



## **Splenic Rupture in *Plasmodium vivax* Malaria: A Case Report from Kuwait**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author MAF designed the study, wrote the protocol for the case. Author JAQ wrote the first draft of the manuscript and managed literature searches. Authors AAF and MS managed the data collection, analyses of the study. All authors read and approved the final manuscript*

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**Case Study**

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### **ABSTRACT**

We describe a case of malaria vivax in a 31 year old Afghan male complicated by spontaneous splenic rupture one month after returning from Pakistan. The ruptured and enlarged spleen displaying multiple subcapsular hemorrhages was surgically resected. Malaria was diagnosed by peripheral blood smear. The patient underwent antimalarial therapy with chloroquine and primaquine. While numerous diseases can result in splenic complications, such as splenic rupture malarial infection is known as the most common cause. Consequently, It is recommended that malaria be always considered in all cases of suspected splenic rupture in the differential diagnosis of all acute fevers, especially among those with a history of travel to an endemic area.

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## 1. INTRODUCTION

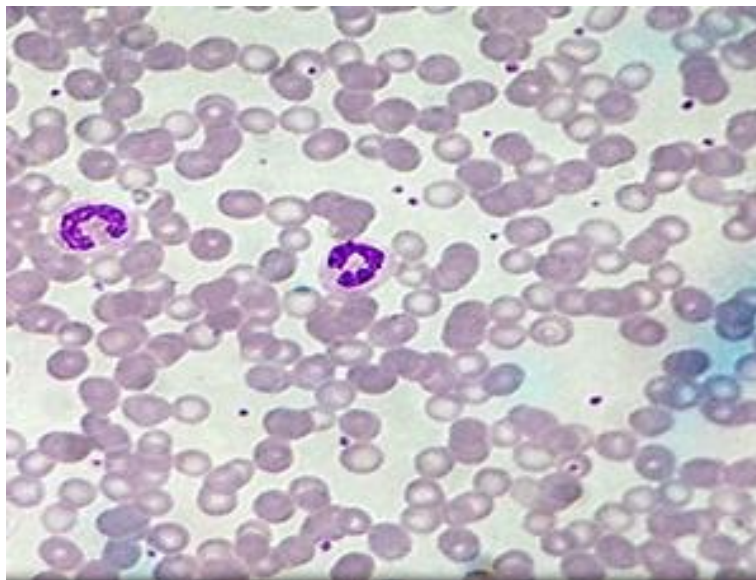
Malaria is the most common infectious diseases in the Asia region [1]. Malaria has been recognized in human beings since centuries. It is a disease of tropical and subtropical countries, particularly Africa and Asia. Despite advances in knowledge, malaria remains as a cause of significant morbidity and mortality worldwide [2]. Kuwait is non-endemic for malaria but, with a large expatriate population, the number of imported infections has increased. There is no local mosquito-borne transmission of malaria in Kuwait. However, in a five year period at the Infectious Diseases Hospital, the number of laboratory-diagnosed cases of malaria increased annually from 87 in 1980 to 534 in 1984, an increase of over 613%. Except for two induced infections due to transfusion, and accidental syringe-needle transmission, all were imported, mainly from the Indian subcontinent. *Plasmodium vivax* was responsible for 87.29% of the cases [3]. Above 40% of world population lives in malaria endemic area, including, India, Pakistan, Bangladesh, Southeast Asia, Africa, area of Middle East, Central and South America [2]. Involvement of the spleen in malaria that results in splenomegaly renders this organ prone to complications such as rupture [4]. In areas where malaria is endemic, spontaneous rupture of the spleen is uncommon. Because of increase of travels to endemic areas and resistance to

antimalarial drugs [5,6], however, malaria is a major medical problem, which is becoming increasingly important to surgeons worldwide [7].

## 2. PRESENTATION OF CASE

A 31 year old Afghan male patient was presented to emergency department in the infectious disease hospital of Kuwait, with sudden onset of upper abdominal pain, followed by palpitations and fainting. He came from Pakistan one month ago. Clinical examination revealed that he was febrile and hypotensive and had pain in the left hypochondrium. Laboratory investigations showed the following values; a westergren erythrocyte sedimentation rate 70 mm/hr, a hemoglobin level of 10.5 g/dL, a platelet count of  $82 \times 10^9/L$ , Hematocrit of 35.5% and a white blood cell count of  $4.5 \times 10^9/L$ . Creatinine value was at 1.69 mg/dL. Urea and electrolytes were normal, and liver function tests were as follows: AST 48 U/L, ALT 110 U/L, and total bilirubin 1.87 mg/dL. Hemoglobin electrophoresis was normal to exclude other causes of homeless anemia, such as sickle cell anemia and thalassemia. Parasites were visualized by both thick and thin blood smears stained with Giemsa (Fig. 1).

Abdominal ultrasonography showed an enlarged, ruptured spleen and free fluid in the peritoneal cavity (Fig. 2).



**Fig. 1. Blood smear, Giemsa stain, x 1000**



**Fig. 2. Ultrasonography showing ruptured spleen**

The patient could not remember a minor trauma before admission. The patient immediately underwent surgery for splenectomy. Laparotomy revealed a lot of hemorrhage and clots intraperitoneally. A splenic tear in the diaphragmatic surface was observed about 7 cm in length. Splenectomy was done. Pathological examination revealed that the spleen weighed 990 g and measured 22 × 13 × 7 cm. Gross examination showed the spleen to be dark gray, with capsular tear and subcapsular hematoma on the medial side. Microscopy revealed dilatation of the sinuses, increased pigmentation and elevated concentration of macrophages. Thick and thin films revealed the presence of *Plasmodium vivax* (parasitemia 2%). Therapy with chloroquine diphosphate (25 mg/base/kg) was initiated directly after surgery followed by primaquine (0.6 mg/base/kg/day during 14 days) after exclusion of a glucose 6 phosphatase dehydrogenase deficiency (G6PD).

The patient was discharged 7 days after the operation and vaccination against pneumococcal infection, meningococcal meningitis and *Haemophilus influenzae*.

### **3. DISCUSSION AND CONCLUSION**

Malaria can exist with numerous clinical symptoms and complications. Occasional splenic complications are known to occur even in a mild form of malaria [8], which require attention. The first case of spontaneous rupture of the spleen was described by Atkinson, an English surgeon, in 1874 [9].

Spontaneous splenic rupture of the spleen means rupture occurring without history of recent blow or injury. Spontaneous splenic rupture in malaria is a rare complication, most commonly seen in acute infection associated with *Plasmodium vivax*. Nevertheless, it is known that spontaneous splenic rupture is not a frequently communicated and diagnosed complication, and several review articles since 1993 suggest a significant underreporting and underdiagnosis of this entity [10].

The exact mechanism of spleen rupture is poorly defined. However, two mechanisms have been implicated in the process. The first explanation for these mechanisms, in acute malaria, is that the altered splenic rupture is a result of highly activated lymphatic tissue of the organ and marked stasis in the splenic sinuses caused by deformed parasite containing erythrocytes with altered surface characteristic. These changes in the splenic structure can lead to asymptomatic enlargement or complication such as hematoma, rupture, hypersplenism, ectopic spleen or torsion [11]. Second, the spleen may be compressed by the abdominal musculature during physiological activities such as sneezing, coughing, defecation and sitting up or turning in bed. This is why all patients with acute malaria should be informed to avoid activities with increased risks of abdominal trauma for several weeks after cure of the acute disease [12]. Most of the cases of spontaneous splenic rupture in malaria occur thru acute infection and are associated with *P. vivax*,

although there have been rare cases related with other *Plasmodium* species [13].

Pathological finding in spontaneous rupture of the spleen includes gross and microscopic changes. On gross examination, in acute malaria, spleen is dark because of congestion, hyperemia and deposition of malarial pigment (haemozoin). The capsule is thin and friable. In chronic malarial, spleen tends to be dark gray with increased density of connective tissue and fibrosis leading to a heavy and massive enlarged organ with a firm or hard capsule. In addition, disruption of the spleen capsule and single or multiple tears in the underlying parenchyma may be found. Tear can be small or large and may be present on any surface [14,15].

There is a debate regarding either to treat patients with spontaneous splenic rupture in malaria by splenectomy or by conservation treatment to preserve the spleen. It is very important to preserve the spleen in patients who live in malaria endemic areas or in those who frequently visit those areas because of overwhelming post-splenectomy infection due to encapsulated bacteria, such as *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Neisseria meningitidis*, that occurs post-splenectomy in 4% of patients without prophylaxis. Splenectomy in such candidates carries the risk of leading them to severe fatal malaria in the future and health professionals should be sure about the compliance of the patients to malaria prophylaxis for life. Splenectomy should be reserved for patients with severe rupture or those with uncontrolled or recurrent bleeding [7,16,17].

Change in the structure of the spleen during the course of acute malaria can result in asymptomatic enlargement or complications such as hematoma formation and rupture. Primary exposure to malaria and infection with falciparum and vivax appear to be important factors in spontaneous rupture of the spleen. Prophylactic treatment should be taken by the traveler to endemic areas, especially those who do so during the summer.

## CONSENT

The patient has given their informed consent in the present case report. All authors declare that written informed consent was obtained from the patient (or other approved parties) for publication of this case report.

## ETHICAL APPROVAL

All authors hereby declares that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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