CASE REPORT

Sudden splenic rupture in a *Plasmodium vivax* infected patient: A case report

Hania Afzal[1], Aamir Hussain[2], Afroze Fatima[3], Muhammad Mansoor Iqbal[2], Huma Hameed[2]

[1]Pakistan Air Force Hospital Mushaf, Sargodha Pakistan
[2]Pakistan Air Force Hospital Faisal, Karachi Pakistan
[3]Shaukat Omar Memorial Hospital, Karachi Pakistan

ABSTRACT

Malaria is a significant public health concern in Pakistan, with *Plasmodium vivax* being a prevalent strain. While the disease typically follows a benign course, it can lead to severe complications including anemia, hepatic dysfunction, jaundice, acute lung injury, acute respiratory distress syndrome, pulmonary edema, shock, acute renal failure, thrombocytopenia and splenic rupture. This case report documents the presentation, diagnosis and management of a 32-year-old male patient. He was admitted with acute febrile illness and diagnosed with *P. vivax* infection. On the fifth day of illness he developed severe abdominal pain and hypotension, necessitating intensive care unit (ICU) admission. Labs revealed precipitous drop in hemoglobin and platelet count. Imaging studies revealed hemoperitoneum with splenic rupture. An emergency laparotomy was performed followed by splenectomy as a therapeutic intervention to manage the acute clinical crisis. Blood transfusions were administered during surgery and post-splenectomy vaccination was given. The patient's condition improved gradually and he was discharged from the hospital. This case report highlights the critical importance of early diagnosis, vigilant monitoring and timely intervention in managing severe complications associated with *P. vivax* infection. Prompt recognition and appropriate management are essentials to prevent morbidity and mortality in patients with severe malaria.

Keywords: *Plasmodium vivax*, Hemoperitoneum, Complication, Splenic rupture, Splenectomy

BACKGROUND

Malaria is endemic in Pakistan and after devastating floods the number of cases increased about four folds i.e. from 40,000 cases in 2021 to more than 1.6 million reported cases in 2022 with actual toll exceeding this number.[1] From January to August 2022, of 170,000 lab confirmed cases in Pakistan, 77% were due to *Plasmodium vivax* (*P. vivax*).[2]

P. vivax malaria poses the greatest global threat among human malaria species, with an estimated 2.5 billion individuals at risk of infection.[3] It exists in dormant stage in liver in form of hypnozoites and can reactivate to blood-stage infection after weeks, months or even years. Primaquine prophylaxis can eliminate this hypnozoite stage.[4]

P.vivax malaria typically follows a benign course but may cause multiple organ dysfunctions and severe life threatening issues such as severe anemia, hepatic dysfunction, jaundice, acute lung injury, acute respiratory distress syndrome, pulmonary edema, shock, acute renal failure, thrombocytopenia and splenic rupture.[5]

We present here case of a patient with *P. Vivax* malaria who developed spontaneous splenic rupture on 5th day of fever onset and was managed with prompt splenectomy and blood products replacement.

CASE REPORT

We present case of a 32-year-old sanitary worker, resident of Karachi Pakistan. He was taking over the counter medicines for fever for last five days when he got admitted to the male ward of PAF Hospital Karachi with complaint of high-grade fever associated with myalgias, headache, anorexia and nausea. Laboratory results revealed a hemoglobin level of 13.6 g/dL, total leukocyte count (TLC) of 3.4 × 10^3/µL, and a platelet count of 47,000/µL, with *P. vivax* infection confirmed on Immunochromatographic test (ICT).

On admission his condition escalated prompting transfer to the intensive care unit (ICU) due to severe abdominal pain and hypotension. The patient was kept on intravenous (IV) fluids and inotropic support. Despite the intensity of symptoms, he remained

Correspondence: Dr. Hania Afzal, Resident Medicine, Pakistan Air Force Hospital Mushaf, Sargodha Pakistan

Email: haniaafzal96@gmail.com

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conscious and oriented, with a Glassgow Coma Scale (GCS) of 15/15.

The subsequent day witnessed a precipitous drop in platelets to 28,000/µL and hemoglobin to 7.7 g/dL, which further dropped to 6.1g/dL on same day. His glucose-6-phosphate dehydrogenase (G6PD) levels were normal with normal liver function tests (LFTs), lactate dehydrogenase (LDH) and urine routine. His reticulocyte count was 0.9. Peripheral film revealed trophozoites of *P. Vivax*, normocytic anemia and absence of schistocytes. All these labs were indicating anemia secondary to loss of blood instead of hemolysis. Abdominal ultrasound revealed ascites and pleural effusion, leading to urgent abdominal contrast enhanced computed tomography (CECT) (Figure-I), ultimately diagnosing hemoperitoneum with splenic rupture.

Urgent intervention took the form of an emergency laparotomy, culminating in splenectomy due to the splenic rupture (Figure-II).

Transfusions, including 4 pints of red cell concentrates (RCC), 4 bags of fresh frozen plasma (FFPs) and 1 mega platelet were administered before and during the procedure. Postsplenectomy vaccination was administered. Patient's clinical trajectory gradually improved leading to his discharge.

This case highlights the intricacies of managing sudden splenic rupture in the context of *P. vivax* infection, emphasizing the significance of meticulous monitoring, timely surgical intervention and supportive care for optimal patient outcomes.

Figure-I: Large sub-capsular hematoma, superoposterior intraparenchymal hematoma (7x6 cm in size) with a parenchyml laceration indicating splenic rupture.

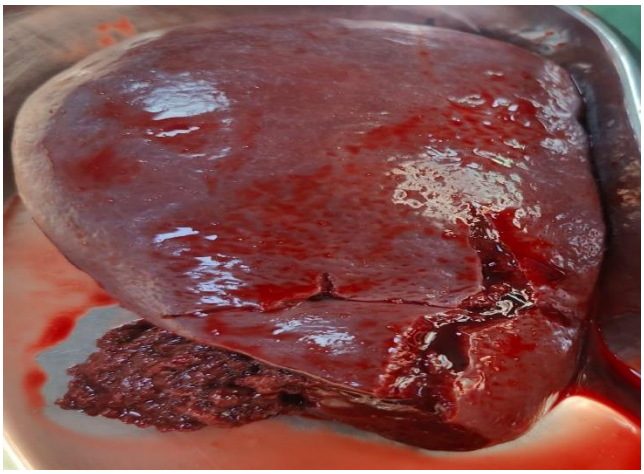

Figure-II: Ruptured spleen.

DISCUSSION

The presented case of a sudden splenic rupture in a *P. vivax* infected patient serves as a poignant reminder of the unpredictable and potentially life-threatening complications associated with malaria. Patient's journey from initial symptoms to a critical state necessitating emergency splenectomy highlights the need for heightened awareness and clinical vigilance in regions where *P. vivax* is endemic.

Splenomegaly is one of the commonest features of malaria, with more marked enlargement with *P. vivax* as compared to other plasmodium species.[5,6] Proportion of palpable spleens in a given population was used by World Health Organization (WHO) in 1950s to 60s, as a metric in deployment of control measures against malaria.[6]

Commonest cause of splenic rupture is trauma followed by hematological malignancies, infections, vascular, genetic and haematological disorders.[5] Malaria related splenic rupture mostly occurs in patients with low or no immunity towards disease and is more prevalent with *P. vivax* than other species.[5, 6] The rate of splenic rupture with malaria might increase with malaria elimination efforts as this complication mostly affects non immune individuals.[7]

It seems that rupture follows rapid enlargement of spleen with preceding infarction. Other reported mechanisms are compression of spleen by abdominal muscles while performing routine activities and stasis of blood in splenic sinuses by deformed erythrocytes and activated lymphatic tissue, though exact pathophysiological mechanism is still unknown.[5,6,7,8] A reported case of splenic rupture after fall from a tree with no direct abdominal trauma and demonstration of

P.vivax in thick smear after splenectomy supports the theory that minor trauma can lead to splenic rupture in malaria.[6]

A previous review of literature reveals 22 cases of spontaneous splenic rupture since 1960 while 15 of these cases were with *P.vivax.*[8] In a reported case patient was initially managed conservatively but his condition deteriorated requiring prompt decision of laparotomy.[8]

The significant drop in platelet count and haemoglobin levels necessitated prompt and aggressive management. Inotropic support and transfusions played a crucial role in stabilizing patient's condition during the perioperative period. The decision to perform an emergency laparotomy and subsequent splenectomy was driven by the urgent need to address the hemoperitoneum resulting from splenic rupture as splenic rupture is a rare but life-threatening complication with 38% mortality.[9]

Splenic rupture was confirmed with computed tomography (CT), which has at least 95% sensitivity and specificity for detecting splenic injury and splenectomy is the treatment of choice in patients with hemoperitoneum and persistent instability.[8] However, the aim of management in malarial splenic rupture should be spleen conservation as it heals in most stable cases and preserving the spleen can help avoid further severe malaria attacks.[8,10] A Brazilian case report demonstrated 2 more episodes of malaria at 2 months intervals after splenectomy in malarial splenic rupture.[5] A study analysing 55 cases of splenic rupture in malaria stated that 14 out of 55 cases were managed conservatively.[7]

The successful outcome in this case underscores the effectiveness of a multidisciplinary approach involving medical specialists, surgeons and anesthetist, as the collaboration between them plays a pivotal role in the managements of such patients.

Additionally, postsplenectomy vaccination should be administered promptly, considering long-term consequences and preventive measures for them.

This case emphasizes the need for healthcare providers to be vigilant about potential severe complications of *P. vivax* infections, even in the absence of typical markers of severity. Further research and case studies are warranted to elucidate the underlying mechanisms leading to splenic rupture in *P. vivax* infections and to refine management strategies for such rare but critical occurrences.

CONCLUSION

Although, *P. vivax* is traditionally perceived as causing milder forms of malaria, this case highlights the importance of considering atypical and severe manifestations. The scarcity of reported cases of splenic rupture associated with *P. vivax* underscores the need for further research to elucidate the underlying mechanisms and risk factors contributing to such complications.

This case provides valuable insights into the complexities of managing severe complications arising from *P. vivax* infection. It emphasizes the critical role of early recognition, vigilant monitoring, timely intervention and multidisciplinary team involvement in optimizing outcomes. This contribution to the evolving understanding of severe manifestations of *P. vivax* malaria encourages on-going research and underscores the importance of continued education for healthcare providers working in malaria-endemic regions.

CONFLICT OF INTEREST

None

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Declared none

AUTHOR CONTRIBUTION

Hania Afzal: Finding resources, data curation, writing and reviewing original draft, accountable for every aspect of the work

Muhammad Aamir Hussain: Treating physician, data curation, investigation and writing**,** accountable for every aspect of the work

Feroze Fatima: Draft proof reading, editing, accountable for every aspect of the work

Muhammad Mansoor Iqbal: Treating surgeon, data proof reading, editing, accountable for every aspect of the work

Huma Hameed: Diagnosis, data curation and investigation, accountable for every aspect of the work

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