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CASE FOR DIAGNOSIS

Bilateral pneumothorax resulting from a diagnostic thoracentesis

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CASE REPORT

This is the case of a 61-yr-old male who underwent a three-stage oesophagectomy and substernal gastric interposition as surgical treatment for a tumour 3, node 0, metastasis 0 poorly differentiated squamous cell carcinoma of the middle oesophagus. Unusual posterior mediastinal anatomy (the thoracic aorta and thoracic duct were very deep, and the distance between the trachea and anterior border of the thoracic vertebrae was unusually small) resulted in complex surgery. As a result, attempts at the traditional Foley technique to transpose the stomach *via* the posterior mediastinum were repeatedly unsuccessful. This necessitated the use of a retrosternal tunnel, *i.e.* substernal gastric interposition.

A chest radiograph performed 12 weeks following surgery in order to investigate persistent progressive shortness of breath on exertion demonstrated bilateral pleural effusions (fig. 1). An elective diagnostic left-sided pleural aspirate was performed. The patient experienced acute shortness of breath and pleuritic chest discomfort immediately post-procedure. The chest radiograph at this time is shown (fig. 2). A chest drain was inserted (fig. 3).

FIGURE 1. Chest radiograph demonstrating bilateral pleural effusions (arrows) and surgical clips from previous oesphagectomy (arrow head).

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FIGURE 2. Chest radiograph revealing a left-sided pneumothorax.

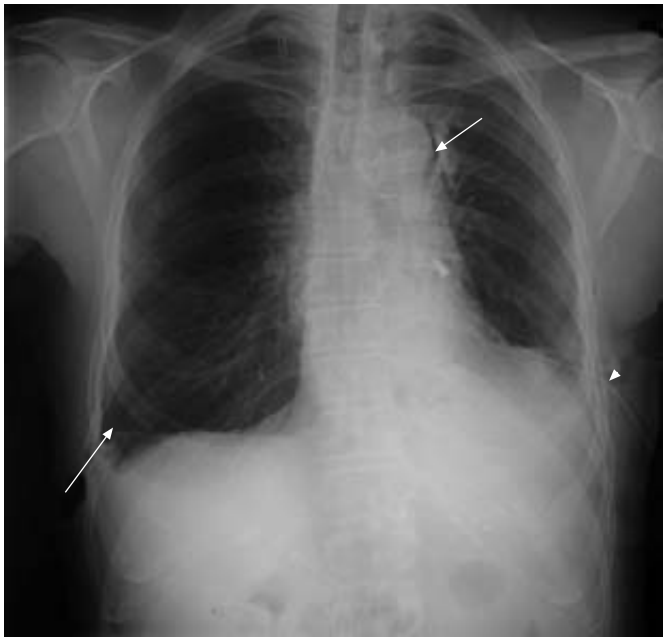

FIGURE 3. Chest radiograph showing a chest drain *in situ* in the left hemithorax (arrow head) and bilateral pneumothoraces (arrows).

BEFORE TURNING THE PAGE, INTERPRET THE RADIOGRAPHS AND SUGGEST A DIAGNOSIS

INTERPRETATION

Bilateral pneumothoraces are seen with a single chest drain *in situ* in the left pleural space (fig. 3). Insertion of the chest drain was accompanied by the prompt resolution of symptoms. The following day there was complete resolution of the ipsilateral and contralateral pneumothoraces *via* the single chest drain.

Diagnosis: Bilateral pneumothoraces secondary to a Buffalo chest.

DISCUSSION

Each lung is enveloped in a pleural sac. The pleural sac consists of two serous membranes: the parietal pleura, which lines the thoracic wall, mediastinum and diaphragm; and the visceral pleura, which invests the lung. A potential space called the pleural cavity exists between the parietal and visceral pleura. A pneumothorax occurs when air fills this cavity. The two pleural sacs are separate structures [1]; therefore, a pneumothorax is unilateral, unless a communication exists between each pleural cavity.

A communication between each hemithorax can be congenital [2], iatrogenic or traumatic in aetiology. It has been reported following procedures involving median sternotomy [3], laparoscopic surgery [4, 5] and heart and lung transplants [6]. In surgical cases, the communication results from the disruption of the anterior pleural reflections [6].

An interpleural communication results in a single pleural space. This is termed 'Buffalo chest' because North American buffalo, or bison, lack an anatomical separation between the two hemithoraces. This facilitated death by bilateral tension pneumothoraces from a hunter's single arrow to the chest [7].

Procedures that carry a risk of pneumothorax can result in bilateral pneumothoraces, if performed on patients who previously underwent surgery which predisposes to interpleural defects. In the current case, this phenomenon followed a pleural tap in a patient post-oesophagectomy. To the present author's knowledge, this is the first reported case of Buffalo chest following oesophageal surgery. In another case report [3], the condition complicated subclavian vein catheterisation in a patient who had previously undergone a median sternotomy. Cardiothoracic operations that can result in a single pleural space are increasing in type and frequency. Procedures with pneumothorax as a possible complication are far more numerable than in previous years, *e.g.* permanent pacemaker insertion and transbronchial biopsies. Therefore, the bilateral pneumothoraces phenomenon is likely to become more prevalent.

The lifespan of an iatrogenic or traumatic interpleural communication varies. It may be a transient post-operative phenomenon before closure by scar tissue [8] or it may be persistent [9]. One study has reported bilateral pneumothoraces complicating transbronchial biopsy in a patient 2 yrs after a heart and lung transplant [6]. In the present case, the patient underwent surgery only 12 weeks previously.

In the presence of an interpleural connection, an air leak on one side can result in bilateral pneumothoraces. This can be potentially life-threatening if it is under tension [9]. There are few case reports of spontaneous bilateral pneumothoraces [10]. Their occurrence is more commonly seen in patients with obvious risk factors for interpleural defects, as outlined previously. One retrospective study has reported bilateral pneumothoraces in six out of 72 heart–lung transplant patients in the immediate post-operative period [8].

Different approaches to the treatment of Buffalo chest have been reported in the literature. These include a conservative approach, unilateral chest drain and bilateral chest drain insertion. Successful outcomes using the single chest drain approach have led some to advocate this method as the standard treatment for bilateral pneumothoraces in cardiothoracic surgery patients [11]. However, a unilateral chest drain does not always achieve resolution of the contralateral pneumothorax. It has been proposed that small interpleural defects may act as a valve, facilitating unidirectional flow of air between the two pleural cavities [5]. In these situations, a second drain is necessary.

CONCLUSION

Surgery can compromise the integrity of the pleurae, resulting in communicating hemithoraces and a single pleural space. In such situations, the occurrence of a pneumothorax may progress to potentially fatal bilateral pneumothoraces. It is necessary to be mindful of this when performing any procedure that carries a risk of inadvertent pneumothorax in patients with risk factors for Buffalo chest, and to advise of this possible complication. The present authors' review of the English medical literature revealed no case report of this phenomenon in patients following oesophagectomy. Therefore, it is important to assess whether the pleura has been manipulated during surgery prior to performing thoracentesis. The present case report aims to increase appreciation of this phenomenon.

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