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Case report

Partial ambulatory management of severe secondary spontaneous pneumothorax

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ABSTRACT

Secondary spontaneous pneumothorax can be difficult to manage especially in patients with advanced lung disease and respiratory failure. Such patients are unfit for surgery and may endure prolonged hospital stays with chest drains in situ. We describe two such cases where the air leak was persistent despite conventional management. Ambulatory devices which we ordinarily use to manage pneumothoraces in patients with a good lung reserve, were employed as a palliative measure. The strategy not only allowed the patients to return home, but also resulted in healing of the air leak which had persisted with conventional management.

1. Background

The clinical burden of secondary spontaneous pneumothorax (SSP) is significant and its management can be complex. Patients with SSP require a longer hospital stay, may need multiple procedures, face complications and sometimes have to go through the frustration of potential treatment failure. Management is particularly complex in advanced and end-stage lung disease. There is some evidence to support the use of ambulatory devices in primary spontaneous pneumothorax (PSP) [1]. However, the evidence to treat SSP in end-stage lung disease with ambulatory devices is limited [1].

2. Case report

2.1. Case 1

A 76-year-old gentleman with severe COPD on long term oxygen therapy (LTOT) was admitted with decompensated breathlessness. His BMI was 14.6 (36 kg), oxygen saturations 82% on air, blood pressure 140/90 mmHg and pulse 130/min. Arterial pH 7.27, pO2 9.31kPa and pCO2 7.71kPa on 35% oxygen. Six years previously, he was treated with a chest drain for a right pneumothorax. Chest radiograph (CXR) on admission revealed a right pneumothorax and lung collapse (Fig. 1). A 12Fg Seldinger chest drain was inserted. Repeat CXR showed re-expansion of the lower zone but the upper zone remained deflated despite negative pressure suction of 1 kPa. The drain later migrated out of pleural cavity resulting in surgical emphysema and a replacement drain was inserted.

With the base of the lung in contact with the chest wall, talc slurry was instilled via the chest tube hoping to achieve partial pleurodesis and prevent complete collapse of the lung in future. Post pleurodesis, the patient was treated for hospital acquired pneumonia with intravenous antibiotics. The air leak persisted and hence, a repeat pleurodesis was planned. The patient refused further intervention and expressed a strong desire to go home with a chest drain in-situ despite potential risks. Following a successful in-patient trial of a Pneumostat™ valve (Atrium Medical Corporation, Hudson, NH, USA) attached to the drain (Fig. 2), discharge home was facilitated as per the patient's wishes. Four days later he was readmitted due to increase in breathlessness. CXR showed reexpansion of the lung but the air leak persisted. A repeat talc pleurodesis and a subsequent blood patch pleurodesis proved futile. The patient continued to express wishes to return home and to facilitate this, the drain was replaced with a Rocket® Pleural vent device™(Fig. 3) (Rocket Medical, Washington, UK). He was allowed to go home with follow-up in the ambulatory care unit (ACU). The patient was reviewed every 4–5 days and on day 9 post discharge, the affected lung had fully re-expanded with complete resolution of the air leak. Twenty months on, the patient continues to live independently.

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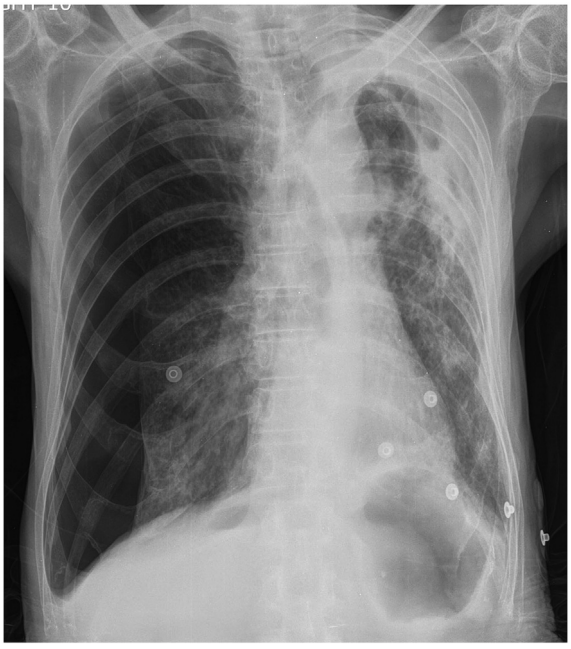

Fig. 1. CXR showing large right pneumothorax.

2.2. Case 2

A 77-year-old lady with COPD and bronchiectasis on LTOT presented with sudden breathlessness. Four months prior to this episode, she had a left sided pneumothorax which was treated with a chest drain. Her pulse was 101 beats/min, respiration 30/min and oxygen saturation 70% on air. Arterial pH was 7.15, PO2 6 kPa and PCO2 12.6 kPa breathing room air. CXR showed a left pneumothorax (Fig. 4) and a 12 Fg Seldinger chest drain was inserted. She also required non-invasive ventilation (NIV) for type II respiratory failure. On the 3rd day, the lung had fully expanded and the chest drain was removed after talc pleurodesis. Subsequently, the pneumothorax recurred and a further chest drain was inserted. The lung remained partially collapsed despite suction.

The underwater seal was replaced with a Pneumostat™ valve whilst the patient was still an in-patient as she was very keen to go home despite the risks. However, this was not well tolerated and she was then trialled with a Rocket® pleural vent inserted in the second intercostal space, mid-clavicular line. The Seldinger chest drain was kept closed and removed 48 hours later as she remained well on the pleural vent alone. At post-discharge review 5 days later the CXR showed no lung expansion. However, by day 10, the air leak had ceased and the pneumothorax had completely resolved. Ultrasound chest showed a small left pleural effusion and 120 ml of straw coloured fluid was aspirated through the pleural vent before its removal. The pleural effusion was presumed to be due to irritation of the pleura by the vent device. Eighteen months on, the patient remains well at home with no further hospital admissions.

Fig. 2. Pneumostat valve attached to chest drain.

Fig. 3. Rocket Pleural vent device in situ.

3. Discussion

The consequences of a pneumothorax in patients with existing lung disease are significantly greater than in PSP, and the management is potentially more difficult. The risk of recurrence of SSP is as high as 40–50% in the first 4 years following an index episode [2].

Patients with SSP are often symptomatic and usually need intervention regardless of pneumothorax size [3]. Due to end-stage disease and frailty, patients with SSP on a background of respiratory failure are particularly challenging to treat. Severe parenchymal compromise, increased tendency to hypercapnia, continuous dependence on oxygen and other factors like cachexia, osteoporosis, poor mobility and hospital acquired infection can lead to delayed rehabilitation.

Patients with end stage lung disease are usually well aware of their terminal condition which makes them yearn to spend their precious time with loved ones at home. Prolonged hospitalisation

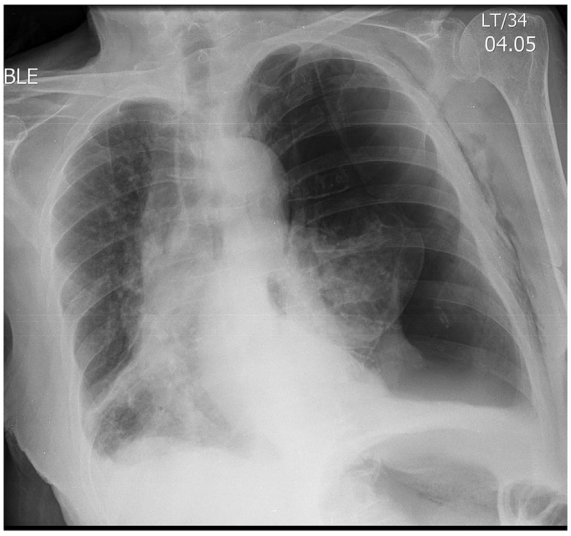

Fig. 4. CXR showing large left pneumothorax.

can incur serious distress and frustration to patients which is deleterious to their morale. Therefore, SSP in this difficult cohort of patients should be dealt with effectively and in accordance with their wishes. One novel way of addressing these issues is the use of ambulatory one-way valve devices.

There are various ambulatory devices available which are convenient, light weight and can be deployed effectively. They are available as valves attachable to chest drains such as the Pneumostat™ device (Fig. 2) instead of a bottle with an underwater seal. Alternatively, stand-alone devices such as the pleural vent can be inserted in the second intercostal space (Fig. 3). These devices are low resistance as they are devoid of lengthy tubing and underwater seal systems. They enable early mobilisation and patient comfort. Post insertion care is less cumbersome and not labour intensive due to reduced tubing and no drain bottles. Additionally, the risk of a chest drain becoming dislodged may be reduced as the devices are lightweight. Currently, there is some evidence for the use of ambulatory devices in PSP[1]. There are also multicentre trials ongoing which may lead to a change in practice and help to refine the current UK and international guidelines [4]. Unfortunately, when it comes to SSP, the evidence is limited [5] and for SSP cases with end-stage lung disease, there are no studies.

These two cases clearly demonstrate the role of a combined approach for complex cases of SSP with end-stage lung disease who are not fit for surgical intervention. They also show that severe secondary pneumothorax may be managed in the community when a conventional approach fails. In all three cases, initial management with drains and suction was not fruitful. Medical pleurodesis also failed but the subsequent ambulatory management with ambulatory devices (Rocket Pleural vent™ and Pneumostat™) led to positive outcomes. This raises the possibility of a role for ambulatory devices in the initial management of complex SSP which, however needs to be investigated further before they are routinely used.

Both the patients had a pneumothorax prior to this episode and perhaps an opportunity to prevent the second pneumothorax was missed by not performing medical pleurodesis during the first presentation as per the American College of Chest Physicians consensus statement [6]. It is now our routine practice to carry out talc pleurodesis at initial presentation in severe secondary pneumothorax although this is yet to be recommended in the BTS guidelines [3].

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