CASE REPORT

Simultaneous bilateral spontaneous pneumothoraces in a patient with occupational asthma

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SUMMARY

Spontaneous pneumothoraces are relatively common; however, simultaneous bilateral spontaneous pneumothoraces (SBSP) have rarely been reported. This case report describes the presentation of SBSP in a 60-year-old man with occupational asthma. He was initially started on treatment for life-threatening asthma, but an early deterioration in symptoms prompted an urgent chest radiography that established the diagnosis of bilateral pneumothoraces. This was managed with bilateral needle thoracocentesis followed by stabilisation with intercostal chest drains. He was subsequently referred to the thoracic unit for minithoracotomy, bullectomy and talc pleurodesis. This case highlights the potential difficulties in diagnosing SBSP and advocates the necessity for prompt chest radiography when managing such presentations in the acute setting.

BACKGROUND

The term pneumothorax is defined as the presence of air in the pleural cavity.¹ It can be categorised according to its aetiology into spontaneous, traumatic and iatrogenic.² Primary spontaneous pneumothorax (PSP) describes the occurrence in patients who are otherwise healthy,³ whereas secondary spontaneous pneumothorax (SSP) is associated with underlying lung disease. SP is relatively common with an incidence of 9/100 000 people.⁴ Simultaneous bilateral SP (SBSP), however, is rarely reported and represents only around 1.9% of spontaneous pneumothoraces.⁵ This case report describes the presentation, diagnosis and management of a patient with occupational asthma who presented with SBSP.

CASE PRESENTATION

A 60-year-old Caucasian man presented to the emergency department with a 2-day history of progressive dyspnoea that was not alleviated with regular salbutamol inhaler therapy. A day prior to attendance, he had received a seasonal influenza vaccine at his local general practice. He had one episode of vomiting which settled before admission. He denied associated chest pain, cough, fever or history of trauma. There was no history of recent air travel. His medical history was relevant for occupational asthma from metal and paint spray, partial oesophagectomy for oesophageal cancer 7 years previously, stroke and epilepsy. He was an ex-smoker with an approximate 8 pack-year history.

On initial assessment, he was distressed but speaking in full sentences. Initial observations were

as follows: oxygen saturations of 90% on 6 L of oxygen, a respiratory rate of 28 breaths/min, blood pressure of 184/110 mm Hg, heart rate of 121 bpm and a temperature of 36.9°C. His Glasgow Coma Score was 15/15 with evidence of orientation to person, place and time. Examination of the cardio-respiratory system was unremarkable. His peak expiratory flow rate was 200 L/min which was <50% predicted. He was immediately transferred to the resuscitation room to start treatment for life-threatening asthma, with prompt administration of salbutamol and ipratropium nebulisers in addition to oral prednisolone.

While receiving therapy, there was evidence of symptomatic deterioration with bilateral pleuritic chest pain, increased dyspnoea and agitation. On examination, the trachea was central but there was evidence of decreased air entry bilaterally and inaudible heart sounds. Intravenous access was secured and an urgent portable chest radiograph requested. Arterial blood gas on 6 L of oxygen at this stage revealed evidence of type I respiratory failure with the following biochemical parameters: pH 7.41, PaCO₂ 5.13 kPa and PaO₂ 8.82 kPa. The chest radiograph revealed bilateral pneumothoraces of approximately 30–40% (figure 1).

Immediate bilateral needle thoracocentesis with large bore cannulas (16G) was performed, which resulted in rapid stabilisation. A small-bore chest drain was inserted on the right using the Seldinger technique,⁶ and a large-bore chest drain inserted using blunt dissection on the left after two

Figure 1 Chest radiograph on admission demonstrating bilateral pneumothoraces.

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unsuccessful attempts using the Seldinger technique. He had clinical evidence of pneumomediastinum (Hamman's crunch) postdrain insertion. A CT of the chest demonstrated residual pneumothoraces bilaterally with associated emphysematous changes, multiple peripheral bullae, pneumomediastinum and extensive bilateral surgical emphysema (figure 2; videos 1 and 2). An oesophageal perforation was considered in the differential, but a subsequent CT with oral contrast demonstrated oesophageal diverticulae only with no convincing evidence of oesophageal rupture.

A referral to the regional thoracic surgical unit was made for further management. While awaiting transfer, there was recurrent blockage of the right chest drain which was replaced twice with small-bore drains and definitively with a large-bore drain. Once transferred, there was clinical suspicion of persistent air leak despite the insertion of new large-bore chest drains bilaterally by the thoracic surgeons. He subsequently underwent anterior minithoracotomy, bullectomy and talc pleurodesis. His chest drains were removed 3 days after surgery, and a chest radiograph post-treatment demonstrated resolution of the pneumothoraces (figure 3). The remainder of his admission was unremarkable and he was discharged home without complications.

Subsequent histology report of the lung tissue showed evidence of fibrous walled bullae. There was no evidence to suggest malignancy or histiocytosis X.

DISCUSSION

The relative incidence of pneumothoraces varies depending on its aetiology. PSP is often seen in tall, thin men with no prior history of trauma or lung disease.⁷ Although patients with PSP have no established underlying lung disease, subpleural blebs and bullae are found in most cases of PSP at thoracoscopy. It is postulated that spontaneous rupture of these are implicated in most presentations.⁸ SSP is usually seen in patients with underlying lung disease, the commonest being chronic obstructive pulmonary disease (COPD).⁹ In comparison to PSP, SSP is potentially more life threatening and difficult to manage due to diminished cardiopulmonary reserve.²

In contrast, SBSP is an extremely rare occurrence. It tends to affect males more often than females, usually those in their late 20s.⁹ SBSP is more likely than unilateral pneumothoraces to be associated with underlying lung pathology.⁷ Reported causes of SBSP include infectious diseases (ie, tuberculosis and *Staphylococcus pneumoniae*) and congenital diseases (ie, cystic fibrosis and Marfan's syndrome), proliferation of mesenchymal and epidermal cells (ie, histiocytosis X, sarcoma, mesothelioma

Figure 3 Chest radiograph post-treatment demonstrating resolution of the pneumothoraces.

and lymphoma), COPD and anorexia nervosa.¹⁰ In this case, the patient had a confirmed diagnosis of occupational asthma from work as a metal and paint sprayer, and his presentation may therefore be classified as secondary SBSP.

There has been a previous study linking aluminium and spontaneous pneumothorax,¹¹ in addition to a recent case of SBSP in a metal worker.¹² However, the patient in our case was unable to clarify the types of materials that he was exposed to. With the smoking history and presence of emphysematous changes on the CT scan, there was a clinical suspicion that he may have elements of COPD and this would warrant further investigations on follow-up. Another rare but potentially life-threatening differential diagnosis that must be considered in such presentations is Boerhaave's syndrome.^{13 14} This is of relevance in our patient as he had an episode of vomiting and a history of partial oesophagectomy, but it was confidently excluded after conducting a CT with oral contrast.

The common clinical manifestations of SP are dyspnoea and pleuritic chest pain.² Symptoms in patients with SSP are more severe than those associated with PSP, and are often found to be disproportionate to the size of the pneumothorax.¹ In SBSP, presentations vary greatly, ranging from absence of symptoms to tension pneumothorax and cardiorespiratory failure.^{7 10} Physical signs on examination may include reduced breath sounds, decreased chest expansion and hyper-resonance to

Figure 2 CT of the chest showing residual pneumothoraces postdrain insertions with associated emphysematous change, peripheral bullae and extensive bilateral surgical emphysema.

Video 1 Animated CT chest images in transverse plane.

percussion. Additionally, features such as tracheal deviation, severe tachypnoea, hypotension and cyanosis may be indicators of tension pneumothorax.⁸

In a case of SBSP, a lateralising sign such as tracheal deviation can be an inconsistent finding and features such as acute onset and rapid cardiovascular compromise are more universal.¹⁵ The constellation of clinical symptoms and signs of SBSP may mimic common respiratory pathologies such as exacerbations of asthma or COPD.¹⁶ Indeed, in our case, the patient was initially managed as an exacerbation of asthma until deterioration of symptoms, which prompted a review of the chest radiograph. In view of potential difficulties in diagnosing SBSP as compared to unilateral pneumothorax, the indication for prompt chest radiography to aid definitive diagnosis has been strongly advocated.¹⁷

Immediate chest drain insertion is essential in the initial management of SBSP, and bilateral chest drainage has been recommended.¹⁰ Furthermore, early referral to thoracic units is recommended for definitive surgical intervention to reduce the risk of recurrence.¹ After chest drain insertion, there is currently no gold standard treatment for SBSP.¹⁸ In this case, the patient underwent minithoracotomy, bullectomy and talc pleurodesis.

Video 2 Animated CT chest images in coronal plane.

Open thoracotomy and video-assisted thoracoscopic surgery (VATS) are two surgical options for definitive treatment and involve surgical pleurectomy, pleural abrasion, talc pleurodesis and bullectomy.¹⁹ A recent review concluded that VATS pleurectomy is comparable to open pleurectomy, but there is a slight increase in recurrence rate.^{20 21}

Learning points

- ▶ Simultaneous bilateral spontaneous pneumothoraces (SBSP) are rare but life-threatening presentations to consider and exclude.
- ▶ SBSP may mimic common respiratory pathologies and therefore, prompt chest radiography is imperative to establishing an accurate diagnosis.
- ▶ Immediate chest drain insertion is essential in the acute management of SBSP.
- ▶ Early referral to the thoracic unit is recommended for definitive surgical intervention to reduce the risk of recurrence.

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