Thrombocytopenia in Malaria

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Malaria continues to be a cause of high mortality and morbidity. Imported cases of malaria are increasing in New York City. Yet, New York physicians, when evaluating patients for fever, frequently missed the diagnosis of malaria. We evaluated the role of platelet count for predicting malarial infection. The study included patients seen between 1996 and 2000 in a New York community hospital for fever who had traveled to a malaria-endemic area. Forty patients with malaria were identified. Our study found the sensitivity of platelet count for diagnosing malaria was 100%, and the specificity was 70%. The negative predictive value was 100% and the positive predictive valve was 86%. Hence, we propose that in any patient with fever and recent travel history, platelet count is an important clue to the diagnosis of malaria. A finding of thrombocytopenia should increase the suspicion of malaria and lead to performance of more specific tests, including multiple peripheral smears and ELISA for parasite-specific antigen, etc.

Key words: malaria ■ fever ■ travel ■ thrombocytopenia

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INTRODUCTION

Malaria continues to be a cause of high mortality and morbidity throughout the developing world.[1] Countries in which malaria had been previously eradicated or adequately controlled have recently seen a resurgence of malaria. It is not surprising that there also is an increase in the incidence of imported malaria in the United States.[1]

Imported cases of malaria have also increased in New York City during the past decade.[1] Yet, local New York physicians, when evaluating patients for fever, initially missed the diagnosis of malaria in 80% of cases.[2] Clues obtained from routine blood tests in such a setting can hence be immensely helpful. Peripheral blood smear is the gold-standard test in diagnosing malaria but is technician-dependent and time-consuming. An attempt is made to evaluate the role of platelet count, a routine test, as a marker for predicting malarial infection.

Thrombocytopenia has been reported to be associated with malaria, with incidence ranging from 40.5[3]–85%,[4,5] with some studies reporting a lower incidence in vivax malaria as compared to falciparum malaria.[6] Thrombocytopenia is thought to be caused by increased spleenic sequestration, immune mediated destruction, and a shortened platelet survival.[7]

MATERIAL AND METHODS

This was a retrospective study done at Coney Island Hospital, a municipal teaching acute care facility that is part of the New York City Health and Hospitals Corporation. The patient population is culturally diverse—with language, cultural, ethnic variation, and disease manifestations more diverse than that of the usual community hospital.

The study protocol included all patients seen between January 1996 and July 2000 who presented with fever and had traveled to a malaria-endemic area in the past two months. Patients were divided into two groups—malaria group and nonmalaria group—on the basis of a peripheral smear. Thick smear using geimsa stain and thin smears using

wright stain were used to detect nonsexual forms of malarial parasite on peripheral smear. A patient was considered not to have malaria if three consecutive smears were negative and included in nonmalaria group. Multiple platelet counts were obtained from each patient.

Thrombocytopenia was defined as platelet count of less than 150,000 cells/cmm. Patients were divided into three subgroups based on platelet count. Thrombocytopenia was considered severe if <50,000 cells/cmm, moderate if 50,000–100,000 cells/cmm, and mild if 100,000–150,000 cells/cmm. The nonmalaria group served as a control while studying the platelet counts in patients with fever and malaria-endemic travel history.

RESULTS

Sixty patients met the inclusion criteria. Forty patients were found to have malaria (23 males, 17 females) with a mean age of 30 years (range 6–53 years). The control group consisted of 20 patients (12 males, eight females) with mean age 28 years (range 12–52 years). Their initial platelet counts ranged from 92,000–300,000 cells/cmm, with a mean of 171,000 cells/cmm. The difference in the platelet counts between the two groups was statistically significant (P<0.001). There was a statistically significant correlation between low platelets and presence of malaria (coefficient correlation r=-0.73) (Figure 1).

Table 1. Characteristics of Thrombocytopenia among the Study Group

	Malaria		
Thrombocytopenia	Present	Absent	Total
Present	40	6	46
Absent	0	14	14
Total	40	20	60

The sensitivity of thrombocytopenia in predicting imported malaria in our institute was 100 % and the specificity was 70 %, positive predictive value was 86%, negative predictive value was 100%.

Among the malaria group, all patients had a recent international travel to malaria-endemic areas—19 to Asia, 14 to Africa, six to South America, and one to Russia. The patient population represented 15 different countries. All patients had fever as their presenting complaint. In eight cases (20%), the malarial parasites were not seen in the first peripheral smear. The initial platelet counts in the malaria group patients ranged from 14,000–142,000 with a mean of 84,450 cells/cmm. All the patients in the malaria group had thrombocytopenia in this study (Table 1).

Among the malaria group, four patients had severe thrombocytopenia, 24 patients had moderate thrombocytopenia, and 12 had mild thrombocytopenia. (Table 2).

Six patients had evidence of hemolysis, and none had disseminated intravascular coagulation (DIC). Twenty-one patients had vivax malaria, and 19 had falciparum malaria.

Thus, the sensitivity of platelet count for predicting imported malaria in our institution was 100%, and the specificity was 70%. The negative predictive value was 100%, and the positive predictive valve was 86%.

Patients with falciparum malaria were found to have lower platelet counts than patients with vivax malaria. Malaria was treated with either chloroquine phosphate, or a combination of quinine sulphate and doxycycline. All patients made a full recovery and were discharged home in a stable condition. Platelet counts improved in all the malarial patients. By discharge, no patient had severe thrombocytopenia, 12

Table 2. Platelet Counts in the Malaria Group Patients on Admission and at Discharge

	On Admission			On Discharge		
	Falciparum Malaria	Vivax Malaria	Combined	Falciparum Malaria	Vivax Malaria	Combined
Severe thrombocytopenia <50,000 cells/cmm	3	1	4	0	0	0
Moderate thrombocytopenia 50,000 –100,000 cells/cmm	11	13	24	1	11	12
Mild thrombocytopenia 100,000 – 150,000cells/cmm	5	7	12	7	1	8
No thrombocytopenia >150,000 cells/cmm	0	0	0	11	9	20

had moderate thrombocytopenia, and eight had mild thrombocytopenia. Twenty patients were discharged with normal platelet counts. There was an average increase of 108,000 cells/cmm in the falciparum group and a 74,000-cells/cmm increase in the vivax group. A mean increase in platelet of 86,375 cells/cmm was observed. The patients' mean hospital stay was 4.35 days (range 1–17 days). Once therapy was instituted, patients with falciparum malaria did seem to take longer to recover from the thrombocytopenia, compared with the vivax group.

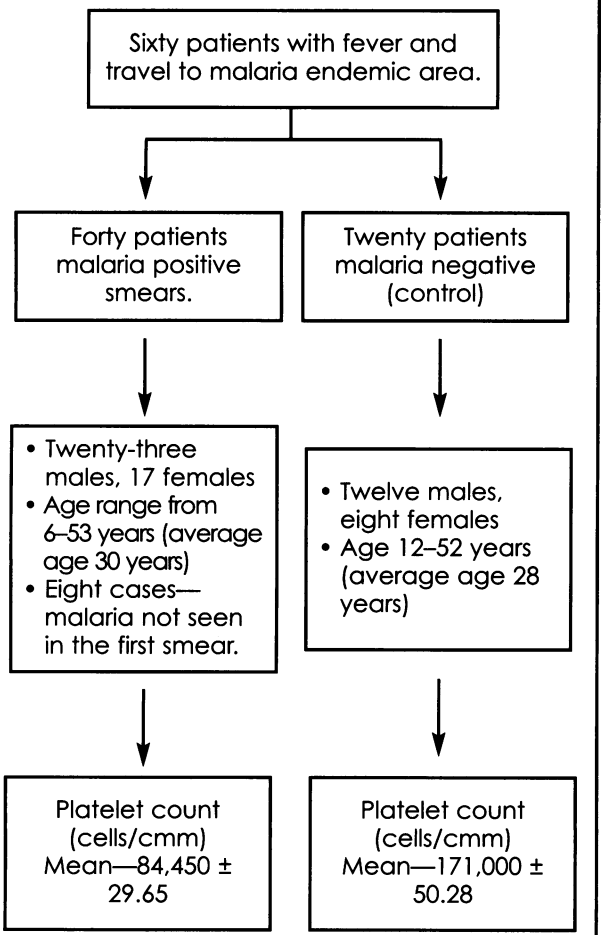
DISCUSSION AND CONCLUSION

Imported cases of malaria do occur frequently in New York City and may be associated with serious complications. Physicians should consider this diagnosis in any patient with fever and a recent travel to a malaria-endemic area.

Detection of malarial parasites in peripheral smear is the gold standard for diagnosis of malaria. It is time-consuming and needs expertise, especially to detect the parasite at low levels of parasitemia. This study found thrombocytopenia, defined as platelet count less than 150,000 cells/cmm, to be a highly sensitive test for this disease, with a very high negative predictive value. Hence, we propose that in any patient with fever and recent travel history, platelet count may be an important clue to the diagnosis of malaria. Thrombocytopenia should increase the suspicion of malaria, and multiple peripheral smears or a more sensitive test—like ELISA—for detection of parasite-specific antigen levels should be performed. Patients with severe thrombocytopenia may be more likely to have falciparum malaria than vivax malaria.

A normal platelet count in such circumstances may suggest a broader differential diagnosis for the fever. We propose that the platelet count can serve as an important initial screening tool in this setting.

Figure 1. Baseline Patient Characteristics



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