YALE JOURNAL OF BIOLOGY AND MEDICINE 94 (2021), pp.277-284.

CASE REPORT

YALE JOURNAL OF BIOLOGY AND MEDICINE
YJBM
CELEBRATING 90 YEARS 1928–2018

A Severe Case of Falciparum Malaria, 10 Years After Malaria Eradication: A Case Report

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Malaria is a major mosquito-borne public health problem especially in tropical countries. The authors report a malaria infection in a 31-year-old man who had returned from East Africa with developed fever and rigor. Because of his thrombocytopenia, decreased hemoglobin, elevated liver enzymes, and splenomegaly, and because of failure to question about recent travel history, he was initially referred to the hematological hospital and medical staff suspected a hematological problem, so he was investigated for bone marrow aspirate and biopsy. As he progressively deteriorated, and after retaking history, his relatives eventually came to mention their travel to Africa. Blood samples were sent to detect malarial parasites, but the results were negative. When an internist was consulted, the patient was drowsy with low oxygen saturation (SpO2), so he was intubated and put on continuous positive airway pressure (CPAP). The internist suggested empirical anti-malarial treatment, which improved the clinical and hematological conditions of the patient. However, the repeated thin blood film showed falciparum malaria ring-shaped trophozoites. The patient persisted with the same treatment for 1 week until his condition improved gradually and completely stabilized, and then he was discharged. Presentation of this case of malaria is crucial to outpatient clinics' proper referral of cases, as is encouraging the physician to think of malaria as a cause of fever and rigor even in countries with eradicated malaria and to insist on mentioning travel history. It is also imperative, in the case of sustaining fever with further deterioration of the patient after proper antibiotic use, to start empirical anti-malarial treatment immediately.

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Abbreviations: ALP, Alkaline phosphatase; ALT, Alanine transaminase; Anti-PR3, Anti-Proteinase-3 Antibody; ANCA, Anti-neutrophil Cytoplasmic Antibody; AST, Aspartate transaminase; BP, Blood Pressure; CBC, Complete Blood Count; CCHF, Crimean-Congo Hemorrhagic Fever; CMV, Cytomegalovirus; CPAP, Continuous Positive Airway Pressure; CRP, C-reactive protein; CV, Cardiovascular; CXR, Chest X-ray; EBV, Epstein-Barr Virus; ECG, Electrocardiogram; ESR, Erythrocyte Sedimentation Rate; GCS, Glasgow Coma Scale; GUE, General Urine Examination; Hb, Hemoglobin; ICU, Intensive Care Unit; IgG, Immunoglobulin G; IgM, Immunoglobulin M; INR, International Normalized Ratio; IU, International Unit; IV, Intra-venous; LDH, Lactase Dehydrogenase; LN, Lymph Node; LOC, Loss of Consciousness; LP, Lumbar Puncture; MPO, Myeloperoxidase; PANCA, Perinuclear Anti-neutrophil Cytoplasmic Antibody; PT, Prothrombin Time; PTT, Partial Thromboplastin Time; RBC, Red Blood Cell; RBS, Random Blood Sugar; RR, Respiratory Rate; SpO2, Oxygen saturation; TSB, Total Serum Bilirubin; TTP, Thrombotic Thrombocytopenic Purpura; Uls, Ultrasound; WBC, White Blood Cells; WHO, World Health Organization.

Keywords: Malaria, *Plasmodium falciparum*, hospitalization, travel history, imported case, Iraq

BACKGROUND

Malaria is a life-threatening disease that is transmitted to humans mostly via bites of a female *Anopheles* mosquito, which carry *Plasmodium* parasites [1]. In 2018, more than 400,000 deaths were reported from malaria worldwide [1]. It occurs mostly in areas where the mosquito has a longer life span, such as Africa. Climatic effects like humidity, rainfall, and temperature all have a role in the transmission of this disease. It mostly affects young children, especially in African Regions (where WHO accounted for 93% of all malaria cases in 2018 [1,2]) and other malaria-endemic regions like the South-East Asia and Western Mediterranean Regions (where immunity was at least partially developed). Meanwhile, in a non-endemic area, all ages of individuals are vulnerable to a malarial infection. This is especially true for those who are migrating to endemic areas, including frequent travelers and refugees [1].

A major outbreak in Iraq occurred in the 1960s when 11,878 cases were recorded by 1965. The second major outbreak in Iraq was in 1995, when the reported cases reached 39,000. Malaria can be prevented in any country with proper prevention planning and action. In this regard, in 2009 the Iraqi Ministry of Health announced that Iraq was free of malaria after a long battle with the disease [3]. However, since then, a few cases are recorded every year in some Iraqi cities [4-6]. However, to the best of our knowledge, none of them were reported in Sulaimaniyah city, Kurdistan region, Northern Iraq.

Malaria infection is curable, but if it is not diagnosed early it may lead to severe disease with a high rate of complications, such as multi-organ failure or even death. Fever and associated rigor and headache are among the early symptoms of malaria infection. These may be very mild, making it quite difficult to differentiate from other less severe infectious diseases that present with fever. Travel history is a very important factor to be considered for diagnosis, especially in cases of fever and rigor, as conversion to more severe disease mostly occurs when the patient did not disclose, or has denied, traveling to an endemic area in the stated travel history. This could lead to delay in the diagnosis and treatment of the disease [1,7]. Five species of *Plasmodium* parasite affect humans; among them, *P. falciparum* and *P. vivax* are the most life-threatening species [1]. A high rate of morbidity and mortality were recorded with *P. falciparum* infection [8]. In severe cases, intravenous administration of the anti-malarial drug is a critical part of disease management [9,10].

In this report, we aim to present a case with falciparum malaria in a region that has been free from malaria for 10 years: Sulaymaniyah, Iraq. This case was complicated by a delay in diagnosis due to the wrong referral of the patient to the tertiary center hospital, delay in asking about travel history, the late reporting by the patient and his relatives of his recent travel history. Thus, the patient was transferred to a hematological hospital (rather than an internal medicine establishment), and parasites were not detected on the stained thick blood film in the first investigation. The patient progressed into a severe form of infection, to the level that tracheal intubation, invasive ventilation, and continuous positive airway pressure (CPAP) had to be used. Starting empirical anti-malarial treatment after patient deterioration saved the patient's life. To the best of our knowledge, this is the first case of falciparum malaria recorded in Sulaimaniyah, Iraq.

CASE PRESENTATION

A 31-year-old male visited Shorsh Hospital (in Sulaymaniyah, Iraq) Outpatient Clinic on September 6, 2019, complained of fever and rigor for two consecutive days. After clinical examination, some laboratory investigations (Table 1), and without questioning about travel history, the physician referred him to Hiwa Hematology/Oncology Hospital for further investigations and confirmation of the causes of his thrombocytopenia.

Once the patient had been admitted to Hiwa Hematology/Oncology Hospital on September 7, 2019, he complained of malaise, intermittent fever, and rigor with sweating, headache, and dizziness. Moreover, nausea without vomiting, anorexia, and weight loss of 5.0 kg in 10 days were reported by the patient.

On clinical examination by an expert clinician, yellow discoloration of the skin and sclera were noted, but there was no itching, skin rash, or abdominal pain, and bowel motion and urination were reported to be normal.

On September 8, 2019, the laboratory tests were repeated, and the results of some tests had fluctuated drastically (Table 2). Chest X-ray (CXR) and Ultrasounds (Uls) of the neck and axilla were normal. However, abdominal Uls revealed splenomegaly with a long axis of 17.2 cm.

His blood film appeared normochromic and normocytic with mature cells but a moderately reduced number of thrombocytes. On the same day, he received the following treatments: 500 ml of glucose saline infusion, Piperacillin/Tazobactum (4.5 g vial, four times daily intravenously (IV), omeprazole (40 mg vial, daily by IV infusion), and paracetamol bottle (100 mg, IV infusion, three times daily).

On September 9, 2019, his hemoglobin (Hb), White Blood Cell (WBC), and platelet counts were 10.9 g/dl, 6.6 $x10^9$/L, and 19 $x10^9$/L, respectively. The next day, the values of Hb, WBC, platelets, and lymphocytes were 9.2 g/dl, 4.6 $x10^9$/L, 14 $x10^9$/L, and 26%, respectively. However, his albumin (3.4 g/dl), Alanine aminotransferase (ALT) (48 IU/L), and Aspartate aminotransferase (AST)

Table 1. Shows initial laboratory tests of a 31-year-old male patient suspected with malaria infection.

Sample and/or Test	Result	Normal Range
Blood		
Random Blood Sugar (RBS)	134 mg/dl	70-110 mg/dl
White Blood Cells (WBCs)	8.6 *10^9/L	3.5-10 *10^9/L
Lymphocytes	9.6%	15-50%
Thrombocytes	58, 54, and 42 *10^9/L on three test samples	100-400 *10^9/L
Granulocytes	86.6%	35-80%
Mid-range absolute count (MID)	3.8%	2-15%
Red Blood Cell (RBC)	5.17 *10^{12}/L	3.5-5.5*10^{12}/L
Hemoglobin (Hb)	13.6 g/dl	11.5-16.5 g/dl
Serum Electrolyte		
Sodium (Na^+)	136.8 mmol/L	136-145 mmol/L
Potassium (K^+)	3.7 mmol/L	3.5-5.1 mmol/L
Chloride (Cl^-)	107.3 mmol/L	98-107 mmol/L
Urine		
Urobilinogen	Positive	Negative
Protein	Positive	Negative

(46.7 IU/L) were normal, while his C-Reactive Protein (CRP) was elevated to 196.7 mg/L. Other tests that came back normal were serum electrolytes, coagulation profiles including international normalized ratio (INR) (1.3), prothrombin time (PT) (16.4 seconds), and partial thromboplastin time (PTT) (33.7 seconds). Negative blood cultures were also recorded.

Similarly, his anti-proteinase-3 (anti-PR3) antibody or antineutrophil cytoplasmic antibody (cANCA), myeloperoxidase antibody (anti-MPO) or perinuclear anti-neutrophil cytoplasmic antibodies (PANCA), and anti-nuclear antibody (ANA) tests, as well as anti-double strands DNA IgG and IgM and rheumatoid factor tests were negative, so he continued the same treatment regimen.

The next day, he was transfused with a single donor unit of platelets (300 ml) because his platelet count was < 20 x10^9/L. Due to his persistent fever, the new antibiotics (meropenem vial (1000 mg, IV infusion, three times daily) and vancomycin vial (1000 mg, twice daily intravenously), and dexamethasone (8 mg ampule, twice daily)) were prescribed. Upon neurological consultation and examination, he did not present any meningeal or focal neurological signs; he had normal brain computerized tomography (CT) with IV contrast. Lumbar puncture (LP) was avoided due to his thrombocytopenia. Thus, carrying on the using of the same prescribed treatment of meropenem and vancomycin vials was recommended. Simultaneously, the consultation of an expert clinician with qualified internal medicine was suggested to determine the main cause(s) of the patient's fever.

On his third day of admission at Hiwa Hematology/Oncology Hospital (September 10, 2019), he received another 300 ml of platelets. The case history was retaken, and several questions were asked of him and his brother regarding recent travel history. His brother declared that the patient had a travel history of 16 days to Africa, specifically Mozambique, from August 14 to September 1, 2019). His condition started three days after returning to Iraq.

We discovered that he traveled illegally with his family (his wife and two children) and wanted to pass borders to travel abroad and reach European countries. In Africa, they were captured and separated from each other, and he was jailed for six days in a very dirty room. The room and its equipment were shared with other prisoners, and he was drinking unclean water. Then, his brother stated that the patient had a history of mosquito bites and received a yellow fever vaccine in Mozambique.

With this new information, a blood sample was collected from him and sent for thin and thick blood film preparation to be stained with Gimesa (described by Daice and Lewis [11]) for malaria and leishmaniasis detection. Upon examination of the slides, no parasites were seen, which might be due to the poor slide preparation and too much debris, which might in turn be due to the old blood sample and RBC hemolysis. Hence, the fluorescent microscopy technique was recommended. The patient's history of yellow fever vaccine, without detection of the malaria parasite, made the physician consider an allergy

Table 2. Shows patient's laboratory tests during his admission into Hiwa Hematology/Oncology Hospital.

Sample and/or Test	Result	Normal Range
Blood		
Random Blood Sugar (RBS)	121mg/dl	70-110 mg/dl
White Blood Cells (WBCs)	5.248 *10^9/L	4-11 *10^9/L
Lymphocytes	1.145 *10^9/L	1.09-2.99 *10^9/L
Thrombocytes	42.109 *10^9/L	150-450 *10^9/L
Monocytes	0.730 *10^9/L	0.24-0.79*10^9/L
Eosinophils	0.026 *10^9/L	0.03-0.044 *10^9/L
Basophiles	0.113 *10^9/L	0.00-0.08 *10^9/L
Neutrophils	3.235 *10^9/L	1.66-6.96 *10^9/L
Red Blood Cells (RBCs)	4.546 *10^{12}/L	4-4.7 *10^{12}/L
Hemoglobin (Hb)	12.463 g/dl	12-16 g/dl
Reticulocytes	0.2%	< 0.1%
Erythrocyte Sedimentation Rate (ESR)	44 mm/hour	0-22 mm/hour
Serum Electrolyte		
Sodium (Na^+)	139 mmol/L	136-145 mmol/L
Potassium (K^+)	3.6 mmol/L	3.5-5.1 mmol/L
Chloride (Cl^-)	105 mmol/L	98-107 mmol/L
Magnesium (Mg)	1.41 mg/dl	1.6-2.6 mg/dl
Ferritin (Fe^{+3})	961 ng/ml	30-400 ng/ml
C-Reactive Protein (CRP)	117.26 mg/L	< 5 mg/L
Total Serum Bilirubin (TSB)	2 mg/dl	0.2-1.2 mg/dl
Renal Function Test		
Blood Urea	25 mg/dl	14-45 mg/dl
Creatinine	0.77 mg/dl	0.7-1.3 mg/dl
Liver Function Test		
Alanine aminotransferase (ALT)	83 IU/L	5-55 IU/L
Aspartate aminotransferase (AST)	50 IU/L	5-34 IU/L
Coombs test	Negative	Negative
Viral		
Hepatitis B virus antigen (HBsAg)	Negative	0.99-1.1 Equivocal
Hepatitis C virus (HCV)	Negative	0.99-1.1 Equivocal

to the yellow fever vaccine as one of the main differential diagnoses.

On September 11, 2019, his Hb (8.5 g/dl) and thrombocytes (21 x10^9/L) decreased significantly, despite two consecutive days of platelet transfusion. Another 300 ml unit of platelets was prepared and transfused. His WBC (5.3 x 10^9/L), lymphocytes, renal function tests, serum electrolytes, amylase, lipase, and ALT were normal. His AST was 64 IU/L with greatly elevated CRP (316 mg/L), and LDH (619 IU/L). Tests for Brucella IgG and IgM were negative. Abdominal Uls was normal except an enlarged spleen (long axis of 18 cm).

Because of his deterioration, the antibiotics were replaced with Tigecycline vial (50 mg, IV) and Ribavirin (200 mg, capsule). An antiviral medication was added to his treatment due to suspicion of viral hemorrhagic fever. However, no health improvement was seen, and the fever did not subside. His thrombocytes and Hb level decreased progressively, while liver enzymes were elevated. Because of decreased platelet and Hb, with elevated liver enzymes, splenomegaly, and with failure to detect parasites on the blood film, the hematological problem was among the main differential diagnoses, while his bone marrow aspirate and biopsy investigations showed

normal active marrow.

On September 12, 2019, the patient's health condition badly deteriorated. The oxygen saturation (SpO2) of 85% on room air, blood pressure (BP) of 100/40 mmHg, body temperature (Temp) of 38.2º C, and random blood sugar (RBS) of 105 mg/dl were recorded.

The consultation of internal medicine was performed at Shar Hospital. The patient had a decreased level of consciousness (LOC) and was dyspneic.

GENERAL EXAMINATION

The patient was drowsy with a Glasgow coma scale (GCS) of seven (7/15), and he experienced gaze palsy and decorticated posture. He was febrile, sweaty, tachypneic (respiration rate (RR) of ten cycles/min), pale, and jaundiced with no goiter, no palpable lymph nodes (LNs), and no positive peripheral pulses.

Other examinations included the following:

- **Neurological**: positive meningeal signs (neck stiffness and Kernig's sign)
- **Chest**: good air entry, no added sound
- **Abdomen**: guarding, palpable spleen (three fingers below costal margin), positive bowel sound
- **Precordium**: no significant findings
- **Skin**: no rash

Consequently, we requested to refer the patient into Shar Hospital to be admitted to the Intensive Care Unit (ICU). In the ICU, the patient was intubated and put on an invasive ventilator. The next day, he was extubated and put on CPAP, his SpO2 was 91%–100% on CPAP, pulse rate was 93–107 beats per minute (bpm), RR was 10–17 CPM, and BP was 110/60 mmHg. Body temperature was around 37.3–38.3ºC and RBS ranging from 173–308 mg/dl. His Hb was 7.6 g/dl, and the platelet was 36 x 10^9/L, while he had normal RBS, renal enzymes, and serum electrolytes.

After 34 hours at Shar Hospital, the patient was referred to the medical ward. As for his symptoms, he had generalized headache without photophobia or phonophobia in the neurological symptom assessment. Nothing was significantly abnormal for most of the other body systems, such as the skin and the gastrointestinal, respiratory, cardiovascular (CV), genitourinary, and endocrine tracts.

Past medical and surgical history were negative, with negative drug history and family history. Regarding social history, he was neither a smoker nor an alcoholic, had a good socioeconomic state, and did not have pets at home.

Differential diagnosis of his disease was malaria, a viral hemorrhagic fever (eg, dengue, yellow fever, or Crimean-Congo Hemorrhagic Fever (CCHF)), leishmaniasis (visceral), leptospirosis, viral infection (Epstein-Barr Virus (EBV)) or cytomegalovirus (CMV), splenic lymphoma, or thrombocytopenic purpura (TTP). Because of the condition of the patient and the suspicion of malaria, a second set of stained thin and thick blood film for malaria detection was requested, and empirical anti-malarial treatments were suggested despite negative malaria parasite results on the first thick blood film. For the treatment of falciparum malaria, artesunate medication should be requested outside of the country because of the absence of falciparum malaria and the general eradication of malaria in the region. Therefore, after importing the medication from Iran, the IV artesunate vial, started on September 13, 2020. He received the first dose of 120 mg artesunate followed, by 60 mg daily for five consecutive days (September 13th to the 18th). He also received a Primaquine tablet (30 mg) as an empirical treatment for other types of malaria, and he continued Ribavirin tablet (200 mg) accompanied by antibiotic and IV fluid administration. The same day, his Hb (8.6 g/dl) and platelets (60 x 10^9/L) begun to increase with WBC (5.7 x 10^9/L). Examination and monitoring by a specialized hematologist showed no hematological disorders.

Finally, on September 14, 2019, the result of the second thin blood film was positive for a malarial parasite (ring-shaped trophozoites) with rouleaux phenomenon which is indicative of inflammation (Figure 1), and the anti-malarial drugs were continued. The result was confirmed after five days by the Central Public Health Lab directorate of Iraq, and the case was recorded. On September 15, 2019, his platelets became 95 x 10^9/L, and Hb was 8.1 g/dl, whereas his RBS, serum electrolytes, renal enzymes, and coagulation studies were normal. Liver enzymes were also normal, apart from a low albumin level (3.1 g/dl). The next day, his Hb elevated to 9.1 g/dl with platelets to 122 x 10^9/L, while he had normal RBS, serum electrolytes, renal enzymes, and electrocardiogram (ECG).

On September 18, 2019, there was a decreasing Alkaline phosphatase (ALP) to 76 IU/L and decreasing both ALT and AST toward the normal range, with slightly decreased spleen size to a long axis of 15 cm on abdominal Uls. The next day, on September 19, 2019, further improvement in Hb (11.4 g/dl) and platelets (170 x 10^9/L) were documented, which drove us to discharge the patient that day.

Two days after his discharge (17 days from his initial symptoms), the patient came back to follow up on his condition, and we realized that all his symptoms were resolved except headache. On examination, he was pale, without jaundice, and with palpable spleen one finger below the costal margin. He had normal vital signs, such as BP of 90/60 mmHg, body temp of 36.5º C, and RBS of 125 mg/dl. His Hb on follow-up visit was 11.2 g/dl, and platelets of 147 x 10^9/L, while serum electrolytes and

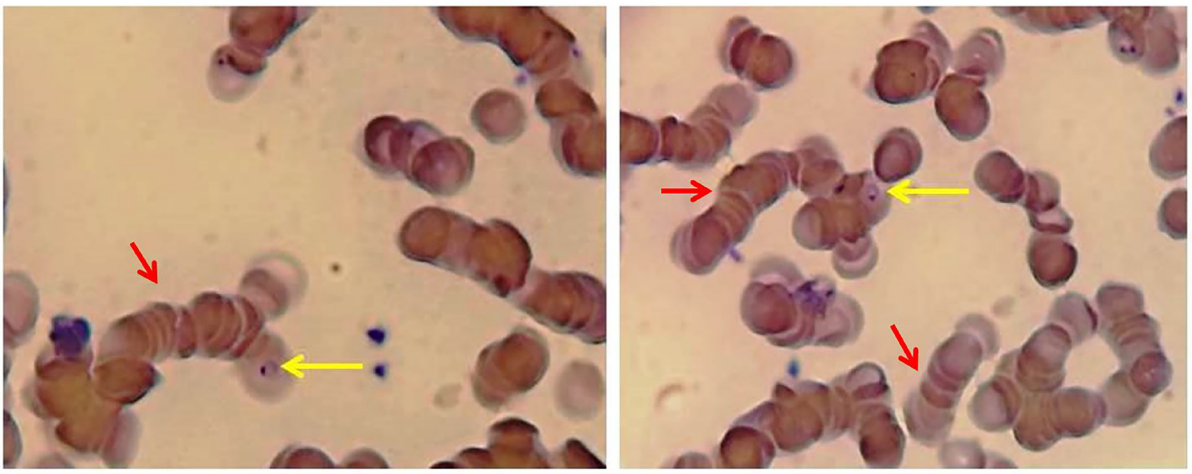

Figure 1. Shows ring form trophozoites of *P. falciparum* in the stained thin smear of the patient's blood sample (Yellow arrows), with rouleaux phenomenon (Red arrows). High power field (×100).

renal and liver enzymes were normal with a total serum bilirubin (TSB) of 0.6 mg/dl.

DISCUSSION

Malarial eradication is an important international goal, and many countries are making great efforts to be classified as malaria-free nations and receive WHO certificates. Such classifications are not only health-related but also may affect the economic and tourism status of the country. Therefore, malarial eradication may positively affect the country's reputation [12].

In the last few years, Iraq has had a more complicated humanitarian situation due to ongoing conflicts and displacements of approximately 3.2 million people in the country, but it was still considered among the countries that are free of malaria. Iraq started a malarial eradication campaign in 1957 to successfully achieve malarial elimination [13]. During the Gulf war in 1991, three autonomous governorates (Sulaymaniyah, Erbil, and Duhok) of Iraq had once again been affected by, and experienced a serious epidemic of, *P. vivax*. It transmitted rapidly to other cities (especially Ninawa and Tamim) and reached 49,840 cases in 1995. Simultaneously, the National Malaria Program started to detect the infected cases, control the transmission of the disease, and introduce free treatment (chloroquine/proguanil antimalarial regimen) for infected people. Proper environmental management systems and vector control were applied at that time to reduce the rate of the disease until 1999, when only 4,134 cases remained [13,14].

Similarly, the prevalence of malaria infection in Iraq was 47,395 cases from 1970–1975, which had declined to 20,191 cases from 1977–1984 [14]. The last two indigenous malaria cases in Iraq were reported in 2008. Finally, in 2009, Iraq officially declared that the country was free from the disease, and the infection was not considered as a heavy burden on the society anymore [3,15].

Vector control is one of the most important factors in this disease's control and management. However, a recent entomological study conducted in Diyala province, Iraq, revealed that mosquito species (*Anopheles*, *Anopheline*, and *Culex*) that can play a role as malarial vectors are increased in the province. The presence of these mosquito species puts people at great risk, especially in a hot and humid climate, which provides a suitable environment for larvae to develop. Thus, this issue needs the authority to conduct further research and investigation to discover the mosquito's source and find a proper way to eradicate the mosquito species to protect citizens from the disease of malaria [16].

According to the WHO report, many of the neighboring countries of Iraq (including the Islamic Republic of Iran, Turkey, and Syria) are continuing efforts to eliminate malaria. Regarding the Islamic Republic of Iran, it is considered one of the malaria-endemic countries of the Eastern Mediterranean Region, as there were 89 locally-transmitted cases in 2017 [17], and in 2018 there were 625 reported imported cases of malaria, only two out of those 625 cases were introduced and not indigenous. The majority of reported cases were *P. vivax*, which was detected in Afghan nationals, while the minority was *P. falciparum* cases. Iran declared that their large, shared border area with Pakistan is a source of malaria. In 2019, they updated the treatment guideline and provided Mefloquine for travelers to malaria-endemic countries [18]. Thus, our research is in agreement with Iranian authority suggestions that unregistered foreign seasonal workers,

border guards, workers in African countries, and travelers to Africa are groups of people at high risk of malaria infection.

Regarding our case report study, the patient had recently traveled to an African country, Mozambique, with his family by illegally crossing borders during the hot weather. He also had a history of a mosquito bite, which is the main route to getting the infection. Thus, vector control is the principal step in the eradication of malaria. Travelers to African countries are considered as a high-risk group to bring the infection back to Iraq again.

Currently, Iraq might be facing a great challenge again with this disease outbreak. The country hosts many refugees, undocumented immigrants, and travelers from poor nations (including war victims), and Iraq has many registered foreign workers/visitors (either family members living in other countries or tourists), which make it difficult for authorities to identify them. As a result, one could conclude the reoccurrence of this disease would be possible in Iraq [5].

In this regard, a recent study revealed that *Plasmodium* species (*P. falciparum, P. vivax,* and *P. fallax*) were detected in Anopheline female mosquitoes that were collected indoor from different areas in Baghdad city. The study proved that malaria is present in Baghdad, Iraq, and predicts that its retransmission is probable at any time. This data is needed to update the information system surveillance and strategies in the national program of malaria elimination, and has not yet been recorded by the WHO [19].

CONCLUSIONS

Presenting this malarial case is crucial to emphasize the role that physician could play in obtaining accurate patient history in informing their diagnosis, proper referrals of cases by outpatient clinics, encourage the physician to consider malaria as a cause of fever and rigor, even in countries with eradicated malaria, and to insist on travel history, as travel to an endemic area is a key cause of malaria being imported into these regions, and raising awareness of patients and their relatives, including the importance of providing a proper history to the medical personnel. In the case of sustaining fever with further deterioration of the patient after proper antibiotic use, it is critical to start empirical anti-malarial treatment even before receiving the positive result on blood film for the malarial parasite, as any delay in beginning this treatment may have fatal consequences.

Author Contributions: DSA and HSR drafted and wrote the manuscript, as well as edited, revised, and formatted the manuscript before submission. SOM consulted as a microbiologist, prepared, and read the stained blood films, and confirmed the presence of the parasite. SJA is an internist who decided and started empirical anti-malarial treatment. SJA, VNM, and RAA are the clinicians who dealt with, monitor, and manage the case in the internal medicine ward and ICU. ROA is the clinician that monitors and manages the hematological issues of the patient. All authors read and approved the final draft of the manuscript before submission.

Acknowledgment: We acknowledge all the staff at the hematology ward of Hiwa Hematology/Oncology Hospital, and we have gratitude to all staff at the internal medicine ward of Shar Hospital.

Ethical approval and consent to participate: Ethical approval from the College of Medicine, University of Sulaimani ethical committee was taken under approval number of 144, on 16-8-2020.

Consent for publication: Consent was granted by the patient for the publication of this case report.

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