Malaria Transmission by Platelet Concentrate Transfusion

Mark D. Garfield, MD; William B. Ershler, MD; Dennis G. Maki, MD

MALARIA is a well-recognized complication of transfusion therapy that is being encountered with increasing frequency in nonmalarious areas of the world. Most cases have derived from administration of infected whole blood or packed RBCs, but reports have also implicated leucocyte concentrates and even fresh plasma. Platelet concentrates have been ascribed as the source of one case of transfusion malaria; however, neither confirmatory data nor clinical details were provided. We report a well-documented case of *Plasmodium falciparum* malaria transmitted by platelet concentrate transfusion.

**Report of a Case**

A 57-year-old woman with acute myelomonocytic leukemia was readmitted to the hospital on June 27, 1977, in leukemic relapse. Between December 1976 and June 1977, she had received no blood products and she had never traveled outside the United States. Physical findings were unremarkable except for pallor, and she was afebrile. The hematocrit level was 32%; the WBC count, 7,100/cu mm (7% normal granulocytes, 60% lymphocytes, 17% monocytes, and 7% blasts); and the platelet count, 45,000/cu mm. Treatment was begun with daunorubicin hydrochloro-
ride, cytarabine, vincristine sulfate, and thioguanine.

Beginning on July 7, she began to have intermittent fever. Although no source of infection could be identified, she was treated intermittently with gentamicin sulfate, carbencillin disodium, and cephalothin sodium, without effect. By early August fever was almost continuous, ranging up to 39.8 °C and accompanied by chills. On Aug 5, typical \textit{P. falciparum} trophozoites and gametocytes were noted serendipitously on a peripheral blood smear; approximately 30% of erythrocytes were parasitized, many multiply. Retrospective review of the patient's prior blood smears demonstrated rare parasitized erythrocytes as early as July 29, and intraacellular trophozoites could be seen in a marrow specimen obtained on Aug 1.

On contacting the local blood product center, we learned that another Wisconsin resident had recently returned from a June trip to Kenya, Ivory Coast, and Togo and had donated blood on July 5. He had not initially informed blood center personnel that he had traveled to malarious areas or that he had taken chloroquine phosphate—primaquine phosphate prophylaxis during the trip. On July 6 he contracted a mild febrile illness diagnosed as \textit{P. falciparum} malaria three days later; his infection responded promptly to treatment. On learning the diagnosis, the patient notified the blood collection center. His unit of blood had been fractionated. The packed RBCs were retrieved, but the platelets had been transfused into the leukemic patient on July 6. Because blood bank personnel felt the non-RBC components could not transmit malaria, physicians of the leukemic patient were not informed.

Because the epidemiologic data strongly suggested that transfused platelets from the donor with Africa-acquired (and presumably, chloroquine-sensitive) malaria were the source of infection, treatment was begun with chloroquine phosphate, 1 g orally followed in six hours by 0.5 g, and then 0.5 g daily for three days; pyrimethamine and sulfadoxine were also given for three days. For 48 hours the patient was confused and oliguric, but with supportive therapy, her condition rapidly improved. By Aug 9, although gametocytes were yet present, parasitized erythrocytes could no longer be detected in her peripheral blood. By the sixth day after beginning therapy, she was afebrile and lucid. The patient died of refractory leukemia on Aug 15. No evidence of residual malaria was present at autopsy.

Of all blood products received by the patient between June 1 and Aug 1, 1977 (70 units of platelets, 8 units of packed RBCs), stored serum was available from 57 to 62 donors. All 57 sera were negative for antibodies to malaria on indirect fluorescent screening at the Center for Disease Control. The remaining five donors were interviewed and excluded as possible sources of infection epidemiologically.

**Comment**

Parasitized erythrocytes are generally considered to be the mode of transmission in transfusion-induced malaria. In those cases where blood components other than RBCs were implicated, transmission by small numbers of RBCs yet present or possibly by free merozoites in the plasma has been hypothesized. However, by using electron microscopy, Fajardo and Tallent have demonstrated intact merozoites within platelets of patients with symptomatic malaria. It is therefore conceivable that infected platelets could also have been the vehicle of transmission in our patient's case.

The prolonged prepatency period in our patient, approximately 23 days, probably reflects a relatively small inoculum of parasites received. It might be tempting to ascribe the severity of her infection to her compromised immune state and genetic susceptibility; however, it is more likely due to the delay in diagnosis. The case-fatality ratio in the United States of imported \textit{P. falciparum} malaria in patients treated by civilian physicians (5.7%) greatly exceeds the fatality ratio in persons treated in military or Veterans Administration facilities (0.2%) and has been attributed to diagnostic delay in the former. It does not appear that systemic malignancy or associated cytotoxic chemotherapy adversely affects the clinical course of malaria. Despite our patient's far-advanced leukemia and recent combination chemotherapy, chloroquine effectively eradicated a severe \textit{P. falciparum} infection.

The American Association of Blood Banks has established restrictions aimed at preventing transfusion malaria. These include rejection for six months—three years if antimalarial prophylaxis has been taken—of any potential donor who recently traveled to an endemic malarious area. Compliance with this standard would have prevented this case and would prevent most other transfusion-induced cases that have been reported in the United States. Moreover, if the blood collection center had immediately informed our patient's physicians when it learned that one of the platelet donors had recently been treated for malaria, the patient could have been prophylactically treated and clinical illness would likely have been averted.

Hematologic malignancies are commonly associated with fever. Most febrile illness in this population derives from bacterial or fungal infection, chemotherapy, pyrogenic transfusion reactions, or the underlying disease; but blood products are heavily used in this population and have resulted in previous cases of transfusion-induced malaria. As our case and recent reports illustrate, all types of nonfrozen blood products, including plasma, have the capacity to transmit malaria. Transfusion-induced malaria should probably be an earlier diagnostic consideration in these patients with persistent fever.

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**Nonproprietary Names and Trademarks of Drugs**


**References**