Plasmodium falciparum: an antipodean case study

Plasmodium falciparum malaria was the subject of a case and poster presentation given by Jayachandran Radhakrishnan at an Australian Institute of Medical Scientists meeting in Bunbury, Western Australia.

A 47-year-old male presented to his GP complaining of intermittent fever, diarrhoea and vomiting. The GP noted that the patient had travelled to the Ivory Coast in West Africa a month previously to attend a job interview. In view of the patient's condition, the GP decided to refer him to Kalgoorlie Regional Hospital for further tests and a complete check. This short study illustrates the importance of diagnostic methods in the early detection of *Plasmodium falciparum* malaria and subsequent treatment outcomes.

PRELIMINARY INVESTIGATION

Prior to referring the patient, the GP had asked him to undergo a series of blood investigations including full blood picture, electrolytes, liver function tests (LFTs), C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and serology for influenza, dengue fever and atypical pneumonia.

Initial laboratory results from these tests yielded little information on which the GP could base a diagnosis. Most of the serology tests required at least a week for the results to be returned, as they were performed in a reference laboratory in Perth.

However, a very low platelet count did give the GP reason to request further blood investigations. Meanwhile, on the following day, the patient was feeling extremely unwell and was admitted to the Kalgoorlie Regional Hospital.

LABORATORY FINDINGS

Initial full blood count on the samples collected by the GP gave a low platelet count (38 x 10^9/L) and a haemoglobin (Hb) value of 126 g/L (Table 1). The peripheral smear examination undertaken in the laboratory to detect the cause of the low platelet level failed to detect any platelet clumps. The CRP was elevated to 154 mg/L and LFTs showed an increase in alanine transaminase (ALT) or γ-glutamyl transpeptidase (GGT) values. However, the low platelet count and Hb gave enough cause for concern for the clinician to order a malaria investigation.

Table 1. Initial results on the bloods collected by the GP.

Hb (g/L) (135–180)	RBC (x10^{12}/L) (4.5–5.5)	Platelets (x10^9/L) (150–400)	CRP (<10)
126	4.07	38	154

Table 2. Results over the four days following commencement of antimalarial treatment.

Day	Platelet count (x10^9/L)	Infected RBCs (%)	Absolute count (x10^9/L)
3	51	4.6	150.6
4	89	2.4	78.3
5	119	<0.5	NA
6	211	<0.5	NA

Fig 1. A fresh blood test on Day 2 using a malaria kit yielded a positive result for *Plasmodium falciparum*.

Fresh bloods were collected from the patient and the laboratory performed a malarial investigation that included a serology test and also peripheral smear examination using thick and thin films. Noting the patient's history of diarrhoea and vomiting and also his recent travel to Africa, a Widal test and blood culture were also requested to investigate the possibility of typhoid fever.

Blood counts were performed on an LH500 analyser (Beckman Coulter), and thick and thin blood films were stained with Leishman.

DIAGNOSIS OF *P. FALCIPARUM* MALARIA

Fresh blood tests undertaken of Day 2 using a malaria kit (BinaxNow, Inverness Medical) (Fig 1) yielded a positive result for *P. falciparum*. The thick (Fig 2a) and thin blood films (Figs 2b and 2c) showed a number of *P. falciparum* trophozoites and the level of infected red cells was estimated at 7%. Absolute count of the infected red cells was estimated at 261.1 x 10^9 cells/L. The blood

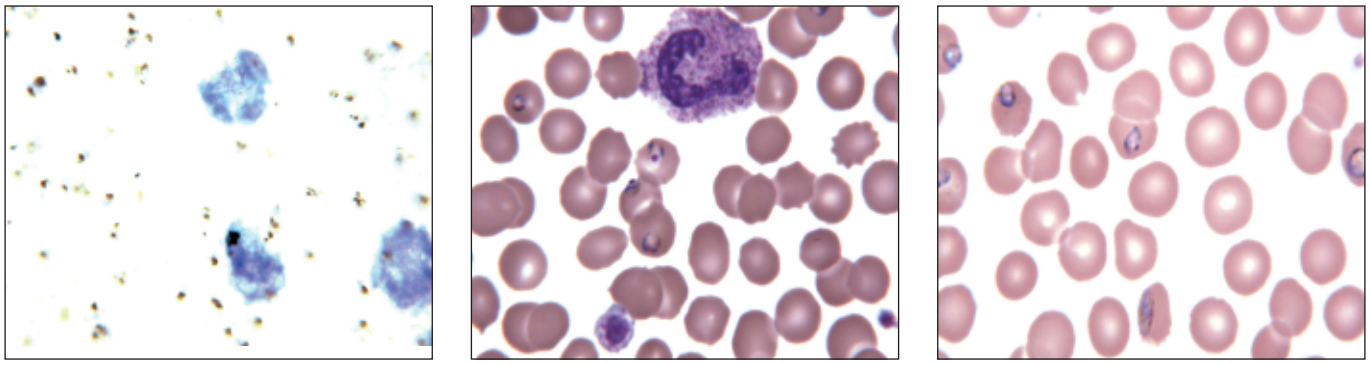

Fig 2. Thick (a) and thin (b and c) blood films showed a number of *Plasmodium falciparum* trophozoites.

cell counts correlated well with the clinical picture. Platelet count was 45 x 10^9 cells/L and the patient was anaemic (Hb 113 g/L). Neutrophils showed mild left shift and moderate toxic granulation.

TREATMENT AND FOLLOW-UP

The patient was started on intravenous (iv) antibiotics and was given an antimalarial drug, which over a period of days decreased the percentage of infected red cells to <0.5% and increased the platelet count to 211 x 10^9/L. On discharged from hospital, the patient was advised to visit his GP regularly for blood tests to monitor the reduction in infected red cells to an absolute count of zero.

OUT OF AFRICA

The condition of the patient improved considerably after administration of the antimalarial drug. His platelet count increased and the illness began to subside.

It would seem apparent that he contracted the malarial disease while on his visit to the Ivory Coast. The Widal and blood culture results were negative, which ruled out co-existing typhoid infection. Serology investigations for dengue, influenza and Epstein-Barr virus were negative.

Timely laboratory detection of the *P. falciparum* parasite improved the condition of the patient; however, this case study also highlights the need for travellers to take precautionary measures when visiting regions of the world in which malaria is endemic. ■

'In view of recent travel to Africa, a Widal test and blood culture were requested to investigate the possibility of typhoid fever'

Jayachandran Radhakrishnan is a medical scientist working at Kalgoorlie Regional Hospital, Piccadilly Street, Kalgoorlie, Western Australia.