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Respiratory Infections In Sickle Cell Disease Patients : Two Case Reports With A Literature Review

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Summary
Sickle Cell Disease (SCD) is an inherited hemoglobin disorder that compromises red blood cell function and significantly increases susceptibility to infections due to functional asplenia and immune dysfunction. In Morocco, the true burden of hemoglobinopathies remains under-documented, though estimates suggest that thousands may be affected. This article presents two cases of respiratory infections in adult SCD patients : one case of pneumonia caused by Klebsiella pneumoniae*, and another of active pulmonary tuberculosis confirmed by molecular testing. Both patients responded well to targeted antibiotic or anti-tuberculosis treatment following initial diagnostic challenges. These cases highlight the importance of early suspicion, thorough microbiological investigation, and individualized antimicrobial therapy. In conclusion, people with SCD are at heightened risk for respiratory infections, and comprehensive diagnostic and preventive strategies are essential to reduce morbidity and improve outcomes. Further research is needed to better characterize infection patterns in this vulnerable population.*

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I. Introduction :

Sickle cell disease (SCD) is a hemoglobinopathy caused by a mutation in hemoglobin, which alters the shape of red blood cells (RBCs) and impairs their capacity to transport oxygen [1]. SCD is a common severe inherited disorders worldwide, with infections contributing significantly to morbidity and mortality [2].

In Morocco, the full extent of hemoglobinopathies is not well-documented. The World Health Organization (WHO) estimates a carrier rate of 6.5%, suggesting around 30,000 individuals may have major forms of thalassemia and SCD [3].

People with SCD are more prone to infections such as pneumonia and tuberculosis (TB) due to weakened immunity [2].

Here we report two cases of respiratory infections in adult sickle cell disease patients, one of pneumonia and one of pulmonary tuberculosis.

II. Case Reports :

Case 1 :

A 22-year-old patient was admitted for a dry cough associated with minor hemoptysis evolving for 2 months, in a context of fever, night sweats and altered general condition. His medical history indicated sickle-cell anemia since childhood, under surveillance, and epilepsy on Depakine, with a notion of recent contact with a tuberculosis patient.

Clinical examination revealed a pale, cachectic patient, polypneic at 26 cycles per minute, tachycardic at 120 beats per minute and hypotensive at 10/6, with right basal condensation syndrome on pleuropulmonary examination.

The biological workup showed an anemia of 8 microcytic hypochromic, a hyperleukocytosis of 13,000, predominantly neutrophils, and a CRP of 240.

The chest X-ray showed a heterogeneous opacity occupying almost the entire right thoracic hemi-field (figure 1). A chest CT scan revealed condensation in the middle lobe (figure 2,3).

Direct examination for acid fast bacilli and MTB PCR in sputum sample were negative.

The patient was started on antibiotic therapy with Amoxicillin-Clavulanic acid and haemostatic treatment. Due to a no clinical improvement, a cytobacteriological examination of the sputum sample was carried out, with isolation of the germ Klesbiella Pneumoniae sensitive to Rocephin + ciprofloxacin.

After 4 days of this dual-antibiotic therapy, the patient showed significant clinical improvement with cessation of haemoptysis, and follow-up imaging confirmed radiological clearance at the end of the treatment (figure 4).

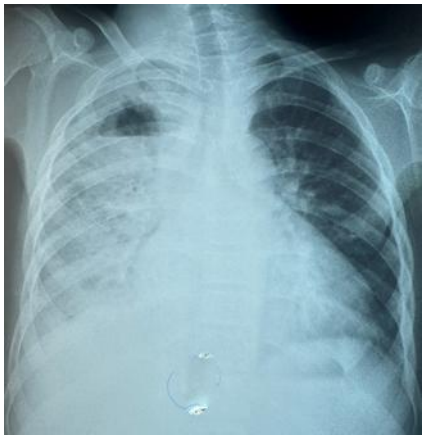

Figure 1 : Chest X-Ray revealing a heterogeneous opacity occupying almost the entire right thoracic hemi-field

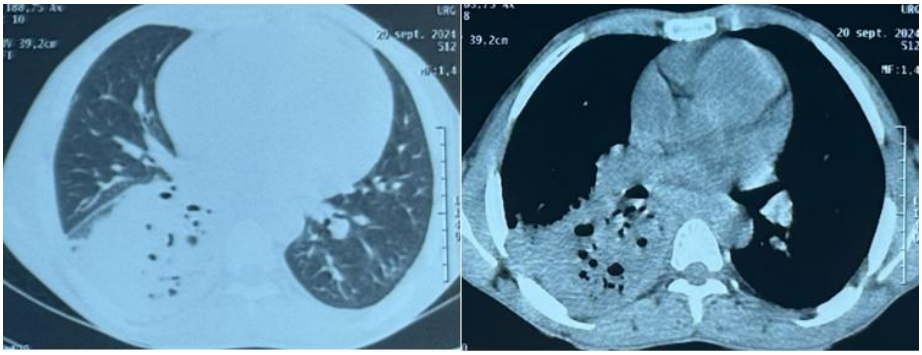

Figure 2,3 : Parenchymal And Mediastinal Transverse Sections Showing a condensation in the middle lobe

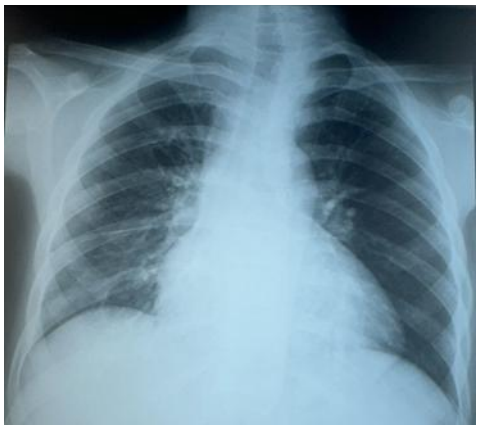

Figure 4 : Chest X-Ray at the end of treatment showing radiological clearing

Case 2 :

A 37-year-old patient presented with left-sided chest pain evolving for 6 months, with no evidence of cough, fever, night sweats or weight loss. Past medical history indicated sickle cell disease since 2009 under surveillance. There was no history of recent travel history, no recent contact with any tuberculosis patient, and no history of smoking or alcohol use.

Clinical examination revealed a patient with stable pulmonary and hemodynamic function. The laboratory work-up was unremarkable.

The chest X-ray showed diffuse micronodules in the 2 thoracic hemi-fields (figure 5).

A thoracic CT scan revealed irregular, speculated nodules in the right upper lobe (figure 6), and solid smooth nodules in the left upper lobe (figure 7).

The QuantiFERON test was positive, and MTB PCR in sputum sample was also positive.

The diagnosis of active pulmonary tuberculosis was confirmed, and the patient started on anti-tuberculosis medications according to the standard regimen adopted in Morocco : Isoniazid (H), Rifampicin (R), Ethambutol (E) and Pyrazinamide (Z) orally (2 RHZE/4 RH).

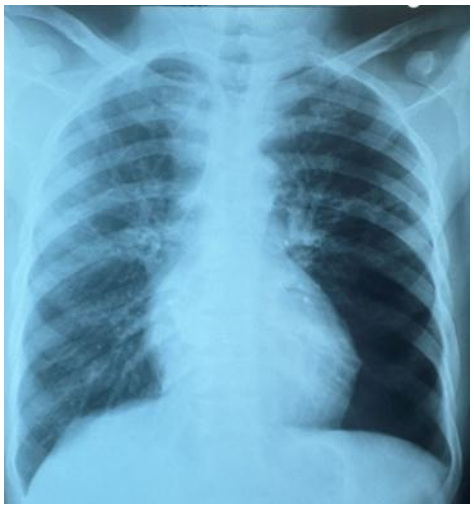

Figure 5 : Chest X-Ray showing diffuse micronodules in the 2 thoracic hemi-fields

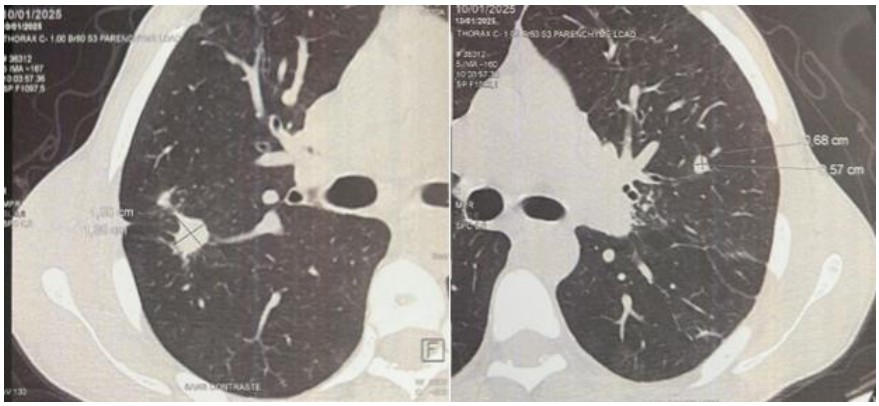

Figure 6,7 : Thoracic CT scan revealing nodules in both the right and left upper lobes

III. Discussion :

Sickle Cell Disease (SCD) is a recessive autosomal hemoglobin disorder caused by a mutation in the gene responsible for producing the beta-globin chain of hemoglobin (Hb). This mutation leads to the substitution of glutamic acid with valine at the 6th position in the chain, forming HbS. The HbS molecules polymerize in red blood cells, changing their shape and causing hemolysis, which leads to acute complications and long-term damage to various organs like recurrent vaso-occlusion, most notably splenic injury increasing the risk of infection - bacterial, viral and parasitic [2,4].

Invasive bacterial infections are common in individuals with SCD, both children and adults. This is primarily due to impaired spleen function, which begins early in childhood, making those with SCD particularly vulnerable to infections [5]. The exact cause of hyposplenia in SCD is not fully understood, but it's believed to result from repeated sickling within the spleen, causing damage, inflammation, and ultimately leading to splenic fibrosis or, in some cases, complete atrophy (autosplenectomy) [6].

In addition to hyposplenism, there is also evidence of immunodeficiency, with dysfunctions observed in both the innate and adaptive immune systems. Blood transfusions have been associated with an increased risk of infection, and the resultant iron overload further predisposes individuals to certain infections [7]. Moreover, there is a heightened risk of respiratory infections caused by encapsulated bacteria, which can progress to septicemia if appropriate antibiotic treatment is not initiated promptly [2].

Current UK guidelines recommend parenteral antibiotic therapy, including coverage for atypical organisms, even in the absence of positive cultures [8]. The choice of antibiotics should follow local policies, typically involving a broad-spectrum penicillin or cephalosporin, along with a macrolide to address atypical pathogens [2].

A prospective study carried out in a total of 100 patients to study prevalence and type of infections in homozygous sickle cell disease patients in both sexes and all age groups, respiratory tract infection was present in 37% cases. The positivity of blood culture was 27% (27 out of 100). Out of 27 blood culture positive cases, Gram negative organisms isolated were Klebsiella (51.55%), Escherichia coli (14.81%), Salmonella (7.40%), Acinetobacter (3.70%) and Gram positive isolates were Enterococcus (7.40%), Staphylococcus aureus (11.11%), Streptococcus Pneumoniae (3.70%) [9].

Another prospective, monocentric, observational study of 61 SCD adults presenting with febrile ACS, systematic blood, urine, and respiratory specimens were collected, before antibiotic initiation, for culture, urinary antigen tests, serology, and nucleic acid amplification tests (NAAT) for respiratory pathogens. Seven bacteria (11.4%) were detected : S.aureus, S. pneumoniae, K. pneumoniae, L. pneumophila, M. pneumoniae [10].

Tuberculosis (TB) is a contagious disease that ranks among the top 10 global causes of death, as reported by the World Health Organization (WHO) in 2020, with approximately a quarter of the global population affected. In 2019, the highest number of TB cases were reported in the WHO regions of South-East Asia (44%), Africa (25%), and the Western Pacific (18%) [11].

Despite the high prevalence of both SCD and TB, which share a remarkably similar geographical distribution, there is limited data on TB in these populations [1]. As previously mentioned, SCD patients are at an increased risk of recurrent infections due to impaired immunity, resulting from splenic vasculature damage that causes asplenia early in the disease course [2,4]. Pulmonary TB is rare in patients with SCD, and if they are infected with *Mycobacterium tuberculosis*, they do not face a higher risk of morbidity or mortality compared to a healthy matched population [12]. The characteristics of TB infection in the adult SCD population are not well documented in the literature [1].

A retrospective study was conducted to assess the clinical patterns of TB in SCD. The study evaluated 457 SCD patients and identified 12 cases of TB, including 3 with pulmonary TB, 7 with lymphatic TB, and 2 with vertebral TB. Fever was a common symptom in these patients, unlike in our case, where no fever was documented. All pulmonary TB patients had positive Mycobacterium culture, and disseminated TB was not detected in any of the patients [1]. Interestingly, this study concluded that TB is more frequently seen as indolent lymphadenopathy rather than pulmonary TB in SCD patients, suggesting that TB is underdiagnosed in this population [1].

Another study reviewed bacterial infection incidents over 30 years among 166 hospitalized SCD patients and found 5 cases of TB, with 3 diagnosed via sputum examination and 2 through lymph node biopsy [13]. Most other studies were case reports.

Despite this, TB infection in SCD patients does not seem to increase morbidity or mortality, particularly when comorbidities are absent [12,14]. Differentiating between pneumonia and pulmonary infarction in the context of SCD is challenging due to the overlap in symptoms and radiological findings. In general, the presence of fever, cough, and other respiratory symptoms does not necessarily indicate infection unless there is pathological evidence of bacterial presence [12].

IV. Conclusion :

People with SCD are more vulnerable to infections due to functional asplenia, immune system dysfunction, chronic inflammation, frequent hospitalizations, and end-organ damage [2].

Effective management involves early diagnostic testing to guide the choice of antimicrobial agents. Infection prevention requires a comprehensive approach. Despite this, many questions regarding infections in SCD remain unresolved, and further research is needed [2].

References :

[1] A. Sani, B.A. Kumo, P.M. Kasim, M.M. Haruna, Transfusion-Dependent Anemia In A Patient With Sickle Cell Disease As Well As Hiv-Associated Tuberculosis, Sub-Saharan African Journal Of Medicine 4 (2) (2017 Apr 1) 52.
[2] Scourfield Le, Nardo-Marino A, Williams Tn, Rees Dc. Infections In Sickle Cell Disease. Haematologica 2025 ;110(3) :546-561.
[3] Who. Executive Board Eb118/5. Thalassemia And Other Haemoglobinopathies. 2006. May.
[4] Álvarez, O., Wietstruck, M.A. (2020). Sickle Cell Disease. In : Bertrand, P., Sánchez, I. (Eds) Pediatric Respiratory Diseases. Springer, Cham. Https://Doi.Org/10.1007/978-3-030-26961-6_52
[5] Pearson Ha, Gallagher R, Chilcote R, Et Al. Developmental Pattern Of Splenic Dysfunction In Sickle Cell Disorders. Pediatrics. 1985 ;76(3) :392-397.
[6] Diggs Lw. Siderofibrosis Of The Spleen In Sickle Cell Anemia. J Am Med Assoc. 1935 ;104(7) :538-541.
[7] Cottas De Azevedo Jt, Malmegrim Kcr. Immune Mechanisms Involved In Sickle Cell Disease Pathogenesis: Current Knowledge And Perspectives. Immunol Lett. 2020 ;224 :1-11.
[8] Howard J, Hart N, Roberts-Harewood M, Cummins M, Awogbade M, Davis B. Guideline On The Management Of Acute Chest Syndrome In Sickle Cell Disease. Br J Haematol. 2015 ;169(4) :492-505.
[9] Shinde S, Bakshi Ap, Shrikhande Av. Infections In Sickle Cell Disease. Iaim, 2015 ; 2(11) : 26-34.
[10] Raffetin A, Et Al. Molecular Testing For Respiratory Pathogens In Sickle Cell Disease Adult Patients Presenting With Febrile Acute Chest Syndrome. Med Mal Infect (2019).

[11] F.Y. Khan, K. Dosa, A. Fuad, W. Ibrahim, A. Alaini, L. Osman, M. Albadri, M. A. Yassin, Disseminated Tuberculosis Among Adult Patients Admitted To Hamad General Hospital, Qatar : A Five Year Hospital Based Study, Mycobact. Dis. 6 (212) (2016) 10, 4172.
[12] O. Chan, E. Loveday, Case Report : Widespread Tuberculosis In Sickle Cell Disease, Clin. Radiol. 45 (1992) 211–214.
[13] Bacterial Infection And Sickle Cell Anemia. An Analysis Of 250 Infections In 166 Patients And A Review Of The Literature, Pubmed N.D. Https://Pubmed.Ncbi.Nlm.Nih. Gov/4944120/. (Accessed 17 September 2021).
[14] S.J. Bowman, Pulmonary Tuberculosis Precipitating The Nephrotic Syndrome In A Patient With Sickle Cell Disease, Nephron 57 (1991) 236, Https://Doi.Org/10.1159/ 000186259.