

# Simultaneous Bilateral Spontaneous Pneumothorax: Report of 6 Adult Patients

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## Abstract

**Background:** Spontaneous pneumothorax (SP) refers to the spontaneous presence of air in the pleural sac(s) without iatrogenic or traumatic factors. The simultaneous bilateral SP (SBSP) is rare yet serious clinical condition which may pose a significant threat to patient's life. Herein, 6 patients with SBSP managed in Sulaimaniyah Teaching Hospital (STH) over 6-year period (2006-2011) are reported with literature review. **Methodology:** A prospective clinical study. The diagnosis was made on clinical and radiographic grounds. The initial therapy was a bilateral tube thoracostomy (BTT) followed by chemical pleurodesis. Thoracotomy for excision of subpleural blebs or bullae and pleurectomy was performed for prolonged air leak (lasting >14 days). **Results:** There were 5 males (83.33%) and 1 female (16.67%) with a mean age of 34.8 years ranging between 20 and 50. All patients had presented with dyspnea and chest pain and were smokers. Three patients (50%) had primary (PSP) whereas the remaining had secondary (SSP) (chronic obstructive pulmonary disease—COPD, n = 2 and pneumonia, n = 1). None of the patients had recurrence. Unilateral thoracotomy was necessary in 5 patients (SSP, n = 3 and PSP, n = 2). Prolonged air leak was observed once postoperatively (16.7%) while mortality was nil. **Conclusions:** Prompt recognition of this rare yet potentially serious condition is crucial. The clinical diagnosis is straightforward with plain chest radiography being the most helpful workup. The initial therapy is via BTT followed by pleurodesis. Surgery is necessary for prolonged air leak and failure of the lung to expand.

## Keywords

Primary, Secondary, Simultaneous Bilateral Spontaneous Pneumothorax, Pleurodesis

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## 1. Introduction

Spontaneous pneumothorax refers to the spontaneous presence of air in the pleural sac(s) without iatrogenic or

traumatic factors. The primary form mostly affects young healthy males with a special body built (slim and tall) having normal lungs apart from subpleural apical blebs whose rupture is generally considered the causative mechanism. In contrast, the secondary form may occur in elderly people with underlying pulmonary lesions such as COPD. The SBSP is rare yet serious clinical condition which may pose a significant threat to patient's life [1]. Acute presentation of SP may be life-threatening. The need for vigilance and early recognition is crucial [1].

In the US, the incidence of PSP is 7.4/100,000 in men and 1.2/100,000 in women whereas the incidence of SSP is 6.3/100,000 in men and 2/100,000 in women [2]. Simultaneous BSP is a rare condition and forms only 1.3% of all spontaneous pneumothorax cases [3] [4]. Unlike unilateral SP, patients with SBSP have usually underlying lung disease [5] [6]. The overall male to female ratio of SP is 5:1 [7]. The higher incidence in men has been attributed to higher rates of smoking, body habits, and different mechanical properties of the lung [7]. Simultaneous BSP can be fatal once it progresses into tension pneumothorax [8] [9]. Simultaneous BSP is mainly seen in patients with chronic obstructive pulmonary disease, tuberculosis, pneumonia, undefined interstitial pulmonary disease, connective tissue disease, and pulmonary metastasis [10]. Herein, 6 patients with SBSP managed in STH (the main surgical hospital in the city) over 6-year period (2006-2011) are reported with literature review.

## 2. Material and Methods

Informed written consent was taken from all patients to be enrolled in this prospective clinical study. The diagnosis was made on clinical grounds (careful history and physical examination) (Figure 1) together with plain chest radiograms in all cases (Figure 2 and Figure 3). Computerized tomography (CT) scan of the chest was performed for cases with SSP to figure out underlying lung disease (Figure 4). Fiberoptic bronchoscopy (FOB) was performed in all patients to rule out any endobronchial lesion. The initial therapy was a bilateral tube



Figure 1. Surgical emphysema in a patient with SP.

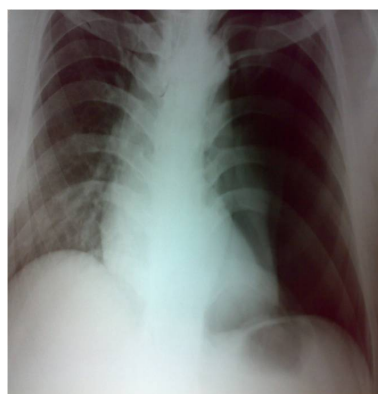
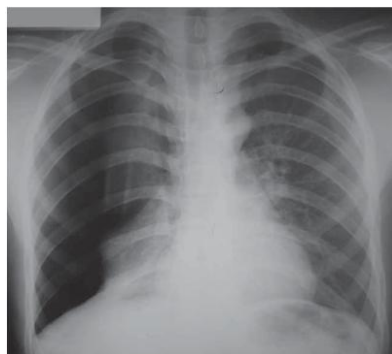
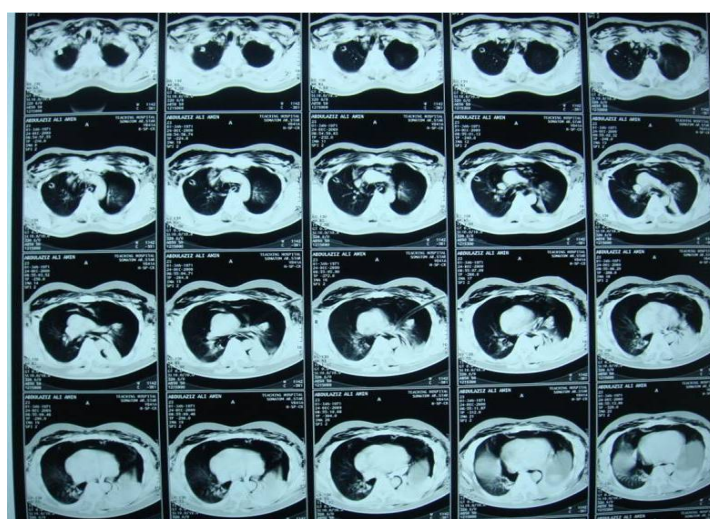


Figure 2. Left-side SP.



**Figure 3.** Bilateral spontaneous pneumothorax.



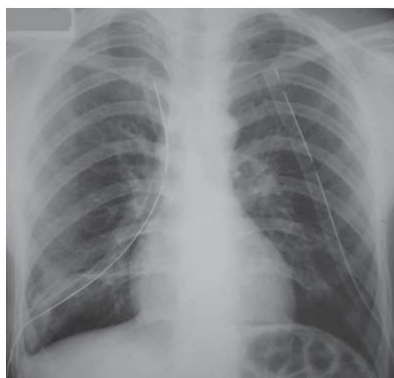
**Figure 4.** Computerized tomography scan of the chest for a patient with left-sided SP.

thoracostomy to relieve the symptoms and achieve lung expansion (**Figure 5** and **Figure 6**). The chest tubes were removed when air leak stopped and the associated fluid drainage was less than 150 ml in 24 hours and the lung was re-expanded. In order to prevent future recurrences, bilateral pleurodesis (with Tetracycline) was intended in all patients. Thoracotomy for excision of subpleural blebs or bullae and pleurectomy (**Figure 7(a)** and **Figure 7(b)**) was performed for prolonged air leak (lasting >14 days). Patients had a close observation in the postoperative period (**Figure 8** and **Figure 9**) and a clinical-radiographic follow-up for 1 year to diagnose a recurrence of pneumothorax.

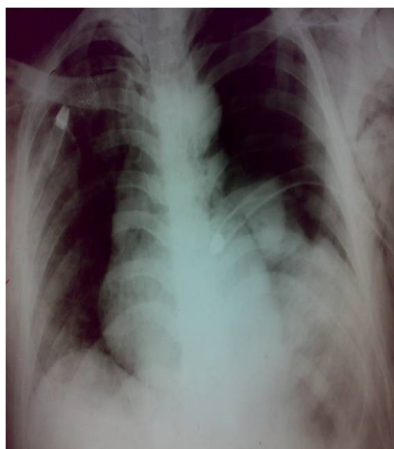
### 3. Results

Six patients (5 males and 1 female) were studied. The age ranged between 20 and 50 years with a mean of 34.8. Symptoms were dyspnea and chest pain ( $n = 6$ ), productive cough ( $n = 1$ ), sweating ( $n = 1$ ), weight loss and malaise ( $n = 1$ ) and moderate subcutaneous emphysema ( $n = 1$ ). All patients had history of smoking. Three patients (50%) had PSP and three (50%) had SSP (COPD,  $n = 2$  and *Staphylococcus aureus* pneumonia,  $n = 1$ ).

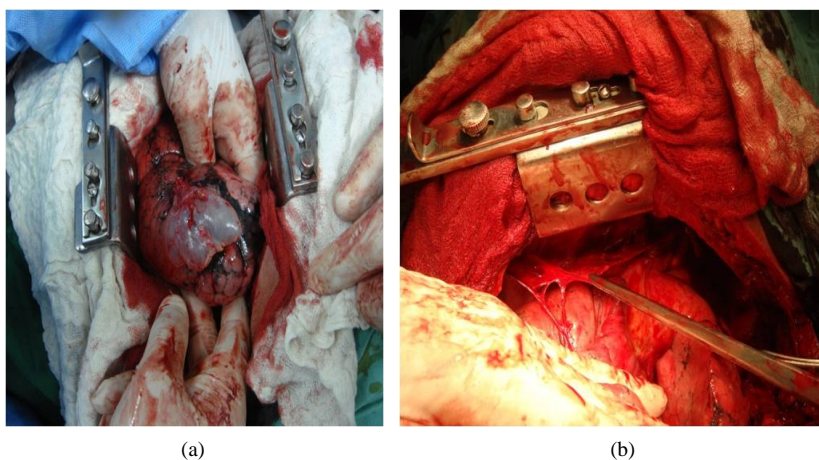
All patients had immediate BTT once the diagnosis was made which significantly improved the symptoms. Chemical pleurodesis (with Tetracycline) was then attempted few days later in all patients. The youngest patient in this series (a man of 20 with PSP) was managed by BTT and chemical pleurodesis without thoracotomy while unilateral thoracotomy was necessary in 5 patients (SSP,  $n = 3$  and PSP,  $n = 2$ ) due to prolonged air leak. During thoracotomy, blebs or bullae were seen and managed by blebectomy or bullectomy combined with localized pleurectomy opposite to the site of blebs or bullae to achieve pleurodesis and prevent future recurrence of



**Figure 5.** Fully expanded lungs following bilateral tube thoracostomies for BSP.



**Figure 6.** BSP with incomplete lung expansions.

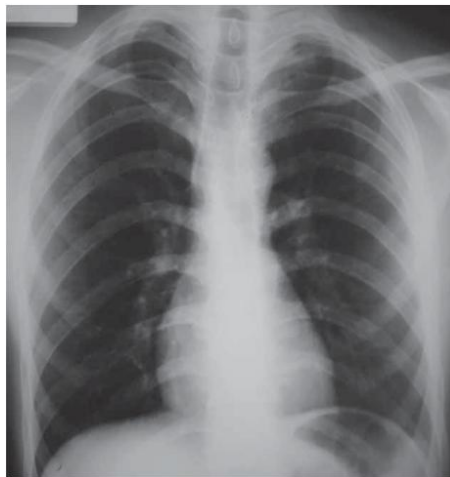


**Figure 7.** (a) Intra-operative photograph showing a big bullous; (b) Intra-operative photograph showing a localized pleurectomy.

pneumothorax. The postoperative complications included prolonged air leak ( $n = 1$ , 16.67%) which stopped after 10 days and wound infection ( $n = 1$ , 16.67%) managed conservatively. All patients were followed-up for at least 1 year. No recurrence and no mortality were recorded during this period.



**Figure 8.** Postoperative photograph showing resolved surgical emphysema.



**Figure 9.** Postoperative chest radiograph at the time of hospital discharge.

#### 4. Discussion

Although in clinical practice, SP is a frequently encountered disease, SBSP is rarely reported in the literatures [2]-[4]. However, it represents a significant health problem. It is generally ascribed to rupture of an intra-thoracic gas-containing structure. Air enters the pleural space when a subpleural apical bleb or a pulmonary cavity ruptures [8]. Most SBSP cases are seen as a result of an underlying pulmonary disease, such as chronic obstructive pulmonary disease, malignant neoplasm, or lung tuberculosis [10]. Infrequently, SBSP may be caused by the pleural window communicating with both pleural spaces [10]. In the literature, some SBSP cases have been reported in association with malignancies [11].

Between 1971 and 1990, Esther *et al.* [3] detected 12 cases of SBSP (PSP,  $n = 5$  and SSP,  $n = 7$ ). Our cases were equally divided into primary and secondary SP but none was found in conjunction with malignancy.

Iraj *et al.* [12] found a significant association between bullae and SSP. Serious systemic diseases could be present in SBSP cases, and respiratory stress could be life threatening [13]. For this reason, patients should be carefully evaluated and receive clear diagnoses. It is generally accepted that rupture of apical subpleural emphysematous blebs causes PSP. It has been reported that SP is seen more frequently in smokers than in non-smokers. Primary SP is most frequently seen in people aged 20 - 29, whereas SSP generally occurs in the elderly [9] [10]. Our patients with SSP were middle-aged.

Simultaneous BSP cases vary in clinical presentation. Patients may present alternating clinical signs and symptoms, ranging from mild dyspnea to cardiopulmonary failure [14]. Patients are usually admitted to the hospital with sudden onset of dyspnea and pleuritic chest pain on the side of the pneumothorax. Physical examina-



tions can appear normal in minimal pneumothorax cases [7]-[9].

In patients with significant pneumothorax, hyper-resonance is detected with percussion, and breath sounds are diminished or lost. All of our patients had sudden onset of dyspnea and chest pain. Plain chest radiography forms the basis of the radiological examination. Computerized tomography of the thorax is indicated to detect underlying causes of spontaneous pneumothorax [11] [14]. Eventhough pneumothorax is a relatively easily suspected disease based on a patient's history and physical examination, a delay in hospital admission and radiological evaluation could threaten patient's life due to worsened state of ventilation and oxygenation. In bilateral pneumothorax cases, diminished breath sounds in both lungs should not mislead the physician, and SBSP should be considered.

The main aims of therapy of SP are to achieve complete lung expansion and prevent a recurrence. The treatment modalities include needle aspiration, percutaneous catheter drainage, tube thoracostomy with chemical pleurodesis, video-assisted thoracoscopic surgery (VATS) and thoracotomy. Hatta *et al.* immediately performed a bilateral tube thoracostomy on an 18-year-old SBSP patient. Afterward, they performed a thoracotomy via axillary incisions and reported excellent results [15]. Similarly, Ohara *et al.* [16] used the same procedure with an SBSP patient.

Neal *et al.* [17] reported performing a bilateral bleb resection by median sternotomy. Today, VATS is accepted as a standard approach for the surgical treatment of SP in most clinics. This surgical procedure enables the surgeon to fully evaluate the entire thoracic cavity by video. The existence of pleural communications could be investigated as well as inspection of the mediastinal pleura. Moreover, VATS causes less postoperative pain and yields smaller cosmetic scars [10].

Surgical treatment is recommended to reduce the risk of recurrence in SBSP [10] [11]. Bullectomy is the most effective method for preventing recurrences. In addition, apical pleurodesis further reduces the risk of recurrence.

Chest drainage constitutes the basis of initial treatment [11] [14] [18]. Air leakage can be stopped in 5 hours in 52% and in 48 hours in 82% of patients with tube thoracostomies [19]. Prolonged air leakage is the most common indication for operation in the first attack. Most clinicians advice surgical treatment in cases of prolonged air leakage that lasts more than 7 - 10 days. There are some studies indicating that air leakage absolutely needs to be stopped in 15 days, and the decision to operate would be made before the end of this period [20]. After relieving the patient's symptoms using a chest tube, a primary or secondary pneumothorax distinction can be made. Planning additional surgical procedures or pleurodesis according to the patient's clinical presentation and underlying disease is more appropriate [21].

## 5. Conclusions

Prompt recognition of this rare yet potentially serious condition is crucial. The clinical diagnosis is straightforward with plain chest radiography being the most helpful workup. The initial therapy is via BTT followed by pleurodesis. Surgery is necessary for prolonged air leak and failure of the lung to expand. When available, video-assisted thoracoscopic surgery is superior to open surgery for blebectomy or bullectomy and pleurectomy in SP patients.

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## Conflict of Interest

None declared.

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