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SURGERY FOR PULMONARY TUBERCULOSIS

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ABSTRACT

Pulmonary tuberculosis continues to be a major health problem all over the world. Medical treatment with antibiotics is effective in most cases. However, when medical treatment fails or complications develop, surgery is indicated. Between July 1994 and June 2000, fifty-two patients with pulmonary tuberculosis, thirty-six males and sixteen females, underwent major surgery at Mansoura University Hospitals. Mean age was 35 years (range 22-54). Chronic suppuration and/or haemoptysis were the main symptoms. Eleven patients had positive sputum at the time of surgery. Thirteen patients had pleuro-pneumonectomy or pneumonectomy. Thirty-six had partial lung resection, two had decortication, and one had thoracoplasty. All patients received antibiotics for at least six months before and nine months after surgery.

Post-pneumonectomy broncho-pleural fistula (BPF) was the most serious complication and accounted for the two deaths in this series. Prolonged air leak was the most common complication. Five patients needed second operation. One-year follow up was complete and late follow up was complete in 80%. No late mortality or disease recurrence were reported. We conclude that surgery for pulmonary tuberculosis, when indicated is efficient and reliable in achieving cure with an acceptable mortality and morbidity.

Objective

To review the indications and assess the outcome of surgery in patients with pulmonary tuberculosis.

Design

Retrospective analysis of all pa-

tients who had surgery for pulmonary tuberculosis over a seven-year period at Mansoura University Hospitals.

Hospitals with such cases in seven years.

INTRODUCTION

Pulmonary tuberculosis continues to be a major cause of morbidity and mortality throughout the world. It is estimated that two billion people (one third of the world's population) would have positive skin test and about 10% of them actually have the active infectious disease (1). It is the world's leading cause of infectious morbidity and mortality (2). Developing countries, because of the economic issues, are the main harborers of the disease (1).

Surgery for pulmonary tuberculosis was the main treatment modality before the advent of effective antibiotics in the 1950s and 1960s. The effect of these antibiotics on surgery was twofold. They decreased the number of patients requiring surgery, the majority of patients are treated medically, but they made pulmonary resection much safer for those who need surgery to eradicate the disease or treat its sequelae (3).

The following report reviews our experience at Mansoura University

PATIENTS AND METHODS

Between July 1994 and June 2000, 85 patients underwent surgery for pulmonary tuberculosis or its sequelae in the Department of Cardiothoracic Surgery, Mansoura University Hospitals. In 33 patients, all with empyema and relatively minor pulmonary disease, relatively minor procedures were performed (under water seal tube drainage in 28 and rib resection and open drainage in 5). These 33 patients are not included in this study. Fifty-two patients underwent major surgery and they constitute the basis of this study.

There were 36 men and 16 women with a mean age of 35 years (range 22 to 54 years). Tuberculous lesions were active (sputum positive for acid-fast bacilli) in 11 patients at the time of surgery, and sequelae of previously treated tuberculosis (sputum negative for acid-fast bacilli) in 41 patients.

Indications for surgery are listed in table I. Preoperative evaluation included chest x-ray (PA and lateral), sputum smear, spirometry and bron-

choscopy. Bronchography was used in our department to assess the bronchial tree before 1994. This was abandoned because of unavailability of the contrast medium (Hytrast) and the increased availability of CT scan. Most patients in this study were assessed with a CT scan.

The mean duration between surgery and the first diagnosis of pulmonary tuberculosis was 30 months (range 6 months to 7 years). All patients had anti-tuberculous chemotherapy for at least 6 months before surgery. Bronchiectatic patients were taught the principles of self-administered physiotherapy and all patients were given nutritional advice.

All operations were performed under general anaesthesia. Selective bronchial intubation with a double lumen tube was used in cases with marked suppuration (7 patients) or risk of severe haemoptysis (2 patients). Single lumen tracheal tube was used in the remaining 43 patients. Standard postero-lateral approach was used in all patients. Table II shows the operative procedures performed. Thirteen patients had pleuro-pneumonectomy or pneumo-

nectomy. Thirty-six had partial lung resection, two had decortication, and one had thoracoplasty. All survivors received anti-tuberculous treatment for at least further 9 months. A new agent was added to the regimen in the 11 patients with preoperative positive sputum.

RESULTS

There were two early (30-day) deaths (3.8%). Post-pneumonectomy broncho-pleural fistula (BPF) with respiratory failure accounted for both. Empyema and BPF complicated almost half of the pleuro-pneumonectomy/ pneumonectomy group (6/13). Two died early of respiratory failure, two repaired early with muscle flaps, and two repaired late after early drainage of empyema, one with thoracoplasty and the other with transmediastinal revision of the stump. One of the two cases of left pleuro-pneumonectomy was complicated with recurrent laryngeal nerve palsy. Prolonged air leak and residual pleural space were common after decortication/ partial lung resection group (4/38). One case needed completion pneumonectomy because the remaining lobe which was borderline at the initial operation failed to expand and fill the hemithorax. All the others

were treated successfully conservatively with continuation of pleural drainage or insertion of new drains. Six patients were transfused more than two units but none needed exploration. Five cases had superficial wound infection. Table III lists second surgical intervention and the duration between them and the initial operation.

All operative survivors were followed-up clinically and radiologically

for one year. All were asymptomatic with no radiological abnormalities detected in the chest x-ray. All survivors who had positive sputum preoperatively (10), showed sputum conversion.

Late follow-up was complete in 39 out of 49 survivors (79.6%). Duration of follow-up ranged from 4 to 122 months (mean 52 months). All patients remained clinically and radiological free.

Table I: Main indications for surgical intervention.

Indication	Number
Destroyed, infected lobe(s), or lung (Bronchiectasis or persistent cavities)	35*
Failure of medical treatment (persistent positive sputum or progression of disease)	11
Chronic empyema	2
Massive life-threatening haemoptysis	3
Tuberculoma	1

* Of them, six patients had empyema and BPF.

Table II: Operative procedure performed in 52 patients.

Operative procedure	Right	Left
Pleuro-pneumonectomy	1	2
Pneumonectomy	3	7
Bilobectomy	4	0
Lobectomy + segmentectomy or wedge resection	0	2
Lobectomy	17	9
Segmentectomy	1	3
Decortication	1	1
Thoracoplasty	1	0
Total	28	24

N.B.: Decortication associated with lung resection in six cases.

Table III: second surgical intervention.

Second operation	Numbe	Duration
Repair of BPF with muscle	2	2 weeks.
Thoracoplasty.	1	14
Transmediastinal revision of BPF.	1	17 months.
Completion pneumonectomy.	1	4 weeks.

DISCUSSION

Pulmonary tuberculosis, once thought to be easily controlled, continues to be a major cause of morbidity and mortality all-over the world. In developed countries, after a steady decrease in the incidence of pulmonary tuberculosis, it has been increasing since 1990 (2,4). In developing countries, which are the main harborers of the disease, the economic impact is far reaching. Ninety percent of persons infected with tuberculosis are younger than the age of fifty years (1). In our series, all patients but one were under fifty years at the time of surgery and more than two thirds were men. This group represents the main wage earners. It is necessary to identify patients early who may benefit from surgery to limit the economic impact of this disease.

Management of pulmonary tuberculosis started in the mid nineteen century with sanatorium treatment, first in Germany and then in most other countries. This consisted of bed rest, diet, high altitude and a graded recovery exercise regime. Surgery was the main form of treatment in the first half of the twentieth century. This was initially achieved by the induction of artificial pneumothorax to produce cavitory collapse. Because of the need for frequent refills and the risk of infection and the development of empyema, thoracoplasty as a permanent form of collapse therapy was introduced in 1930s. This was the main form of treatment for more than two decades before the development of chemotherapy and lung resection in 1950s (5). The second half of the last century saw the conversion of tuberculosis

from a disease of high virulence and high mortality with bedridden patients to one in which treatment by chemotherapy is successful in most patients, who are ambulant and rarely need more than a few days in hospital for diagnosis and initiation of treatment (5)

Surgery is, however, necessary for two main categories of patients; when medical treatment fails, and for the treatment of complications.

Failure of medical treatment is characterised by progression of disease or the absence of well-defined clinical and radiological effect in response to antibiotics (6). This may result from complacency of patients or sometimes physicians (2). Medical treatment should be well planned and well monitored. Surveillance should be continued until cultures are consistently negative. Follow-up should be continued for few years afterwards to ensure that re-infection has not occurred (5).

Other causes of failure of medical treatment are difficulty of antibiotic penetration and the high number of organisms contained in a cavity; and the presence or the emergence

of multi-drug resistant mycobacteria. (1)

The emergence of multi-drug resistant mycobacteria, resistant to both Rifampicin and Isoniazid, has largely been due to sub-optimal treatment; too few drugs, inadequate doses, and / or erratic administration. This leads to loss of efficacy of the most potent anti-tuberculous antibiotics, protracted hospital stay, the requirement of surgery for cure, and great increase in the cost of treatment. (2).

In this study, eleven patients (21%) had positive sputum when considered for surgery despite medical treatment for duration of six months to two years. The incidence of multi-drug resistant tuberculosis in these patients is not known, as sensitivities were not performed. The decisions that medical treatment has failed and to proceed for surgery were based on clinical and radiological grounds.

All the ten survivors in this group (91%) showed sputum conversion and remained negative for the period of follow-up. However, one patient had right pneumonectomy in this group developed early broncho-pleural fistula and died of respiratory

failure. Others (1,3,4) have showed the effectiveness of surgery in eradicating active disease when medical treatment fails.

Surgery plays an important role in the management of complicated tuberculous lesions even when these lesions are no more active. These complications include destroyed lung parenchyma (persistent cavities or bronchiectasis) with persistent or recurrent pyogenic or superimposed mycotic infection, massive life threatening haemoptysis, empyema with or without underlying parenchymal disease or a broncho-pleural fistula, and less commonly tuberculoma or bronchostenosis (7). In this study, forty-one patients underwent surgery for complicated lesions.

Destroyed lung parenchyma with persistent pyogenic infection affects usually lower lung fields or an entire lung (7). Isolated upper lobe lesions, because of the better drainage, are usually the source of recurrent haemoptysis rather than recurrent or persistent infection. This was the main indication for surgery in our study (thirty five patients). Decortication of associated empyema was performed in six patients. Souilamas and co-workers in

Paris as well (4) shared this experience.

Massive life threatening haemoptysis may result from erosion into a bronchial artery or more rarely from pulmonary arterial bleed caused by rupture of Rasmussen's aneurysm in a tuberculous cavity. Surgery is indicated if the patient bled more than 600 ml in 24 hours. The patient should be positioned to minimise possible aspiration of blood. Bronchoscopy should follow to identify the source of bleeding. In this series, two patients were successfully treated with the above protocol followed by surgical resection (lobectomy in both cases).

Only one patient in this study underwent thoracoplasty for recurrent haemoptysis from a left apical cavity. He did not have adequate pulmonary reserve and was deemed unfit for pulmonary resection.

Tuberculous empyema with little or no parenchymal involvement is an uncommon indication for surgery. Such patients usually respond to medical treatment and needle aspiration (5). Only two patients in this study underwent decortication

of chronic empyemas. As mentioned before, six patients had decortication combined with pulmonary resection (lobectomy or pneumonectomy).

In this study, the operative mortality (3.8%) is comparable with that of Pomerantz et al (3.3%) (1). However, it is much higher than that of Souilamas et al (0.4%) (4). This may be explained by the higher incidence of pleuro-pneumonectomy/ pneumonectomy in our study (25%) compared to that in the latter (14.6%). Patients who need pneumonectomy for cure tend to have more aggressive disease and less pulmonary reserve. Both operative deaths were due to post-pneumonectomy empyema/ BPF. This is the most serious complication of pulmonary resection. In the future, we intend to consider prophylactic use of muscle flaps at the time of surgery when this problem is anticipated. This seems to decrease the incidence of BPF in the experience of Pomerantz et al (1).

Residual pleural space and prolonged air leak were the most common complications (7.6%). This is comparable with (6.5%) in Souilamas et al (4).

The timing of surgical intervention is often difficult to determine. This depends on the response to medical treatment and the development of complications. All of our patients had at least six months of medical treatment before surgery.

Thorough follow-up is essential to achieve cure. In this study, the one-year follow-up was complete. However, one out of five operative survivors were lost to follow-up.

Conclusion

Although cure of pulmonary tuberculosis is achieved by medical treatment in most cases, some fail to respond to medical treatment and others develop complications. In both occasions, surgery is efficient and reliable in achieving cure with an acceptable mortality and morbidity.

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