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Massive Splenic Infarction Abscess in A Teenager with Sickle Cell Disease: A Case Report in Northern Benin

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Abstract

Introduction: Splenic abscess is rare in children. This report discusses a case of splenic abscess complicating an infarction in a teenager at the Teaching Hospital of Borgou/Alibori in Benin Republic.

Patient and Observation: The patient was a 14-year-old teenager with hemoglobinopathy (SC), admitted to the pediatric department for generalized abdominal pain associated with fever and a dry cough. On physical examination, he presented with an infectious syndrome, generalized abdominal pain, highly sensitive splenomegaly, left lung consolidation, and severe malnutrition. Abdominal ultrasound and thoraco-abdominal CT-scan revealed a splenic infarction abscess. Following medical treatment, which included broad-spectrum antibiotic therapy and analgesia, a total splenectomy was performed. During surgery, the spleen appeared greyish and contained pus, which, upon cytobacteriological examination, isolated a *Klebsiella pneumoniae* strain sensitive to the combination of amoxicillin-clavulanic acid. The patient showed favorable evolution under this treatment.

Conclusion: Splenic abscess should be suspected in any subject with sickle cell disease presenting with painful and febrile splenomegaly.

Keywords

Abscess, Spleen, Sickle Cell Disease, Child, CHUD-B/A, Benin

Introduction

Splenic abscess is a rare condition in children [1], primarily occurring in specific comorbidities such as sickle cell disease [2]. Access to specialized care for patients with sickle cell disease remains challenging in some regions of Sub-Saharan Africa, exposing them to multiple and unusual complications, including splenic abscess. Due to its rarity, it is often misunderstood, leading to diagnostic, therapeutic, and prognostic challenges. In this report, we present a case of splenic abscess complicating a massive infarction of this organ in a fourteen-year-old teenager with sickle cell disease at the pediatric unit of Borgou/Alibori Teaching Hospital in Northern Benin.

Patient and Observation

Case Report

He was a 14-year-old teenager with hemoglobinopathy SC, brought in by his parents due to generalized abdominal pain, more pronounced in the left hypochondrium, which had been ongoing for two weeks and forced the patient to adopt an anteflexion position. He also had a fever (39.5°C) and a dry cough. There were no reports of thoraco-abdominal trauma or recent air travel before the onset of symptoms. Prior to this hospitalization, he had been admitted to a primary level hospital where he received a 4-day course of antibiotic therapy consisting of ceftriaxone and metronidazole, along with antispasmodic medication, but there was no improvement in his symptoms.

Regarding his medical history, he was known to have sickle cell disease (Hb-SC), which was diagnosed at the age of 10 during painful osteoarticular crises, but he had never received long-term follow-up for this condition. His vaccinations, both for the expanded program on immunization (EPI) and non-EPI, were not up to date, and he occasionally used herbal teas to manage painful crises. He resided in a village situated at an elevation of 1450 feet above sea level.

The physical examination upon admission revealed an altered general condition, with a temperature of 37.8°C, a heart rate of 95 beats per minute, a respiratory rate of 25 cycles per minute, and an oxygen saturation of 97%. The patient weighed 32 kg, had a height of 154 cm, resulting in a body mass index (BMI) of 13.5 kg per square meter, which was significantly below the average (BMI/A < -3 standard deviations), indicating severe malnutrition. Abdominal examination showed generalized abdominal pain with highly sensitive splenomegaly (type 3), as well as abdominal tenderness and periumbilical pain. A left lung consolidation was detected at the pulmonary level. The suspected diagnoses were acute generalized peritonitis, sepsis, splenic abscess, and abdominal vaso-occlusive crisis.

Certain diagnostic procedures such as plain abdominal X-ray and blood culture were not performed. However, the blood count revealed hypochromic and microcytic anemia, with a hemoglobin level of 8.8 g/dl, leukocytosis of 17,500/mm3 with a predominance of polynuclear neutrophils (58%), and a platelet count of 470,000/mm3. Uremia, creatinine, and blood glucose levels were within normal range.

Abdominal ultrasound showed a massive splenic infarction affecting 2/3 of the spleen with pseudo-abscess foci. Thoracic and abdominal computed tomography scan with and without contrast material injection revealed a sizable splenic abscess foci and left basal pneumonia (**Fig-1**). Additionally, an HIV test, which is performed routinely on all admitted patients, came back negative.

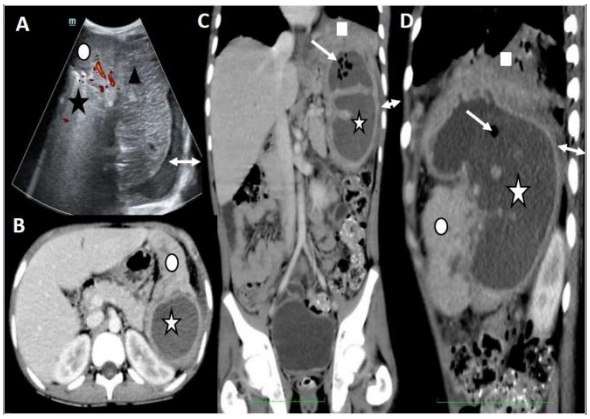

Fig-1:

(A) transverse Doppler ultrasound section of the spleen and abdominal CT scan in the portal phase in axial (B), frontal (C) and left parasagittal (D) sections.

Splenomegaly (white circle) with absence of vascularization of the lower two-thirds of the spleen (black triangle), perisplenic effusion (double white arrow) and aeric hyperechogenicity reflecting the aeric component of the abscess (black star). The CT-scan finds a voluminous splenic abscess (white star), site of aeric hypodensity (white arrows). Presence of perisplenic effusion (double white arrow) and contiguous left basal alveolar pneumonitis (white square).

All these clinical and para-clinical findings contributed to the diagnosis of splenic infarction abscess in the context of severe acute malnutrition and sickle cell disease (Hb-SC). Initially, the child received medical treatment consisting of a combination of ceftriaxone 2g per day, metronidazole 1g per day, and ofloxacin 400mg per day for ten days, along with gentamicin 80mg per day for three days as antibiotic therapy. Additionally, the patient received analgesia with tramadol and paracetamol, 2 liters of hydration per day using drinking water, and was fed with ready-to-use therapeutic food (PlumpyNut).

The evolution of the condition showed improvement with the resolution of fever from the fifth day, although there was still exquisite pain in the left hypochondrium. Due to persistent pain and the extent of infarction and abscess foci shown by the CT-scan, a decision was made to perform a splenectomy. During surgery, multiple parieto-splenic, hepato-splenic, and omento-splenic adhesions were observed. The spleen was found to be greyish in color with whitish spots, and its capsule was friable, leading to the release of chocolate pus. The spleen was removed and examined in pathological anatomy, revealing areas of necrosis, spleen congestion, and fibrosis with the presence of hemosiderin (**Fig-2** and **Fig-3**).

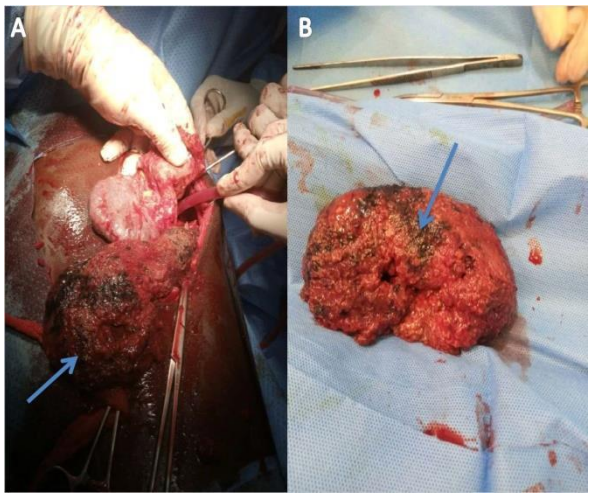

Fig-2:

Discovery of a greyish spleen during surgery (A), spleen stump (B) dotted with necrotic-looking areas (blue arrows)

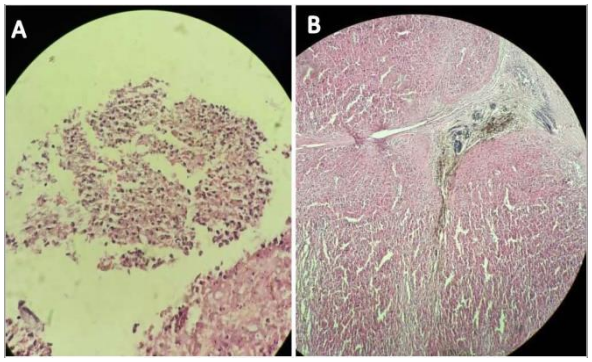

Fig-3:

Necroticarea in the center (A), congestion and fibrosis at 2 p.m. (B) with the presence of hemosiderin pigments

Postoperatively, the patient received two units of packed red blood cells (300ml each) through transfusion. The initial antibiotic treatment was continued as the cytobacteriological examination of the pus had isolated *Klebsiella pneumoniae*, sensitive to ceftriaxone, ciprofloxacin, gentamicin, and amoxicillin-clavulanic acid. Based on the antibiogram results, the patient was subsequently treated with amoxicillin-clavulanic acid 3g per day for 10 days, leading to a favorable clinical evolution.

After the splenectomy, the patient was discharged from the hospital eleven days later and prescribed folic acid 5mg and penicillin V for antibiotic prophylaxis. Additionally, the patient received vaccinations against pneumococcal, meningococcal, *Haemophilus influenzae*, and salmonella typhi diseases. Follow-up visits at 3 and 6 months after the splenectomy showed the patient was doing well.

Discussion

Abscess of the spleen is a rare diagnosis, with an incidence ranging between 0.14% and 0.7% in autopsy series [3]. While most cases are observed in adult patients with specific medical histories, particularly those with immunosuppression, there have been reported cases in patients with sickle cell disease [2,4]. In the latter group, splenic abscesses have been considered rarer due to their tendency to undergo early autosplenectomy, a process in which the spleen gradually atrophies and shrinks.

Sickle cell disease affects multiple organs, and the spleen is one of the most frequently affected, with various complications such as splenic sequestration, hypersplenism, infarction, and splenic abscess [5].

Initially, individuals with sickle cell disease experience splenomegaly during their first decade of life, but over time, the spleen undergoes progressive atrophy as a result of repeated vaso-occlusive crises and infarctions, eventually leading to autosplenectomy [2]. However, in some cases, splenomegaly may persist into more advanced age, as observed in our patient. The persistence of splenomegaly in sickle cell disease patients predisposes them to the development of splenic infarction. The early functional asplenia resulting from autosplenectomy renders sickle cell patients more susceptible to systemic infections and, in the presence of splenic infarction, increases the risk of developing a splenic abscess [2,6].

Splenic infarction is a well-documented complication in patients with hemoglobinopathies. In some cases, it may be an early, small, and imperceptible event [7]. However, in massive cases, it can affect more than 50% of the spleen size and is commonly observed in individuals carrying heterozygous SC, SE, and β-thalassemia. The usual triggering factor is high altitude, leading to hypoxia, particularly in unpressurized aircraft, but cases have also been reported at altitudes of 5,000 to 7,000 feet above sea level [7,8]. The description reported in the literature aligns with the observations made in our patient who was heterozygous for Hb-SC and had an infarction affecting over 50% of his spleen, despite not living at high altitude or having recent air travel.

Our patient likely developed sepsis due to his functional asplenia, a condition resulting from the autosplenectomy associated with sickle cell disease, and his severe acute malnutrition, which increases his vulnerability to systemic infections. Additionally, the lack of specialized follow-up and poor immunization coverage, both for vaccines from the Expanded Program on Immunization (EPI) and non-EPI vaccines, are significant contributing factors to his increased susceptibility to infections, despite the identified pathogen not being covered by vaccination.

Regarding the diagnosis, the presence of generalized abdominal pain, fever, and sensitive splenomegaly led us to suspect a splenic disorder. Emergency abdominal ultrasound confirmed the presence of splenic infarction, while abdominal computed tomography provided a clearer diagnosis of the abscess. In practice, ultrasound is a simple and easy examination but may be less sensitive than abdominal computed tomography, which is the main diagnostic tool for splenic abscess. Computed tomography offers more specificity and provides detailed information about the anatomical location, size, and relationship of the abscess with neighboring organs [2].

The identification of *Klebsiella pneumoniae* on cytobacteriological examination of the pus suggests a significant immune deficiency in our patient. Various pathogens can cause splenic abscess, including staphylococci, streptococci, and gram-negative bacilli, such as salmonella [1,2]. Given the range of potential pathogens, our initial medical treatment involved broad-spectrum antibiotic coverage, including third-generation cephalosporins and quinolones.

Regarding the surgical approach, splenectomy is commonly indicated in patients with sickle cell disease for various reasons, including repeated crises of splenic sequestration, hypersplenism, massive splenic infarction, and splenic abscess [2]. The literature offers different protocols for treatment, such as partial splenectomy, percutaneous drainage guided by computed tomography, or non-interventional treatment with antibiotics [1,2,9]. In our patient's case, total splenectomy was indicated due to the presence of massive splenic infarction and abscess, justifying this therapeutic choice. In the context of sickle cell disease, some authors recommend total splenectomy due to the non-functional nature of the spleen in the majority of these patients [2].

Total splenectomy in patients with sickle cell disease must be accompanied by penicillin chemoprophylaxis for five years following the procedure. Additionally, regular and systematic vaccination against encapsulated pathogens, particularly pneumococcus, is essential to reduce the risk of infections associated with functional asplenia.

Conclusion

In conclusion, while splenic abscess is a rare condition, it should not be overlooked in clinical practice. Healthcare providers need to be aware of its existence, especially in patients with hemoglobinopathies, particularly those with heterozygous types, presenting with febrile conditions and sensitive splenomegaly. Prompt recognition and early management are crucial as it is a diagnostic and therapeutic emergency. With timely intervention and appropriate treatment, there is a possibility of a favorable outcome for patients affected by splenic abscess. Therefore, maintaining a high index of suspicion and quick action are essential for improving patient outcomes in such cases.

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Conflict of Interest

The authors have read and approved the final version of the manuscript. The authors have no conflicts of interest to declare.

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