

CASE REPORT

Spontaneous Splenic Rupture in a Malaria-Positive Adult: Case Report and Evidence Review with proposed management algorithm

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ABSTRACT

Spontaneous splenic rupture (SSR) is a rare but potentially fatal condition that can occur as a complication of various infections, such as mononucleosis, including malaria, hematological conditions like leukemia and lymphoma and certain inflammatory or neoplastic conditions. Malaria, caused by the *Plasmodium* parasite, predominantly affects the spleen, but rupture remains an uncommon complication. Herein, we present a case of a 28-year-old male patient who was diagnosed with severe malaria caused by *Plasmodium vivax* and subsequently developed spontaneous splenic rupture. The patient presented with fever and acute abdominal pain, and imaging confirmed splenic rupture with moderate splenomegaly. Patient was managed conservatively on medications and ultrasound-guided percutaneous drain insertion from interventional radiology for pelvic and perisplenic collection. The pathophysiology of spontaneous splenic rupture in malaria is not well understood, but it is thought to be due to splenic congestion, hyperplasia of splenic reticuloendothelial cells, and parasitic-induced inflammation, sometimes associated with post-trivial trauma. It is associated with significant morbidity and mortality, especially in cases where diagnosis is delayed. Spontaneous splenic rupture should be considered as a differential diagnosis in malaria-positive patients presenting with acute abdominal pain, especially when accompanied by signs of circulatory collapse. Early detection and prompt intervention are crucial in reducing mortality.

Keywords: Spontaneous splenic rupture, *Plasmodium vivax*, Malaria, Abdominal pain, fever, moderate splenomegaly, intervention radiology.

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INTRODUCTION

Spontaneous splenic rupture is an uncommon but severe medical emergency that can be associated with various underlying conditions, including infections, trauma, and hematological diseases.¹⁻³ It is often seen in patients with conditions like infectious mononucleosis, malaria, and certain hematologic malignancies like leukemia and lymphomas. The spleen's susceptibility to rupture in infections such as malaria is often due to the parasite's destructive effect on the organ. *Plasmodium falciparum*, which causes the most severe malaria, often leads to splenic enlargement and congestion, increasing the risk of rupture.⁴ *P. vivax* can rarely cause this as well. The spleen is a primary organ for immune response and filtration of parasitized red blood cells and is profoundly affected during malaria infection. Splenomegaly is common, and in rare instances, it may lead to splenic rupture, typically due to the distension of the splenic capsule as the organ becomes

enlarged and inflamed. It may sometimes be associated with rupture post-trivial trauma, which is relatively uncommon.⁵

Case Report

A 28-year-old male from a malaria-endemic region presented to the general surgery emergency with a complaint of abdominal pain mainly towards the left upper abdomen radiating towards the left shoulder and back for 6 days. He has been suffering from fever, chills, malaise, and mild abdominal pain for the past 20 days. On examination, he was vitally stable with mild tachycardia and had marked tenderness in the left upper abdomen. He was clinically pale. He has a history of poliomyelitis for the last 25 years with bilateral lower limb weakness. Upon physical examination, the patient was febrile with a temperature of 38.5°C. Abdominal examination revealed tenderness and rebound tenderness over the left upper quadrant, with guarding. There was no history of significant trauma or any other significant medical history that would

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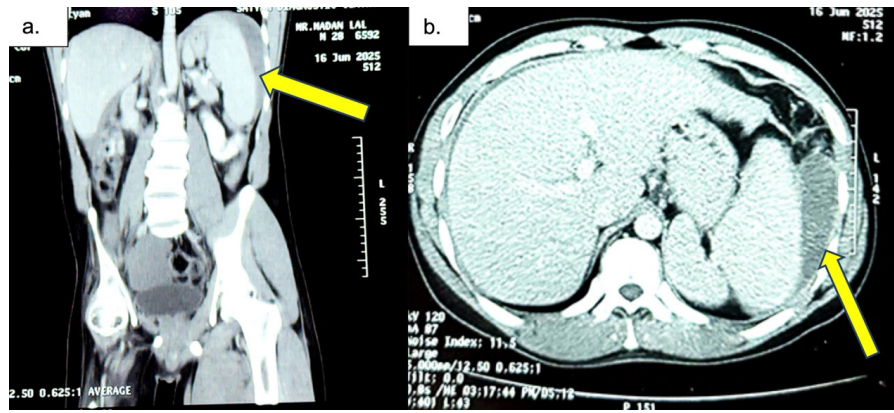


Figure 1: a. Coronal view and b. sagittal view of CT images showing perisplenic collection (Arrow) with enlarged spleen

predispose the patient to splenic rupture. Initial laboratory investigations revealed a positive result for *P. vivax* malaria in a peripheral blood smear. Hemoglobin levels were significantly reduced at 6.6 g/dL, and no abnormality of liver function tests. Based on clinical examinations and findings, the probable diagnosis of intra-abdominal solid organ injury with severe anemia was made. Ultrasound of the whole abdomen showed moderate splenomegaly with irregular splenic margins and mild to moderate peri-splenic and peritoneal collection. A contrast-enhanced abdominal CT scan (Figure 1) showed an enlarged spleen- moderate splenomegaly of 21x14x9 cm- with a tear in the capsule with peri-splenic and intra-abdominal free fluid, suggestive of spontaneous splenic rupture. Based on clinico-radiological evidence, the diagnosis of spontaneous splenic rupture in a plasmodium-positive patient was made.

The patient was stabilized with resuscitation by intravenous fluids and blood transfusions, and broad-spectrum antibiotics were started to prevent secondary infections. Given the contained peri-splenic collection with mild pelvic collection and the patient's vital stability with complete responder to intravenous fluids and blood products, ultrasound-guided percutaneous drain insertion in the peri-splenic collection with single-time aspiration of pelvic collection was done from the interventional radiology department. AAST grading has also been used in a few reported studies of spontaneous rupture of the spleen, and in our case, AAST grading of splenic rupture was found to be Grade II. Further, the patient was started on appropriate antimalarial therapy, including intravenous artesunate, and was closely monitored in the postoperative wards with regular vitals and 12-hourly hemoglobin monitoring. The patient had an uneventful recovery. He was discharged on day 7 post percutaneous drain insertion with a drain cut bag in situ and with instructions for outpatient follow-up (Figure 2).

DISCUSSION

The pathophysiology of spontaneous splenic rupture in malaria is thought to be multifactorial. The spleen becomes congested with blood due to increased sequestration of parasitized red blood cells, and hyperplasia of reticuloendothelial cells occurs

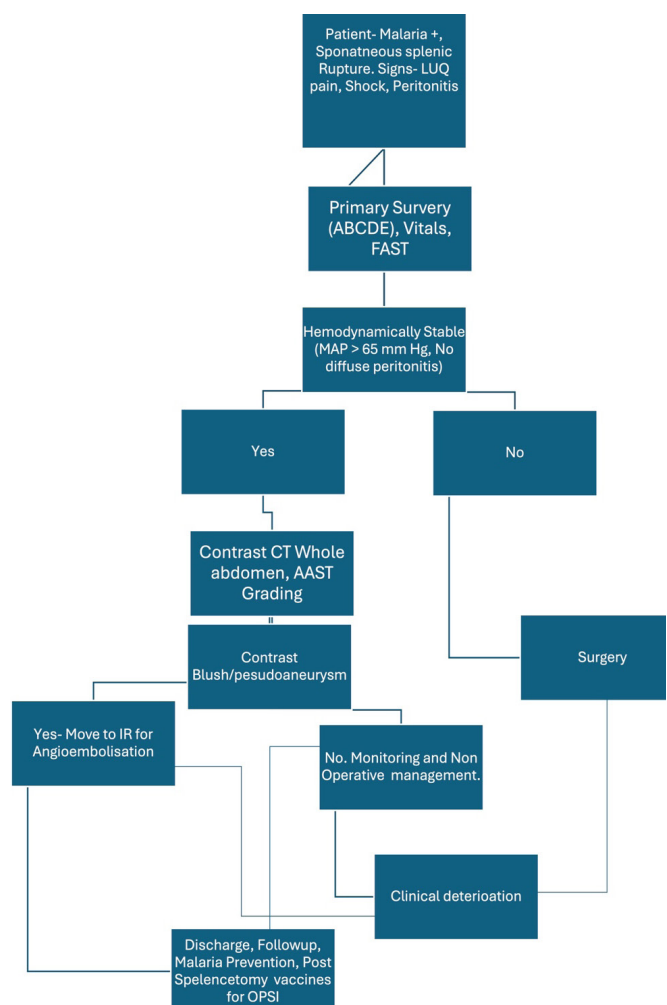


Figure 2: Management Algorithm for spontaneous splenic rupture with malaria.

as part of the body's immune response. This leads to splenic enlargement and distension, which weakens the splenic capsule and predisposes it to rupture. *Plasmodium* parasites can cause damage to the endothelium, leading to microvascular leakage

and tissue fragility.¹⁻⁵ Although spontaneous splenic rupture is a rare complication of malaria, certain factors like severe malaria, massive splenomegaly, delayed diagnosis and treatment, and, in rare cases, minor trauma due to an enlarged spleen can increase its likelihood.^{5,6} Managing spontaneous splenic rupture requires both medical and surgical interventions. Initial medical management involves stabilizing the patient with fluids, blood transfusions, and treating the underlying malaria infection.⁶⁻⁸ Surgical intervention is necessary for significant ruptures (AAST grade 4 or 5) or when conservative measures fail to control hemorrhage.⁶ Splenectomy is typically performed when the rupture is extensive or when there is ongoing bleeding (Figure 2). The prognosis for spontaneous splenic rupture in malaria patients mainly depends on the severity of the rupture and the timeliness of intervention. Early recognition and treatment potentially improve outcomes, but delayed diagnosis and inappropriate management can lead to high morbidity and mortality.

CONCLUSION

Spontaneous splenic rupture is a rare but serious complication of malaria, especially in cases of *P. falciparum* and rarely in *P. vivax* infection, which is discussed herein. Early recognition of the condition is crucial, and urgent surgical intervention may be required in cases of significant rupture with a higher AAST grade of Injury. The association between malaria and splenic rupture underscores the importance of managing malaria cases aggressively, especially in endemic regions, and ensuring

compliance with prophylactic and therapeutic regimens to reduce the risk of severe complications like splenic rupture.

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