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An Observational Study of Surgical Management and Outcome of Patients with Pleuropulmonary Tuberculosis in a Tertiary Care Hospital

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Abstract

In 2022, the WHO reported India, the Philippines the Russian Federation as leading in global MDR-TB cases, with India accounting for 27%. MDR-TB resists Rifampicin and Isoniazid, making treatment challenging and successful in only half the cases. Consequently, new treatment options are urgently needed. Historically, lung surgery was a primary TB treatment before antibiotics. Today, due to increasing treatment failures, surgery is reconsidered for specific cases, particularly localized cavitary pulmonary TB. However, surgical evidence remains limited, especially in low- and middle-income countries. This study aims to identify surgical indications, evaluate postoperative outcomes assess the risks and benefits for pleuropulmonary tuberculosis patients. The study was conducted at a tertiary care hospital in South Gujarat from January 2014 to December 2019, involving patients who underwent surgical intervention for MDR-TB. Patients included were those unresponsive to medical therapy with progressive clinical and radiological findings. Data were collected from hospital records. Postoperative outcomes were assessed at one week and three months, concentrating on symptom improvement and morbidity. A total of 30 patients were studied, predominantly males (76.67%) with a mean age of 28.4 years. Most patients were newly diagnosed cases (73.33%). Radiological findings included hydropneumothorax with a partially collapsed lung (40%) and empyema (26.67%). The majority of operations were decortications (70%). Postoperative follow-up indicated that 63.33% of patients had no complications, while 10% experienced wound infections and gaping 3.33% required revision surgery. The mortality rate was 3.33%. Surgical intervention for pleuropulmonary tuberculosis can significantly improve patient outcomes, particularly in cases unresponsive to medical treatment. The study underscores the importance of considering patient-specific factors such as age, nutritional status comorbidities to minimize postoperative risks. A multi disciplinary approach involving surgery, postoperative medical management patient education is crucial for managing complicated tuberculosis effectively.

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Key Words

Collapsed lung, decortications, empyema, lobectomy, MDR-TB

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INTRODUCTION

In 2022, The World Health Organization (WHO) reported the countries with the largest share of the global number of people estimated to have developed Multiple Drug Resistant (MDR TB) (incident cases) -India (27% of global cases), the Philippines (7.5% of global cases) and the Russian Federation (7.5% of global cases)[1]. MDR TB is defined as resistance to at least Rifampicin and Isoniazid, the two main drugs used in anti-tuberculosis treatment [1]. Treatment of MDR-TB is long and difficult and globally only half of such cases reach a successful outcome with treatment[1].

In this context of low therapeutic effectiveness, new treatment options are urgently needed. In the pre-antibiotic era, lung surgery was the main therapeutic option for TB[2]. Today, with increasingly failing treatment regimens, it is again being considered a reasonable approach for some specific cases, notably localised cavitary pulmonary TB (PTB) in patients with treatment failure and sufficient pulmonary reserve to tolerate resection, or in urgent life-threatening situations[3].

Despite a renewed interest in this approach, surgery for TB still lacks the support of evidence. Some studies have suggested that surgery is effective for TB cases in specific conditions[4,5] and a recent meta-analysis of mostly observational data[6] showed that surgery may double the odds of a successful treatment outcome for MDR-TB cases. Data from low- and middle-income countries (LMIC), where the disease is most prevalent, are scarce. Understanding the types of surgical interventions performed as well as their outcomes is a priority for designing effective, feasible approaches for scaling up surgery for PTB in programmatic settings.

So, the aim of the present study was to identify the causes and indications for surgical management in patients with pleuropulmonary tuberculosis, to study the postoperative outcomes in terms of faster recovery and general condition improvement evaluate the risks and benefits of different surgeries for pleuropulmonary tuberculosis.

MATERIALS AND METHODS

Present study was carried out at tertiary care hospital in South Gujarat between January 2014 and December 2019. All the patients over the past 5 years (2014-2019) having surgical intervention in MDR TB were included in the study as per inclusion and exclusion criteria of the study. These patients were initially treated by the Tuberculosis and Chest Diseases department and referred to the Surgery department due to either failure of medical therapy or the development of complications necessitating surgical intervention. Data were obtained from the case records of these patients, accessed from the hospital's medical records section after obtaining formal permission (waiver) from the Human ethics committee and medical superintendent.

Inclusion Criteria:

- Patients admitted with active tuberculosis or complications thereof, unresponsive to medical therapy, with unchanged or progressive clinical and radiological findings.
- Patients at the New Civil Hospital, Surat, with acid-fast bacilli sputum smear positivity after 3 months of treatment, showing persistent radiological features of reversible or irreversible lung damage due to infection.
- Patients with lesions specifically caused by Mycobacterium tuberculosis.
- Male and female patients of all age groups.

Exclusion Criteria:

- Patients lacking investigation reports indicative of tuberculosis requiring surgical intervention, those medically unfit those with empyema due to malignant pleural effusion or clotted haemothorax.
- Patients who responded well to antitubercular drugs.
- Patients who underwent surgical intervention for tuberculosis but had incomplete documentation of the treatment provided.

Patients were evaluated for signs and symptoms, respiratory examinations, radiological investigation as needed and surgical findings like duration of the surgery, intra-operative findings: presence of contagious, pleural cavity, fibrotic cavities combined with caseous lesions with upward displacement of lung hilus, presence of tuberculomas, presence of pleural empyema and presence of broncho pleural fistula.

Postoperative data were evaluated at the end of one week and during the three-month follow-up, obtained from the records maintained by the Tuberculosis and Chest Diseases department. The evaluation focused on, improvement in the signs and symptoms of the patients and postoperative morbidity and mortality.

RESULT AND DISCUSSIONS

Approximately 30 patients were admitted in tertiary care hospital in past 5 years (duration 2014-19) (average number of patients admitted in surgery department of NCHS per year for surgical management of pleuropulmonary tuberculosis :12).

30 patients were included in the research, with the

highest number falling in the age category of 21-30 years, as shown in (Table 1). Mean age of the study group in this study was 28.4 years. In this present study, Male predominance was found having Male: female ratio of 3.2:1.

The age distribution indicated that 30% of the participants were aged between 21 and 30 years, followed by 20% each in the 11-20 and 31-40 age groups, 13.33% in the 41-50 age group, 10% in the 0-10 age group 6.67% in the 51-60 age group. Gender distribution showed a predominance of males, constituting 76.67% of the sample, while females represented 23.33%. Regarding the type of cases, the majority were newly diagnosed (73.33%), with defaulters and relapse cases accounting for 16.67% and 10%, respectively. Radiological presentations revealed that 40% of the participants had hydropneumothorax with a partially collapsed lung, 26.67% had empyema, 23.33% had hydropneumothorax with a completely collapsed lung 10% had a destroyed lung. The laterality of lung involvement showed that 56.67% of the cases involved the right lung, while 43.33% involved the left lung. Sputum test results indicated that 6.67% were positive 93.33% were negative. In terms of drug resistance, 63.34% of the participants exhibited no drug resistance, 13.33% were rifampicin-resistant 23.33% were multi-drug-resistant. The types of operations performed included decortication in 70% of the cases, pneumonectomy in 23.34% thoracic window and left upper lobe lobectomy each in 3.33% of the cases (Table 1).

Postoperative follow-up of 29 out of 30 patients, conducted three months after surgery in the tuberculosis and chest department while they were receiving postoperative anti-tuberculosis medication, revealed an improvement in symptoms and no operative morbidity among the patients.

The majority of patients, 19 out of 30 (63.33%), experienced no complications or morbidity. However, postoperative complications were noted in several cases: 3 patients (10%) developed a wound infection, 3 patients (10%) experienced wound gaping greater than 2 cm 3 patients (10%) required revision surgery. Additionally, there was one case of mortality, accounting for 3.33% of the patients (Table 2).

The mean age of the participants was 28.4 years. The gender ratio of males to females was 3.2:1, indicating a higher prevalence of males. Lung involvement showed a right-to-left predominance ratio of 1.3:1. The distribution of tuberculosis cases revealed a ratio of 7:1.4:1 for newly diagnosed cases, defaulters relapse cases, respectively. In terms of drug resistance, the ratio of no drug resistance to rifampicin resistance to multi-drug resistance was 5:1:1.7. The mean duration of chemotherapy before surgery was 2.23 years. The complications (morbidity) to mortality ratio was 7:1, indicating that for every mortality case, there were seven cases of morbidity (Table 3).

In all studies, including Dewan[6], Somocurcio[7] Shirodkar[8] and the present study, the most common age group for participants was 21-30 years, with Shirodkar[8] specifying 20-29 years. All studies consistently showed a male predominance.

Dewan[6] and Somocurcio[7] did not report this data. Shirodkar[8] had 4 (4.7%) defaulters, whereas the present study reported a higher percentage at 5 (16.67%). Dewan[6] and Somocurcio[7] also did not provide data on relapse cases. Shirodkar[8] reported 11 (12.9%) relapse cases, compared to 3 (10%) in the present study. Shirodkar[7] reported 39 (45.5%) newly diagnosed cases, while the present study had a significantly higher proportion at 22 (73.33%).

Dewan RK[6] and Somocurcio JG[7] did not provide data. Shirodkar S[8] reported 1 (1.2%), whereas the present study reported a significantly higher 19 (63.34%). Shirodkar S[8] reported 5 (5.9%) cases, compared to 4 (13.33%) in the present study. Shirodkar S[8] reported 7 (8.2%), identical to the 7 (23.33%) reported in the present study. Dewan RK[6] reported 35 (57.38%), Shirodkar S[8] reported 50 (58.8%) the present study found 17 (56.67%). Dewan RK [6] reported 26 (42.62%), Shirodkar S[8] reported 34 (40%) the present study found 13 (43.33%).

Dewan RK[6] performed 158 cases, Shirodkar S[8] performed 34 (40%) the present study had 21 (70%). Dewan RK[6] reported 212 cases, Somocurcio JG[7] had 27 (22.33%), Shirodkar S[8] reported 30 (35.3%) the present study had 7 (23.34%). Dewan RK[6] performed

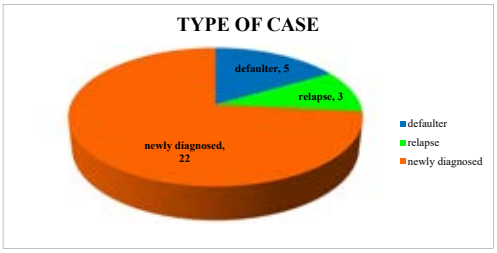

Fig. 1. Distribution of participants according to type of cases

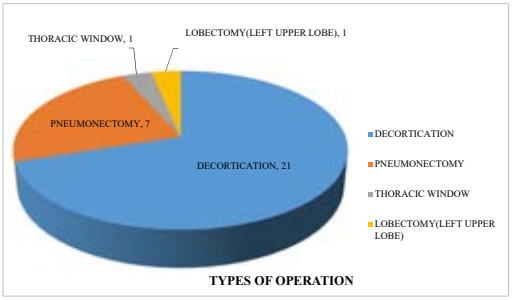

Fig. 2. Distribution of study participant according to type of operation

Table 1. Demographic data and clinical Characteristics of study participants

Parameters		Number (%)
Age	0 -10	3 (10)
	11 -20	6 (20)
	21 – 30	9 (30)
	31 – 40	6 (20)
	41 – 50	4 (13.33)
	51 - 60	2 (6.67)
Gender	Male	23 (76.67)
	Female	7 (23.33)
Type of case	Defaulter	5 (16.67)
	Relapse	3 (10)
	Newly Diagnosed	22 (73.33)
Radiological presentation	Empyema	8 (26.67)
	Hydropneumothorax with completely collapsed lung	7 (23.33)
	Hydropneumothorax with partially collapsed lung	12 (40)
	Destroyed Lung	3 (10)
Laterality of Lung	Right Lung	17 (56.67)
	Left Lung	13 (43.33)
Sputum	Positive	2 (6.67)
	Negative	28 (93.33)
Drug resistant tuberculosis	No drug resistant	19 (63.34)
	Rifampicin resistant	4 (13.33)
	Multi-drug resistant	7 (23.33)
Type of operation	Decortication	21 (70)
	Pneumonectomy	7 (23.34)
	Thoracic Window	1 (3.33)
	Lobectomy (Left upper lobe)	1 (3.33)

Table 2. Complications after operation

Complication	N (%)
No Complication / Morbidity	19 (63.33)
Wound Infection	3 (10)
Wound Gaping > 2cm	3 (10)
Revision Surgery	3 (10)
Mortality	1 (3.33)

Table 3. Summary of observation

Patient collective data	Numerical values
Mean age	28.4 years
Male: female	3.2:1
Right: left lung predominance	1.3:1
Newly diagnosed: defaulter: relapse	7:1.4:1
No drug resistance: rifampicin resistance: multi drug resistant	5:1:1.7
Mean duration of chemotherapy before surgery	2.23
Complications(morbidity): mortality (%)	7:1

Table 4. Comparison of parameters of different studies to present study

Parameter	Dewan RK [6]	Somocurcio JG, *et al.*, [7]	Shirodkar S, *et al.*, [8]	Present study	
Most common age group	21 – 30 years	21 – 30 years	20 – 29 years	21 – 30 years	
Dominancy: Male or female	Male	Male	Male	Male	
Type of cases	Defaulter	Not Available (NA)	NA	4 (4.7%)	5 (16.67%)
	Relapse	NA	NA	11 (12.9%)	3 (10 %)
	Newly Diagnosed	NA	NA	39 (45.5%)	22 (73.33%)
Drug resistant tuberculosis	No drug resistant	NA	NA	1 (1.2%)	19 (63.34 %)
	Rifampicin resistant	NA	NA	5 (5.9%)	4 (13.33 %)
	Multi-drug resistant	NA	NA	7 (8.2%)	7 (23.33 %)
Laterality of Lung	Right	35 (57.38%)	NA	50 (58.8%)	17 (56.67 %)
	Left	26 (42.62%)	NA	34 (40%)	13 (43.33 %)
Type of surgery	Decortication	158	NA	34 (40%)	21 (70 %)
	Pneumonectomy	212	27 (22.33%)	30 (35.3%)	7 (23.34 %)
	Thoracic Window	744		10 (11.8%)	1 (3.33 %)
	Lobectomy (Left upper lobe)	452	76 (62.8%)	6 (7.1%)	1 (3.33 %)
Complications	No Complication / Morbidity	NA	NA	3 (17.6%)	19 (63.33 %)
	Wound Infection	NA	NA	22 (49.4%)	3 (10 %)
	Wound Gaping > 2cm	NA	2 (7.41%)		3 (10 %)
	Revision Surgery	2%	NA	12 (14.1%)	3 (10 %)
	Mortality	55 (4.2%)	5 %	5 (5.9%)	(3.33 %)

744 cases, Shirodkar S[8] had 10 (11.8%) the present study reported 1 (3.33%). Dewan RK [6] performed 452 cases, Somocurcio JG[7] had 76 (62.8%), Shirodkar S[8] reported 6 (7.1%) the present study had 1 (3.33%). Data not available for Dewan RK[6] and Somocurcio JG[7] Shirodkar[8] reported 3 (17.6%) with no complications, while the present study had 19 (63.33%). Data not available for Dewan[6] io JG[7] Shirodkar[8] reported 22 (49.4%), whereas the present study had significantly fewer, 3 (10%). Dewan[6] did not provide data. Somocurcio JG[7] reported 2 (7.41%) the present study had 3 (10%). Dewan[6] reported a 2% incidence. Shirodkar[8] reported 12 (14.1%), while the present study had 3 (10%). Dewan[6] reported 55 (4.2%), Somocurcio[7] reported 5%, Shirodkar[7] reported 5 (5.9%) the present study had 1 (3.33%).

The rationale for recommending surgery for MDR-TB is based on two main arguments[8].First, the bacilli may be sequestered inside thick-walled compartments, such as granulomas, abscesses cavities, where antibiotics cannot easily penetrate. Second, in the course of a long-standing disease with a large number of caseating tissue foci, there is substantial tissue destruction, Endarteritis obliterans[7] and poor vascularisation, reducing drug delivery into the affected tissue. These factors not only impact the survival of the individual patient, they also contribute to the development and transmission of MDR-TB. A recent meta-analysis showed that partial lung resections were associated with better treatment outcomes for MDR-TB compared with no surgical procedure[9].

The timing of the surgical procedure is another point that is still unclear. The WHO currently recommends that resection surgery for MDR-TB should be timed to allow the best chances of cure with the least morbidity[10]. This suggests that it makes more sense to perform elective procedures at an earlier stage, when the disease is still confined to one lobe or lung, rather than perform urgent procedures at a later stage with extensively destroyed parenchyma. One study in Peru has suggested that surgery for MDR-TB performed in the first 6 months of treatment increased the probability of a successful treatment outcome with a regimen of shorter duration, with little additional cost to the TB programme, as long as facilities and expertise already exist[11]. Unfortunately, this is not the reality in many LMICs with fragile health systems[12].

The complications and mortality in this study were similar to those in previous reports. In Israel, one cohort of 17 patients showed 5.8% mortality in the early post-operative period, with 35.3% complications [4]. In Morocco, another study showed 3.44% mortality with 31% complications[13]. In New Delhi, the mortality was 4.2% with 10.1% complications[5]. In this series, the mortality was 5.9% with 20% complications, indicating that the results of surgery for PTB are consistent in resource-limited settings.

CONCLUSION

Surgical intervention for complications of tuberculosis significantly improves symptoms and overall pulmonary function. Postoperative complications are generally mild and manageable. However, surgery should be planned considering the patient's age, nutritional status comorbid conditions to minimize postoperative morbidity and mortality. Managing complicated tuberculosis requires a multidisciplinary approach, including patient education about the treatment plan, surgical intervention, follow-up medical management, chest physiotherapy regular pulmonary function evaluation. This holistic approach enhances the overall outcome for patients with complicated tuberculosis.

REFERENCES

1. WHO., 2024. Drug-resistant TB. World Health Organization, Geneva, witzerland, https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2023/tb-disease-burden/1-3-drug-resistant-tb#:~:text=The%20countries%20with%20the%20largest,%2C%20Pakistan%2C%20Myanmar%20and%20Nigeria.
2. Bertolaccini, L., A. Viti, G.D. Perri and A. Terzi, 2013. Surgical treatment of pulmonary tuberculosis: The phoenix of thoracic surgery?. J. Thorac. Dis., 5: 198-199.
3. WHO., 2014. The role of surgery in the treatment of pulmonary TB and multidrug- and extensively drug-resistant TB. World Health Organization, Copenhagen, Denmark.
4. Papiashvili, M., I. Barmd, L. Sasson, M. Lidji and K. Litman *et al.* 2012. Pulmonary resection for multidrug-resistant tuberculosis: The Israeli experience (1998-2011). Isr. Med. Assoc. J., 14: 733-736.
5. Ekpe, E.E. and V. Obot, 2014. Indications and outcome of surgery in pleuro-pulmonary tuberculosis. Trop. Med. Surg., Vol. 2 .10.4172/2329-9088.1000174.
6. Dewan, R.K., 2009. Surgery for pulmonary tuberculosis-a 15-year experience. Eur. J. Cardio-Thoracic. Surg., 37: 473-477.
7. Somocurcio, J.G., A. Sotomayor, S. Shin, S. Portilla, M. Valcarcel, D. Guerra and J. Furin, 2007. Surgery for patients with drug-resistant tuberculosis: Report of 121 cases receiving community-based treatment in lima, peru. Thorax, 62: 416-421.
8. Shirodkar, S., L. Anande, A. Dalal, C. Desai and G. Corrêa *et al.,* 2016. Surgical interventions for pulmonary tuberculosis in Mumbai, India: Surgical outcomes and programmatic challenges. Public Health Action, 6: 193-198.
9. Fox, G.J., C.D. Mitnick, A. Benedetti, E.D. Chan and M. Becerra et al., 2016. Surgery as an adjunctive treatment for multidrug-resistant tuberculosis: An individual patient data metaanalysis. Clin. Infect. Dis., 62: 887-895.
10. WHO., 2014. Companion Handbook to the WHO Guidelines for the Programmatic Management of Drug-Resistant Tuberculosis. World Health Organization, Geneva, Switzerland, Pages: 452.
11. Sharma, D., K. Hayman, B.T. Stewart, L. Dominguez and M. Trelles *et al.,* 2015. Surgery for conditions of infectious etiology in resource-limited countries affected by crisis: The médecins sans frontières operations centre brussels experience. Surg. Infec., 16: 721-727.

12. Bouchikh, M., A. Achir, M. Caidi, S.E. Aziz and A. Benosman, 2013. [Role of pulmonary resections in management of multidrug-resistant tuberculosis. A monocentric series of 29 patients]. Rev. Pneumol. Clin., 69: 326-330.