Imported Falciparum Malaria in British Troops Returning from Kenya

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SUMMARY: The objective of this study was to report on a breakthrough of *Plasmodium falciparum* infection following a military exercise in central Kenya and the treatment regimens used. A series of case reports are presented from the three UK hospitals involved.

Among 150 British soldiers who had been on exercises for five weeks in central Kenya, taking proguanil/chloroquine anti-malarial prophylaxis, seven developed symptomatic falciparum malaria. Initial symptoms, which started between 2 and 10 days before their return to England, included faintness, sweating, shivering, diarrhoea, headache and myalgia. Diagnosis was delayed from between 5 and 13 days after the first symptom. One patient was severely ill with 50% parasitaemia: he required intensive care, exchange blood transfusion and haemofiltration for acute renal failure. Compliance with chemoprophylaxis was not measured and anti-mosquito measures were not generally practised. However, British Army policy was amended in June 1993 so that mefloquine will be used in future rather than proguanil/chloroquine.

It was concluded therefore that even in an educated and motivated population simple preventive measures are not observed. Chemoprophylactic compliance could be improved by changing to a simpler regime. Falciparum malaria is a medical emergency that requires urgent admission for confirmation of diagnosis, supportive and curative treatment. Its presence should be suspected in any ill traveller.

Introduction

The incidence of malaria due to *Plasmodium falciparum* is increasing in the UK (1). Twelve deaths occurred out of 2332 notified cases in 1991 and 11 out of 1629 in 1992 (2). These deaths were associated with a delay in diagnosis rather than delay in presentation (3). So clinical suspicion of malaria must remain high in any unwell traveller who has returned from an endemic area.

Case Reports

We describe seven patients. Five were treated at the Duchess of Kent's Military Hospital (DKMH), Catterick, one at a local district general hospital and one at the John Radcliffe Hospital, Oxford. All were male soldiers who had returned from a five week company strength (150 men) exercise at Mpala Farm, near Nanyuki, central

Kenya. Cases 1-6 had also participated in a sub-group exercise (21 men) during which they had travelled through the bush at night, slept in the open air by day and not taken any precautions against mosquito bites. At the end of the exercise the sub-group went on a camel safari through the bush in the same area. All the soldiers had received a pre-tour lecture on illness prevention measures in the tropics. They were instructed/ordered to take chloroquine sulphate 300mg (base) weekly and proguanil 200mg daily starting one week before departure and continuing for four weeks after return. Mosquito nets and diethyl toluamide (DEET) liquid repellent were available in Kenya. The Regimental Medical Officer (RMO), who is a principal in general practice, recommended and oversaw these preparations (Table 1).

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Table 1 – Preventive Measures
(Information from direct interviews by one author)

	Chemoprophylaxis Compliance (1)	Appropriate Clothing (2)	Use of Mosquito Nets (3)	Insect Repellent Use (4)
Case 1	+	–	–	–
Case 2	+	+	–	–
Case 3	+	–	–	–
Case 4	–	+	–	–
Case 5	–	–	–	–
Case 6	–	–	–	+
Case 7	+	+	+	+

1. Perfect compliance (+) or admitted dubious compliance (–).
2. Use of long sleeves and trousers at dusk (+) or not (–).
3. Use every night (+) or not (–).
4. Personal daily use of diethyl toluamide (as issued) in the bush (+) or not (–).

Case 1 took his anti-malarial chemoprophylactic drugs as instructed but did not take any precautions against mosquito bites. As a result he was bitten frequently. He spent most of the time around Mpala Farm but at the end of the tour joined the camel safari. He was well until 15 April when, while still in Kenya, he felt faint and shivery while shopping. He consulted the medical officer who prescribed paracetamol but did not suggest any investigations. The patient went to bed but was soon forced to resume some duties. He developed mild diarrhoea. He was due to fly back to UK on 19 April and by that time felt extremely ill and was scarcely able to get on to the plane unaided. When he landed at RAF Brize Norton he was driven by ambulance to the Churchill Hospital, Oxford where he was admitted to the infectious diseases ward at about midnight. The first blood slide showed a 25% *P. falciparum* parasitaemia (mature trophozoites) and he was started on quinine (loading dose). He was then transferred to the intensive care unit at the John Radcliffe Hospital. He was complaining of breathlessness and pain on taking a deep breath. His legs were extremely tender and could not bear his weight. He had noticed jaundice for about 24 hours. In passing he mentioned that another soldier in his group, Case 2, had also developed jaundice and intermittent fever during the last week they were in Kenya.

On examination he was fully conscious with marked jaundice but no haemorrhages. Pulse 120 per minute regular, blood pressure 120/75, auscultation normal. He was markedly tachypnoeic. The abdomen was rigid and very difficult to palpate but ultrasound confirmed hepatosplenomegaly (spleen 14 cm). The muscles of his thighs, calves and nuchal region were very tender to palpation. He had already had one episode of hypoglycaemia (1.9 mmol/l) since starting quinine treatment.

Investigations revealed marked thrombocytopenia ($20 \times 10^9/l$, sodium 127 mmol/l, potassium 4.7 mmol/l, urea 40.7 mmol/l creatinine 595 mmol/l, albumin 32 g/l, total bilirubin 140 mmol/l, creatine kinase 396 iU/l, aspartate aminotransferase 279 iU/l, alkaline phosphatase 300 iU/l. The blood lactate was extremely high at 20.5 mmol/l, C-reactive protein 297 mg/l.

Treatment in the Intensive Care Unit from 20–27 April included haemofiltration, two exchange blood transfusions of 4 units each because of his persistent hyperparasitaemia, which had reached a peak of 50% on 20 April, and platelet transfusions. He developed shadowing on the chest radiograph consistent with hypostatic pneumonia and possibly ARDS and became hypoxaemic. He was given oxygen by mask but was not mechanically ventilated. His parasitaemia fell to 16% on 21 April and disappeared over the next few days. On 27 April he was transferred to the Renal Unit where he had further haemofiltration and diuretic treatment and was transferred on 4th May to a renal unit in Yorkshire. He was allowed home after 7 days.

Case 1 was the index case. Others with similar exposure were at risk and with this in mind the medical centre at RAF Brize Norton was alerted by the John Radcliffe Hospital team to the potential risk to the rest of the party on 20 April 1993.

Case 2 was referred to DKMH by the RMO immediately on return to UK on 20 April 1993. He had felt unwell for four days before flying home. In Kenya he was initially assessed by a regimental para-med and discharged after a day's rest when his symptoms of sweats and myalgia had subsided. Jaundice was not noted. He had not used a mosquito net or repellent although he had been sleeping outdoors beside a swamp while on

non-immune traveller. Case 1 demonstrates how quickly fulminant falciparum infection can develop. He boarded the flight home feeling ill and collapsed during the journey. The RMO on board decided to continue to UK rather than detour to an unknown destination. This decision may have created a delay in initiating curative therapy. Falciparum malaria is a medical emergency requiring urgent intervention. This may have implications for airlines and those doctors who escort their charges from tropical zones.

Education of doctors and patients alike is essential. Case 6 had symptoms but did not seek medical help until he was instructed because he felt his holiday was more important despite a pre-tour lecture on such topics.

Screening an at risk but asymptomatic population for falciparum infection is controversial. However, the harvest of Cases 5 and 6 from screening 21 men was worthwhile as earlier treatment was possible. Screening consisted of a symptom enquiry, observation of temperature for a minimum of 24 hours and serial thick and thin blood films. Fellow travellers with similar exposure to an index case should be considered at high risk. The screening of such a group is justified by the benefit accruing from earlier diagnosis.

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