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Evaluation of thoracic surgery as a treatment approach in patients with rifampin-resistant chronic tuberculous empyema

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TO THE EDITOR,

Rifampin-resistant chronic tuberculous empyema (RR-CTE) is caused by tuberculous bacilli infection in the pleural space and purulent exudate accumulation. It always develops from the untimely or inappropriate treatment of tuberculous pleurisy. Unfortunately, thick and calcified pleural walls limit the penetration of anti-tuberculosis drugs into the infected empyema space, contributing to the prevalence of drug resistance.[1,2]

When traditional treatment of RR-CTE is ineffective, intensified chemotherapy and surgical intervention should be considered. Surgical interventions assist in disease diagnosis, reduce infection, re-expand the lung, and prevent subsequent chronic respiratory impairments.[2-4] The present study aimed to explore the outcomes and complications of pleural fiberboard decortication.

Preoperative RR-CTE patients were considered eligible if they presented with chronic empyema for > 6 weeks, tolerated surgery, and complied with the anti-tuberculosis program for more than 2 months. Meanwhile, postoperative histopathological examinations from patients who were not eligible were excluded. The postoperative cure standards were as follows: abscess cavity closure, no active lesions in chest computed tomography (CT) scans, lung reexpansion > 80%, and negative etiological examination.

The evaluations included analysis of medical records, surgical treatment, complications, and recurrence rate.

All analyses were conducted using the SPSS 22.0 software. Normally distributed data were analyzed using the T-test. Non-normally distributed data were analyzed using the non-parametric Rank Sum Test (Mann-Whitney Test). Differences and correlations were considered statistically significant when p-values were < 0.05.

In this retrospective observational study, the convenience sample was obtained from the electronic database at the Department of Thoracic Surgery in Chongqing. Given that the medical information of inpatients was recorded necessarily and anonymously by case history, our data analysis could not cause any breach of privacy or present any undue personal risk to the participants. The Ethics Committee of the Chongqing Public Health Medical Center approved this study and waivered informed consent from the patients involved.

A total of 47 patients (male: 33, female: 14), with a median age of 23 years (range 13-55), received surgical treatment from May 1, 2015 to March 31, 2019.

Surgical anesthesia was performed using double-lumen intubation and the intravenous route. In short, the basic operation method consists of open surgery and VATS. If the focus invaded other tissues, they were also resected. After the operation, sufficient drainage (including closed thoracic drainage and negative pressure drainage) and corresponding anti-infection symptomatic treatment were necessary.

Based on the drug sensitivity results, the duration of the anti-tuberculosis regimen was adjusted for 2-14 months before surgery in 9 patients; meanwhile, the duration of the anti-tuberculosis regimen of 38 patients was adjusted for 1-4 months after surgery. Thirty-two patients accepted simple pleural fiberboard stripping, while 15 accepted pleural fiberboard stripping combined with another form of surgery (7 cases of chest wall tuberculosis resection, 4 cases of wedge resection, 2 cases of chest wall tuberculosis resection + lobectomy, 1 case of chest wall tuberculosis resection + partial pneumonectomy + wedge resection, and 1 case of bronchial fistula repair).

All patients were followed up for more than 1 year. Forty-six patients (97.87%) healed with the stage I wound and had negative sputum etiological examination for *Mycobacterium tuberculosis* (Mtb). The symptoms of 45 patients were obviously relieved, with pus cavities completely closed and the lungs reopened. CT examination showed that there was no active pulmonary focus in the postoperative evaluation.

The mean operative time was 220.81 ± 78.32 minutes (range 75-420), with a blood loss of 322.34 ± 261.85 mL (range 50-1000) during surgery. Five patients received blood transfusion during the operation (10.64%), and the transfusion volume was 0.21 ± 0.62 U of red blood cell suspension (range 0-2). The drainage duration was 13.22 ± 7.94 days (range 5-38). Two patients underwent long-term thoracic closed tube drainage (median 17 days, range 10-38) (Table 1).

Five patients had postoperative complications (10.64%): 1 case of atelectasis, 1 case of delayed wound healing, 1 case of continuous air leakage after the operation,

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Table 1. Short-term postoperative data.

	Median	Range
Operation time (min)	220.81 ± 78.32	75-420
Intraoperative blood loss (mL)	322.34 ± 261.85	50-1000
Transfusion volume (U)	0.21 ± 0.62	0-2
Closed thoracic cavity drainage time (days)	13.22 ± 7.94	5-38
Length of hospitalization (days)	17.99 ± 7.02	10-38

which was finally cured by a second operation after 6 months, and 2 cases of hepatic impairment.

The closed drainage time of empyema complicated with pulmonary tuberculosis (n = 30) was 13.17 days (range 5-37), and the median length of hospitalization was 17.74 days (range 10-38). The closed thoracic cavity drainage time of the extrapulmonary tuberculosis group (n = 17) was 13.31 days (range 6-38), and the length of stay at the hospital was 18.44 days (range 11-38). This group included chest wall TB, spinal TB, ankle TB, and chest wall TB complicated with mammary gland TB. No significant differences were found between the two groups regarding early recurrence (p = 0.06; p = 0.51).

Anti-tuberculosis medication in RR-CTE has not been favorable yet, inducing condition relapse, long courses of treatment, obvious pleural thickening, and complications with other forms of extrapulmonary tuberculosis.[5] Fortunately, surgery for tuberculosis sequelae and the complications had a significant effect. Nowadays, the combination of anti-infective drug treatment and tube thoracostomy/intermittent thoracentesis always shows therapeutic effect in patients with pulmonary, pleural, mediastinal, or thoracic wall involvement, which may promote complete resolution of the thickened visceral parietal pleura and retain the functional capacity of the lung to a great extent.[6-8] In the present study, RR-CTE was common at all ages, a fact that was corroborated by Somenath Kundu and Acharya et al.[9,10]

Surgery would clear the intrathoracic lesion and enable fiberboard excision. Moreover, the normal elasticity of the chest would be restored, lung function would be improved, and the treatment duration shortened. Herein, based on the effective anti-tuberculosis treatment program, the total curative effect was 45 cases, and the cure rate was 95.74%.

In our study, we combined available surgery information on drug-resistant tuberculous pleurisy to estimate its clinical characteristics and therapeutic effect. We found that once the pleural cavity is infected with tuberculosis and develops into chronic empyema, forming irreversible tuberculosis, early surgical intervention should be performed to maximize the possibility of recovery. The advantages of surgery include: the quick obtainment of specimens and enhanced cure rates, clinical symptom relief, and quality of life improvement, facts that should be worthy of widespread clinical application.

Being a retrospective observational study, the reached conclusion may be affected by some selective bias. Prospective randomized controlled trials should be encouraged to further evaluate the long-term efficacy and safety of surgical treatment in RR-CTE.

AUTHOR CONTRIBUTIONS

Sikuan Ye: software and design. LZ: materials or referral of patients. WY and XZ: analysis and writing-review. Song Yang: study conception and design. All authors: drafting and revision of the manuscript and approval of the final version.

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