

Case Report

A Case Report of Silico-Tuberculosis

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Introduction

The End TB strategy aims to eliminate tuberculosis (TB) by 2035. Silicosis, a serious disease on its own, is also a significant risk factor for TB. It was responsible for 280,000 YLLs (years of life lost) and 376,000 YLDs (years lived with disability) in 2019. Here we report a patient with silicosis related to artisan gold mining who developed non-tuberculous mycobacterial infection and discuss on the preventive and diagnostic challenges in a resource-constrained setting.

Citation : Gebrehiwot KG, Gebremariam TW, A case report of Silico-tuberculosis Ethiop Med J 62 (1) 61-63

Submission date : 6 March 2023 **Accepted:** 27 December 2023 **Published:** 1 January 2024

Case

On August 2021, a 34-year-old man from North West Tigray, Ethiopia was referred to our hospital (Ayder Comprehensive Specialized Hospital) for cough productive of blood-tinged muco-purulent sputum, shortness of breath, fever, and a weight loss of 10kg over two years. He had previously taken two full courses of anti-tuberculous medications (2RHZE/4RH) with little improvement. The result of the acid-fast stain was not reported by the referring clinic.

He worked in an artisanal gold mining in his village for 5 years and he never used any dust protection mechanisms. He reported that a group of young men would dig 2-3 meters deep into the rock and then create horizontal tunnels up to 20 meters long by hammering the rock. The patient does not know the risk that freshly formed silica poses.

On physical examination: He was wasted with weight of 41kg, RR=28, SaO₂ of 90% and coarse crepitations over the posterior upper chest bilaterally. His chest X-ray and chest CT-scans showed extensive bilateral, predominantly upper lung opacities; cavitations and dilated (bronchiectatic) airways (see Figure 1 below). Unfortunately, his initial chest x-ray was lost.

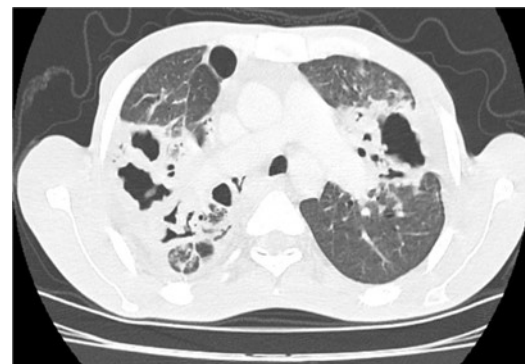


Figure 1. Chest CT-scan showing bilateral thick-walled cavitations in the middle-upper lungs

Sputum AFB was positive twice (reported as +4) but the sputum GeneXpert was negative three times. Sputum culture for non-tuberculous mycobacteria (NTM) was not possible due to the war in the region during the time. With the diagnosis of Silico-tuberculosis (Accelerated silicosis complicated by cavitary pulmonary Nontuberculous mycobacteria), the patient was put on daily RHZE+ daily 250mg Azithromycin as an outpatient. Injectable anti-TB medications (streptomycin and amikacin) were unavailable and couldn't be added.

On the second month of treatment, his constitutional symptoms as well as the sputum improved. However, his shortness of breath and weight loss remained the same. On his fifth month of treatment, he showed clinical signs of worsening with additional 2kg weight loss. His chest X-ray showed a new minimal effusion on the right side (Figure2).



Figure 2: Chest X-ray on the fifth month of treatment. Bilateral patchy opacities and right upper lung cavitation with right costophrenic angle obliteration.

Smear microscopy for AFB at that time was reported as scanty (0-9bacilliperHPF) and GeneXpert was still negative. Due to the clinical worsening; the patient was referred to a hospital with MDR-TB service for addition of Amikacin and inpatient management.

Discussion

Despite the widespread presence of dust-associated occupations, this is the first case of silicosis reported from Ethiopia (3). Silicosis is caused by inhalation of respirable size crystalline silica. It mainly manifests with chronic cough, shortness of breath, fatigue and weight loss. It is diagnosed by a combination of symptoms, exposure history and radiologic findings after excluding other similar lung diseases. The disease is classified into chronic, accelerated and acute (silicoproteinosis) based on the duration of exposure to silica as well as its clinical presentations (4).

Many occupations in developing nations are associated with silica exposure and poor awareness of workers together with limited regulatory mechanisms can lead to silicosis and its complications. Construction related occupations including quarrying of stones, stonecutting, crushing, ground works, demolition of buildings, drilling, and cement production are all sources of silica dust. Construction is especially common in rapidly developing nations like Ethiopia and deserves particular attention in the prevention of the disease (5).

Small scale gold mining is another important risk factor in Ethiopia. In 2015, there were about 271 artisan gold mining areas in Tigray alone, employing only that take on thousands of young men and women

(6). This occupation requires the workers to dig deep into the rocks using simple tools under limited ventilation.

Building rock-hewn churches is a long tradition in Ethiopia. The country owns many rock-hewn churches (more than 100 in Tigray alone), some of them as old as 17,000 years (7). This practice continues to this date and is a very important risk factor to address (Figure3).



Figure3. Rock—hewn church in the making in Adigrat city, Tigray

Tuberculosis very commonly complicates silicosis or silica exposure with an odds ratio reaching about 30 (8). In a patient with silicosis, the presence of constitutional symptoms, hemoptysis and cavitory lesions on radiography should lead to consideration of overlapping tuberculosis (4). The limited availability of culture and sensitivity for mycobacteria in developing nations makes differentiating NTM from MTB difficult. However, currently many developing countries own molecular techniques such as GeneXpert test. A positive sputum AFB together with a negative GeneXpert test for TB suggests an NTM infection (9).

Finally, silicosis is a relentlessly progressive disease with no effective therapy but it can be completely prevented using various techniques. These include elimination (abandoning high-risk occupations), substitution, isolation or containment of high-risk processes, ventilation (natural and artificial means), applying respiratory protective equipment, and training of workers (10). These techniques are effective, but adapting them to the special conditions of non-formal occupations of developing nations is another challenge due to cost implications.

Conflict of interests

None declared

Funding

The authors did not receive any funding for this work

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