Plasmodium falciparum Malaria Retinitis; A Case Study at the Armed Forces Hospital, Jazan

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Receive date:20/10/2023

Revise date:20/10/2023

Accept day:5/11/2023

Publish date:7/11/2023

Key words: Plasmodium falciparum ;Malaria; retinitis

Malaria is one of the most common life-threatening infectious disease. It is still a major health problem worldwide, in tropical and subtropical areas. According to the World Health Organization) about 229 million new malaria cases were reported in 2019 and more than 3.4 billion people are at risk of infection. 94% of the malaria cases were reported in the WHO African Region (AFR), also 3.0 and 2.2% of the cases were recorded in the Southeast Asia Region and Eastern Mediterranean Region, respectively **[1]**.

In the Kingdom of Saudi Arabia, the national malaria control program, which was started in 1948, has achieved a great reduction in the number of malaria cases. Malaria is now restricted to the southwestern areas, which includes the Aseer and Jazan regions. Malaria cases increased again after 2014, with 5,382 malaria cases reported in 2016 most of the cases were *Plasmodium falciparum* **[2,3]**.

In retrospective study during the period of 2010–2017, the association of climatic changes especially in the rainy times with the monthly reported malaria cases was retrospectively analyzed in Jazan and showed that the frequency and distribution of malaria cases (A total of 1124 febrile subjects were found to be positive for malaria: 1060 (94.3%) were infected with *P. falciparum* and 5.7% (64/1124) had *P. vivax*) **[4]**.

Cerebral malaria is a neurological complication of Malaria, caused by *plasmodium falciparum*. Ophthalmological lesions have been described in this condition and some retinal lesions are specific. They gave rise to the malarial retinopathy, mainly described in pediatrics, with severe outcomes **[5]**. The reported cases in adults are very few, hence it may need more focus on it.

The evidence for including the assessment for malaria retinopathy in the diagnosis of cerebral malaria is strong. Including the signs of malaria retinopathy as retinal angiography and histopathological data in the definition of cerebral malaria in African children strongly benefits other patients; it will also lead to useful information and clinical case definitions for malaria retinopathy associated with P. falciparum **[6]**.

Case study:

A previously healthy 27-year-old male military soldier presented at The Emergency Room of The Armed Forces Hospital in Jazan with a 3-day – history of cyclic fever associated with chills, rigors, headache, and blurred vision. One week earlier, before the onset of his symptoms, he mentioned that he was working in a nearby area in Jazan, which is known to be endemic in malaria, and The

The patient had been in his usual state of health until 3 days before this admission when fever and rigors were noticed. Also, he noticed a darkening of the urine color. On further discussion, he reported being bitten by a lot of mosquitos. He did not report dyspnoea, chest pain, or cough. He had no GIT symptoms, no motor or sensory deficits, and denied any fits or loss of consciousness. The patient denied any bleeding orifices or skin rash. The patient did not smoke tobacco, use illicit drugs, or drink alcohol.

The patient was admitted to The Internal Medicine Department. On examination, He was fully conscious and oriented to time, place, and persons. His vitals showed that the temperature was 39.1 °C, the blood pressure was 115/ 68 mm Hg, the pulse was 112 beats per minute, the respiratory rate was 22 breaths per minute, and the oxygen saturation was 98 % in the room air. He started to develop blurred vision and difficulty with colors, his CNS examination was unremarkable with normal cranial nerves examination, normal gait with no sensory or motor deficits in all limbs, pupils were equal, round, and reactive to light, and the neck was supple. His chest examination showed no crackles or wheezes. The heart sounds were regular, with no murmur. Abdominal examination was soft and lax on palpation with no organomegaly and no edema in the lower limbs. There was no cervical, axillary, inguinal lymphadenopathy or skin rash.

A full laboratory work-up was requested and the results showed that the hemoglobin level was 10.5 g per decilitre, the mean corpuscular volume was 94 fl, and the platelet count was 62,000 per cubic millimeters. The WBC was 3.2 per cubic millimeters, with a normal differential. The creatinine level was 74 µmol per liter, the albumin level 3.8 g per decilitre, and the total protein level 7.5 g per decilitre. The liver profile showed mildly elevated aminotransferases with ALT 88 and AST 70. The prothrombin time was 18.6, INR 1.5, partial thromboplastin time 43, and The LDH was 287 U per liter (normal value, 120 to 242), and the haptoglobin level was less than 10 mg per decilitre (normal value, 30 to 200). The reticulocyte production index was 1.3, and the direct Coombs test was negative. The peripheral blood smear revealed a *Plasmodium falciparum* microgametocyte using Giemsa stain with a parasitemia level of 6 %.

The patient was started on Artesunate intravenous injections at a dose of 2.4 mg/kg given at 0, 12, and 24 hours and then once daily for a total of 7 days. Moreover, he was given 3 tablets of Fansidar (sulfadoxine 500 mg – pyrimethamine 25 mg) dose on the first day of admission as per The Saudi Ministry of Health guidelines.

The ophthalmology team was consulted: And on examination, there was a decrease in acuity of vision of both eyes (right eye (6/60) and left eye (6/12), with a marked impairment in his Colour vision of the red-green deficiency of 3/21 with Ishihara score for color vision [7]. Fundus examination showed pigmented para-venous chorioretinitis, macular whitening, and black pigmentation on the retinal vessels mainly at the periphery.

His ophthalmological examination records 1 year earlier during his annual check-up were normal with an acuity of the right eye (6 / 6) and the left eye (6 / 6), with intact color vision and normal fundus examination.

Based on that, the patient was diagnosed with severe *Falciparum malaria* with malaria retinitis, which is considered a type of cerebral malaria.

During the patient's hospital stay, the patient reported improvement of his symptoms with a resolution of fever and rigors. However, he still complained of blurred vision. Laboratory follow-up was done daily and showed improvement and laboratory results. On day 7 his laboratory results showed that the blood film for malaria was negative and his routine laboratory results showed that the hemoglobin level was 11.7 g per decilitre, and the platelet count 220,000 per cubic millimetre. The WBC was 7.2 per cubic millimeter, with a normal differential. The creatinine level was 68 µmol per liter. The liver profile showed normal aminotransferases with ALT 32 and AST 20. The prothrombin time of 11.6, and INR 1.1. So, the patient was discharged from the hospital and was scheduled for a follow-up with the ID OPD as well as the ophthalmology OPD after 2 weeks.

Fundus fluorescein angiography during admission showed that there was Central retinal whitening with no cotton wool spots. There was no Obstruction of microcirculatory blood flow with normal perfusion of retinal blood flow, as shown in (figures 1 and 2) for the right eye and (figures 3 and 4) for the left eye.

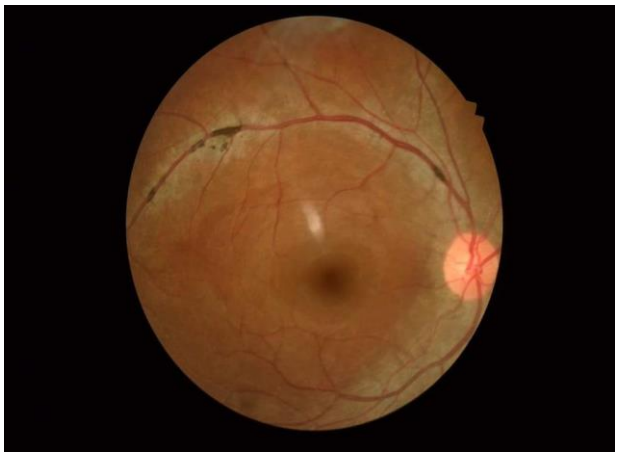


Figure 1: The right eye showed multiple small zones of vessel discoloration of pigmented Para-venous retino-choroiditis more at the periphery than central, but no hemorrhages nor papilledema.

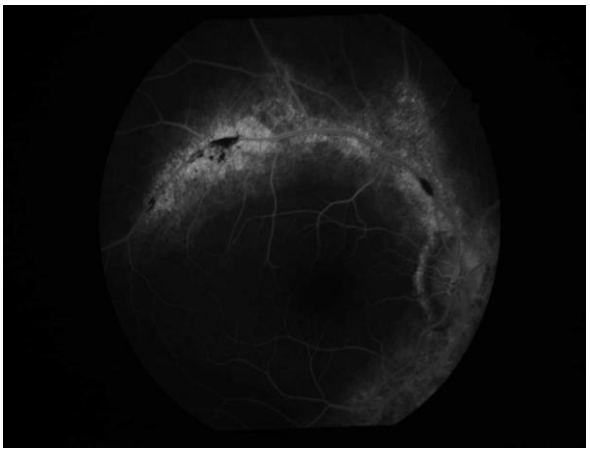


Figure 2: The right eye showed that there was leakage along the upper and lower retinal blood venous

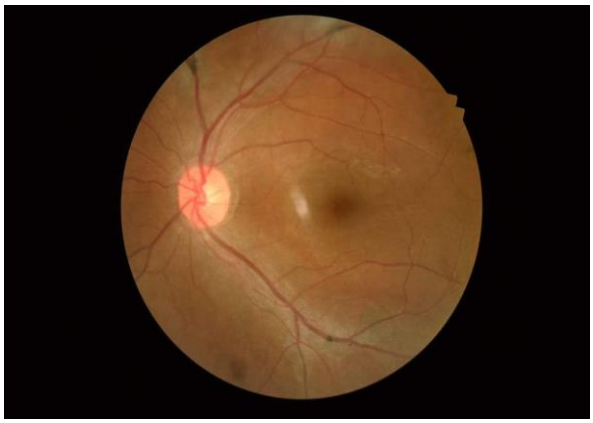


Figure 3: The left eye showed multiple small zones of vessel discoloration of pigmented Para-venous retino-choroiditis more at the periphery than central, but no hemorrhages nor papilledema.

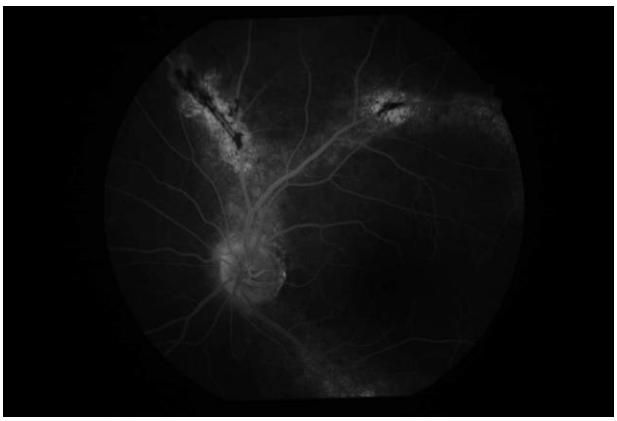
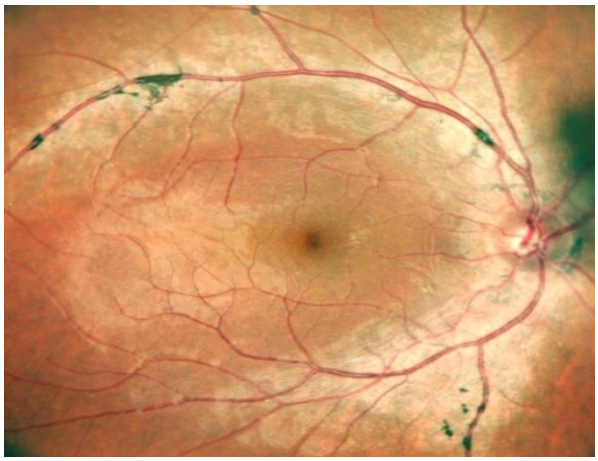
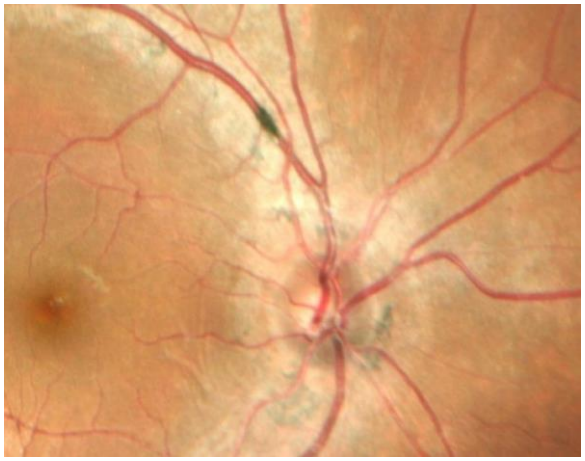


Figure 4: Showed left eye with fluorescein leakage from the upper temporal and nasal retinal veins.

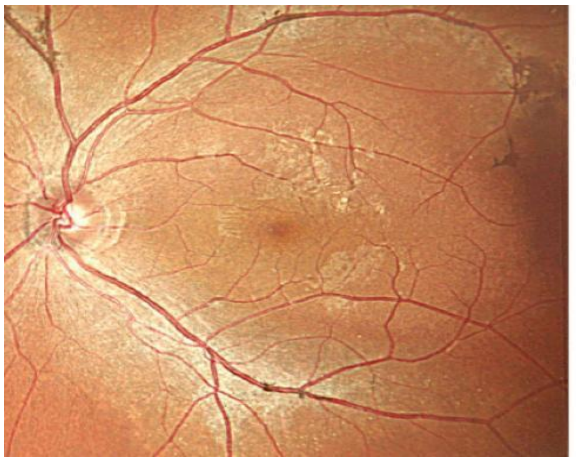
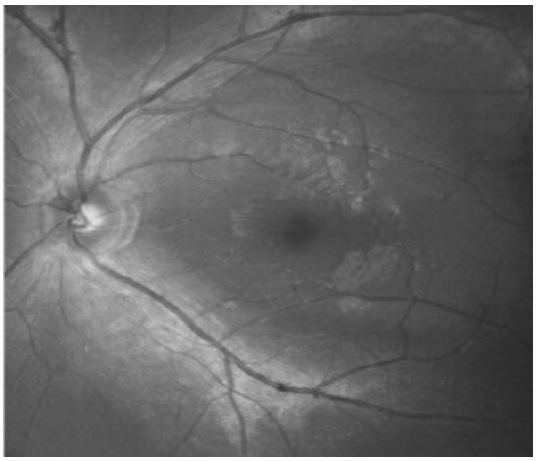
Two weeks later, the patient came to the Infectious disease clinic follow-up and showed that he was clinically stable, his laboratory work-up showed a negative blood film for malaria and his other routine laboratory investigations were within normal. The patient was also on a regular follow-up at the ophthalmology clinic and he was improving.

At 12 months, The patient's full ophthalmology examination showed improvement of his vision of 6/6 in the right eye and 6/6 in the left eye, and his color vision also showed marked improvement of red-green to 18/21 with Ishihara score for color testing **[7]**.

Fundus fluorescein angiography was done at 12 months and showed the same malaria pigments along the blood vessels, but there was an improvement in macular whitening with complete resolution. The patient retina photos at that visit at 12 months are shown in Figures 5, 6, 7, and 8) respectively.

Figures 5 and 6 for the right eye after 12 months showed: Multiple small zones of vessel, pigmented discoloration of Para-venous vessels more peripheral than center, also no leakage along retinal blood vessels.

Figures 7 and 8 for the left eye after 12 months showed: Multiple small zones of vessel pigmented discoloration of Para-venous vessels in peripheral, with no leakage.

After 12 months, OCT MACULA was done and was normal as shown in figures 9 and 10 below in figures 9 and 10:

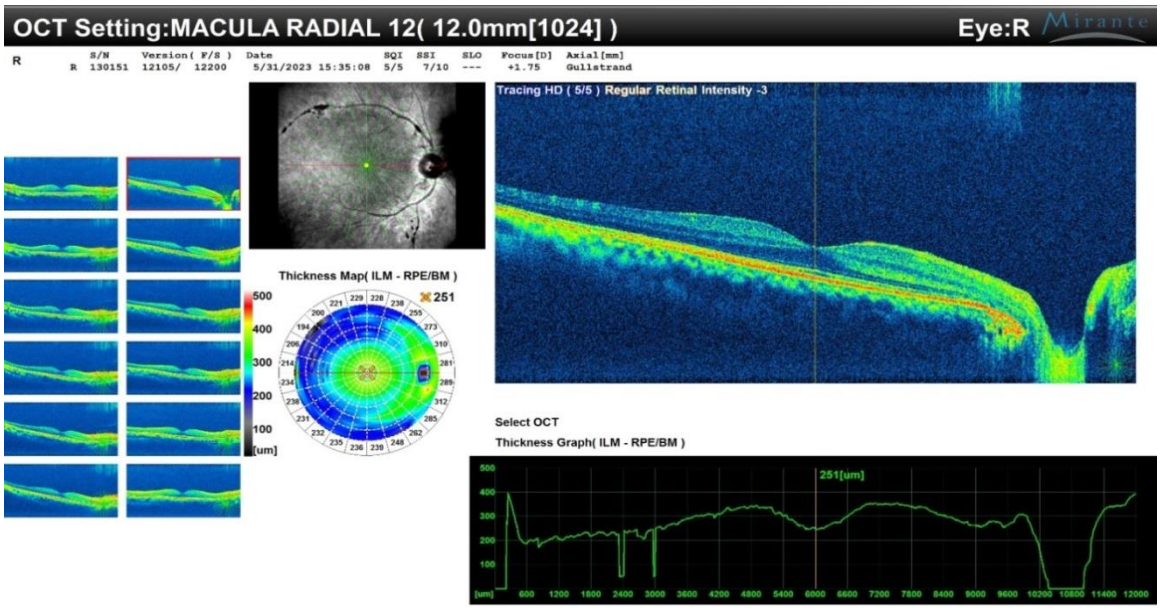


Figure 9: Right eye OCT (optic coherence tomography) for macula was normal.

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DOI: 10.21608/AEJI.2023.325149

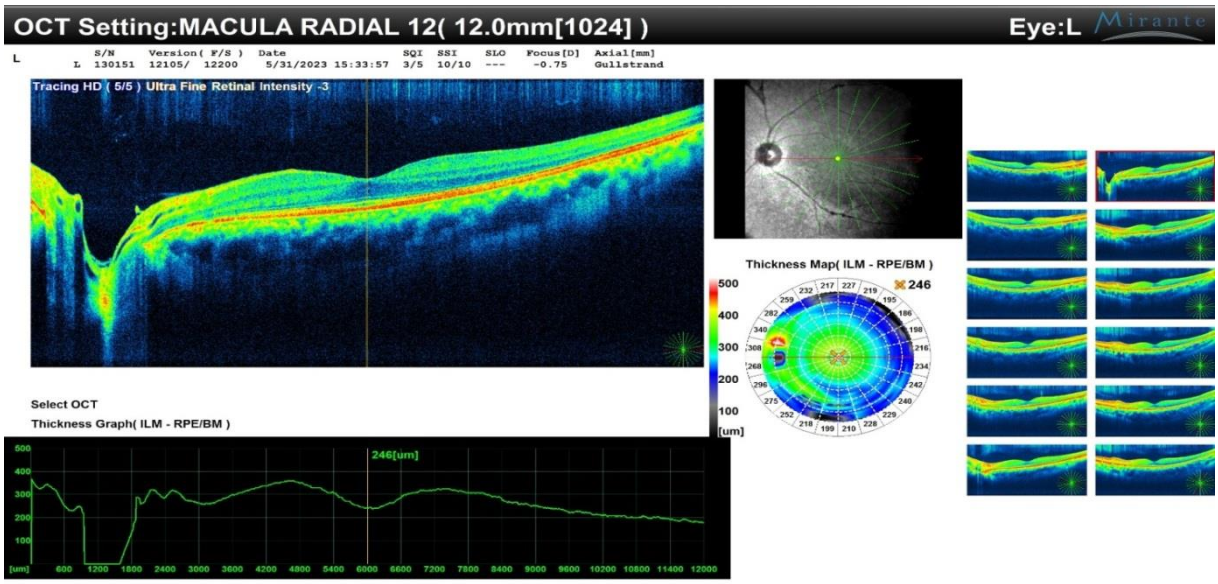

Figure 10: Left eye OCT (optic coherence tomography) for macula was normal.

Conclusion

Prober and on-time management of *Falciparum Malaria* can save eyes and lead to complete resolution of visual acuity and color vision.

Ethical consideration: All the information gathered from the patients was handled confidentially, and it was used only for research purposes.

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Site as: Al Jurebi, M., Behiry, A., Attia, O., Alharbi, S. Plasmodium falciparum Malaria Retinitis; A Case Study at the Armed Forces Hospital, Jazan . *Afro-Egyptian Journal of Infectious and Endemic Diseases*, December 2023; 13(4): 287-291. doi: 10.21608/aeji.2023.325149