Thoracoscopic surgery for simultaneous bilateral spontaneous pneumothorax

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Citation

Abstract
Simultaneous bilateral spontaneous pneumothorax (SBSP) is a life-threatening condition very rarely documented. It usually results from the rupture of subpleural blebs/bullae and progresses to tension pneumothorax. Prompt and appropriate diagnosis and treatment are necessary in patients with such condition. Thoracoscopic surgery is considered as a standard approach for definitive treatment to SBSP. We report two cases of SBSP presenting sudden chest pain and acute dyspnea treated with bilateral tube thoracostomy and posterior bilateral bullectomy through thoracoscopy.

INTRODUCTION
Simultaneous bilateral spontaneous pneumothorax (SBSP) is an extremely rare life-threatening condition, accounting for about 1.3% of spontaneous pneumothoraces (1), and in most cases results from the rupture of subpleural blebs/bullae (2). Although acute dyspnea is the most common symptom observed in patients with SBSP, the spectrum of clinical presentation is extremely varied, ranging from no symptoms to cardiopulmonary failure and death (1, 3, 4). Therefore, aggressive surgical approach to treat and prevent recurrence must be promptly undertaken (1). Bilateral bullectomy through thoracoscopic surgery has been a mainstay of definitive treatment in patients with SBSP (3, 6, 7).

The aim of this report is to describe two cases of SBSP presenting acute severe respiratory distress treated with bilateral tube thoracostomy at the emergency department and ulterior bilateral bullectomy through thoracoscopy.

CASE REPORTS

CASE 1
A 16 years-old Brazilian Amazon boy with no remarkable medical history of respiratory disease presented acute bilateral chest pain and severe sudden dyspnea at home while studying. The patient was brought to the Emergency Department severely dyspneic and an initial diagnosis of asthma was suspected, however the patient's respiratory distress did not improved with the appropriated treatment. Due to progressive worsening on patient's general condition, he was referred to the Intensive Care Unit (ICU) and immediately intubated with an endotracheal tube and mechanically ventilated with 100% oxygen. Plain chest radiography showed bilateral pneumothorax. Bilateral chest tubes were inserted in the fifth intercostal spaces and full expansion of the lungs were achieved. The patient was weaned from mechanical ventilation and extubated 24 hours latter. He was discharged from the ICU on the second day and was referred to the Thoracic Surgery Department due to continuous air-leakage. Chest computed tomography (CT) identified pulmonary bilateral bullae.

The patient was placed under general anesthesia in a supine position with a double-lumen orotracheal tube. Bilateral thoracoscopic surgery was performed and during direct observation of the thoracic cavities, ruptured bullae were found on the apex of both lungs. A partial wedge resection with endo-stapler and parietal pleurectomy to prevent recurrence were performed without any difficulty. Bilateral chest drainage tubes were inserted and the patient was extubated immediately after the surgery. Postoperative course was uneventful and, as complete pulmonary expansion was achieved and no signs of air-leakage were noted 48 hours after surgery, chest tubes were removed. The patient was discharged home on the fifth postoperative day with no complains.

CASE 2
26 years-old non-smoker Brazilian Amazon man was admitted at the General Surgery Department presenting
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acute severe chest pain and moderate dyspnea. The patient’s medical history was unremarkable, except for the presence of arterial hypertension. There was no history of any previous respiratory disease. On physical examination, the patient was alert, cold sweating, extremely pale with nasal flaring and supraclavicular retraction. The trachea was in the middle line. Lung auscultation revealed diminished breath sound throughout both sides of the chest, more markedly on the right. Plain chest radiography showed bilateral collapsed lungs without mediastinal shift (Figure 1).

**Figure 1**
Figure 1: Plain chest radiography showing bilateral pneumothorax without mediastinal shift.

As no other structural abnormality was identified, a diagnosis of SBSP was made and urgent bilateral chest tube drainage was immediately instituted. Although, the patient’s general condition normalized and bilateral collapsed lungs improved considerably, air-leakage continued. Chest CT showed the presence of bilateral bullae. The patient was therefore referred to the Thoracic Surgery Department for definitive operation.

The patient was placed in a supine position with a double-lumen orotracheal tube under general anesthesia. Bilateral thoracoscopic surgery was initiated and during direct observation of the thoracic cavities, ruptured bullae were identified at the superior lobe of both lungs (Figure 2). A partial wedge resection with endo-stapler and parietal pleurectomy to prevent recurrence were performed without any difficulty. Bilateral chest drainage tubes were inserted and the patient was extubated immediately after operation. Postoperative course was uneventful and, as complete pulmonary expansion and no signs of air-leakage were noted 4 days after surgery, chest drainage tubes were removed. The patient was discharged home on the sixth postoperative day with no complains.

**DISCUSSION**

SBSP is an extremely rare life-threatening condition, ranging between 0% to 5.2% of all reported cases of spontaneous pneumothorax (1,4), and occurs predominantly in men, at a ratio of 3:1 (1, 5-8). It has been described in association with infectious and congenital diseases, proliferation of mesenchymal and epidermal cells, and psychiatric disorders (1, 5-8). However, spontaneous primary pneumothorax often occurs due to the rupture subpleural blebs/bullae (9). In the present study, no clinical lung disease that could explain the spontaneous pneumothorax was verified, instead of that, during thoracoscopy both patients were found to have subpleural blebs/bullae.

The mechanisms of bullae formation remain unclear. According to Sahn et al (2000) (2), a possible explanation is that degradation of pulmonary elastic fiber occurs, induced by smoking-related influx of neutrophils and macrophages. This process causes an imbalance in the protease-antiprotease and oxidant-antioxidant systems (9). Kouerinis et al (2004) (12) reported that connective tissue disease,
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which affect the structure, and the synthesis of elastin and type III collagen, may be related to spontaneous pneumothorax. However, no past medical or familial history that could be involved in bullae formation were noted in our patients.

The spectrum of clinical presentation of SBSP is extremely varied, raging from no symptoms to cardiopulmonary failure (1). Mori et al (2005) (8) reported the case of a patient with SBSP without complaints during the treatment of lung adenocarcinoma with multiple lung metastasis, whereas Donovan (1987) (4) described a patient with SBSP that evolved cardiac dysrhythmia. However, sudden chest pain and dyspnea are the commonest symptoms observed (1). In our cases, both patients had chest pain and dyspnea. In the first case an initial diagnosis of asthma was suspected, however plain chest radiography confirmed the presence of bilateral pneumothorax.

Bilateral bullectomy through thoracoscopic surgery has been a mainstay of definitive treatment in patients with SBSP (3, 6, 7). It is a safe, minimally invasive and effective approach to treat SBSP that also decreased postoperative analgesia requirements (1). However, the surgical approach to prevent recurrence is controversial. Pleurodesis achieved through gauze pleural abrasion present a higher recurrence rate than apical pleurectomy (7). In our study, both patients were treated with thoracoscopic surgery and apical pleurectomy was performed to prevent recurrence without complications.

SBSP is known to be an extremely rare life-threatening event that requires prompt and appropriate diagnosis and treatment. The present study reinforces that thoracoscopic surgery is an excellent procedure for the treatment of SBSP, associating an effective surgical approach with low morbidity.

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