

Case Report

Post traumatic persistent broncho-pleural fistula managed with autologous blood patch pleurodesis: a rare case report

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ABSTRACT

Persistent air leak (PAL) and bronchopleural fistula (BPF) following penetrating thoracic trauma are uncommon and pose significant therapeutic challenges. Surgical repair and endoscopic interventions may not always be feasible, particularly in peripheral fistulas or in hemodynamically fragile patients. We report a rare case of post-traumatic persistent BPF following a close-range firearm injury to the chest in a 26-year-old male. Despite initial stabilization and intercostal drainage, the patient developed recurrent pneumothorax with massive air leak after chest tube removal. Imaging confirmed a BPF. Autologous blood patch pleurodesis (ABPP) was performed via the intercostal drain using 100 mL of autologous blood. A repeat instillation was required after 24 hours due to PAL, following which complete resolution was achieved. The lung remained fully expanded, and the chest tube was successfully removed without complications. This case highlights ABPP as a simple, safe, cost-effective, and minimally invasive option for managing refractory post-traumatic PAL when conventional measures fail.

Keywords: Autologous blood patch pleurodesis, Hemopatch, Bronchopleural fistula, Pneumothorax, Intercostal drainage

INTRODUCTION

Persistent air-leak (PAL) is a known major complication of surgical pulmonary resection procedures and it is also described as complication seen with morbid lung conditions such as chronic obstructive pulmonary disease (COPD), infectious diseases (such as tuberculosis) and trauma.¹ Post-traumatic PAL and BPF are less commonly encountered and very few reported cases are available for review. Conservative treatment modalities such as prolonged chest drainage, use of negative suction, physiotherapy and trial of pleurodesis with tetracycline, povidone iodine, talc, etc., all offer variable success. Heimlich valves have also been used with some success. Open/surgical approach to manage BPF is technically challenging and may be tolerated by a fraction of patients. Less invasive, i.e., endoscopic techniques have

demonstrated decent success rates but may not be suitable for trauma cases where the likely cause is peripheral.²⁻⁴ In this report we describe the use of ABPP to repair BPF in a patient with refractory pneumothorax and bronchopleural fistula post penetrating thoracic injury.

CASE REPORT

A 26 years old male sustained gunshot wound to right side of chest, by deliberate self-harm, i.e., close range firearm (rifle) discharge. Examination revealed tachycardia, with hypotension with entry and exit wounds over Right side of the chest and local bleeding. He was resuscitated immediately; hemostasis achieved for entry & exit wounds and an intercostal drain (ICD) was placed on the right side by separate entry. Computed topography (CT) of Chest suggested hemo-pneumothorax and lung

parenchymal injury over right side, however no major injury to great vessels, bronchial tree, mediastinal structures and heart. He continued to be hemodynamically stable and showed a positive course of recovery with conservative treatment. Hemo-pneumothorax resolved over 12 days and ICD removal was done. Patient resumed physiotherapy and incentive spirometry. After 5 days of ICD removal, he developed sudden tachycardia and hypotension. Chest X-ray revealed pneumothorax over right side. CT guided needle aspiration was done; however, recurrence of similar episode was noted few hours post procedure. He underwent emergency right ICD placement. HRCT Chest revealed BPF with massive air leak.

After stabilization, considering open repair a morbid procedure, decision to proceed with ABPP through ICD was made. To facilitate this, the drainage system was modified ensuring aseptic conditions, a three-way connector was added between the ICD and the tube

draining to the underwater seal. 100ml of blood was drawn from peripheral (right cubital) vein in non-heparinized syringes. The blood was then immediately injected through the three-way connector. This was followed by instillation of 30ml sterile normal saline as flush. The port was then closed, and the patient was asked to change positions every 15-20 minutes (lateral-supine-contralateral) till 90 minutes to ensure a uniform distribution of blood on the entire pleural surface. The patient was evaluated at 12 hours, and the period was uneventful. However, at 24 hours recurrence of symptoms was noted and confirmed on imaging (chest X-ray). Air leak was found to be persistent and re-instillation of autologous blood was done following the above-mentioned protocol. PAL resolved and ICD removal was done 01 week later. He remained hemodynamically stable and repeat imaging showed, completely expanded right lung with healed parenchymal injury (gunshot trajectory visible) and no pneumothorax (Figure 1).

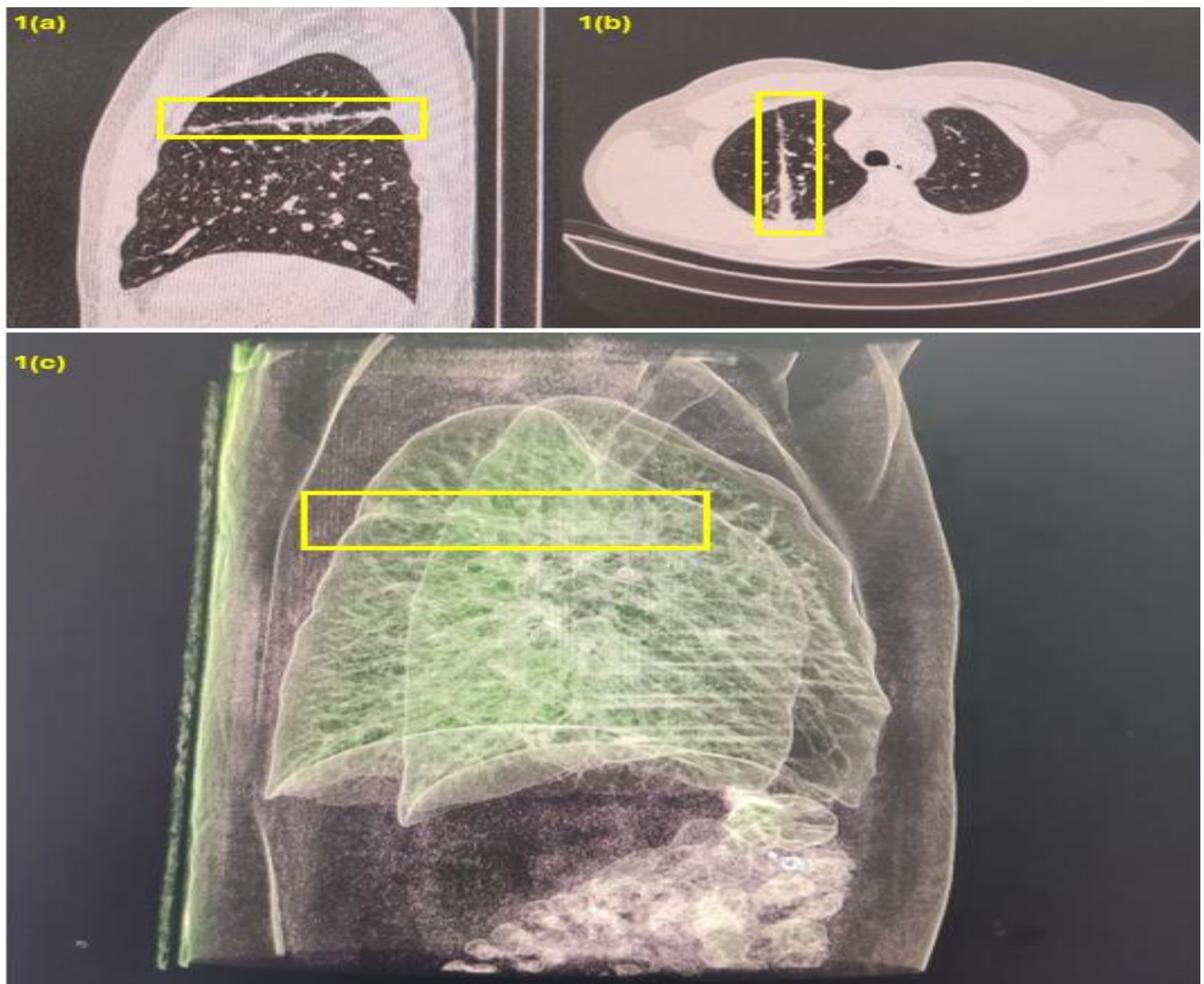


Figure 1: (a) parasagittal, (b) axial section and (c) digital 3-D reconstruction on CT scan showing completely expanded right lung with healed parenchyma and trajectory of (firearm) injury.

DISCUSSION

Autologous blood pleurodesis is an inexpensive and effective method of treating postoperative air leaks. The autologous blood is readily available, does not require processing and has a very low periinterventional complication rate and multiple attempts increases the overall success rate.^{2,3}

Robinson et al first described the use of autologous blood instilled through chest tube as an attempt to close PAL after spontaneous pneumothorax, in 1987 and reported a success rate of 85%.⁵ Most authors have described its use in management of PAL after pulmonary resections and after hydatid cyst operations. The success of ABP has been varied between 27% to 100% in reported literature.

The mechanism of action for ABPP is believed to be the sclerosing property of blood. When blood is in contact with pleura, it induces a non-infectious inflammatory reaction. Along with this, the formation of fibrin and fibroblast migration in blood clot occludes alveolar air leaks leads.⁶

There is no universal consensus or treatment protocol for management of PAL. It varies from ICD drainage to Open repair. ABPP has shown promising results in few studies. In the studied literature mainly describing ABPP for post-operative PAL, fairly standardized protocols are described for the procedure regarding the time intervals for administering the blood, but not for quantity of blood to be injected into the pleural cavity, which varies between 50 and 150 ml.⁷⁻¹²

Although few studies have suggested 120 ml as the optimal amount of blood to treat PAL, also describing that the procedure can be safely repeated every 24 hours. It is postulated that higher amounts of blood may not be associated with increase in the risk of complications, but rather helps reducing the necessity to repeat the procedure and consequently the total amount of blood injected to have stop an air leak.¹³

A common concern with ABPP is that the autologous blood may provide a culture medium for bacteria to proliferate, thereby increasing the risk of empyema, which is the most reported complication after blood patch. The highest incidence rate of empyema reported in the literature was seen in a study by Cagirici et al in which 3 (9%) of the 32 patients who underwent pleurodesis developed empyema.¹⁴ It can be challenged that PAL itself acts as a risk factor for empyema, and therefore the dilemma whether it was the air leak or the autologous blood that caused the empyema persists.¹⁵ The symptoms of fever after ABPP can be interpreted as a pleural inflammatory reaction to the injection of a liquid into the pleural cavity. This complication is widely described and more frequently after injection of sclerosing agents or talc.¹⁶

CONCLUSION

PAL due to post-traumatic BPF remains a challenging clinical problem, particularly when surgical repair is associated with high morbidity. This case highlights the successful use of ABPP as a simple, safe, and cost-effective minimally invasive option in managing refractory air leak following penetrating thoracic injury. ABPP can be easily performed through an existing intercostal drain, is repeatable, and avoids the need for complex surgical or endoscopic interventions in selected patients. In carefully chosen cases, especially where the fistula is peripheral and the patient is clinically stable, ABPP should be considered an effective therapeutic alternative before proceeding to definitive surgical repair.

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