



# Surgical Management of Complications of Pulmonary and Pleural Tuberculosis: Clinical Insights and Outcomes

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## Abstract

**Background:** Pulmonary and pleural Tuberculosis (TB) remains a major global health challenge, with significant morbidity and mortality worldwide. While medical treatment for TB has improved dramatically in recent years, some patients still suffer from post-TB complications, including drug-resistant TB, as well as cavitary lesions and areas of destroyed lung that persist despite successful treatment. Surgical treatment for TB-related pulmonary and pleural complications has taken a secondary role since the advent of effective medical treatment, but it remains an important option for selected patients.

**Methods:** This retrospective cross-sectional study included 67 patients who underwent surgical management for pleural or pulmonary tuberculosis at Tikur Anbessa Specialized Teaching Hospital and Menelik II comprehensive specialized Hospital in Addis Ababa, Ethiopia between January 1<sup>st</sup>, 2018 and December 31<sup>st</sup>, 2020. Convenience sampling was used, and data was collected through a structured questionnaire and reviewed medical charts. Data was analyzed using SPSS version 25, and ethical considerations were maintained throughout the study.

**Results:** The most common presenting symptoms were cough (100%) and weight loss (50.7%), and the left upper lobe of the lung (34.3%) was the most commonly affected part. Decortication was the most frequently performed surgical procedure (50.7%), followed by lobectomy (20.9%) and wedge resection (14.9%). Post-surgery complications were observed in 32.8% of patients, with bronchopleural fistula (13.4%), postoperative empyema (10.4%), and hospital-acquired pneumonia (9%) being the most common complications. One patient (1.49%) died per-operatively. The mean postoperative hospital stay was 16 days.

**Conclusion:** This study provides important insights into the clinical characteristics, surgical procedures, and postoperative outcomes of patients with pulmonary and pleural TB who underwent surgery in Ethiopia. Decortication was the predominant surgical procedure, and the majority of patients did not experience postoperative complications. However, complications such as Bronchopleural fistula, postoperative empyema, and hospital-acquired pneumonia were observed. These findings highlight the importance of optimal management of postoperative complications to improve patient outcomes in the management of pulmonary and pleural TB.

**Keywords:** Tuberculosis; Pulmonary complications; Pleural complications; Decortication; Lobectomy

## Introduction

Tuberculosis (TB) is a highly infectious disease caused by the bacterium *Mycobacterium tuberculosis*. It primarily affects the lungs, but can also affect other parts of the body such as the brain, kidneys, and bones. Despite significant advances in medical treatment, TB remains a major public health challenge, with high morbidity and mortality rates worldwide. In 2020, an estimated 10 million people fell ill with TB and 1.5 million died from the disease [1].

Medical therapy is the primary approach to TB management and consists of a combination of antibiotics. The standard treatment for drug-susceptible TB is a six-month course of four antibiotics. However, some patients may require longer treatment duration or more complex regimens due to drug resistance, comorbidities, or other factors [2].

While medical therapy is the cornerstone of TB management, surgical intervention can be an important option for selected patients with persistent or complicated disease. Surgical procedures can

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be performed to remove areas of lung affected by TB, drain abscesses or empyema, or repair damage to the pleura [3]. Surgical intervention may be used in cases where medical management is insufficient, or when there is a risk of post-TB complications such as bronchiectasis or fibrosis. However, the decision to perform surgery should be made on a case-by-case basis, taking into account individual patient factors and the availability of resources [4].

This retrospective study analyzed the clinical characteristics, surgical procedures, and postoperative outcomes of patients with pulmonary and pleural TB who underwent surgery at two tertiary hospitals in Addis Ababa, Ethiopia. The study provides important insights into the use of surgery as a treatment option for TB-related pulmonary and pleural complications in a resource-limited setting.

The findings of the study demonstrate the predominance of decortication as the most frequently performed surgical procedure, with indications for surgery including TB empyema, aspergilloma, bronchiectasis, post-TB destroyed lung, and others. The study also revealed a relatively low incidence of postoperative complications, although some patients did experience bronchopleural fistula, postoperative empyema, and hospital-acquired pneumonia. These results underscore the importance of optimal management of postoperative complications to improve patient outcomes.

By examining the use of surgery in a resource-limited setting, the study provides important insights into the epidemiology and management of TB-related complications. The findings of this study can inform clinical decision-making and improve the management of pulmonary and pleural TB, particularly in resource-limited settings. Further research is needed to better understand the indications for surgery, optimize perioperative care, and improve outcomes for patients with TB-related complications. Overall, the study underscores the importance of a multidisciplinary approach to the management of TB-related complications, with surgery playing an important role in the comprehensive care of these patients.

## Methodology

### Study design and setting

This retrospective cross-sectional study was conducted at two tertiary hospitals, in Addis Ababa, Ethiopia. The study was conducted between January 1<sup>st</sup>, 2018 and December 31<sup>st</sup>, 2020.

### Study participants

The study included 67 patients who underwent surgical management of complications of pleural or pulmonary tuberculosis during the study period. Convenience sampling technique was used to select the study participants, and all patients who met the inclusion criteria were included in the study. Patients with disseminated bilateral lung and pleural disease who were managed with tube thoracostomy alone were excluded from the study.

### Data collection

Data was collected using a structured questionnaire developed by the investigators. The questionnaire included demographic information, presenting symptoms, imaging findings, surgical procedures, postoperative complications, and length of hospital stay. The medical charts of all study participants were reviewed and the relevant data was extracted. Data cleaning and coding was performed to ensure accuracy and completeness of the data.

### Data analysis

The collected data was analyzed using SPSS version 25.

Descriptive statistics such as means, standard deviations, frequencies, and percentages were used to summarize the data. Inferential statistics such as Chi-square tests and t-tests were used to assess the associations between variables where appropriate.

### Ethical considerations

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Approval was obtained from the institutional review board. Patient confidentiality was maintained at all times, and all data was collected and stored in a secure and confidential manner. Informed consent was not required for this retrospective study as it involved the review of medical charts only.

## Results

The study included a total of 67 patients, with a mean age of 34.09 ± 10.38 years. The majority of the patients were male (65.7%) (Figure 1). These demographic characteristics are consistent with previous studies that have reported a higher prevalence of TB among males and a high burden of TB in resource limited settings in sub-Saharan Africa, where access to healthcare and diagnostic tools is limited.

The most common presenting symptoms were cough (100%) and weight loss (50.7%), followed by, chest pain (43.3%), shortness of breath (28.4%), hemoptysis (24.8%), and fever (20.9%) (Figure 2). These symptoms are consistent with the typical clinical presentation of TB, which often involves cough, weight loss, and respiratory symptoms.

Imaging before surgery was performed on all patients, with chest CT or ultrasound being the most common modalities. Imaging findings showed pleural collection (52.2%), bronchiectasis changes (28.4%), and fibro-cavitary lesions (22.4%). Other imaging findings included pleural thickening (16.4%), pneumothorax (9%), and destroyed lung (9%). These imaging findings are consistent with previous studies that have reported similar patterns of TB-related pulmonary and pleural complications.

The study found that decortication was the most frequent surgical procedure, accounting for 50.7% of cases, followed by lobectomy (20.9%), wedge resection (14.9%), and Pneumonectomy (11.9%). Other procedures included Bronchopleural fistula repair, windows thoracostomy [3], thoracoplasty [2], and segmentectomy [1]. Only 3 patients had undergone VATS decortication (Figure 3). These surgical procedures are consistent with previous studies that have reported similar indications for surgery and surgical techniques for TB-related complications.

The common indications for surgery were TB empyema (50.7%), aspergilloma (37.3%), bronchiectasis (28.4%), post-TB destroyed lung, and others (9%) respectively. These indications for surgery are consistent with previous studies that have reported similar indications

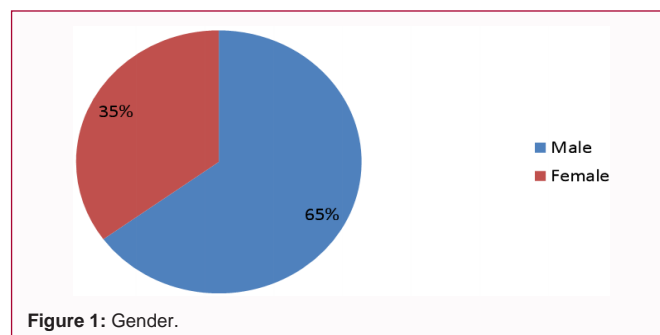


Figure 1: Gender.

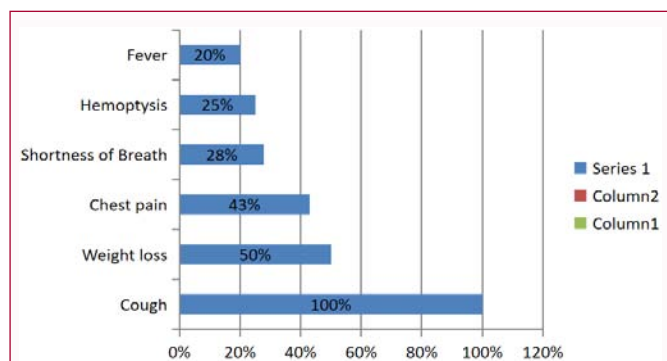


Figure 2: Clinical Presentation.

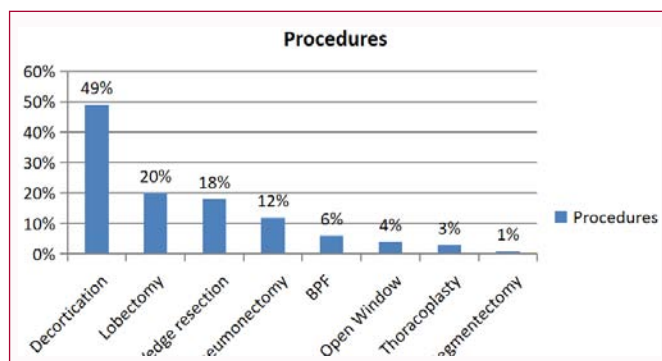


Figure 4: Procedures.

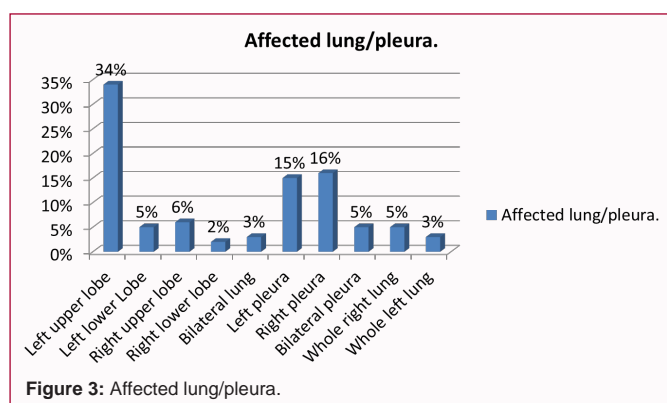


Figure 3: Affected lung/pleura.

for surgical intervention in TB-related complications.

Post-surgery complications were encountered in 32.8% of patients, with bronchopleural fistula (13.4%), postoperative empyema (10.4%), and hospital-acquired pneumonia (9%) being the most commonly reported. The mortality rate was 1.49%, with one patient dying perioperatively. The majority of the patients (67.2%) did not experience any post-surgery complications, and the mean postoperative hospital stay was 16 days.

The most affected part of the lung was the left upper lobe which accounted for 34.3%, the right pleura being the 2<sup>nd</sup> most affected side (Figure 4) with 23.9%. 20.9% of the patients had comorbidities like Diabetes Mellitus and pulmonary hypertension among others.

The study has some limitations, including its retrospective design. The study findings may not be generalizable to other settings with different patient populations and healthcare systems. However, the study provides valuable insights into the use of surgery as a treatment option for TB-related pulmonary and pleural complications in a resource-limited setting such as Ethiopia, where access to medical treatment may be limited.

## Discussion

Tuberculosis (TB) continues to be a major public health challenge, with significant morbidity and mortality worldwide [1,5]. While medical treatment for TB has improved dramatically in recent years, some patients still suffer from post-TB complications, including drug-resistant TB, as well as cavitary lesions and areas of destroyed lung that persist despite successful treatment [3]. Surgical treatment for TB-related pulmonary and pleural complications has taken a secondary role since the advent of effective medical treatment, but it remains an important option for selected patients [2].

This retrospective study analyzed [6,7] patients who underwent surgery for TB-related pulmonary and pleural complications at two tertiary hospitals in Addis Ababa, Ethiopia. The study found that the mean age of patients undergoing surgery for TB-related complications was relatively young at  $34.09 \pm 10.38$  years, which is consistent with previous studies [8,9]. The most common presenting symptoms were cough, chest pain, shortness of breath, hemoptysis, fever, and weight loss, which is consistent with the typical clinical presentation of TB [9,10].

Imaging before surgery was performed on all patients, with chest CT or ultrasound being the most common modalities. Imaging findings showed pleural collection, bronchiectasis, fibro-cavitary lesions, pleural thickening, pneumothorax, and destroyed lung, which is consistent with the patterns of TB-related pulmonary and pleural complications seen in previous studies [6,12].

The study found that decortication was the most frequent surgical procedure, followed by lobectomy, wedge resection, and Pneumonectomy. The common indications for surgery were TB empyema, aspergilloma, bronchiectasis, post-TB destroyed lung, and others [6]. These findings are consistent with previous studies that have reported similar indications for surgery [3,6,11].

Post-surgery complications were encountered in a small proportion of patients, with bronchopleural fistula, postoperative empyema, and hospital-acquired pneumonia being the most commonly reported. The mortality rate was low, with only one patient dying after surgery. These findings are consistent with previous studies that have reported low mortality rates after surgery for TB-related complications [6,11].

The study findings suggest that surgery can be an effective treatment option for TB-related pulmonary and pleural complications, particularly in cases where medical management is not sufficient or when there is a risk of post-TB complications [2,3,6,11]. However, the decision to perform surgery should be made on a case-by-case basis, taking into account individual patient factors and the availability of resources.

Previous studies have also suggested that surgery can be a safe and effective treatment option for TB-related complications when performed in appropriate cases and with proper perioperative care [2,3,6,11]. Perioperative care includes preoperative optimization of the patient's medical condition, appropriate antimicrobial prophylaxis, and close postoperative monitoring for complications [2,3,6].

At the core of successful patient outcomes lies the provision of

exceptional perioperative care. This is especially critical for patients with pleural cavity conditions, where even the smallest detail can have a profound impact on their recovery.

We firmly believe that implementing a comprehensive perioperative care plan that includes essential interventions such as respiratory physiotherapy, adequate pain control, and a controlled aspiration system to maintain the negative pressure of the pleural cavity, can significantly improve patient outcomes. By providing these measures as early as possible during the perioperative period, we can help patients to optimize their recovery and minimize the risk of complications.

The study also highlights the importance of early diagnosis and treatment of TB to prevent post-TB complications and the need for surgical intervention [3,6,11,12]. The use of imaging modalities such as CT scans can aid in the diagnosis of TB-related pulmonary and pleural complications and help in the planning of surgical procedures [6,12].

In conclusion, surgery can be a safe and effective treatment option for selected patients with TB-related pulmonary and pleural complications [2,3,6,11]. Early diagnosis and treatment of TB are important in preventing post-TB complications and the need for surgical intervention [3,6,11,12]. Further research is needed to better understand the indications for surgery and to optimize perioperative care in patients with TB-related complications.

## Conclusion

This retrospective study suggests that surgery can be an effective treatment option for selected patients with TB-related pulmonary and pleural complications in Ethiopia. The decision to perform surgery should be based on individual patient factors and resource availability, and proper perioperative care is crucial for favorable outcomes. Early diagnosis and treatment of TB is crucial to prevent post-TB complications and the need for surgical intervention. Further research is needed to optimize perioperative care and improve outcomes for patients. A multidisciplinary approach to the management of TB-related complications is important, with surgery being a valuable component.

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