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(CASE REPORT)



Pneumothorax occurring during the final stage of treatment in miliary tuberculosis patients

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Abstract

Air in the pleural space can cause lung collapse and respiratory discomfort, which can be life-threatening in very ill patients, making pneumothorax a medical emergency. Since tubercle bacilli can travel through the blood to the lungs and other organs, Miliary Tuberculosis (TB) is a disseminated disease that can be lethal. We present a case of a 36-year-old male with Pneumothorax Occuring during the Final Stage of Treatment in Million Tuberculosis Patients. The patient is currently undergoing outpatient treatment of miliary TB for the 11th month and so far his condition is getting better, however was admitted to the emergency unit of the hospital, diagnosed with left pneumothorax based on clinical, laboratory, and radiology showing. In meanwhile, 88% of the room air was saturated with oxygen, necessitating Intensive Care Unit treatment with HFNC FiO₂ 100 Flow 60, followed by high concentration oxygen therapy with a non-rebreathing mask (NRM) of 15 litres/minute. Combivent inhalation and pulmicort inhalation were given every 15 minutes. The family refused to install a water sealed drainage or chest tube in the patient. The patient was also given treatments with ceftriaxone, citicolin, methylprednisolone, omeprazole and the advanced phase of tuberculosis drugs namely Rifampicin 450 mg and Isoniazid 300 mg. On the 6th day of treatment in the ICU, the patient's condition improved and the pneumothorax decreased. In this case, the likelihood of Pneumothorax in patients with miliary tuberculosis needs to be emphasized, as well as the importance of evaluation and strict follow-up to prevent the occurrence of pneumothorax.

Keywords: Pneumothorax; High oxygen concentration; Inhaled treatment; Miliary tuberculosis

1. Introduction

Due to collapsed lungs, respiratory problems, or circulation issues, pneumothorax can result in a life-threatening emergency. Pneumothorax can be detected from the results of radiographic examinations and treatment depends on the results of radiographic examinations at that time. Treatment depends on timely radiographic examinations. Pneumothorax can be a medical emergency due to the presence of air in the pleural space, causing lung collapse and respiratory distress, especially in critically ill patients.[1,2] The severity of the collapsed lung dictates the pneumothorax's clinical appearance. Both trauma that produces communication through the chest wall and lung rupture of the visceral pleura are potential entry points for air into the pleural cavity.[3] This results in decreased venous return, hypotension, and hypoxia. Pneumothorax can be asymptomatic to potentially life-threatening.[4] Although miliary tuberculosis is a common disease, cases of pneumothorax occurring in Miliary TB patients are rare.[5] Due to the hematogenous spread of tubercle bacilli to the lung and other organs, miliary tuberculosis is a potentially lethal condition that causes tuberculous foci that are roughly the size of a millet seed (1 to 2 mm) in size. John Jacobus Manget originally used the term "miliary tuberculosis" in 1700 to describe pathological samples with tiny tubercles like millet seeds. Disseminated tuberculosis was described as the infection of the blood, bone marrow, or liver, or as the involvement of two organ locations that are not nearby. A characteristic sign supporting the diagnosis of miliary

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tuberculosis on a chest radiograph is miliary mottling. Miliary tuberculosis can be pulmonary and extrapulmonary tuberculosis.[6][7]

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2. Case

A 36-year-old Indonesian male was admitted to the emergency unit of the hospital with shortness of breath, very severe shortness of breath, difficult to communicate with, decreased consciousness and fever. On physical examination found an increase in respiratory rate, respiratory asymmetrical lung expansion, decreased breath sound intensity. The patient is currently undergoing outpatient treatment for miliary TB for the 11th month and so far his condition is getting better, however was admitted to the emergency unit of the hospital, diagnosed with left pneumothorax and miliary tuberculosis based on clinical, laboratory, and radiology showing (Figure 1). Room air oxygen saturation of 88%, necessitating ICU treatment with HFNC FiO₂ 100 Flow 60, followed by high concentration oxygen therapy utilizing a non-rebreathing mask (NRM) that expels 15 litres/minute. A Albuterol, ipratropium and budesonide inhalations are given every 15 minutes. The patient's family refused to install a water sealed drainage or chest tube on the patient. Laboratory results showed leukocytes 18,580 cells/ μ L. Blood gas analysis, namely pH 7.33, pCO₂ 64 mmHg, pO₂ 242 mmHg, BE -6.2 mmol/L, HCO₃ 33 mmol/L. The patient was also given treatments with ceftriaxone injection, citicolin injection, methylprednisolone injection, omeprazole and the tuberculosis drugs rifampicin 450 mg and isoniazid 300 mg. The patient was treated in the Intensive Care Unit for 5 days. On the 6th day of treatment in the ICU, the patient's condition improved and the pneumothorax began to decrease from the results of the radiography examination (Figure 2 and 3). The patient was transferred to the inpatient ward, there were no complaints. Clinically improved and was scheduled to be discharged. The patient's TB treatment was completed at the end of the 12th month. He had no comorbidities in his medical history (eg hypertension, diabetes mellitus, autoimmune disease, or malignancy). From his previous history, this patient had suffered from TB about 4 years ago, only took TB medication for 4 months and was never controlled by the pulmonary clinic again. Two years later the patient came to clinic with complaints of coughing for almost 2 months, fever, weight loss of 7 kg. The chest radiograph revealed millet-shaped lesions with characteristic miliary mottling, uniformly distributed distinct lesions of 1 to 2 mm in size, in all lung zones, right atelectasis and extensive fibrosis (Figure 4). The patient was treated for two months with a standard first-line oral regimen of rifampicin 450 mg once daily, isoniazid 300 mg once daily, pyrazinamide 1000 mg once daily, ethambutol 1000 mg once daily (2HRZE), other symptomatic medication and continued TB treatment continuation phase with outpatient care in pulmonary clinic (Figure 5 and 6). In this case, the likelihood of Pneumothorax in patients with miliary tuberculosis needs to be emphasized, as well as the importance of evaluation and strict follow-up to prevent the occurrence of pneumothorax.



Figure 1 The present of infiltrates, miliary mottling, uniformly distributed distinct lesions of 1 to 2 mm in size, in almost all lung zones, right atelectasis and extensive fibrosis in both lung



Figure 2 Fibrosis, atelectasis of right lung, right perihilar fibroinfiltrate



Figure 3 Atelectasis and fibrosis in right lung



Figure 4 Pneumothorax is seen as a region of lucency (dark) around the edge of the lung (left lung). Fibroinfiltrates and pleural effusion in right lung. Attached Endotracheal tube (ETT) with 2 corpus tip above carina



Figure 5 Atelectasis and fibrosis of the right lung, fibrosis in left lung, compared to the previous chest X-ray, showed improvement



Figure 6 Atelectasis and fibrosis of the right lung, fibrosis in left lung

3. Discussion

In individuals with compromised immune systems brought on by comorbidities, malnutrition, usage of corticosteroids, or immunosuppressive medications, military tuberculosis is a primary infection.[8] Military TB is used to denote all progressive, widespread, hematogenously disseminated forms. Although pneumothorax is a common consequence of tuberculosis, persons with miliary disease seldom have it.[9] Pneumothorax and the miliary pattern are uncommon radiographic findings, with incidences of 1.3% and 1.5%, respectively.[10] Shortness of breath and dry cough are the main features of a pneumothorax also seen in patients with miliary tuberculosis without pneumothorax.[11] Pneumothorax is seen during treatment even if it may not be present at the beginning. This alerts the treating physician to the patient's deteriorating clinical course of miliary tuberculosis when they experience life-threatening shortness of breath as a result of a pneumothorax.

The pathogenesis of pneumothorax in miliary tuberculosis is unclear, but it is possible that the mechanism of caseation or subpleural miliary nodule necrosis and rupture may cause the pneumothorax. Acute miliary spread can cause emphysema changes.[12, 13, 14] In miliary tuberculosis, an open thoracotomy should not be performed until the patient has been receiving antituberculosis drugs for at least several weeks. Chest tube insertion is the first line of treatment for patients with subsequent spontaneous pneumothorax.[15] In this case, the patient was on TB treatment for up to 10 months with outpatient care at the pulmonary clinic. The patient's condition at that time had improved, but in the 11th month of treatment, the patient came to the emergency room with a pneumothorax and decreased consciousness.

Excessive coughing brought on by miliary tuberculosis is another cause of pneumothorax because it causes a fast rise in intra-alveolar pressure and simultaneous airway restriction [12]. It is then directed into the vascular adventitia of the hilus as well as the interstitial tissue of the lung. Mechanism of **caseous necrosis with rupture into the pleural space** in confluent subpleural miliary nodules. A pneumothorax will result from air leaking into the pleural cavity as a result of this. [16,17]

The haematological changes seen in miliary TB are usually nonspecific. Patients may experience pancytopenia, anemia, leukopenia, leukocytosis, especially lymphocytosis, thrombocytopenia, or thrombocytosis. The most common hematological abnormality in miliary TB is anemia of chronic disease. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) increases are frequent acute phase reactants. Also discussed are leukemic responses, which might be misinterpreted for leukemia. Disseminated intravascular coagulation (DIC), which is uncommon, frequently occurs in conjunction with MODS and ARDS. [18] In this case, laboratory results showed leukocytes 18,580 cells/ μ l. Blood gas analysis, namely pH 7.33, pCO₂ 64 mmHg, pO₂ 242 mmHg, BE -6.2 mmol/L, HCO₃ 33 mmol/L, while the results of other blood tests were still within normal limits.

Partial or atypical pneumothorax patients are usually given oxygen therapy. Study of oxygen therapy increasing improvement rates based on small population of secondary spontaneous pneumothorax. The results show that oxygen therapy can increase the resolution rate. The use of routine oxygen therapy in patients with partial or atypical pneumothorax should be considered with caution. [19] In this case the oxygen saturation was 88% room air, hence requiring ICU treatment using HFNC FiO₂ 100 Flow 60, afterward subjected to high oxygen concentration therapy using a non-rebreathing mask (NRM) of 15 litre/minute. Combivent and pulmicort inhalations are given every 15 minutes. The patient's family refused to install a chest tube drain.

4. Conclusion

We reported one case of pneumothorax occurring during the final stage of treatment in miliary tuberculosis patients. The likelihood of pneumothorax in patients with miliary tuberculosis needs to be emphasized, as well as the importance of evaluation and strict follow-up to prevent the occurrence of pneumothorax. The patient presents with severe shortness of breath due to a **pneumothorax, which is a life-threatening emergency**, and seeks out **the underlying pathology** so that it can be managed and treated effectively. This sudden clinical deterioration of miliary TB patients should be noted by treating physicians.

Compliance with ethical standards

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Statement of informed consent

Written informed consent for the publication of this study was obtained from the patient's family. A copy of the consent form is available upon request.

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