Localised Outbreak of Falciparum Malaria in Singapore

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ABSTRACT

Malaria is primarily an imported disease in Singapore. Local outbreaks are uncommon. We describe a localised outbreak of three patients with Falciparum malaria, which we believe to be locally acquired. There was one fatality due to severe disease and late presentation. Malaria should be considered as a cause of febrile illness as the likelihood of cure depends on early detection and treatment.

Keywords: Falciparum malaria, imported, locally acquired

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INTRODUCTION

Malaria is primarily an imported disease in Singapore. Most of the cases are imported by returning travellers and foreign workers. In this report, we describe a localised outbreak of three cases of falciparum malaria, which we believe were acquired locally.

CASE 1

A 71-year-old mentally retarded Chinese lady was admitted in June 2001 with fever, lethargy and drowsiness of one week and jaundice of two days duration. She had epilepsy and old polio since childhood. She was bedbound and had not travelled out of Singapore.

Physical examination revealed a dehydrated, drowsy patient with a temperature of 38.2ºC and BP of 107/63 mmHg. She had marked jaundice and a tender hepatomegaly. Her lower limbs were flaccid and wasted.

Full blood count showed: Hb 9.9 g/dL, white cell count 15.4 x 10^3/uL, platelets 16 x 10^3/uL. An incidental blood film revealed *Plasmodium falciparum* (35% parasitemia). Serum urea was 55 mmol/L, serum creatinine 643 umol/L, sodium 133 mmol/L, potassium 6.0 mmol/L. Liver function tests were deranged with albumin 22 g/L, bilirubin 198 umol/L, ALP 202 U/I, ALT 93 U/L and AST 250 U/L. PT was 26.9s and PTT (A) 52s. Serum amylase was normal. She was diagnosed to have severe falciparum malaria. She developed acute pulmonary oedema and septic shock requiring mechanical ventilation and inotropic support.

She was transferred to the intensive care unit five hours after admission. Intravenous quinine 1g loading dose and 500mg eight hourly was instituted. Platelets and fresh frozen plasma were transfused. Oral doxycycline was added the following day. The parasite count had decreased to 23%. Blood cultures gave negative results. However, her condition deteriorated, with worsening renal failure, metabolic acidosis, disseminated intravascular coagulation and she died on the same day.

CASE 2

A 44-year-old Chinese man who was admitted in June 2001 after four days of intermittent fever, associated with chills, rigors and preceding cold sweats. He had myalgia and arthralgia for four days. He had returned from a three-day trip to Genting and Malacca, Malaysia, five days before admission.

His temperature was 39.6ºC, blood pressure 120/70 mmHg and pulse 88/min. He was jaundiced and had mild splenomegaly. His haemoglobin was 16 g/dL, white cell count 2.9 x 10^3/uL, platelets 35 x 10^3/uL. Blood film revealed *Plasmodium falciparum* (<1% parasitemia). Coagulation profile, creatinine and electrolytes were normal. Liver function tests were deranged with bilirubin 81 umol/L, ALP 148 U/L, ALT 198 U/L and AST 122 U/L.

He received oral quinine and doxycycline for one week. His fever defervesced on day 5. He was discharged one week after admission. At review two weeks later, he was well with a negative blood film for malaria parasite and normal full blood count and liver function.

CASE 3

An eight-year-old girl was admitted in June 2001 for fever of four days associated with chills and rigors. She had accompanied her father (case 2) to Malaysia.

Examination revealed a lethargic, toxic looking child, with a temperature of 39.8ºC and blood pressure 92/68 mmHg. She had a tinge of jaundice and hepatosplenomegaly. The haemoglobin was 13.5 g/dL, white cell count 3.9 x 10^3/uL, platelets 47 x 10^3/uL. Creatinine and electrolytes were normal. Bilirubin was 86 umol/L, ALP 293 U/L, ALT 60 U/L, AST 79 U/L,

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PT was normal and PTT (A) 50 secs. Blood film showed *Plasmodium falciparum* (2% parasitemia).

She was treated with mefloquine and primaquine for two days. Her fever resolved after four days and she was discharged one week after admission. She was well when reviewed one week later with a negative blood film for malaria parasite and normal full blood count and liver function.

DISCUSSION

Malaria is a legally notifiable disease in Singapore. More than 95% of all cases in Singapore are imported. A total of 266 cases of malaria were reported in Singapore in 2000 of which 264 (99.2%) were imported and only 2 (0.8%) were acquired locally[1]. *Plasmodium falciparum* accounted for 33.1% and *Plasmodium vivax* 64.3% of all infections[1]. Of the two local cases, one was vivax malaria and the other, falciparum malaria[1]. The majority of imported cases were from people who visited endemic areas and foreign workers, mainly from Indonesia and the Indian subcontinent.

It was thus most unusual to have a cluster of three patients with *Plasmodium falciparum* malaria. Further investigations revealed that they lived in the same condominium in the eastern part of Singapore.

Our first patient was a disabled, elderly lady who had not travelled out of Singapore. The other two patients had travelled to Malaysia. However, the onset of their fever was four days from the time they first reached Malaysia. This contrasts with the known incubation period of falciparum malaria of approximately 12 days (range 9-60)[2]. This observation, coupled with the fact that all three patients lived in the same condominium, made it probable that they acquired the infection locally. However, despite epidemiological investigation, no imported source was identified. Active case detection and mass blood surveys of the residents in that area were conducted by the Quarantine and Epidemiology Department, Ministry of the Environment. More than 200 residents volunteered to be screened for malaria parasites via peripheral blood film investigation. No further cases were found. We postulate that the source may have been an asymptomatic foreign worker or a tourist with parasitemia who was staying in that area, or even a Singaporean traveller or national serviceman who had not taken malaria prophylaxis. The parasitemia could have been resolved by the time mass screening was carried out.

Vector control and situational assessment were also carried out in this area. Vector surveillance and control operations were also stepped up. The area was fogged several times at night and the vector situation was assessed nightly using human bait as well as actively seeking potential *Anopheles* mosquito breeding habitats. No *Anopheles* mosquito was found in the area despite these efforts.

The clinical features of the three cases were similar with fever, jaundice and thrombocytopenia being common. Our first patient was initially diagnosed to have cholangitis. However, *Plasmodium falciparum* was incidentally detected in the peripheral blood film.

The first two patients were treated with quinine and doxycycline. This is the recommended regimen in our region due to high rates of chloroquine resistant *Plasmodium falciparum*. The third patient was treated with mefloquine and primaquine.

Unfortunately, the first patient died shortly after admission even though the level of parasitemia had decreased. According to WHO gravity criteria[3], decreased consciousness, acute renal failure, raised bilirubin, high parasitemia and severe hypoglycemia were present in this patient. Despite management in an intensive care setting, this elderly patient with severe malaria died. The case fatality rate in severe malaria often exceeds 10%[4]. A local study found that the mortality of patients with severe falciparum malaria was 15% while the mortality of patients with all types of malaria requiring intensive care was 12.5%[5].

In the past decade, six outbreaks of locally acquired vivax malaria had been identified[6-9]. All outbreaks except one, had "imported" index cases. This report is the first outbreak of locally acquired malaria in recent years. Malaria should be considered in febrile patients even in those without travel history. Blood films are easily and rapidly performed and curative treatment is available.

Singapore is both vulnerable and receptive to the introduction of malaria because of the constant influx of travellers and foreign workers and the presence of the *Anopheles* vector. Early detection and treatment would prevent further spread of the disease.

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