



## Case Report

## Case report of active pulmonary TB in a sickle cell disease patient

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## ABSTRACT

Both Sickle cell disease (SCD) and Tuberculosis (TB) are prevalent, and mostly concentrated in similar geographic areas. Since there is an overlap of the possible presenting symptoms of SCD complications and TB, a low threshold for suspicion of TB in these patients is recommended. We present a case of an active TB infection in a SCD patient that presented mainly with chronic cough.

## 1. Introduction

Tuberculosis (TB), an infection caused by *Mycobacterium tuberculosis* spreading via airborne particles, is estimated to have infected a quarter of the world's population and considered to be the leading cause of death from a single infectious agent worldwide [Global TB Report by WHO]. TB can present either as pulmonary TB, classically as a cavitation, or extrapulmonary TB [1].

SCD is a common hemoglobinopathy due to a mutation on the beta chain hemoglobin. This affects the RBCs shape and their ability to carry oxygen to the tissues, leading to vaso-occlusive crisis [2].

It is to note that, not only SCD and TB are commonly found in similar geographic areas, SCD patients are in general at an increased risk of infection which could favor the development of TB in these patients [2]. Despite this overlap, there are little data available about TB in SCD patients.

Here we report a case of a 29-year-old SCD patient, who presented with chronic dry cough and subjective fever, with no recent travel or contact with sick patients, and was found to have an active TB infection with a cavitory lesion on CT chest. He was admitted and is currently under isolation and treatment.

## 2. Case presentation

A 29-year-old gentleman presented with chronic dry cough for four months, he had intermittent subjective fever, no hemoptysis, no night sweats, no shortness of breath, no chest pain. Past medical history is

remarkable for Sickle cell anemia on Hydroxyurea and Folic acid, and a previous tuberculosis infection at age five treated for two months. He has been living in Qatar for the past 2 years. He works as a driver and does not live in a crowded place. There was no history of recent travel or recent contact with any TB patient, no history of smoking or alcohol use. He received COVID-19 vaccine this year. Patient was referred to the tuberculosis clinic for further investigations regarding his chronic cough, including a chest CT that revealed a cavitory lesion. The patient was shifted to the ward under isolation and all set of required investigations were done (Table 1).

After admission, acid fast bacilli were detected in the third sputum sample, and QuantiFERON test was positive. The patient underwent bronchoscopy and Bronchoalveolar lavage (BAL) culture was negative, but PCR MTB was positive. The endobronchial biopsy reports were remarkable for necrotizing granulomatous inflammation. Patient was diagnosed as active TB and started on TB medications, isoniazid, rifampicin, ethambutol, and pyrazinamide by mouth daily.

## 3. Discussion

Sickle cell disease (SCD) is a widespread genetic disorder that characterized with the presence of Hemoglobin S (HbS) which alters the normal shape of red blood cells (RBCs) into sickle-shaped cells and affect their normal function [3]. SCD is common in Sub-Saharan, Africa, India, Saudia Arabia and Mediterranean countries. It has a wide range of complications on public health. The main pathology arises from the sickle-shaped RBCs that blocks the capillaries when hypoxemia is

; TB, Tuberculosis; SCD, Sickle cell disease.

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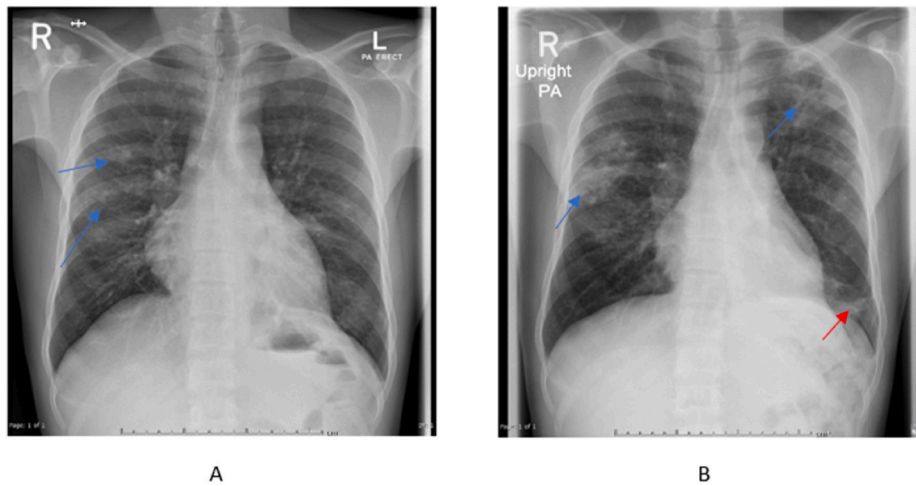


Fig. 1. Chest X ray.

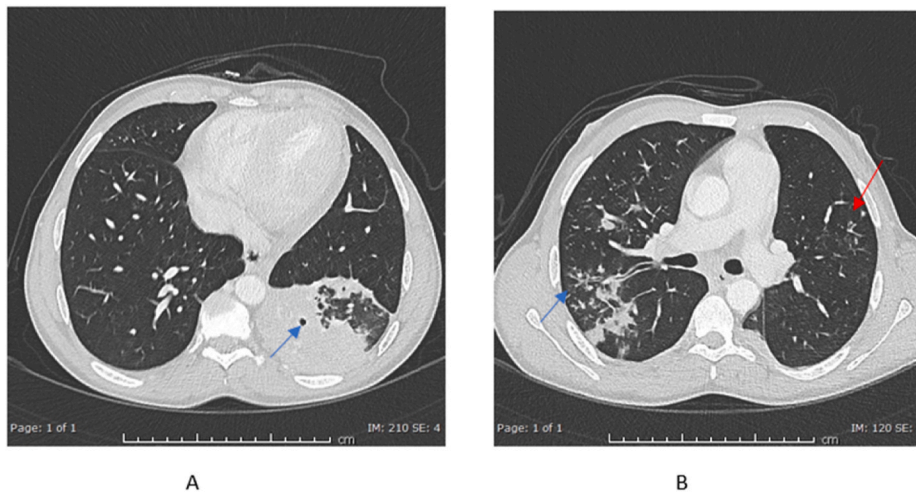


Fig. 2. CT chest.

present [4]. SCD patients are at risk of multiple complications ranging from chronic persistent anemia to recurrent painful crisis, profound anemia and spleen enlargement, as well as the recurrent infections due to loss of splenic function [5].

Tuberculosis (TB) is a communicable disease that is considered among the top 10 causes of death worldwide according to the World Health Organization (WHO) 2020 report, affecting around a quarter of the world population. Geographically, most people who developed TB in 2019 were in the WHO regions of South-East Asia (44%), Africa (25%) and the Western Pacific (18%). The causative organism is *Mycobacterium tuberculosis*, transmitted through aerosol route. The disease presents either as pulmonary TB or extrapulmonary TB [1]. The classical finding in pulmonary TB is cavitation. The presence of cavitary lesion raises the possibility of drug resistance, treatment failure and a delayed sputum culture conversion. In addition, affected TB patients with pulmonary cavities are considered the main source of TB transmission when compared with those without cavitation. TB cavity site is usually in the apices of the lungs or apical part of lower lobes, the presence of this cavity forms a lifelong risk of reactivation and spreading when the cavities connect with airways releasing viable infectious bacilli, increasing the risk of spread to other humans. Another possible complication happens when infected monocytes distribute the mycobacteria through the blood-borne phase of TB causing military TB [6].

Despite of the high prevalence of both SCD and TB with a remarkable

similar geographical distribution, little data are available about the TB in those population. SCD patients, as we mentioned before, are at risk of recurrent infections due to the impaired immunity following splenic vasculature damage causing asplenia early in the disease course. This makes infections an important cause of death in SCD patients. Usually, the bone is the most common site of infarction in the context of painful crisis. Chest involvement could present in form of acute chest syndrome, infection pneumonia, pulmonary hypertension or fibrosis in the lung [2, 7].

Pulmonary TB is rare in patients with SCD, and if those patients are infected with mycobacterium tuberculosis, they are not at a higher risk of morbidity and mortality than healthy matched population [8].

The characteristic of TB infection in adult population with SCD is not well documented in the literature. Francois Lionnet et al. conducted a retrospective study to assess the clinical patterns of TB in SCD. They evaluated 457 patient with SCD and found 12 cases of TB, three of them had pulmonary TB, seven had lymphatic TB and two had vertebral TB. Fever was present in all pulmonary TB patients, compared to our patient, where no fever was documented in hospital. All pulmonary TB patients diagnosed with positive *Mycobacterium* culture, disseminated TB was not detected in any patients [2]. Another study reviewed the incident of bacterial infections over 30 years among 166 SCD patients who were hospitalized and found 5 cases of TB (3 diagnosed by sputum examination and 2 by lymph node biopsy) [9]. Other papers were mainly case

**Table 1**  
Investigations results.

Investigations	
Chest Xray: Fig. 1.	Chest X-ray postero-anterior view: A) At presentation with faint small patchy infiltrates seen scattered in both lungs, more evident at the right midlung zone (Blue arrows) B) After about 3 months show progressive course with large patchy areas of pneumonic consolidation with suspected cavitation in both lungs (Blue arrows), left basal atelectatic bands (red arrow) and blunting of left costophrenic angle
HRCT. Fig. 2	High resolution Computed Tomography of chest in Axial plane A) Large area of consolidation in the lower lobe of the left lung with small cavitation inside (blue arrow) B) Small patchy areas of pneumonic consolidation in the right middle lobe with multiple small nodules and Tree in bud appearance (Blue arrow), similar small nodules are noted in the Apico-posterior segment of the left upper lung lobe (Red arrow)
Blood tests:	
Hemoglobin (13–17 gm/dL)	8.6
RBCs (4.5–5.5 × 10 <sup>6</sup> )	2.8
WBCs (4–10 × 10 <sup>3</sup> /UL)	10.5
PLT (150–400 × 10 <sup>3</sup> /UL)	582
Procalcitonin	0.12
CRP (0–5 Umg/L)	72.2
D-dimer (0.00–0.4 mcg/L)	2
LDH (135–214 U/L)	247
Renal function tests (Urea/Cr) (2.1–8.8mmol/L) (44– 80Umoll/L)	1.9/57
ALT/AST (0–33 U/L) (0–32 U/L)	27/29
Albumin (35–50 gm/L)	28
COVID-19 PCR	Negative
G6PD screen	Normal
Quantiferon TB	Positive
Acid fast bacilli	Three consecutive samples, First and second negative Third positive
BAL	Culture: Negative PCR MTB: positive. No resistance to Rifampin
Hepatitis serology and HIV	Negative.
Hemoglobin electrophoresis (At diagnosis in 2015): HgbA 0.0 – HgbA2 4.0 – HgbF 1.9 – Hgb S 94.1 – Hgb H absent.	

reports. One paper described the diagnosis of Pulmonary TB in a SCD male patient who presented with chronic cough for 1 month, weight loss, night sweats and breathless, along with abnormal chest Xray. Diagnosis was confirmed with bacterial culture from sputum sample, in contrast to our patient where the only complain was the chronic cough, with abnormality noticed only on chest CT [10]. Another case reported the clinical course of disseminated TB infection in a SCD male patient manifested over multiple admissions, with radiological evidence of TB on chest Xray. However the diagnosis was made via abdominal lymph node biopsy [8]. Clinical course and outcome was different between the two mentioned cases, however, the presence of TB infection in SCD patient does not seem to increase morbidity and mortality, especially in the absence of comorbidities [8,10].

It is very difficult to differentiate between pneumonia and pulmonary infarction in the context of SCD due to the similarity in presenting

symptoms and radiological findings. Usually the presence of fever, cough and other respiratory symptoms does not reflect infection unless there is a pathological evidence of bacteria presence [8]. Interestingly, the retrospective study that was done by Fracois Lionnet et al. concluded that TB is more present as indolent lymph nodes rather than pulmonary TB and for this TB is underdiagnosed among those population [2].

#### 4. Conclusion

Despite of the worldwide spread of both TB and SCD in same geographical pattern, no relation was found between the two diseases. Previous studies showed that the presence of TB in SCD patients is mostly indolent and more likely to be extrapulmonary. All those factors cause underdiagnoses of TB in SCD population.

We recommend raising the clinical suspicion for TB infection when a SCD patient present with chronic cough even in the absence of other characteristic TB findings.

#### Statement of ethics

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Case approved by HMC Medical Research center.

#### Declaration of interest

The authors report no conflicts of interest.

#### Author's contribution

All authors contributed equally to writing the manuscript. Authors have no conflict of interest.

#### Data availability statement

All data related to the article are available upon request.

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Not commissioned, externally peer reviewed.

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#### Ethical approval

Yes.  
Case approved by MRC.

#### Consent

Consent was taken from patient. Available upon request.

#### Author contribution

Lina Okar: Literature review- Manuscript writing. Mohamed Rezek: Manuscript writing. Mohammad Yassin: literature review, mentor. Mohamed Talaat: Radiologic imaging readings and manuscript writing.

#### 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

Qatar national library.

#### Declaration of competing interest

None.

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