

## Management Options for Tuberculous Bronchopleural Fistula

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### Abstract

Bronchopleural fistula is the persistent connection between bronchial tree and pleural cavity. It is seen as a potentially catastrophic complication of pulmonary tuberculosis, which is still endemic in North-East India. A total of 9 patients of bronchopleural fistula was analysed. Computed Tomography of thorax was used as the primary diagnostic modality. Successful management of the fistula could be achieved by the control of active infection with anti-tubercular chemotherapy and intercostal drainage in 3(33%) patients. However, nearly half of the patients (44%) required decortication with bronchopleural fistula repair. Another 2 (22.22%) patients required thoracoplasty as definitive surgical treatment. Majority of the patients had uneventful postoperative period. Thus, management of bronchopleural fistula needs to be individualized, dictated by the initial response. It still remains one of the complex challenges to thoracic surgeons in spite of medical and technical advances.

**Keywords:** Bronchopleural Fistula; Pulmonary Tuberculosis; Bronchopleural Fistula Repair; Decortication; Thoracoplasty

### Introduction

Bronchopleural fistula (BPF) is the persistent connection between bronchial tree and the pleural cavity and is associated with significant morbidity and mortality [1-3]. Bronchopleural fistula is one of the serious complications of pulmonary tuberculosis which is almost always associated with pleural space infection. Although the incidence of pulmonary tuberculosis has declined in Western countries, it is still endemic in Northeast India. Management of bronchopleural fistula is one of the most complex challenges encountered by the thoracic surgeons. It ranges from conservative management to intercostal drainage and/or surgical intervention. Although fistulas almost always occur within three months after lung surgery [4], BPF following tubercular pleuropulmonary infection can occur at any time during acute or chronic phase of the disease.

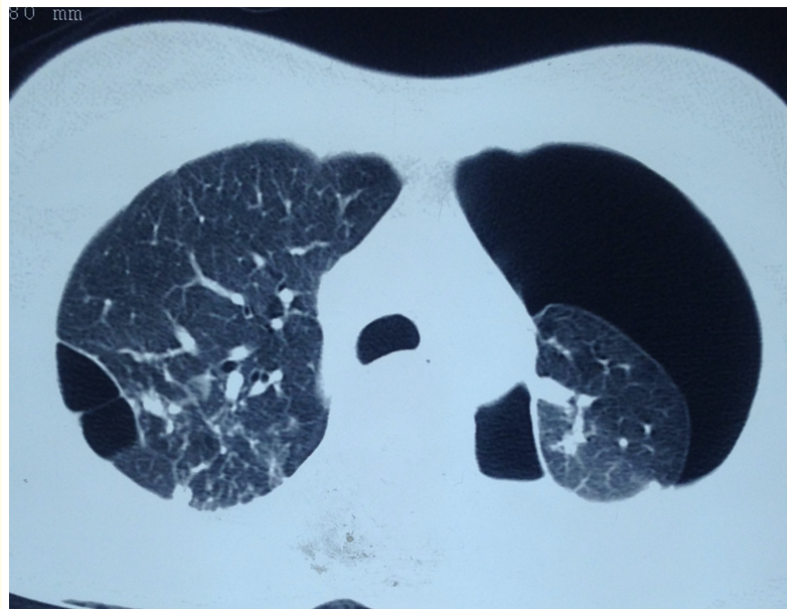
### Materials and Methods

A total of 9 patients (Male = 7 and Female = 2) of bronchopleural fistula were analyzed during January 2017 to June 2019 in the CTVS Unit of Regional Institute of Medical Sciences (RIMS), Imphal, India. All the patients were referred from Respiratory Medicine Department of RIMS and were in the various phase of antitubercular treatment except in one patient who had already completed the antitubercular treatment 20 years back. Diagnosis of tuberculous BPF was made by the Chest Physicians and accordingly antitubercular drugs was prescribed. Chest X-ray and CT scan were the main imaging techniques used. Fiberoptic bronchoscopy was done in 6 patients but could not visualize the BPF in all the six patients.

This study is to analyze the different types of treatment of tuberculous bronchopleural fistula and its outcome.

**Results**

A total of 9 patients was studied. Youngest patient was 19 years of age (Figure 1) and oldest being 82 years old with a mean age of 35 years. All the patients presented with varying degree of dyspnea, chest pain and/or fever with persistent air leak. One patient had associated subcutaneous emphysema. All the patients had empyema thoracis (Table 1).



**Figure 1:** Left tuberculous BPF in a 19 years old patient.

Age (in years)	Sex	Symptoms	Antitubercular therapy (ATT)	Pleural space infection (empyema)	Procedure
19	F	Dyspnea, chest pain, fever	+	+	Decortication and BPF (peripheral) repair
21	M	Dyspnea	+	+	Intercostal drainage alone
24	M	Dyspnea, fever	+	+	Intercostal drainage alone
25	M	Dyspnea, chest pain	+	+	Latissimus dorsi flap thoracoplasty
30	M	Dyspnea, fever, chest pain	+	+	Decortication and BPF repair
37	F	Dyspnea	+	+	Decortication and BPF (peripheral) repair
38	M	Dyspnea, chest pain, fever	+	+	Decortication and BPF repair with intercostal muscle flap
54	M	Dyspnea, subcutaneous emphysema	+	+	Intercostal drainage alone
82	M	Dyspnea, fever	h/o ATT	+	Partial thoracoplasty

**Table 1:** Patients' clinical summary.

Three (33.33%) patients were managed by intercostal drainage alone. Duration of intercostal drainage varies from 6 to 8 weeks. Negative suction was not applied. In this group of patients, air leak was subsequently reduced with increasing lung expansion which was observed in repeated chest X-rays and reducing air bubbling in the drainage bag. Intercostal drain was clamped for 24 hours and a chest X-ray was done prior to removal to make sure that there was no pneumothorax from residual air leak.

Decortication with BPF repair was done in four (44.44%) patients. Figure 2 showed the site of peripheral fistula with thickened visceral pleura. In 1 (11.11%) patient, the fistula repair was reinforced with intercostal muscle flap. In the other 3 (33.33%) patients BPF was repaired with 4-0 prolene.

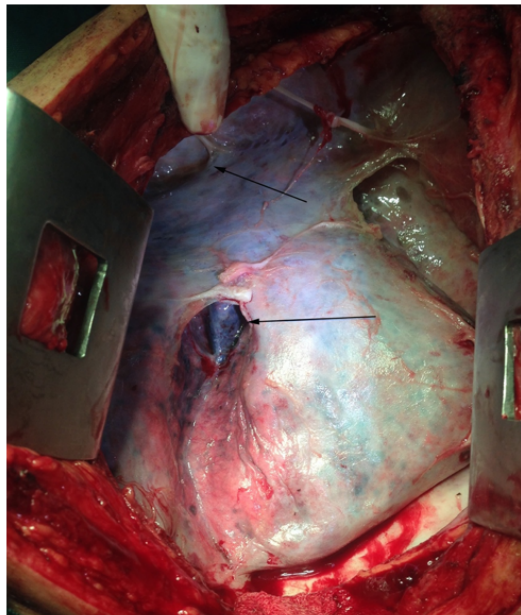


Figure 2: Arrow shows sites of BPF.

Thoracoplasty was done in 2 (22.22%) patients in whom decortication could not be done because of extensive fibrosis of the visceral pleura. In one patient, 25 years old, there was multiple air leak. In this patient we did latissimus dorsi thoracoplasty. The other patient was 82 years old and here, we did partial thoracoplasty.

Two patients had postoperative minor air leak which was gradually resolved. One patient who underwent partial thoracoplasty required postoperative ventilatory support which was weaned off after two days. All other patients had uneventful postoperative period (Table 2).

Procedure	Complications	Duration of hospital stay
Intercostal drainage alone	-	4 weeks
Intercostal drainage alone	-	5 weeks
Intercostal drainage alone	-	5 weeks
Decortication and BPF (peripheral) repair	-	10 days
Decortication and BPF (peripheral) repair	Minor air leak	21 days
Decortication and BPF repair with intercostal muscle flap	-	10 days
Decortication and BPF repair	Minor air leak	19 days
Latissimus dorsi flap thoracoplasty	-	12 days
Partial thoracoplasty	Post-operative mechanical ventilation for 2 days	17 days

Table 2: Post-operative complications.

In all the patients intercostal drain was clamped for 24 hours prior to removal, and chest X-ray repeated and if there was no recollection of air in the pleural space, intercostal drain was removed.

Duration of hospital stay ranges from 4 to 5 weeks in patients managed with intercostal drainage alone. In the operative group, it ranges from 10 to 21 days depending on the events during the postoperative period (Table 2).

### Discussion

In the developing world, especially in this part of the country, which is endemic for tuberculosis, BPF is one of the serious complications in pulmonary tuberculosis. Bronchopleural fistula related mortality ranges from 18 - 71% [5-7].

Tuberculous BPF can be caused by subpleural caseous necrosis or rupture of a cavitary lesion into the pleural cavity or erosion into the lung by tuberculous empyema. Presence of fever, productive cough, and the presence of fluid-air level in the pleural space seen on Chest X-rays or CT scans in the absence of an evident external cause is indicative of a bronchopleural fistula [8]. It was also reported that CT scan of chest succeeded to demonstrate direct or indirect signs of BPF in 86% of patients with central, and 100% of the patients with peripheral fistula [9,10].

BPF, if left unattended, can lead to tension pneumothorax. Protecting the contralateral lung from spillage of pleural fluid is the single most important action when BPF is diagnosed [4]. Tuberculous BPF is managed initially by intercostal drainage and further intervention like fibreoptic bronchoscopy or surgery, depending on the initial response.

Tuberculous bronchopleural fistula often presents in subacute or chronic forms. The subacute presentation is more insidious and is characterized by wasting, malaise, and fever. The chronic form is associated with an infectious process and fibrosis of the pleural space with varying degree of respiratory compromise [11].

Resolution of bronchopleural fistula depends on quick diagnosis and early treatment of underlying tuberculosis with antitubercular chemotherapy and careful management with intercostal drainage [12]. Three (33.33%) of our patients were managed by intercostal drainage alone. Intercostal drainage of bronchopleural fistula allows pleural space decompression which aids in lung re-expansion and minimizes airflow through the fistula which helps in fistula healing.

Classical surgical management consists of thoracotomy, inspection and searching for the leaking site, debridement of fibrin or decortication, resection of necrotic tissue around the fistula site, closure with non-absorbable sutures with or without reinforcement with a vascularized pedicle patch [13,14]. In our present series, four (44.44%) patients underwent decortication along with closure of peripheral BPF with 4-0 prolene and in one patient the repair was reinforced with intercostal muscle flap.

Several techniques have been described for the treatment of chronic BPF ranging from Eloesser flap to Clagett or modified Clagett procedure to thoracoplasty [15-17]. Two of our patients had extensive fibrosis of the visceral pleural and decortication was not possible. In one patient we did transposition of latissimus dorsi to fill up the pleural space and one elderly patient was managed with partial thoracoplasty.

### Conclusion

Choice of the appropriate surgical intervention in managing the tuberculous BPF depends on the type of fistula, nutritional and respiratory status of the patient. Appropriate surgical intervention should be instituted as early as possible depending on the clinical status of the patient. Managing tuberculous BPF by intercostal drainage alone takes longer time to heal the fistula when compared with surgical closure of the fistula. Early surgical closure of the bronchopleural fistula with appropriate surgical technique gives better result.

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