

# Surgery for Pleuropulmonary Tuberculosis

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**Summary:** The purpose of our study was to analyze current indications for surgery in pleuropulmonary tuberculosis (TB). We present our experience with TB patients presenting with indications for surgery between 1998 and 2003. **Material and Methods:** The indications for surgical intervention included 220 cases of empyema, mediastinal lymphadenopathy 48 cases, hemoptysis 25 cases, destroyed lung 24 cases, undiagnosed pleural effusion 24 cases, bronchiectasis 18 cases, cavitary lesion with MDRTB 13 cases and pulmonary aspergilloma 10 cases. Thirteen patients with multidrug-resistant tuberculosis required surgical intervention, although 26 were treated with second line drugs during this period. **Results:** The techniques utilized included decortication in 152 cases, lobectomy in 62 cases, rib resection for pleural drainage in 50 cases, anterior mediastinotomy in 48 cases, pneumonectomy in 28 cases, open pleural biopsy in 24 cases, and thoracoplasty in 18 cases. In 12 patients (3.1%), two procedures were performed, and in one case, 3 procedures. In 65 cases (17%) there were complications, of which persistent air leakage after decortication & pulmonary resection was the most frequent (n=26). There was a mortality rate of 2.8% (11 cases). **Conclusions:** In our experience, surgery in the treatment of TB is indicated to resolve sequelae or complications, since cases of simple or multidrug-resistant TB can be managed pharmacologically. The morbidity and mortality rates in our series were acceptable.

**Key words:** Tuberculosis (TB), thoracotomy, complications

Tuberculosis (TB) is responsible for the deaths of 60,000 people out of 250,000 new patients registered in Pakistan every year<sup>1</sup>. The Study of tuberculosis is a fascinating travel through the history of medicine and surgery since the dawn of civilization. At the beginning of the 20<sup>th</sup> century, tuberculosis was indeed the foremost single cause of death among adults and at that time, a system of sanatoriums that emphasized bed rest and nutrition was created to help fight the disease<sup>2</sup>. It was in those institutions that cavity closure by means of surgical modalities, such as phrenic nerve crush, Thoracoplasty, and plombage, were found to be of value in controlling the infection. Surgery in pulmonary tuberculosis (TB) has gone through several phases in its history, from being the treatment of choice in earlier times, before the discovery of antituberculin drugs, to its current status as a treatment modality used only in special circumstances<sup>3,4,5</sup>. There are several important controversies surrounding the role of surgery in TB, which the present study will attempt to address in some depth.

The discovery of *Mycobacterium tuberculosis* in 1882 coincided with the introduction of surgical treatment by 'extra pleural pneumothorax', as the procedure was called by Forlanini. For many years collapse of the lung was the principal treatment for TB, with the principal aim of impeding the spread of the microorganism, which needs an aerobic medium for its growth. Thirty years later, Jacobus described thoracoscopy for the resection of pleural adhesions in TB. The discovery of streptomycin in 1943 began a new era in the treatment of this disease<sup>6</sup>. Since then, new drugs have been filling the therapeutic arsenal, relegating the role of surgery to second place.

There remain, however, several clinical situations that can be treated surgically, and these occasionally provoke controversy. It seems clear that this therapeutic option is indicated in the management of some sequelae and complications of the disease, although the role that surgery could take in the treatment of multidrug-resistant TB is more controversial. While some authors defend it as an alternative therapy<sup>7</sup>, others relegate it to special cases only<sup>8</sup>. The aim of the present study is to evaluate indications for surgery and surgical techniques, on the basis of the experience acquired in our centers over the past 6 years, as a contribution to this particular aspect of the treatment of TB.

## Material and methods

A retrospective review was performed on the available charts of 382 consecutive patients who underwent surgery for pleuropulmonary tuberculosis at Lady reading hospital, Postgraduate Medical Institute, Peshawar, Mayo Hospital Lahore, Surgimed Hospital Lahore, between 1998 and 2003. Three hundred and eighty-two patients were included (252 males and 130 females), ranging in age from 14 to 79 (average age 48.4). The three departments operate with similar diagnostic and therapeutic criteria. In all of these cases there were evolving complications in previously-diagnosed TB that required surgery, or TB was discovered during surgery. A preoperative examination was done in all patients, including computed tomography (Fig 1,2). When possible, pulmonary function tests were also performed. Pulmonary function tests were performed in all patients, when an elective major pulmonary resection was planned (lobectomy or pneumonectomy). Wherever

possible the patient's sputum smears and cultures were rendered negative before surgery by standard antituberculosis treatment. In cases of multidrug-resistant TB, the treatment was individualized according to the results obtained in the study of drug sensitivity and the previous treatment history. The surgical indications are summarized in Table 1. The majority was elective (353 cases, 91.8%). The procedures utilized were determined either by the pathology or by the diagnostic and therapeutic goals of the operation. They can be grouped as follows:

Group 1 – Therapeutic procedures on the pleural cavity:

- Decortication
- Rib resection
- Thoracoplasty

• Group 2 – Pulmonary resections:

- Lobectomy
- Pneumonectomy

• Group 3 – Diagnostic procedures:

- Anterior mediastinotomy
- Open Lung biopsy

Patients with empyema thorax who did not respond to tube thoracostomy were treated with rib resection, decortication and Thoracoplasty. Pulmonary resections were done with double lumen tubes and carried out by posterolateral thoracotomy (fig 3) and standard operating techniques, covering the bronchial stump with intercostal muscle or parietal pleura. Anterior Mediastinotomy was done by the familiar standard procedure. All of the samples were studied microbiologically and histologically. The patients were observed closely during the postoperative period. The observation period lasted from 6 months to 1 year after conclusion of treatment.

## Results

The indications for surgical treatment in our series are shown in Table 1. Among 39 patients with multidrug resistant TB, 13 patients required surgical treatment, and all were successfully managed by surgery & medication. Direct sputum staining was positive in 40 cases upon preoperative diagnosis. Only one case of atypical mycobacterium was found (*M. avium*). In 72 cases (18.8%) concomitant diseases were diagnosed (Table 2), among which diabetes mellitus and malnutrition were dominant. In 62 of the cases, two or more of these diseases were present in the same patient. The total number of procedures carried out is summarized in Table 3. In 12 patients (3.1%), two procedures were performed, and in one case, 3 procedures. In 12 patients, decortication failed to resolve pleural empyema. Thoracoplasty was done in these patients. Two patients after pneumonectomy had bronchopleural fistula, which successfully treated with conservative treatment. Postoperative mortalities were in 11 patients (2.8%). Group II accounted for most of the mortalities (6 cases), patients who had undergone pulmonary resection for hemoptysis (3 cases),

aspergillomas (2 cases) and destroyed lung (1 cases), complicated by arrhythmias, myocardial infarction, respiratory and/or pleural infections. Two cases of Thoracoplasty died due to ARDS. Two cases died after decortication due to arrhythmias and myocardial infarction. One patient died after anterior mediastinotomy due to respiratory failure. Postoperative complications appeared in 66 patients (17.2%), 15 of which experienced 2 or more complications. Persistent air leakage was prominent, accounting for 26 cases. General complications appeared in 9 cases (sepsis, renal insufficiency, cardiac insufficiency), another 18 patients had infections of surgical wound (Fig 4), and there were 2 cases of postoperative hemothorax which required reexploration. Pleural empyema occurred in 4 patients, postoperative pneumonia in 4, and hemoptysis in 5 and postpneumonectomy bronchopleural fistula in 2. Among the various groups, a higher incidence of complications was detected in Group 1, involving not only complications specific to this type of surgery, but also general complications arising from the poor state of health of some of the patients included in this group (Table 4). The postoperative stay (excluding postoperative mortality) averaged 16 days, with a range from 5 to 40 days.

Table 1. Indications for surgery

Indications	n=	%age
Pleural empyema	220	57.5
Mediastinal nodes	48	12.5
Hemoptysis	25	6.5
Destroyed lung	24	6.2
Undiagnosed pleural effusion	24	6.2
Bronchiectasis	18	4.7
Cavitary lesion with MDRTB	13	3.4
Pulmonary aspergilloma	10	2.6

Table 2. Diseases associated with pulmonary tuberculosis.

	n=	%age
Diabetes mellitus	65	17
Malnutrition	56	14.6
Contralateral tuberculosis	34	8.9
COPD	22	5.7
HCV	6	1.5
HBV	4	1

Table 3. Surgical procedures

Group 1	
Decortication	152
Rib resection	50
Thoracoplasty	18
Total	220
Group 2	
Lobectomy	62
Pneumonectomy	28
Total	90
Group 3	
Anterior mediastinotomy	48
Open pleural biopsy	24
Total	72

Table 4 : Perioperative complications

<b>Group 1</b>	
Persistent air leakage	18
Wound infection	10
Residual space	9
Pleural empyema	4
Pneumonia	3
Hemothorax	2
<b>Group 2</b>	
Persistent air leakage	8
Residual space	5
Post-pneumonectomy bronchopleural Fistula	2
Wound infection	2
<b>Group 3</b>	
Wound infection	2

Fig 1 : CT-Scan showing destroyed left lung

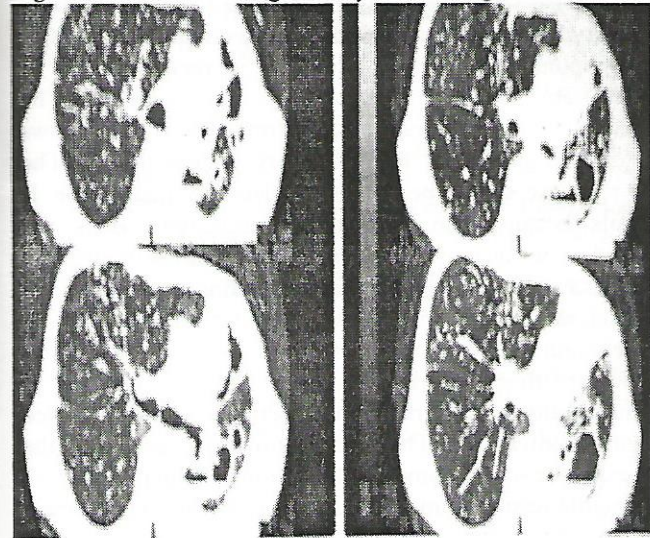


Fig 2 : CT-Scan showing aspergilloma

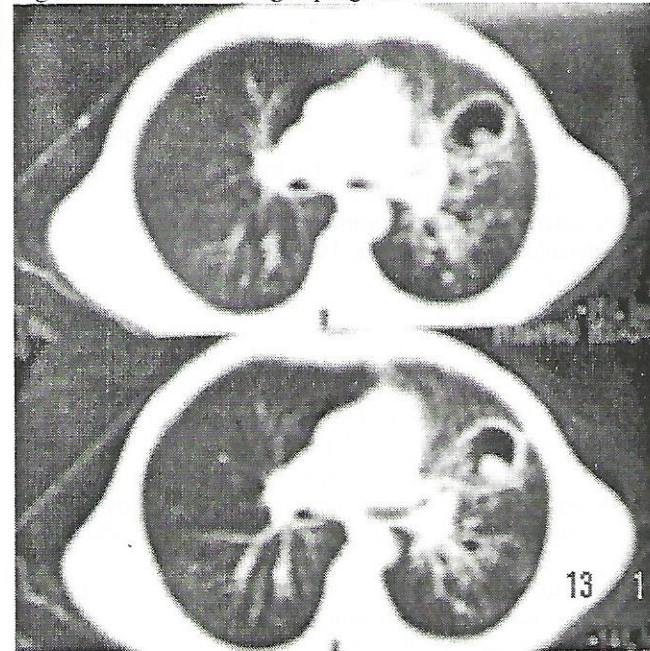


Fig 3 : Postlateral thoracotomy for pneumonectomy

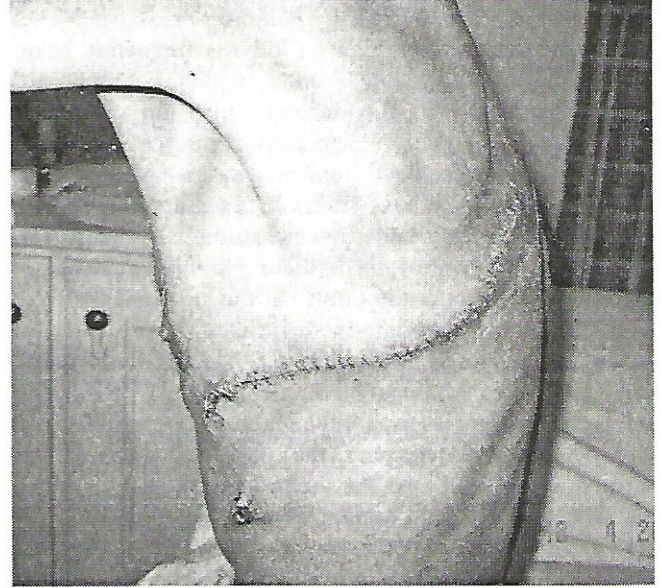


Fig 4 : Infected thoracotomy wound



### Discussion

The surgical indications for TB are still a matter of discussion. Controversies continue over indications for surgery in some types of complications, and also over the right timing for surgery. In each case the solution varies according to the degree of complication and the risk to the patient<sup>4</sup>. It is also important to keep in mind the diseases that may occur simultaneously, as in our study, where we found 18.8% rate of co morbidity, especially chronic diseases, such as diabetes.

The timing for treatment in patients with positive sputum is highly debated and considered a key question<sup>3,4</sup>. Along with other authors<sup>9,11</sup>, we believe that the ideal moment for surgery is when the sputum is negative, except in cases of emergency due to complication<sup>12</sup>.

One of the most controversial aspects of TB surgery is the surgical treatment of multidrug-resistance. The surgical treatment of this type of TB has frequently been described, with acceptable results, which has induced several authors to recommend excision of the lesion<sup>5,7,11,13,14</sup> even before 3 months of medical treatment has proven ineffective<sup>15</sup> or in cases of atypical mycobacteria<sup>16-19</sup>. We have found it necessary to perform this type of operation under such conditions, because we were unable to control the situation by tuberculostatic treatment with second-line drugs. In our opinion, the role of surgery is very important in such cases. With respect to atypical mycobacteria infections, we had only one case, from which we can draw no binding conclusions.

Bronchiectasis as an evolving complication requiring surgery has decreased over the past few years. This decrease is related to the improvement in medical treatment of TB. It still continues to be an indication for surgery, taking into account the limitations of the disease and good operating conditions<sup>20,21</sup>. The evaluation of this kind of complication demands good imaging technology. Classically, bronchography was used, which still finds many advocates, although in our centers we have ceased to use it, in favor of high resolution thoracic CT. Another form of bronchial disorder that may be an indication for surgical treatment is bronchial stenosis. Surgery may be necessary to resect the stenosis or to do bronchoplastic resections<sup>22, 23</sup>. Prophylactic intervention has been suggested to resect adenopathies that may fistulize into the bronchotracheal tree<sup>24</sup>.

Surgery of destroyed lung presents a challenge to the surgeon because of the high rate of complications, particularly after pneumonectomy<sup>24</sup>. We performed 28 pneumonectomies and faced this type of complication twice. Dissection proximal to the bronchial stump should be kept to a minimum, in order to preserve intact as much as possible of its blood supply. It must also be covered by intercostal muscle, parietal pleura or mediastinal fat. Positive sputum, empyema and pneumonectomy on the right side constitute risk factors for postoperative morbidity<sup>26,27</sup>. The risk is also high when aspergilla infection coexists with the disease.

The absence of a specific diagnosis of a pulmonary mass or node may warrant invasive procedures to rule out the presence of a neoplasm. The association between neoplastic disease and TB is well-known, and takes the form of *scar cancer*, which develops over tuberculosis scars. One characteristic that rouses suspicion is the absence of improvement during tuberculostatic treatment. In this type of neoplasm, most often adenocarcinomas, a high incidence of stage I has been reported, with a more favorable prognosis<sup>11</sup>.

The special tropism characteristic of destructive tubercular lesions for the setting of aspergillomas is well known. Resection anticipatory of evolving complications has been described, and its advisability seems to be beyond

debate<sup>28</sup>. Along with other authors, we recommend surgery even when the course of the disease is asymptomatic<sup>11,29</sup>.

The treatment of asymptomatic persistent pulmonary cavities has been the object of controversy. Some authors advocate resection for the prevention of aspergillomas<sup>11</sup>. In our opinion, prophylactic excision is not justified if there is no other motive for surgery, such as recurring hemoptysis, or suspicion of neoplasm or aspergilloma.

Residual tuberculin pleural cavities are usually the consequence of treatments carried out by means of collapse therapy and plombage<sup>28,29</sup>. Thoracostomy has become popular, and its use is preferred in the first step, followed by thoracoplasty or filling the cavities with myoplasties. Thoracoplasty technique has yielded excellent results for us, without serious complications (fig. 5). In the case of plombage, severe complications and high mortality have been described<sup>30</sup>. These complications even occur spontaneously, and excision is recommended to remove any foreign bodies, even prophylactically. The management of pneumothorax secondary to TB follows the classic guidelines for secondary pneumothorax. The first response should be to place a pleural drainage tube. If it fails because the pulmonary parenchyma does not expand or because of persistent air leaks, thoracotomy may be indicated; however, general conditions should be kept in mind, and less aggressive treatment is preferred.

### Conclusion

Pulmonary tuberculosis, even though it responds well to antituberculosis treatment, has certain well-established surgical indications. These indications are generally the consequence of outcome complications. Surgery can give acceptable results from a morbidity / mortality standpoint.

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