.

Our policy is to offer surgical treatment only to cases with drug resistant MTB or to symptomatic patients with destroyed lungs. In this series, four patients (20%) were encountered with resistant MTB to multiple drug courses over an average period of 9.5 years. Other indications for surgery included chronic productive cough, which affected the quality of patients life, hemoptysis, and the development of aspergilloma complex.

Fig. 2. Chest roentgenogram of a 48-year-old female with MTB and destroyed left lung.

Fig. 3. Chest roentgenogram 2 years after successful left pneumonectomy.
In all cases resection was limited to the completely destroyed parenchymal lung tissue, which was demonstrated by CT and VQ lung scans. Pneumonectomy, therefore, should only be performed when the destruction involves the entire lung. This is to ensure that none of the healthy lung tissue is unnecessarily removed, especially when pneumonectomy for chronic infectious disease is known to be associated with higher mortality and morbidity [11]. The pre-operative evaluation of those patients should also confirm a healthy contralateral lung with satisfactory function. Our patient population had a lower average age compared to other studies from the US which is probably due to the fact that MTB is still endemic in the Middle East affecting children at earlier age. The indications for surgery, therefore, were of a different order in our patients, chronic productive cough and hemoptysis being the commonest indications, while in a previously reported series, resistant MTB was the dominant indication for surgery [12].

Careful preoperative evaluation and good preparation should aim to reduce the post-operative complications and respiratory failure in particular. Despite a low percentage of FEV1 and FVC pre-operatively (40.2 and 41.2% of the predicted, respectively), all patients were extubated during the immediate post-operative period and that could be explained by the fact that the removed lung was completely destroyed and non-perfused.

In view of the dense fibro-vascular symphisis between the lung and parietal pleura, excessive bleeding occurred during dissection. Therefore, we elected to do routine extrapleural dissection as this proved to be safer and less traumatic. This fibrovascular symphisis was found most commonly in the apex of the chest and over the diaphragm to a lesser extent. The hilar nodes were found to be fibrotic, sometimes calcified, and infiltrated the pulmonary vessels. We have experienced two cases of vascular injury despite careful dissection.

Bronchopleural fistula (BPF) after pneumonectomy is a common complication associated with high rates of morbidity and mortality [9]. The risk of BPF increases with resection for inflammatory diseases, especially MTB [6]. We have closed all our bronchial stumps using staplers and that was covered with intercostal muscle flap in three patients. None of the cases developed post-operative BPF. The best technique for closure of the bronchial stump is still a debate. Good results have been reported, regardless of using either hand suture or stapler technique with or without muscle flap [1]. Preservation of peribronchial tissues and leaving a short bronchial stump, as practiced in this series, probably constitute the most important factors for the prevention of BPF after pneumonectomy.

Haemostasis of the residual pleural space is mandatory and extra time should be spent to ensure complete haemostasis before closure. Two of our cases required re-exploration for bleeding. In one patient a risk factor was identified, an aspergilloma complex was found to invade the chest wall. Empyema is another dreadful complication and early recognition and management after exclusion of an associated BPF gives satisfactory results. In our experience, the presence of drug resistant MTB at the time of surgery did not increase the risks of BPF or empyema.

Following surgery, good results with respect to sterilization of the resistant MTB and elimination of associated symptoms were achieved. All patients were free of the productive cough and the hemoptysis during the follow up period with a minimum of 12 months.

We conclude that surgical resection for MTB should be limited to drug resistant cases or cases with associated complication like hemoptysis, bronchiectasis, and aspergilloma complex. Surgical resection should be limited to the affected part with destroyed lung tissue with no perfusion. Pre-operative preparation should aim not only to reduce the associated pulmonary sepsis but also to improve the patient nutritional status. Careful surgical technique is the key to reduce the risks of post-operative bleeding, BPF, or empyema. The low morbidity reported in this series should encourage the adoption of the surgical option in selected patients.

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References


