



Pulmonary Medicine

A CASE OF RIGHT PNEUMOTHORAX WITH PERSISTENT BRONCHOPLEURAL FISTULA TREATED BY PLEURODESIS WITH AUTOLOGOUS BLOOD PATCH WITH CONTRALATERAL POST-TUBERCULAR LUNG DISEASE

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ABSTRACT Persistent bronchopleural fistula (BPF) complicating secondary spontaneous pneumothorax is a formidable clinical challenge, particularly in patients with pre-existing parenchymal lung disease. We present a case of a 22-year-old female with a history of multidrug-resistant pulmonary tuberculosis (MDR-TB) treated in childhood, who developed a right-sided pneumothorax with a persistent BPF and contralateral post-tubercular fibrocavitary lung destruction. Conventional intercostal drainage failed to achieve pleural apposition. Fiberoptic bronchoscopy localized a significant air leak to the right upper lobe, and two sequential autologous blood patch pleurodesis procedures (25 mL each) were performed, resulting in complete pleural symphysis and resolution of the pneumothorax without recurrence. This case underscores the efficacy and safety of autologous blood patch pleurodesis as a minimally invasive, cost-effective intervention for managing complex secondary pneumothorax in patients with compromised pulmonary reserve, particularly in resource-constrained settings.

KEYWORDS :

INTRODUCTION

Secondary spontaneous pneumothorax complicated by a persistent bronchopleural fistula (BPF) is a critical clinical entity, often refractory to conventional therapeutic modalities, especially in patients with underlying structural lung disease such as post-tubercular sequelae. BPF is characterized by an abnormal communication between the bronchial tree and the pleural space, leading to persistent air leakage and failure of lung re-expansion⁽²⁾. Standard interventions, including prolonged intercostal tube drainage or thoracic surgical procedures (e.g., video-assisted thoracoscopic surgery [VATS] or open pleurectomy), are frequently associated with significant morbidity and may be contraindicated in patients with diminished pulmonary reserve⁽¹¹⁾. Autologous blood patch pleurodesis has emerged as a novel, minimally invasive technique that leverages the fibrinogenic properties of autologous blood to induce pleural adhesion and seal fistulous tracts⁽⁶⁾. This case report delineates the successful management of a persistent BPF in a young female with a history of MDR-TB and contralateral lung destruction, highlighting the utility of autologous blood patch pleurodesis in high-risk patients in resource-limited environments.

Case Report

A 22-year-old female was referred to our tertiary care center with a one-month history of right-sided secondary spontaneous pneumothorax managed with an intercostal drainage (ICD) tube in situ. She presented with exertional dyspnea (Modified Medical Research Council [MMRC] Grade II), right-sided pleuritic chest pain, and subjective feverishness. Her past medical history was notable for MDR-TB diagnosed in 2014, confirmed by *Mycobacterium tuberculosis* culture demonstrating resistance to rifampicin and isoniazid, with susceptibility to kanamycin, para-aminosalicylic acid (PAS), and ofloxacin. She completed a full treatment regimen (Inj Kanamycin, Tab Ethionamide, Tab Cycloserine, Tab Levofloxacin, Tab Ethambutol, Tab Pyrazinamide, Tab Pyridoxine) per the National Tuberculosis Elimination Programme (NTEP) guidelines.

On physical examination, the patient was afebrile, with a respiratory rate of 26 breaths per minute, heart rate of 150 beats per minute, blood pressure of 110/80 mmHg, and oxygen saturation of 99% on ambient air. Thoracic examination revealed bilateral diminished vesicular breath sounds without adventitious sounds, consistent with a grade 2

bronchopleural fistula. Chest radiography and high-resolution computed tomography (HRCT) thorax confirmed a right-sided pneumothorax with extensive left-sided fibrocavitary lung destruction secondary to post-tubercular sequelae.

Pulmonary Interventions

1. Fiberoptic Bronchoscopy on 28th November 2023: Sequential blocking of each segment done with endobronchial balloon occluder , suspected air leak in the apical and anterior segments of the right upper lobe , high flow O₂ was used to check leak. Bronchoalveolar lavage samples were negative for acid-fast bacilli (AFB), GeneXpert MTB/RIF, cytology, and *Mycobacterium* Growth Indicator Tube (MGIT) culture, ruling out active tuberculous reactivation.

2. First Autologous Blood Patch Pleurodesis on 29th November 2023 : 25 mL of the patient's own autologous blood obtained from femoral artery was instilled via the ICD, followed by clamping for two hours. Post-procedure, minimal serosanguinous drainage was noted, and chest radiography demonstrated partial lung re-expansion with persistent BPF.

3. Second Autologous Blood Patch Pleurodesis on 2nd December 2023 : A repeat autologous blood patch with 25 mL blood was administered, with the ICD unclamped after two hours. Serial chest radiographs confirmed complete pleural apposition and resolution of the pneumothorax, which was confirmed by imaging.

The patient was discharged with detailed follow-up instructions and remained asymptomatic with sustained lung expansion on subsequent imaging. No recurrence was observed during outpatient follow-up on serial chest radiographs over 1 year.

Figure 1 (A): Chest X-Ray showing right-sided pneumothorax pre-pleurodesis

Figure 1 (B): Chest X-Ray showing right-sided pneumothorax post-pleurodesis

Figure 2 (A): HRCT Thorax showing right-sided pneumothorax pre-autologous blood patch pleurodesis

Figure 2 (B): HRCT Thorax showing right-sided pneumothorax post-autologous blood patch pleurodesis

Figure 3 : Fiberoptic Bronchoscopy with endobronchial balloon occlusion



Figure 1 (A) Figure 1 (B)

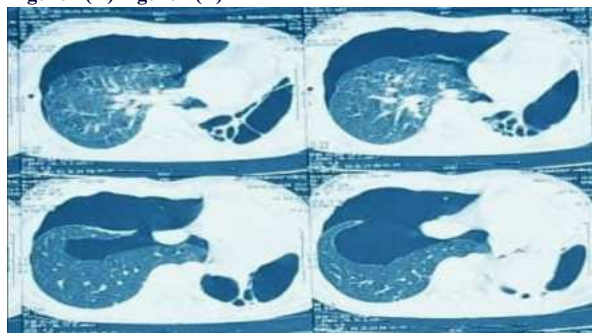


Figure 2 (A)

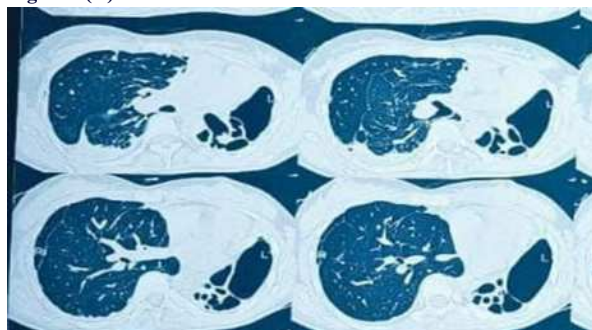


Figure 2 (B)



Figure 3

DISCUSSION

Persistent BPF complicating secondary spontaneous pneumothorax is a complex clinical scenario, particularly in patients with significant parenchymal lung disease, such as post-tubercular fibrocavitary sequelae. The pathophysiology involves formation of a fistulous tract between the bronchial tree and pleural cavity, resulting in continuous air leakage and failure of pleural apposition⁽²⁾. Conventional management, including prolonged intercostal drainage or surgical interventions (e.g., VATS, pleurectomy, or decortication), carries substantial risks of perioperative morbidity, particularly in patients with compromised pulmonary reserve⁽¹¹⁾. Autologous blood patch pleurodesis represents a paradigm shift in the management of such cases, utilizing the fibrinogenic and pro-inflammatory properties of autologous blood to create a pleural seal and promote symphysis⁽⁵⁾.

In this case, the patient's history of MDR-TB and contralateral lung destruction posed significant therapeutic challenges. The successful resolution of the pneumothorax and BPF following two autologous blood patch procedures underscores this simple and inexpensive technique's efficacy in achieving pleural obliteration in such patients, or in others at high-risk. The mechanism involves the formation of a fibrin matrix at the site of the fistulous tract, which incites localized pleural inflammation and fibrosis, thereby effectively sealing the

recurrent / persistent air leak⁽⁹⁾. This concurs with case reports in literature which supporting the use of blood patch pleurodesis in secondary pneumothorax, particularly in patients with underlying parenchymal disease⁽³⁾.

The procedure's technical simplicity, minimal invasiveness, and low cost make it particularly advantageous in resource-constrained settings, where access to advanced thoracic surgical expertise or facilities may be limited⁽¹⁾. The absence of significant procedural complications, such as hemothorax or empyema, further enhances its safety profile⁽⁶⁾. However, variability in outcomes necessitates further research to optimize procedural parameters, including the ideal volume of blood (typically 20–50 mL), timing of repeat instillations, and the role of adjunctive therapies (e.g., intrapleural antibiotics or sclerosing agents)⁽⁴⁾.

Comparative studies have demonstrated that autologous blood patch pleurodesis achieves similar efficacy to chemical sclerosants (e.g., talc or doxycycline) with a lower risk of systemic complications⁽⁸⁾. Additionally, its applicability in patients with poor performance status or contraindications to surgery positions it as a critical therapeutic option⁽¹⁰⁾. While surgical interventions remain the gold standard for refractory BPF, autologous blood patch pleurodesis serves as a critical therapeutic bridge for patients with prohibitive surgical risks⁽⁷⁾. This case adds to the growing body of literature supporting its application in complex pulmonary conditions, particularly in the context of post-tubercular sequelae. Future studies should focus on long-term outcomes, standardization of protocols, and the potential integration of multimodal therapies to enhance efficacy.

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