Secondary Spontaneous Tension Pneumothorax: A Case Report of an Uncommon Presentation of Post-Tuberculosis Sequelae

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Abstract

Introduction. Tuberculosis (TB) remains one of the top life-threatening infectious diseases worldwide. Even after completion of treatment, numerous patients had post-TB sequelae as a consequence of lung damage during TB infection. We reported an uncommon case of secondary spontaneous tension pneumothorax in a patient with post-TB sequelae.

Case Presentation. A 68-year-old smoker man presented with sudden shortness of breath since 2 hours ago. He had a history of pulmonary TB 15 years ago which had completed antituberculosis treatment and had been experiencing symptoms associated with post-TB sequelae for the last 1 year. Physical examinations and chest X-ray showed tension pneumothorax. The recent GeneXpert sputum test showed a negative result for Mycobacterium tuberculosis. We performed urgent needle decompression, followed by chest tube insertion. He responded well to the treatment and was discharged after the seventh day with no residual pneumothorax.

Conclusion. Spontaneous tension pneumothorax in patients with post-TB sequelae is rare and has a complex pathogenesis. It may include several factors including pulmonary fibrosis, pleural adhesion, ruptured open healed cavity or bullae, and lung damage from cigarette smoking. It should be managed by urgent needle decompression followed by chest tube thoracostomy.

Keywords: Tension pneumothorax, tuberculosis, sequelae, needle decompression, chest tube.

Introduction

Tuberculosis (TB) is still one of the most important infectious disease and remaining one of the top causes of mortality worldwide.1 Despite ongoing attempts for early diagnosis and treatment, TB still represents one of the biggest health risks for the majority of the developing countries with a estimated prevalence of 647/100,000 population in Indonesia.2 A growing body of research indicates that after completion of TB treatments, despite complete bacteriological cure has occurred, a sizeable portion of TB survivors have post-TB sequelae, as a result of damage of lung tissues during the course of active TB.3 The risk of morbidity and mortality from respiratory causes increases if these alterations lead to pulmonary dysfunction, which may range from minor symptoms to life-threatening dyspnea.4

One of the fatal complications of pulmonary TB is spontaneous pneumothorax, with an incidence rate of 0.6-1.4%.5 The frequency of secondary spontaneous pneumothorax due to pulmonary TB has also grown with the recent emergence of TB cases. Although it commonly occurs in patients with active pulmonary TB, spontaneous pneumothorax can also rarely occur in patients who have recovered from TB, as a consequence of post-TB sequelae. The presence of old pulmonary TB lesions in patients with secondary spontaneous pneumothorax can lead to more difficult management.6

Tension pneumothorax is the most severe and life-threatening type of pneumothorax that develops when air is continuously entrapped in pleural space through a one-way valve mechanism, compressing the lungs and mediastinum, which can cause obstructive shock and death. Early identification and intervention of tension pneumothorax are crucial to prevent rapid hemodynamic deterioration.2 Tension pneumothorax is typically associated with trauma and the incidence of spontaneous occurrence of tension pneumothorax in post-TB sequelae is very rare and not yet reported in the literature. Here we report a case of secondary spontaneous tension pneumothorax in a 68-year-old man with a history of pulmonary TB presented in a regional public hospital in Ketapang Regency, West Kalimantan, Indonesia.

Case Presentation

A 68-year-old man from a rural region of Ketapang Regency in Indonesia presented to the emergency department with complaints of sudden shortness of breath since 2 hours ago accompanied by right-sided pleuritic chest pain. There was no history of trauma or injury to the chest. He is an active smoker for the last 20 years (a pack per day). He had a history of pulmonary tuberculosis (TB) 15 years before and completed 6 months of treatment with antituberculosis drugs with a complete bacteriological cure. For the last a year, he had a history of recurrent respiratory infections associated with post-TB sequelae which usually get better after treatment at a primary healthcare facility.

On initial evaluation, he was alert but in respiratory distress with a respiratory rate of 32 breaths/min using accessory muscles of respiration, tachycardic with a regular heart rate of 112 beats/min, blood pressure of 110/80 mmHg, and body temperature of 36.6°C. His pulse oximetry saturation was 72% on room air, which increased to 90% with a non-rebreather mask at 10 L/m supplemental oxygen. Physical examination revealed trachea deviated to the left, jugular venous distention, decreased breath sounds over the right hemithorax with hyper-sensorous on percussion. Another physical examination was unremarkable. Emergency chest X-ray was performed showing the collapse of the right lung with a shift of trachea, mediastinum, and heart to the left hemithorax indicating tension pneumothorax and the left lung had fibrotic lesions (Figure 1 left). The electrocardiogram showed sinus tachycardia without other significant changes. Laboratory examination showed leukocytosis with a white blood cell count of 15.300/µl without other abnormalities. The patient was initially treated with emergency needle decompression by using a 14G-sized intravenous catheter inserted into the second intercostal space of the midclavicular line on the right hemithorax, which was followed by an audible release of air and rapid improvement of the vital signs (Figure 1 right).
After needle decompression, a definitive chest tube thoracostomy was then performed. There were bubbles seen in the water-sealed drainage (WSD) bottle with good undulation and positive force expiratory bubbles. An immediate chest x-ray was performed after chest tube insertion, which confirmed adequate placement of the chest tube with the tip at the level of the sixth posterior costae and improvement of the pneumothorax (Figure 2).

![Figure 1. Left: Chest X-ray showing the collapse of the right lung with contralateral mediastinal shift indicating tension pneumothorax. Right: Needle decompression was performed with a 14G IV catheter on the right hemithorax at the second intercostal space of the midclavicular line.](image1)

![Figure 2. Immediate chest x-ray after chest tube insertion confirmed adequate placement of the chest tube with an improvement of pneumothorax.](image2)

![Figure 3. Left: Serial chest x-ray on the 4th day showed minimal residual pneumothorax of the right lung. Right: Serial chest x-ray on the 7th day showed no remaining pneumothorax.](image3)

He was then admitted to the isolation room, treated with oxygen, intravenous antibiotics, analgetic, mucolytics, and bronchodilators. On the 2nd day, the GeneXpert examination of sputum showing negative results for Mycobacterium tuberculosis, so the patient was transferred to the surgical ward. Serial chest x-ray on the 4th day showed improvement of the pneumothorax and the patient was getting better (Figure 3 left). On the 7th day, the patient no longer had shortness of breath, no more bubble seen in the WSD with negative force expiratory bubble. Serial chest x-ray showed no more pneumothorax of the right lung (Figure 3 right). The chest tube was then removed and the patient was discharged on the same day in stable condition without any complication and given medication of oral antibiotics, analgetic, mucolytics, and bronchodilators. One week later he came for control at the outpatient clinic in a good condition without any symptoms.

**Discussion**

Pneumothorax is a condition when there is an accumulation of air outside the lung, which is enclosed within the pleural cavity. This may result in complications related to ventilation, oxygenation, or both. Pneumothorax is clinically categorized as spontaneous pneumothorax and non-spontaneous pneumothorax. Pneumothorax that occurs without any preceding trauma or obvious triggering events is called spontaneous pneumothorax. Spontaneous pneumothorax is further classified as primary spontaneous pneumothorax (in absence of an underlying lung disease) and secondary spontaneous pneumothorax (in presence of an underlying lung disease, such as chronic obstructive pulmonary disease, TB, cystic fibrosis, lung cancer, and interstitial lung disease). Secondary spontaneous pneumothorax is associated with a worse outcome than primary spontaneous pneumothorax.

Secondary spontaneous pneumothorax is one of the important life-threatening complications of TB that requires rapid intervention. It is typically occurs during the active stage of pulmonary TB due to extensive lesions, empyema and bronchopleural fistula, rupture of sub pleural cavity, and rupture of pleura due to liquefactive necrosis. Briones-Claudet et al. reported a case of tension pneumothorax after cavity rupture in a patient with active pulmonary TB. In our report, an unusual case in which tension pneumothorax occurred not in a patient with active TB, but in a post-TB sequelae condition.

Post-TB sequelae refers to a set of anatomical and pathophysiological changes in the lungs that arise as a result of complications following an infection of pulmonary TB, even after the end of the treatment and complete bacteriological cure. It can be classified based on the affected structures, including the parenchymal, airway disease, vascular, pleural/chest wall, and mediastinum. Many patients with pulmonary TB sustain anatomical and histological changes as a result of the disease, including parenchymal damage, broncho-vascular distortion, fibrosis, bronchiectasis, emphysema, and other well-described changes, which contribute to TB sequelae. Post-TB sequelae can occur in 60-90% of patients which may lead to limited physical tolerance and decreased quality of life. A study by Nihues et al. reported that patients with post-TB sequelae experience respiratory symptoms, which include cough (28%), sputum production (23%), wheezing (22%), and dyspnea (8%).

The pathogenesis of pneumothorax in post-TB sequelae patients is complex and not yet fully understood. It can involve multiple factors. A thorax CT scan examination is necessary to more clearly identify structural abnormalities in a patient with pneumothorax. However, in our case, it was not performed due to the limited facility in our hospital. The presence of fibrosis or scarring secondary to TB can lead to a loss of elasticity in the lung tissue, making it more prone to collapse. Chronic inflammation associated with TB can lead to the formation of pleural adhesions, increasing the risk of pneumothorax. Our patient is an active smoker. Cigarette smoking can cause inflammation and further destruction of the lung tissue, which contributes to the occurrence of pneumothorax. Other important causes that can lead to pneumothorax are rupture of an open healed cavity and rupture of a bullae or bleb secondary to fibrosis and damage of the lung tissue.
Tension pneumothorax is the most severe form of pneumothorax which requires immediate intervention due to hemodynamic instability secondary to mediastinal compression. It requires urgent needle decompression with a large-bore needle (14G or larger) in the 2nd intercostal space in midclavicular line or 4th/5th intercostal space in anterior axillary line.18 This maneuver converts tension pneumothorax into simple pneumothorax. The needle is retained while waiting for urgent definitive chest tube insertion with WSD. Thoracic surgical consultation should be considered in patients with persistent air leak for more than 48 hours. Surgical intervention can be performed through open thoracotomy or video-assisted thoracoscopic surgery.19

Conclusions

Recent evidence suggests that a significant proportion of patients suffer from post-TB sequelae after completion of TB therapy. Post-tb sequelae are caused by the destruction of lung tissue by the TB process, may manifest from mild symptoms to life-threatening dyspnea. Secondary spontaneous tension pneumothorax is a rare manifestation of post-TB sequelae that can be fatal if not diagnosed and managed promptly. Spontaneous tension pneumothorax in post-TB sequelae has a complex pathogenesis and it is not yet fully understood. It can involve multiple factors including pulmonary fibrosis, pleural adhesion, ruptured open healed cavity or bullae, and lung damage from cigarette smoking. Spontaneous tension pneumothorax should be managed by urgent needle decompression and followed by chest tube thoracotomy. Thoracic surgical consultation is considered if a persistent air leak occurs.

Disclosure

The authors declare no conflict of interest.

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None.

Role of authors

Writing the manuscript and collecting data of the patient: HAW. Reviewing and revising the manuscript: YV, ELM, WM. All authors contributed and approved the final version of the manuscript.

References