Case Report

Deadly dust: Silicotuberculosis as a downplayed and overlooked fatal disease in Indonesia

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ABSTRACT

Background: Silicosis is one of the most common diseases among all occupational diseases. The main clinical focus on the silicosis complication will be tuberculosis.

Case presentation: A 28-year-old male presented with complaints of chronic dry cough, weight loss, decreased appetite, and night sweats. The patient worked in the synthetic leather factory for 7 years and rarely used proper protective equipment. Chest X-ray showed bilateral fibroinfiltrate as a sign of a specific process in the lungs. Thoracic HRCT suggested an infected cystic type of bronchiectasis. Bronchoalveolar lavage from bronchoscopy was performed. The result of the silica spectrophotometric test and GenXpert BAL was both positive for silicosis and tuberculosis, consecutively. The patient has been diagnosed with an occupational lung disease accompanied by tuberculosis complications, namely silicotuberculosis. The patient received tuberculosis therapy and was advised to an early retirement due to disability.

Discussion: The duration and level of intensity of exposure, as well as the severity of silicosis, are factors of tuberculosis. The silicosis diagnosis can be made from occupational history or silica exposure, as well as appropriate radiological and histopathological findings.

Conclusion: Silicotuberculosis is a disease due to silica exposure, and is often found in TB endemic countries.

1. Introduction

Pneumoconiosis is the most frequently found disease among all occupational diseases [1]. Silicosis is one of the most common pneumoconioses [2]. Silicosis is a pulmonary fibrosis disease caused by inhalation, retention, and pulmonary reaction to silica crystals that contain silicon dioxide (SiO2) [3]. Tuberculosis (TB) is a complication of silicosis that has become a focus of clinical attention over the last few centuries. The risk of developing tuberculosis is reported to be 2.8 to 39 times higher in patients with silicosis compared with healthy individuals [4]. Based on the description above, this study reported a case of Indonesian adults with silicotuberculosis. We report based on SCARE guideline 2020 [5].

2. Case presentation

A 28-year-old male complained of having dry cough for 3 months accompanied by decreased appetite, lost weight of about 3 kg in the last three months, and night sweats. The patient worked in the synthetic leather factory for the last 7 years. The patient was a non-smoker. The patient worked as a manual laborer in a synthetic leather factory for 7 years and rarely used proper protective equipment. The respiratory rate of 24 × /min and SaO2 of 99% with oxygen support (nasal cannula) of 3 L/min. There was no history of other diseases, and the patient did not smoke. The patient worked as a manual laborer in a synthetic leather factory for the last 7 years.

From the chest X-ray examination, reticulogranular patterns were found in the right and left paracardial areas, accompanied by fibroinfiltrates on both sides of the lung (Fig. 1). The results of thoracic HRCT showed cystic type dilatation and thickening of the superior, middle, inferior right lung’s bronchial branches, and inferior bronchial branches of the left lung and fibrosis in the anterobasal segment of the right inferior lobe (Fig. 2).

The bronchoscopy performed on the patient on the 10th day of treatment indicated normal results, and samples were taken from bronchoalveolar lavage (BAL) for silica and GenXpert spectrophotometric tests. The results of the silica spectrophotometric test obtained 27.25 ppm SiO2. Meanwhile, the Xpert BAL gene detected the presence of Mycobacterium tuberculosis which was sensitive to rifampicin. This patient was treated according to tuberculosis category 1 guidelines.
reactions and reduces type 1 immune reactions so that TB infection will worsen [6]. In addition, excessive surfactant protein A is associated with the inhibition of reactive nitrogen species production by activated macrophages and fibrosis in the anterobasal segment of the right inferior lobe.

The diagnosis of silicosis is constructed based on an occupational history of exposure to silica dust with appropriate radiological and histopathological findings. LAB specimens will be examined by spectrophotometric method to determine the silica content in units of SiO2 ppm [7]. Analysis of LAB fluid can reveal lymphocytosis and neutrophils in acute silicosis. In a study of patients with acute silicosis, 70% of BAL macrophages contained silica particles [8]. TB investigations should be performed on patients with suspected silicotuberculosis. Mycobacterium tuberculosis is often not discovered on sputum examination because silica fibrosis inhibits the production of tubercle bacilli in sputum. Cultured acid-fast bacilli are often categorized as non-tuberculous mycobacteria (NTM) [9].

Plain chest radiographs, with the International Labor Organization (ILO) classification, have traditionally been used as the standard in screening and diagnosing silicosis in workers [10]. The classic picture of silicosis on chest radiographs is irregular opacity with a small, symmetrical pattern. The diameter of the opacity is usually more than 1 cm and is most commonly found in the upper and mid-lung areas. The appearance of asymmetric nodules, consolidation, cavitation, and rapid disease change suggest the presence of TB in a patient with silicosis. A computed tomography scan (CT-scan) of the chest is superior to plain chest radiographs for detecting early-phase silicosis and is better at detecting nodular addition. CT scan often shows calcification surrounded by emphysema. Peripheral hilar calcification with an eggshell-like shape presents in 5% of silicosis, and it becomes a pathognomonic sign of this disease [11].

There is still no proven, effective treatment for silicosis. Treatment is aimed at the complications of the disease. Should the disease has caused symptoms, symptomatic therapy is conducted such as giving oxygen, bronchodilators, and antibiotics should infection appears [12,13]. The most important management is the prevention of silicosis. Prevention is carried out in workplaces that have a risk of silicosis. Identification of risk factors for this disease benefits not only the academic research community but also workers or employees and policymakers. Several strategies could be implemented, such as controlling or reducing exposure to silica dust, ensuring continuity of TB treatment, managing the situation by medical personnel, providing occupational health training and education, improving the quality of life of workers, inducing intensive medical surveillance and TB screening in routine health checks, and regulating policy to reduce inhalation of dust by workers or employees [4]. Based on this evidence, the US Occupational Safety and Health Administration (OSHA) lowers the occupational exposure limit for crystalline silica from 0.1 to 0.05 mg/m³ [14]. Good ventilation in the workplace should be provided so that clean air could enter and dust would not accumulate in the workplace. Therefore, it is important to increase awareness of the occurrence of silicosis in high-risk workers [15].

4. Conclusion
Silicotuberculosis is a disease that is often encountered in patients with a history of silica exposure in TB endemic areas. The diagnosis of both diseases is often difficult to establish because of overlapping clinical and radiological features. Bronchoalveolar lavage examination plays an important role in the diagnosis of silicotuberculosis with the discovery of silica particles and TB germs. The management of silicosis is still limited to symptomatic drug administration and infection control. The anti-TB medication is given to silicotuberculosis patients according to the standard regimen. Therefore, it is important to increase awareness of the occurrence of silicosis in high-risk workers.
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Consent

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Author contribution

All authors contributed toward data analysis, drafting and revising the paper, gave final approval of the version to be published and agree to be accountable for all aspects of the work.

Registration of research studies

1. Name of the registry: -.
2. Unique Identifying number or registration ID: -.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): -.

Guarantor

Isnin Anang Marhana.

Declaration of competing interest

Yovita Citra Eka Dewi Djatioetomo and Isnin Anang Marhana declare that they no conflict of interest.

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