





Secondary spontaneous pneumothorax: a time to re-evaluate management

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Introduction

Spontaneous pneumothorax (SP) was first described in 1819 by Laennec and refers to the presence of air within the pleural space (i.e. interspersed between the lung and the chest wall). It has been traditionally categorized as primary or secondary, depending on the underlying lung disease [1,2]. Secondary SP (SSP) is frequently due to cystic fibrosis, asthma, chronic obstructive pulmonary disease, interstitial lung disease (ILD), and connective tissue-related ILD (CTD-ILD) [2].

The primary goal of treatment in SP is the re-expansion of the lung. Current evidence supports a conservative treatment for primary SP [3], but less emphasis has been placed on the management of SSP in the last 10 years [4]. The current British Thoracic Society (BTS) guidelines recommend hospitalization and placement of a small-bore chest drainage for an SSP patient with evidence of a large pneumothorax or severe symptoms including breathlessness [5]. However, there is still considerable heterogeneity in the management of SSP. This heterogeneity is likely due in part to the myriad of therapeutic choices defined by

Abstract

Spontaneous pneumothorax (SP) is defined as the presence of air in the pleural cavity and remains a significant health problem. Secondary SP (SSP) is associated with underlying lung diseases, such as cystic fibrosis, chronic obstructive pulmonary disease (COPD), and interstitial lung disease (ILD), and is associated with poor outcomes. The current guidelines in the management of SSP have not been updated since the last decade; therefore, new protocols focused on the management of SSP should be evaluated. We present two cases of patients admitted with SSP who were treated conservatively due to haemodynamic stability. In both cases, the pneumothoraces resolved without further complications.

current guidelines which might contribute to differences in care decisions by clinicians [6].

We present two cases of SSP, one due to CTD-ILD and one due to coronavirus disease 2019 (COVID-19). Both cases were successfully treated with a conservative management without recurrence at the time of the current manuscript.

Case Report

The first case is a 35-year-old female with a medical history of Sjögren's syndrome (SjS) diagnosed in 2019. Her lung function at the time of diagnosis showed a severe restrictive pattern (forced vital capacity (FVC): 37%, 1.07 L) and a 6-min walk test of 446 m. The patient had missed recent follow-up appointments due to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, and had stopped taking her medications due to economic issues. She began to experience increased shortness of breath (modified Medical Research Council, mMRC3) and coughing episodes that made her unable to perform day-to-day activities.

One week before her admission, her dyspnoea worsened (mMRC4) and she developed sudden chest pain in the right hemithorax. Upon arrival to our hospital, a computed tomography (CT) scan of the chest was performed which showed a pneumothorax (Fig. 1A). After reviewing the case with a multidisciplinary team, it was concluded that the patient was otherwise haemodynamically stable. She was treated with supplemental oxygen at 10 L/min through a reservoir facemask device, morphine IV 0.83 mg/h on infusion, and prednisone 20 mg daily. She was closely monitored for the next 24 h, and her work of breathing improved without developing haemodynamic instability. A second CT scan of the chest was performed 72 h after starting treatment and showed a complete resolution of the pneumothorax (Fig. 1B).

The second patient is a 76-year-old male with a medical history of hypertension and chronic heart failure, who was diagnosed with a SARS-CoV-2 infection in August 2020. It is notable that the patient had initiated at-home supplementary oxygen and sodium hypochlorite (1 mL by mouth every 24 h for one month). Due to persistent symptoms, he was evaluated by a primary care physician and placed on dexamethasone and antimicrobial therapy for the following two weeks. Then, he was referred to continue the evaluation in our respiratory clinic on ambulatory basis. A CT scan of the chest revealed extensive lung damage with low lung function (FVC 41%, 1.56 L) and a 6-min walk test of 392 m. Four months after being diagnosed with COVID-19, he complained of sudden chest pain in the right hemithorax while walking with shortness of breath (mMRC3), which improved with the administration of supplementary flow oxygen (3 L/min) at home. Due to persistent symptoms, the patient was admitted to our hospital for evaluation.

Upon arrival, the patient was haemodynamically stable. A CT scan of the chest was performed showing a right pneumothorax (Fig. 2A). The treatment was initiated with supplementary oxygen at 15 L/min in addition to morphine infusion (0.83 mg/h) and prednisone 20 mg daily. During his hospital stay, there was an improvement in

dyspnoea and chest pain. A second CT scan of the chest was performed in the following 72 h (Fig. 2B), which showed an incomplete expansion of the pneumothorax. As the patient was clinically stable, it was decided to continue the same strategy for the next 72 h. One week after admission, a new CT scan of the chest was performed showing a complete re-expansion of the pneumothorax (Fig. 2C).

Discussion

SSP is associated with high morbidity and mortality. The annual incidence of SSP is 6.3 and 2 per 100,000 men and women, respectively [7]. The incidence of SP in patients with CTD-ILD is not well known; on the other hand, the incidence of pneumothorax due to SARS-CoV-2 infection is only reported as case reports/case series. Lung damage caused by CTD-ILD and COVID-19 might represent a broad group of diffuse parenchymal lung injury patterns characterized by varying degrees of inflammation and fibrosis with impaired lung function, and is potentially associated with an increased risk of morbidity and mortality [8]. Recent data have shown that the development of SSP in subjects with CTD-ILD is associated with a lower 10-year survival rate (29.6% vs. 81.3%) [5]. Retrospective studies of patients with COVID-19 suggested that an SP might occur in 1% of those requiring hospital admission, 2% in patients requiring intensive care unit (ICU) admission, and in 1% of patients who die from the infection [9].

The majority of patients with SSP have compromised lung function due to underlying disorders, and therefore, it often presents as a life-threatening disease requiring immediate action [10]. The lower the level of baseline FVC, the higher the risk of poor outcomes due to pneumothorax [5]. Even though our patients' baseline lung function revealed a severe restrictive pattern (FVC 37% of the predicted value in the first patient and 41% in the second patient), they have a good response to the conservative treatment.

Current recommendations in the management of SSP included interventional drainage or chest tube insertion,

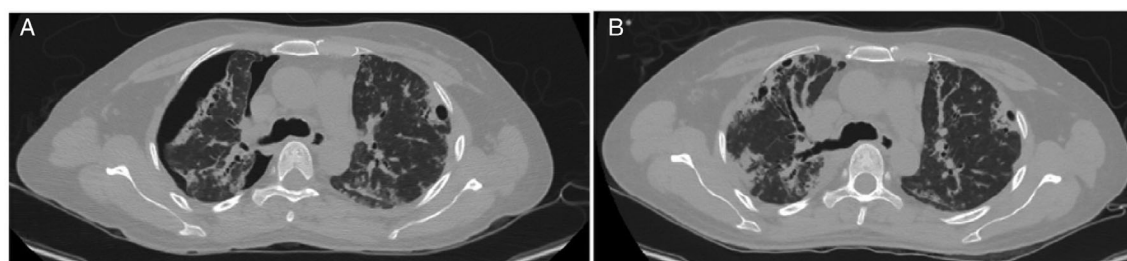


Figure 1. Chest computed tomography (CT) scan (patient 1). (A) Partial pneumothorax in the right lung. (B) Right lung re-expansion 72 h after supplementary oxygen.

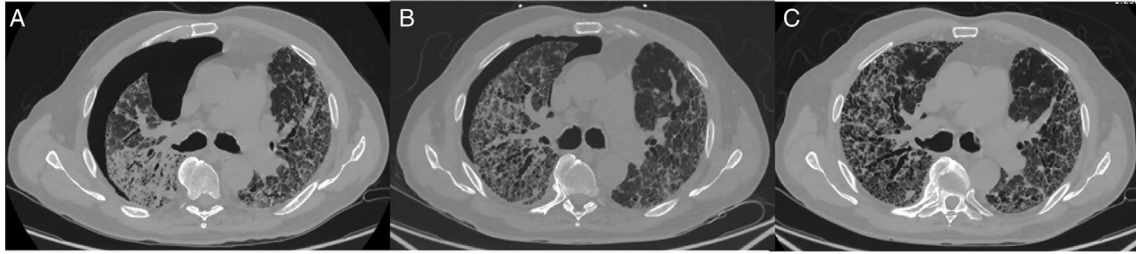


Figure 2. Chest computed tomography (CT) scan (patient 2). (A) Partial pneumothorax in the right lung. (B) Partial re-expansion in the right lung 72 h after supplemental oxygen. (C) Right lung re-expansion seven days after supplemental oxygen.

and often hospitalization is required and prolonged [11]. Despite recommendations for interventional actions in SSP, it is not totally clear if current approaches should be applied to every patient. We must consider that 10 years have passed since the last update in the guidelines of SSP, and not much emphasis has been placed on the management. Our cases were successfully treated with conservative management, despite them initially having a higher intensity in their shortness of breath. After treatment with oxygen and morphine, there was a remarkable improvement in their symptoms after three and seven days, and both pneumothoraces resolved. Therefore, we might consider the heterogeneity of symptoms on initial evaluation to timely decisions regarding the better treatment of SSP in clinical practice [10].

In the management of primary SP, recent evidence suggests that conservative treatment has been associated with fewer pneumothorax recurrences, hospitalization days, likelihood of prolonged chest tube drainage, need for surgery, and adverse events than interventional management [5]. However, conservative management has not been recently evaluated in patients with SSP, specifically those without haemodynamic instability. To the best of our knowledge, a recent report by Wang et al. analysed how often there were same-admission recurrence prophylaxis (SARPs) performed in SSP admissions in the US. Chest tube insertion was performed in 66.98% of SSP admissions, 34.3% received SARP and 20.43% of patients received a conservative management without recurrence of SSP [12]. Therefore, as a take-home message, a conservative management strategy might be considered in patients with SSP who complain of shortness of breath without haemodynamic instability. However, more studies are needed to address this question in order to reduce the number of adverse events regarding an invasive approach.

The main limitations of our study include that these results should be considered after a careful evaluation of a patient with SSP. An intervention (chest tube insertion) should be considered if the patient does not have any improvement in symptoms as well as if the patient's condition became haemodynamically unstable.

Disclosure Statement

Appropriate written informed consent was obtained for publication of this case report and accompanying images.

Author Contribution Statement

Arturo Cortes-Telles: data collection, analysis, and discussion. Diana Lizbeth Ortíz-Farías: data collection, analysis, and discussion. Felipe de Jesús Hernández Pérez: data collection, analysis, and discussion. Dulce Rodríguez Morejon: data collection.

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