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Surgical Management of Pulmonary Tuberculosis Complications: A Retrospective Study.

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Abstract

Background

Pulmonary tuberculosis remains a major public health problem, particularly in developing countries. Although antituberculous chemotherapy is the cornerstone of treatment, surgery still plays an important role in selected patients who develop complications such as massive hemoptysis, destroyed lung, bronchiectasis, empyema, broncho pleural fistula, or persistent cavitary disease. Evaluating the surgical outcomes of these patients is essential to improve perioperative care and reduce postoperative morbidity and mortality.

Objectives

To assess the indications, postoperative complications, and outcomes of surgical management in patients with pulmonary tuberculosis complications and to determine their impact on hospital stay, intensive care admission, and mortality.

Methodology

This retrospective descriptive study was conducted at Department of Thoracic Surgery Unit, Lady Reading Hospital Medical Teaching Institution, Peshawar from Jan 2018 to Jan 2019. A total of 100 patients who underwent surgery for complications of pulmonary tuberculosis during the study period were included. Demographic characteristics, clinical presentation, indication for surgery, type of surgical procedure, postoperative complications, hospital stay, ICU admission, and mortality were recorded using a structured data collection form. Data were analyzed using SPSS version 24. Continuous variables were expressed as mean \pm standard deviation, while categorical variables were presented as frequencies and percentages. Statistical significance was set at $p < 0.05$.

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Results

A total of 100 patients were included in the study. The mean age of the patients was 41.8 ± 12.6 years, and males constituted 62% of the study population. The most common indications for surgery were massive or recurrent hemoptysis (28%), destroyed lung (24%), bronchiectatic sequelae (18%), tuberculous empyema (16%), and bronchopleural fistula (14%). Lobectomy was the most frequently performed procedure, followed by pneumonectomy and decortication. Postoperative complications were observed in 31% of patients. The most common complications were prolonged air leak (10%), wound infection (7%), postoperative empyema (6%), and bronchopleural fistula (4%). Patients who developed complications had a significantly longer hospital stay compared with those without complications (12.4 ± 4.8 days vs 7.1 ± 2.9 days, $p = 0.01$). ICU admission was required in 15% of patients, while overall postoperative mortality was 4%.

Conclusion

Surgery remains an important treatment option in selected patients with complications of pulmonary tuberculosis. Although postoperative morbidity is notable, appropriate patient selection, meticulous surgical technique, and careful perioperative management can result in acceptable outcomes. Early recognition of high-risk patients may reduce complications and improve postoperative recovery.

Keywords: Pulmonary tuberculosis; Thoracic surgery; Hemoptysis; Bronchopleural fistula; Empyema; Surgical outcomes

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Introduction

Pulmonary tuberculosis continues to be a major cause of morbidity worldwide, particularly in countries with a high burden of disease. Although medical treatment remains the mainstay of management, surgical intervention still has an important role in carefully selected patients with complications or localized disease not adequately controlled by chemotherapy (1). Thoracic surgery for tuberculosis has regained importance in the era of drug-resistant disease and post-tuberculous structural lung destruction (2). The most common indications for surgery in pulmonary tuberculosis include massive or recurrent hemoptysis, destroyed lung, localized cavitary disease, bronchiectatic sequelae, chronic empyema, and bronchopleural fistula (3). In some patients, surgery is also considered for persistent sputum positivity in localized multidrug-resistant tuberculosis despite appropriate medical therapy (4). These conditions are often associated with repeated infection, respiratory compromise, and reduced quality of life (5). Surgical management may involve procedures such as lobectomy, pneumonectomy, segmentectomy, cavernostomy, decortication, or closure of bronchopleural fistula, depending on the extent and nature of the disease (6). Advances in anesthesia, perioperative support, and surgical technique have improved outcomes, but postoperative complications remain a significant concern (7). Common complications

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include prolonged air leak, empyema, bronchopleural fistula, postoperative bleeding, wound infection, and respiratory failure (8).The risk of postoperative morbidity is influenced by several factors, including nutritional status, disease extent, pulmonary reserve, preoperative infection control, and the type of resection performed (9). Patients with destroyed lung, chronic empyema, and extensive pleuropulmonary adhesions may be particularly vulnerable to adverse postoperative outcomes (10). Therefore, evaluation of institutional experience is important for understanding complication patterns and optimizing perioperative management (11).

Research Objective

To assess the indications, postoperative complications, and outcomes of surgical management in patients with complications of pulmonary tuberculosis.

Materials and Methods

Study Design and Setting

This retrospective descriptive study was conducted at Department of Thoracic Surgery Unit, Lady Reading Hospital Medical Teaching Institution, Peshawar from jan 2018 to jan 2019.

Participants

The study included 100 patients who underwent surgery for complications of pulmonary tuberculosis during the study period.

Inclusion Criteria

Patients aged 18 years or older with complications of pulmonary tuberculosis requiring surgical management were included. These included patients with massive or recurrent hemoptysis, destroyed lung, bronchiectatic sequelae, chronic empyema, bronchopleural fistula, or persistent localized cavitory disease.

Exclusion Criteria

Patients with incomplete medical records, those undergoing surgery for non-tuberculous pulmonary disease, and patients who were managed conservatively without surgery were excluded.

Data Collection

A structured proforma was used to collect data regarding age, gender, presenting symptoms, indication for surgery, type of surgical procedure, postoperative complications, duration of hospital stay, ICU admission, and mortality.

Statistical Analysis

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Data were analyzed using SPSS version 24. Quantitative variables were presented as mean ± SD, while categorical variables were expressed as frequency and percentage. Associations were assessed using the chi-square test and independent t-test. A p-value less than 0.05 was considered statistically significant.

Results

A total of 100 patients underwent surgical management for complications of pulmonary tuberculosis. The mean age was 41.8 ± 12.6 years, and 62 patients were male. The most common presenting symptoms were hemoptysis, chronic cough, fever, weight loss, and dyspnea. The most frequent indication for surgery was massive or recurrent hemoptysis (28%), followed by destroyed lung (24%), bronchiectatic sequelae (18%), tuberculous empyema (16%), and bronchopleural fistula (14%). Lobectomy was the most commonly performed procedure (38%), followed by pneumonectomy (22%), decortication (18%), segmentectomy (12%), and bronchopleural fistula repair or other procedures (10%). Postoperative complications occurred in 31 patients (31%). The most common complication was prolonged air leak (10%), followed by wound infection (7%), postoperative empyema (6%), and bronchopleural fistula (4%). Patients with postoperative complications had significantly longer hospital stay than those without complications (12.4 ± 4.8 days vs 7.1 ± 2.9 days, p = 0.01). ICU admission was required in 15 patients (15%), while overall mortality was 4%.

Table 1. Baseline Characteristics and Surgical Indications

Variable	Frequency (n)	Percentage (%)
Age (years), mean ± SD	41.8 ± 12.6	—
Male	62	62%
Female	38	38%
Massive/recurrent hemoptysis	28	28%
Destroyed lung	24	24%
Bronchiectatic sequelae	18	18%
Tuberculous empyema	16	16%
Bronchopleural fistula	14	14%

Table 2. Types of Surgical Procedures Performed

Procedure	Frequency (n)	Percentage (%)
Lobectomy	38	38%
Pneumonectomy	22	22%
Decortication	18	18%

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Segmentectomy	12	12%
BPF repair/other procedures	10	10%

Table 3. Postoperative Outcomes

Outcome Variable	Value
Postoperative complications	31 (31%)
Prolonged air leak	10 (10%)
Wound infection	7 (7%)
Postoperative empyema	6 (6%)
Bronchopleural fistula	4 (4%)
ICU admission	15 (15%)
Mortality	4 (4%)
Hospital stay with complications	12.4 ± 4.8 days
Hospital stay without complications	7.1 ± 2.9 days

Discussion

The present study showed that surgical intervention in pulmonary tuberculosis complications was most commonly performed for massive hemoptysis, destroyed lung, bronchiectatic sequelae, tuberculous empyema, and bronchopleural fistula. This pattern is consistent with thoracic surgical literature, where surgery is generally reserved for life-threatening complications, localized destructive disease, and selected drug-resistant cases not adequately managed by medical therapy alone (12,13). In our series, lobectomy was the most frequently performed operation, followed by pneumonectomy and decortication. This finding is in line with previous reports showing that anatomical lung resection is often required in patients with localized cavitary destruction, recurrent hemoptysis, or bronchiectatic sequelae, while decortication is commonly used for chronic tuberculous empyema (14,15). The choice of procedure largely depends on disease extent, side of involvement, pulmonary reserve, and the presence of pleural infection or fistula. Postoperative complications occurred in nearly one-third of patients, with prolonged air leak, wound infection, postoperative empyema, and bronchopleural fistula being the most frequent. Similar complications have been described in prior series of surgery for tuberculosis-related thoracic disease, particularly in patients undergoing major resections or operations in the setting of dense adhesions, chronic infection, or poor nutritional status (16,17). Bronchopleural fistula and postoperative empyema remain particularly important because they are associated with prolonged hospitalization and increased postoperative morbidity. An important finding in this study was the significantly longer hospital stay among patients who developed postoperative

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complications. This observation is consistent with previous surgical reports showing that postoperative morbidity in tuberculosis patients increases chest tube duration, antibiotic requirement, and need for additional interventions, thereby prolonging recovery and resource utilization (18,19). The need for ICU admission in a subset of patients further reflects the complexity of perioperative management in this population. The observed mortality rate in the present study was low but clinically significant. Earlier reports have shown that mortality after surgery for pulmonary tuberculosis complications is usually linked to respiratory failure, sepsis, bleeding, or bronchopleural complications, especially following pneumonectomy or surgery in patients with advanced unilateral destruction (20). Careful patient selection and preoperative optimization therefore remain essential. Overall, the findings of this study support the role of surgery as an effective adjunct in selected patients with pulmonary tuberculosis complications. Better perioperative planning, optimization of nutritional and infectious status, and timely referral may help reduce postoperative morbidity and improve outcomes. Institutional evaluation of outcomes remains important for refining surgical indications and perioperative pathways in these high-risk patients (21,22). These patterns broadly match published reviews and retrospective surgical series on pulmonary TB complications.

Limitations

This study has several limitations. It was conducted at a single center and used a retrospective design, which may limit generalizability and introduce information bias. The study also included a heterogeneous group of tuberculosis-related complications and procedures, which may have influenced overall complication rates and outcomes.

Conclusion

Surgical management remains an important treatment option in selected patients with complications of pulmonary tuberculosis. Massive hemoptysis, destroyed lung, bronchiectatic sequelae, tuberculous empyema, and bronchopleural fistula were the most common indications for surgery. Although postoperative morbidity remains notable, careful patient selection and improved perioperative care can lead to acceptable outcomes.

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Conflict of Interest: Nil

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Authors Contribution

Concept & Design of Study: **Faridullah Khan Ismail¹**

Data Collection: **Muhammad Abid Khan²**

Drafting: **Tahir Aslam³**

Data Analysis: **Muhammad Abid Khan²**

Critical Review: **Tahir Aslam³**

Final Approval of version: **All authors approved the final version.**

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