

Beware of Simultaneous Bilateral Spontaneous Pneumothorax: Case Reports and Literature Review

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Abstract: INTRODUCTION: SBSP (Simultaneous Bilateral Spontaneous Pneumothorax) means concurrent or coincident bilateral pneumothorax. Usually, chest drains insertion is followed by pleurodesis to prevent recurrence. METHOD: There are a few cases of SBSP each year in Wong Tai Sin Hospital of Hong Kong. It consists of two groups clinically. One group is easily tackled by bilateral chest drain insertion followed by pleurodesis and the other group is difficult to achieve full lung expansion despite the application of negative suction via the chest drains. Pleurodesis cannot be achieved in the latter as the visceral and parietal pleura are not in touched. RESULTS: By considering the pressure difference between the different intrapulmonary compartments, the underlying cause can be identified. The following two cases demonstrated the basic principle—the success of chest drain relies on an enclosed pleural space. DISCUSSION AND CONCLUSION: Literature review of the SBSP will be followed by the proposed treatment.

Key words: Simultaneous bilateral spontaneous pneumothorax, transpulmonary pressure, interpleural pressure, pleuro-pleural communication, VAT (Video-Assisted Thoracoscopy).

1. Introduction

SBSP (Simultaneous bilateral spontaneous pneumothorax) is rare but potentially fatal. It constitutes up to 1.9% to 4% cases of spontaneous pneumothorax in different studies [1, 2]. Etiology of SBSP is challenging to clinicians as most patients do not have an underlying lung pathology. The pearl of successful chest drain management lies on the integrity of the individual pleural space, i.e., whether the pleural spaces are communicable to each other or not.

Case 1 describes SBSP with intact pleural spaces. Simple bilateral chest drain insertion followed by pleurodesis is all that required.

Case 2 describes SBSP with communicable pleural spaces. The negative pressure applies to the two chest drains are dissipated in equalization the pressure of the right and left pleural spaces rather than the transpulmonary pressure, just like two kids playing the

tug-of-war game. Although there is no air-leak noted in the chest drain bottles bilaterally, the lungs cannot expand well (Fig. 1). In the other words, the negative pressure applied bilaterally just equalize the interpleural pressure, instead of allowing the lungs to expand fully. It is an “easy way out”.

2. Case Report 1

A 84 years-old man, non-smoker, presented with sudden dyspnoea and was admitted to Emergency Department. He denied any recent chest injury, strenuous exercise or diving. He had a medical history of left lung shadow but refused investigation. Otherwise, he enjoyed good past health.

Physical examination showed decreased left side air-entry with trachea deviated to the right and there was hyper-resonant percussion note over the left side.

CXR (Chest X-ray) showed left side pneumothorax with mediastinal shift. Left side chest drain was inserted and post-CXR showed good position of the chest drain. However, CXR on the next day showed a right side pneumothorax and right side chest drain was

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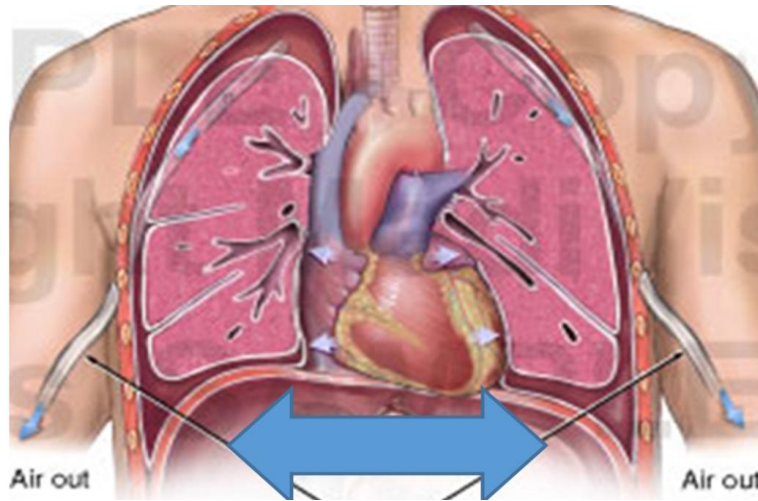


Fig. 1 In SBSP with inter-pleural communication, the pressure gradient across the 2 pleural spaces is less than the transpulmonary pressure (alveolar pressure—intrapleural pressure).

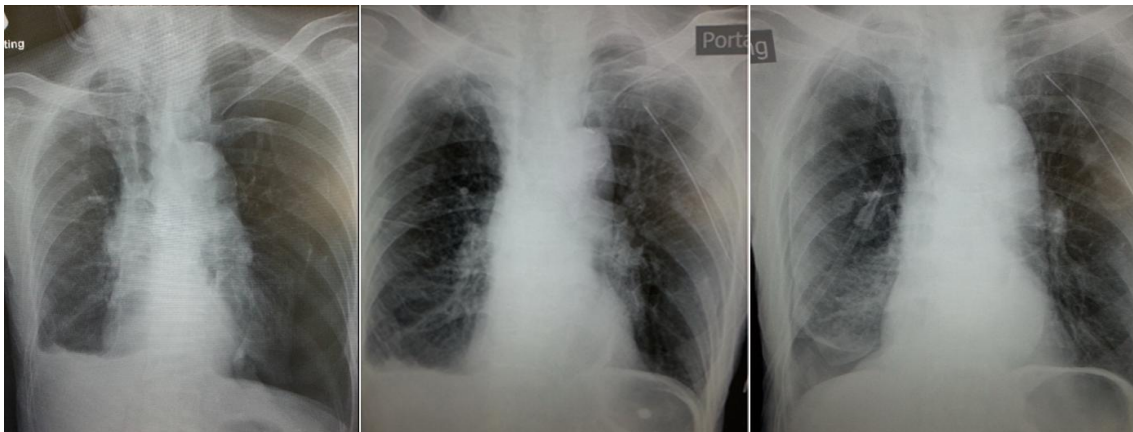


Fig. 2 Left : left pneumothorax. Middle: left lung expanded after chest drain insertion. Right: new development of right pneumothorax.

also inserted (Fig. 2).

Patient was put on oxygen therapy via the nasal prongs and the lungs were expanded gradually. Pleurodesis was performed sequentially after the air-leak had been ceased. Patient was recovered uneventfully.

3. Case Report 2

A 61 year-old bed-bound aged home resident, non-smoker, had hereditary cerebellar degeneration. He presented with fever with decreased general condition. Examination showed decreased air-entry over the lower zones. CXR showed right mid-zone consolidation. White cell count was raised with neutrophil predominant. Liver and renal function tests

were normal. Augmentin was started after septic workup. Sputum AFB (acid fast bacilli) smear was positive and culture reviewed mycobacterium tuberculosis. Patient was put on isoniazid 300 mg daily, rifampicin 450 mg daily, ethambutol 750 mg daily, and pyrazinamide 1 g daily according to the drug sensitivity test. Fever persisted and patient developed coffee-ground vomiting one week after tuberculosis treatment. The differential diagnosis for fever included reactional fever, complications of TB, hypersensitivity reaction, TB drug reactions, hospital acquired sepsis and that for coffee-ground vomiting included stress ulcer and peptic ulcer. CXR showed SBSP and right mid-zone consolidation and so bilateral chest drains were inserted (Fig. 3).

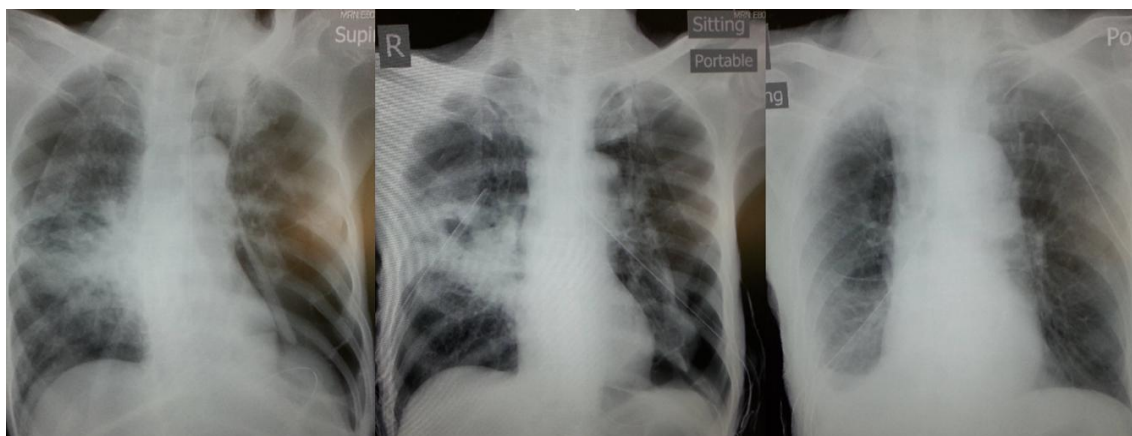


Fig. 3 Left: SBSP. Middle: Middle: bilateral chest drains in-situ. Right: bilateral “apparently” expanded lungs.

Intravenous sulperazone 2 g Q12H was started after repeating the septic work-up. Serial CXRs showed clear-up of the lung shadows but the pneumothorax persisted. 10-15 cm H₂O negative suction was applied to both chest drains.

VATS (video-assisted thoracoscopic surgery) pleurodesis was declined due to patient’s poor general condition. Endobronchial valve insertion was not performed as there was no persistent air-leak.

At one time, right lung was apparently fully expanded. Negative suction was off on the right side and there was no bubbling over the right chest drain. So we planned to pour talc slurry into right pleural space, then clamped the right chest drain. However, CXR just before pleurodesis showed re-development of right pneumothorax and the procedure was abandoned.

The same scenario occurred over the left side. Both lungs were not fully expanded afterwards despite the re-application of negative pressure via the chest drains. Patient finally succumbed three months after hospitalization.

4. Discussion

The success of chest drain in treating pneumothorax relies on a closed pleural space. With the oxygen therapy via the nasal prongs together with the positive inspiratory pressure, the lung will expand gradually. In difficult cases, negative suction is applied to increase the transpulmonary pressure. However, in SBSP with

communicable pleural spaces, the negative pressure applied on either sides just cancel each other and full lung expansion cannot be achieved.

Pleuro-pleural communication should be suspected if there is peculiar response to chest tube drainage. The initial air-leak noted in the chest drain bottle will be disappeared after the initial lung defect has healed up. The pleuro-pleural communication is usually located at the anterior part or the lower part of the middle mediastinum due to the embryological development and will be discovered in thoracoscopy [7].

Previously, it is believed that male smokers with underlying lung disease or those with pneumocystis carinii lung infection are prone to bilateral pneumothorax but cases were also found in patients in exacerbation of COPD (chronic obstructive pulmonary disease) or in severe asthmatic attack [3-6]. A case series of 12 patients showed more than 41% SBSP patients did not have underlying lung pathology like lymphangioliomyomatosis, histiocytosis X or lung metastases. Furthermore, COPD and bullous lung disease were not associated with SBSP [2]. In addition, most patients were non-smokers.

So the detection of SBSP relies on the clinical suspicion rather than based on certain “phenotype”.

Prognosis is good with timely bilateral chest drain insertion [8]. However, patients may acquire pneumonia due to decreased mobility and lung collapse. High risk patients, with inadequate pulmonary reserve,

cannot undergo general anaesthesia and thoracoscopic treatment.

In the clinical management of SBSP, clinician should be vigilant to patient with unilateral pneumothorax to start with but deteriorates afterwards despite optimal medical therapy. Also, beware of pleuro-pleural communication in case of poor lung expansion.

As apparent full lung expansion may not be “real”, hanging the chest drain over a drip-stand is safer than clamping the chest drain after the instillation of talc slurry. The former keeps the talc the talc slurry in pleural space while allowing air to escape in case of tension pneumothorax [9].

5. Conclusions

SBSP is managed by bilateral chest drain insertion followed by pleurodesis. If there is lack of full lung expansion despite negative suction and there is no bubbling seen in the chest drain bottles, think of inter-pleural communication. VATS pleurodesis or means to increase the alveolar pressure will solve the problem but the latter method may break the initial lung defect again.

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