A fatal case of imported malaria in a non-endemic developing country – Mongolia, 2016

Michael Emery von Fricken1, Bekh-Ochir Baigalmaa2, Ganbold Dalantai2, Leslie Valenzuela1, Nymadorj Tsogbadrakh2, Julia Ellenberg Painter1, Paul Michael Lantos1,3,4,5
1Department of Global and Community Health, George Mason University, Fairfax, VA, USA
2National Center for Zoonotic Diseases, Ministry of Health, Ulaanbaatar, Mongolia
3Division of Pediatric Infectious Diseases, School of Medicine, Duke University, Durham, NC, USA
4Division of General Internal Medicine, School of Medicine, Duke University, Durham, NC, USA
5Duke Global Health Institute, Duke University, Durham, NC, USA

1. Introduction

Plasmodium falciparum malaria is endemic throughout the tropical world, with hundreds of millions of cases and an estimated 438,000 deaths annually[1]. International travelers who contract malaria may not develop clinical disease until they return to their country of origin. In 2013, an estimated 6,800 cases of malaria were imported to non-endemic countries[2]. This poses a clinical challenge to physicians in non-endemic areas (e.g., Mongolia), as there may be critical delays in recognizing infection and obtaining access to artemisinin-based combination therapies.

2. Case report

In March 2016, a 31-year-old man presented to a provincial hospital in Mongolia with a five-day history of fever, vomiting, diarrhea, dizziness, and myalgia. He was evaluated, given Tylenol, and discharged that evening. The following morning, the patient returned to the hospital and was admitted, with additional symptoms of tachypnea and tachycardia. He received empiric doxycycline therapy in addition to supportive care, including fluid resuscitation and treatment for hyperglycemia. Upon
admission to the hospital, the patient reported that disease onset occurred the same day that he had returned from the Democratic Republic of Congo (DRC), where he had been working for five months with a mining operation. He said he had been prescribed an unknown drug for malaria prophylaxis shortly after arriving in DRC, but reported poor adherence.

Shortly after admission, hospital staff sent a blood sample to the National Center for Zoonotic Diseases in Mongolia for testing. A peripheral blood smear revealed *Plasmodium falciparum* hyperparasitemia with an estimated 32% of erythrocytes infected (Figure 1). The diagnosis was confirmed by both rapid diagnostic test and PCR the same day.

Despite confirmed malaria diagnosis, access to treatment was delayed, as artemisinin-based combination therapy was not in stock at the admitting hospital. The following evening, seven days after illness onset (Day 2 of hospitalization), the patient began to receive intravenous artesunate, which was obtained from an international non-governmental organization. Despite initiating therapy, the patient developed subsequent renal and hepatic failure, followed by coma. Aggressive supportive measures were unsuccessful, and the patient died on the ninth day of illness (Day 4 of hospitalization). Delays in hospitalization, diagnosis, and treatment likely contributed to the patient’s death.

**3. Discussion**

Malaria in immunologically naïve travelers often results in life-threatening disease. However, mortality from imported malaria is preventable with effective prophylaxis and prompt diagnosis and treatment. The patient described above had traveled to an area of Africa with high malaria transmission intensity, and had reported poor compliance with his prophylactic regimen. Adherence to chemoprophylaxis, during time in malaria endemic countries and following returning home, must be emphasized in the pre-travel setting. Patients should be counseled to seek urgent medical care for any fevers following travel, and to report their travel history even if the physician does not ask. In this case, upon hospital admission, the patient was treated with doxycycline, which has antimalarial activity but would not be recommended as a sole agent for treatment of active infection. This chain of events underscores the difficulty in evaluating and treating malaria in non-endemic places where both physicians and patients are unfamiliar with infection. The international presence of Mongolia has grown as the country has transitioned from a socialist to a market economy, due in part to an expanding mining industry[3]. As international trade and travel increase, the frequency of imported malaria to Mongolia and other developing non-endemic countries will likely rise. This highlights the need to enhance recognition of malaria and ensure the availability of effective treatment in Mongolia and other non-endemic countries.

**Conflict of interest statement**

We declare that we have no conflict of interest.

**Acknowledgment**

This work was supported by the National Center for Advancing Translational Sciences of the NIH (KL2 TR001115) to PLM.

**References**

[1] World Health Organization. World malaria report 2015. Geneva: World Health Organization; 2015. [Online] Available from: http://www.who.int/malaria/publications/world-malaria-report-2015/report/en/ [Accessed on 23rd March, 2017]

[2] Velarde-Rodríguez M, Van den Bergh R, Fergus C, Casellas A, Sanz S, Cibulski R, et al. Origin of malaria cases: a 7-year audit of global trends in indigenous and imported cases in relation to malaria elimination. *Glob Health Action* 2015; 8: 10.3402/gha.v8.29133.

[3] Ebright JR, Altantsetseg T, Oyungerei R. Emerging infectious diseases in Mongolia. *Emerg Infect Dis* 2003; 9(12): 1509-15.