Dusty trephine

Hira Qadir [a], Mohammad Faizan Zahid [b], Natasha Ali [a,c,*]

[a] Department of Pathology and Laboratory Medicine, The Aga Khan University, P. O. Box 3500, Stadium road 74800, Karachi, Pakistan, [b] Medical Graduate, The Aga Khan University, Karachi, Pakistan, [c] Department of Oncology, The Aga Khan University, Karachi, Pakistan

[*] Corresponding author at: Department of Pathology and Laboratory Medicine/Oncology, The Aga Khan University, P. O. Box 3500, Karachi 74800, Pakistan. · Received for publication 8 July 2015 · Accepted for publication 15 July 2015

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Malaria is a vector-borne infectious disease caused by parasitic protozoa belonging to the genus *Plasmodium*. The protozoa are transmitted through the bite from an infected female *Anopheles* mosquito (the definitive host). These are introduced into the systemic circulation as sporozoites from the mosquito's saliva. From the blood, the protozoa travel to the liver. In the hepatocytes, they reproduce (asexually) and mature into merozoites. After being released from the liver, they infect red blood cells to reproduce further (blood-stage schizogony). Typical symptoms of malaria include, but are not limited to, high-grade fever with rigors and chills, anemia, and headache, which, in severe cases, can progress to coma and possibly death.[1,2]

A 47-year-old male patient was referred to our center for evaluation. He had an underlying chronic kidney disease and had been complaining of high-grade fever, weakness, and occasional vomiting for the past 2 months. A general physical examination showed conjunctival pallor. The rest of the systemic examination was unremarkable. Complete blood counts showed pancytopenia (hemoglobin, 7.0 g/dL; hematocrit, 23.7%; white blood cells, 0.8×10^9/L;

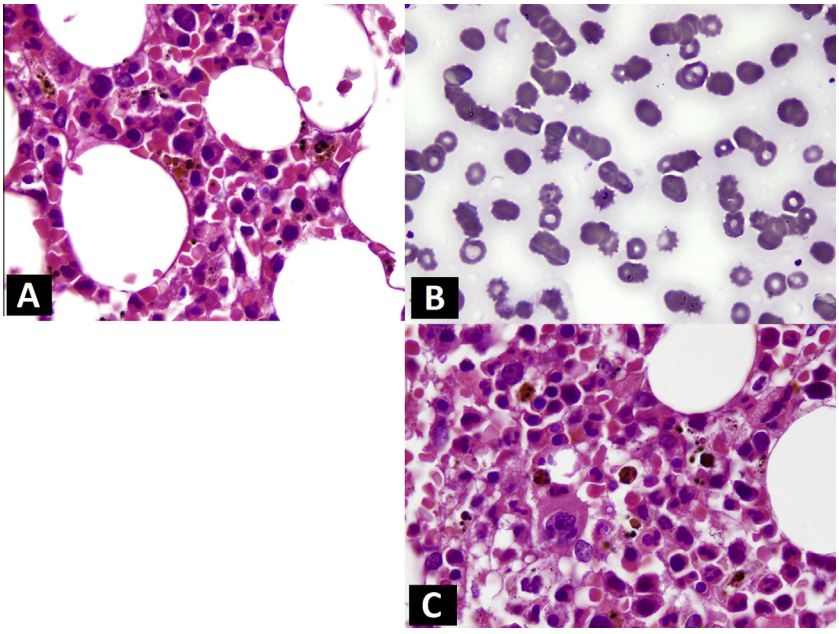

Figure 1. (A and C) Multiple areas of erythroid and myeloid precursors demonstrating gametocytes of *Plasmodium falciparum* studded with hemozoin pigment (hematoxylin and eosin stain, 400×). (B) Peripheral blood film showing anisocytosis, acanthocytosis, and trophozoites of *P. falciparum* (Leishman stain, 400×).

absolute neutrophil count, 0.3×10^9/L; and platelets, 88×10^9/L). For further evaluation of pancytopenia, bone marrow examination was recommended. Peripheral blood film showed anisocytosis, acanthocytosis, and trophozoites of *Plasmodium falciparum* (Fig. 1B). Bone marrow trephine biopsy showed multiple areas of erythroid and myeloid precursors demonstrating gametocytes of *P. falciparum*, studded with hemozoin pigment (Fig. 1A and C).

Severe malarial anemia (SMA) is a noteworthy cause of morbidity and mortality worldwide, especially in tropical and developing regions. Characterized by high-grade fevers associated with rigors, chills, and massive hemolysis, malaria can result in potentially life-threatening anemia. Bone marrow dysfunction, especially a low reticulocyte count in the presence of hemolysis and severe anemia, is one of the most striking findings associated with SMA in human beings.[3] Inflammatory mediators, such as tumor necrosis factor-alpha (TNF-α), may be associated with this bone marrow suppression,[4] but the abnormal bone marrow morphology on microscopic images indicates that several other factors may contribute to loss of marrow function in SMA. Hemozoin itself, which is an end product of digestion of hematophagous organisms,[1,5] such as malarial parasites, has cytotoxic properties and has been associated with suppression of the bone marrow *in vitro* (even in the absence of TNF-α) and *in vivo*.[3] TNF-α and hemozoin also appear to synergize each other's bone marrow suppressing properties. Finally, microscopic examination of bone marrow specimens from patients who die of malaria have shown pigmented erythroid and myeloid precursors, which have been correlated with abnormal hematopoiesis.[3]

CONFLICTS OF INTEREST

None to declare.

REFERENCES

1. Wickramasinghe SN, Abdalla SH. Blood and bone marrow changes in malaria. Baillieres Best Pract Res Clin Haematol 2000;13:277–99.
2. World Health Organization. World malaria report. Geneva, Switzerland: WHO; 2012.
3. Casals-Pascual C, Kai O, Cheung JO, Williams S, Lowe B, Nyanoti M, et al. Suppression of erythropoiesis in malarial anemia is associated with hemozoin *in vitro* and *in vivo*. Blood 2006;108:2569–77.
4. Clark IA, Chaudhri G. Tumour necrosis factor may contribute to the anaemia of malaria by causing dyserythropoiesis and erythrophagocytosis. Br J Haematol 1988;70:99–103.
5. Sullivan DJ. Theories on malarial pigment formation and quinoline action. Int J Parasitol 2002;32:1645–53.