



ORIGINAL RESEARCH PAPER	Pulmonary Medicine
SECONDARY SPONTANEOUS TENSION PNEUMOTHORAX IN A PATIENT WITH SEVERE COPD AND BULLOUS EMPHYSEMA: A CASE REPORT FROM A TERTIARY CARE CENTRE	KEY WORDS:

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ABSTRACT

Background: Secondary spontaneous pneumothorax (SSP) is a serious and potentially life-threatening complication of chronic obstructive pulmonary disease (COPD). The risk is significantly increased in patients with advanced emphysema and bullous lung disease. Early diagnosis and prompt management are essential to prevent respiratory failure and hemodynamic compromise. **Case Presentation:** A 68-year-old male, known case of severe COPD with a 40 pack-year smoking history, presented to the emergency department with sudden onset left-sided pleuritic chest pain and progressive breathlessness. On admission, oxygen saturation was 90% on room air. Physical examination revealed decreased breath sounds over the left hemithorax with respiratory distress. Chest radiograph demonstrated a large left-sided pneumothorax with significant collapse of the underlying lung. HRCT chest revealed a large left-sided tension pneumothorax with rightward mediastinal shift, collapse of left lower lobe segments, multiple large subpleural bullae with fibrotic changes in the left upper lobe, and focal paraseptal emphysema in the right upper lobe. **Management and Outcome:** The patient was immediately managed with oxygen supplementation and intercostal chest drain (ICD) insertion. Serial radiographs demonstrated progressive lung re-expansion and symptomatic improvement. Laboratory investigations including complete blood count, renal function tests and liver function tests were within normal limits. The ICD was removed after seven days and the patient was discharged in stable condition with smoking cessation counselling and follow-up advice. **Conclusion:** Secondary spontaneous tension pneumothorax should be considered in all COPD patients presenting with acute deterioration and pleuritic chest pain. Prompt diagnosis, radiological evaluation and early pleural decompression are crucial for favourable outcomes.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality worldwide. Progressive destruction of alveolar walls results in emphysematous changes, bullae formation and impairment of lung mechanics. Secondary spontaneous pneumothorax (SSP) occurs when air accumulates within the pleural cavity in patients with underlying lung disease. COPD remains the most common cause of SSP in adults.

The incidence of SSP increases with advancing age and smoking exposure. Patients with bullous emphysema are particularly susceptible because rupture of subpleural bullae can result in leakage of air into the pleural space. Unlike primary spontaneous pneumothorax, SSP usually presents with greater respiratory compromise due to limited pulmonary reserve. Tension pneumothorax represents the most severe form and may lead to mediastinal shift, cardiovascular instability and death if not recognized promptly.

We report a case of secondary spontaneous tension pneumothorax in a patient with severe COPD and extensive bullous emphysema who was successfully managed with intercostal chest drainage.

CASE PRESENTATION

A 68-year-old male presented to the emergency department with complaints of sudden onset left-sided pleuritic chest pain and progressively worsening shortness of breath for one day. The patient was a chronic smoker with a cumulative smoking exposure of approximately 40 pack-years and was a known case of severe COPD receiving bronchodilator therapy.

There was no history of trauma, recent invasive procedures or previous pneumothorax. On examination, the patient appeared dyspneic and tachypneic. Oxygen saturation measured on room air was 90%. Clinical examination revealed markedly reduced air entry over the left hemithorax along with hyperresonance on percussion. Cardiovascular examination was otherwise unremarkable.

INVESTIGATIONS

Routine laboratory investigations including complete blood count, liver function tests and renal function tests were within normal limits. Chest radiography revealed a large left-sided pneumothorax with significant collapse of the left lung. A visible pleural line with absence of peripheral lung markings was noted. The findings were suggestive of a large secondary spontaneous pneumothorax.

HRCT chest was subsequently performed for detailed evaluation. Imaging demonstrated a large left pleural air collection with collapse of left lower lobe segments and rightward shift of the mediastinum and trachea, consistent with tension pneumothorax. Multiple large subpleural bullae with fibrotic changes were observed in the left upper lobe. Focal paraseptal emphysematous changes were noted in the apical segment of the right upper lobe. No pleural effusion was identified.

Table 1. Clinical Profile

Age	68 years
Sex	Male
Smoking History	40 pack-years
Underlying Disease	Severe COPD
SpO2 at Admission	90% on room air
CBC	Normal
LFT	Normal
RFT	Normal
Diagnosis	Secondary Spontaneous Tension Pneumothorax

Table 2. Radiological Findings

Chest X-ray	Large left-sided pneumothorax Partial collapse of left lung Absence of peripheral lung markings
HRCT Chest	Left-sided tension pneumothorax Rightward mediastinal shift Collapse of left lower lobe segments Multiple large subpleural bullae Left upper lobe fibrotic changes Right upper lobe paraseptal emphysema



FIGURE 1. Pre-ICD chest radiograph showing large left-sided pneumothorax.



Figure 2. Post-ICD chest radiograph showing re-expansion of the left lung.

MANAGEMENT AND OUTCOME

The patient was immediately started on supplemental oxygen therapy. Considering the large size of pneumothorax and radiological evidence of tension physiology, urgent intercostal chest drain insertion was performed.

Following pleural decompression, the patient showed significant symptomatic improvement. Serial chest radiographs demonstrated progressive lung re-expansion and reduction in pleural air collection. No major procedure-related complications were observed during hospitalization. The intercostal chest drain was maintained until complete clinical and radiological improvement was achieved and was removed after seven days. The patient was discharged in stable condition with advice regarding smoking cessation, inhaled bronchodilator therapy and regular pulmonary follow-up.

DISCUSSION

Secondary spontaneous pneumothorax is a well-recognized complication of advanced COPD and carries higher morbidity and mortality than primary spontaneous pneumothorax. The underlying mechanism is usually rupture of emphysematous bullae located near the pleural surface. Chronic smoking remains the strongest risk factor for both COPD progression and development of SSP.

In the present case, the patient had severe COPD with a substantial smoking history of 40 pack-years. HRC'T demonstrated multiple large subpleural bullae and emphysematous changes, supporting bullae rupture as the likely pathophysiological mechanism. The presence of mediastinal shift on C'T indicated tension physiology and emphasized the urgency of intervention.

Clinical presentation of SSP typically includes acute onset dyspnea and pleuritic chest pain. Hypoxemia is common due to reduced ventilatory reserve. In our patient, oxygen saturation was 90% on room air at presentation, reflecting significant respiratory compromise.

Chest radiography remains the initial imaging modality of choice; however, HRC'T provides superior assessment of

underlying parenchymal disease and bullous abnormalities. In this case, HRC'T was particularly useful in demonstrating bullous emphysema and confirming tension pneumothorax. Management of SSP depends on the size of pneumothorax and severity of symptoms. Large pneumothoraces generally require intercostal chest drainage. Prompt pleural decompression remains the cornerstone of therapy in tension pneumothorax. Early intervention in our patient resulted in rapid symptomatic relief and successful lung re-expansion.

Smoking cessation remains one of the most important long-term interventions to reduce recurrence risk and slow progression of COPD. Continued pulmonary follow-up is necessary because recurrence rates remain significant in patients with underlying emphysematous lung disease.

CONCLUSION

Secondary spontaneous tension pneumothorax is a potentially fatal complication of severe COPD and bullous emphysema. Acute pleuritic chest pain and worsening dyspnea in COPD patients should raise immediate suspicion for pneumothorax. Prompt radiological diagnosis and early intercostal chest drainage can significantly improve outcomes and prevent life-threatening complications.

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