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CASE REPORT

An Unusual Case of Concurrent Dengue and Malaria Infection

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ABSTRACT

Dengue and malaria infections are common mosquito-borne infectious diseases in tropical and subtropical regions. The clinical manifestations of dengue and malaria often mimic each other, causing the predicament of early diagnosis without laboratory investigations. Concurrent dengue and malaria infection are often rare scenarios when both diseases occur in a particular patient at the same time. A high index of suspicion is therefore required to establish an early diagnosis to ensure complete success in its management. This case report is about concurrent dengue and malaria infection in a 54-year-old Pakistani man who presented with high-grade fever for three days before admission. On examination, he was febrile (38.8°C) with no other findings. His blood investigations were positive for NS1 antigen and IgM but negative for IgG. His peripheral blood film revealed the presence of *Plasmodium vivax*. He was treated for dengue fever with supportive management and started with oral Riamet (artemether and lumefantrine) along with oral primaquine 30 mg daily for two weeks' duration. Following treatment, the patient demonstrated progressive clinical improvement and was subsequently discharged back to the community clinic for the continuation of care.

INTRODUCTION

Dengue and malaria are the two most prevalent mosquito-borne infectious diseases affecting the tropical and subtropical countries (Epelboin et al., 2012; Wiwanitkit, 2011). Lately, both are still causing major public health concerns because of their respective high morbidity and mortality

rates. Clinically, their disease manifestations can be entirely similar to acute febrile illness occurring at the beginning (Selvaretnam et al., 2016). Thus, laboratory investigations are often required to enable clinicians to arrive at a definite diagnosis. Of interest, despite a high prevalence rate of both diseases in tropical and subtropical regions, very few reports or articles have been published on concurrent dengue and malaria infection. A retrospective study which was done in French Guiana revealed 17 cases of dengue and malaria co-infection among the 1723 patients who presented with acute febrile illness from the year 2004 to 2005 (Carme et al., 2009). We report a case of a foreigner who presented with acute febrile illness with specific chronological events and investigations, which lead to the definite diagnosis of concurrent dengue and malaria infection.

CASE PRESENTATION

A 54-year-old Pakistani man, with no comorbidity, presented with fever associated with chills and rigours for three days before admission. He also developed three episodes of vomiting and reduced appetite for a similar period. He had been working in Malaysia as a businessman for the past ten years. The last time he travelled back from Pakistan was one year ago, and he denied any recent history of travelling. On examination, he was febrile (38.8°C). There were no rash, lymphadenopathy, or hepatosplenomegaly. Systemic tests are unremarkable. His dengue NS1 antigen and IgM were positive on day 3 of illness or day of admission (Table 1). He had inadequate oral intake before admission. He was then treated for dengue fever with symptomatic management. Due to persistent fever, he was also screened for malaria, which is not uncommonly encountered in our region. His blood film for parasites confirmed the presence of *Plasmodium vivax* (Table 2).

Table 1 The results of dengue fever tests taken at day 3 of illness or day of admission.

Parameters	Results
Non-structural protein-1 antigen	Positive
IgM	Positive
IgG	Negative

Table 2 The results of blood film for malarial parasite (BFMP)

Parameters	Results
Species	*Plasmodium vivax*
Quantitative microscopy (asexual/ sexual)	*Plasmodium vivax* 3656/0 per µL of blood

The remaining blood investigations were shown in Table 3. The presence of trophozoites in a thick and thin blood smear is shown in Figures 1 and 2. Subsequently, a diagnosis of concurrent dengue and malarial infection was made. He was admitted to the medical ward for initiation of treatment and daily monitoring of his malaria parasites count. Oral Riamet (artemether and lumefantrine) was started as per management guideline of malaria in Malaysia year 2014 along with oral primaquine 30 mg daily for two weeks' duration (Ministry of Health Malaysia, 2014). Following the treatment initiation, he demonstrated progressive improvement both clinically and biochemically. He was then discharged back to the community clinic and remained well during follow-up.

Table 3 Blood parameters for the patient

Parameters	Results (On admission)	References
Haemoglobin	13.0	13.0 – 18.0 g/dL
White cell count	2.3	4 – 11 × 10^9/L
Platelet	90	150 – 400 × 10^{10}/L
Urea	3.2	2.8 – 7.2 mmol/L
Sodium	140	136 – 145 mmol/L
Potassium	4.1	3.5 – 5.0 mmol/L
Creatinine	80	74 – 110 umol/L
Total protein	69	66 – 83 g/L
Albumin	39	35 – 52 g/L
Globulin	32	28 – 36 g/L

Total bilirubin	20	5 – 21 µmol/L
Alanine aminotransferase (ALT)	30	< 45 U/L
Alkaline phosphatase (ALP)	40	30 – 120 U/L
G6PD	Negative	–

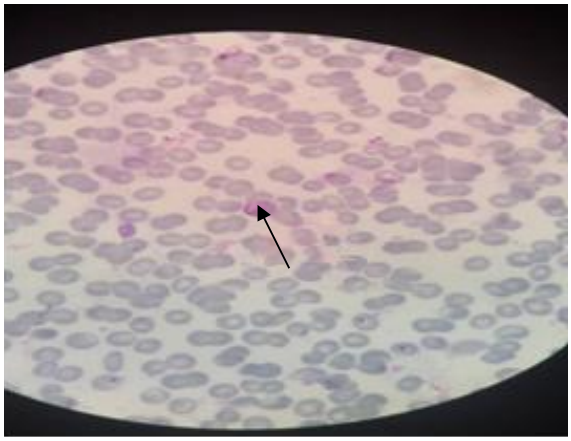

Figure 1 Thick blood smear showing the presence of trophozoite (black arrow)

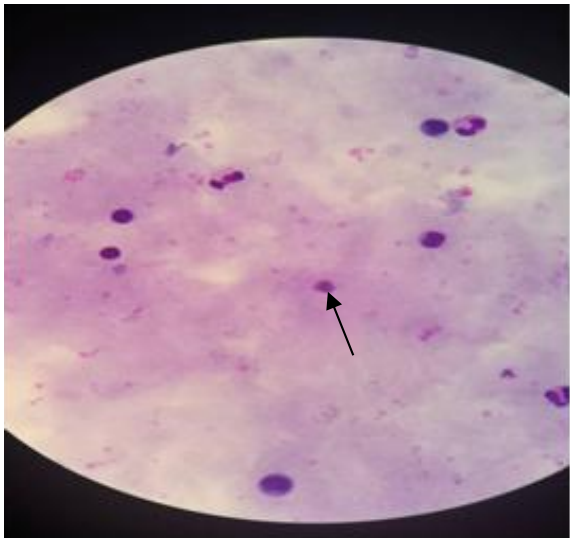

Figure 2 Thin blood smears showing the presence of trophozoite (black arrow)

DISCUSSION

This patient was found to have concomitant dengue and malaria infection. The majority of the clinicians often encounter the predicament to reach the diagnosis as the existence of another disease is often forgotten when the first diagnosis had been made.

Concurrent dengue and malaria infection were first reported in the year 2005 (Epelboin et al., 2012). It refers to a scenario when both the diseases coincide in a particular patient at a similar time (Selvaretnam et al., 2016). Both dengue and malaria infections are transmitted via animal vectors (mosquitoes), namely *Aedes* and *Anopheles,* respectively (Wiwanitkit, 2011; Malaysia Health Technology Assessment Section (MaHTAS), 2015). In general, dengue infection commonly affects the urban population, whereas malaria infection mainly affects people who live or work in the forest. This is attributed to the fact that both the diseases are spread by vectors that do not share the same habitat (Selvaretnam et al., 2016). As a result, extensive overlapping of habitat seldom happens, causing a low incidence of co-infection compared to a single infection. This coincides with findings in the report written by Carme et al. (2009) in French Guiana, which stated that the incidence of co-infection among febrile patients was only 0.99%.

In terms of clinical manifestations, concurrent infection and mono-infection often present similarly. However, the pathogenic mechanisms differ such that anaemia is the main feature of patients with malaria due to significant intravascular hemolysis (Ministry of Health Malaysia, 2014). In contrast, thrombocytopaenia is often the main predictor of dengue fever. Table 4 below demonstrates the clinical features of mono-infection versus co-infection (Carme et al., 2009; Ministry of Health Malaysia, 2014).

Table 4 The clinical differences of both dengue and malaria infection

Features	Dengue	Malaria	Co-infection
Causative agent	Dengue virus (DEN-1,2,3,4)	Protozoa parasite (*Plasmodium* sp.)	Dengue virus and *Plasmodium* sp.
Mode of transmission	Vector (*Aedes* mosquito)	Vector (*Anopheles* mosquito)	Vectors (*Aedes* and *Anopheles*)
Symptoms and signs	Fever, headache, rash, vomiting, mucosal bleed, muscle pain	Fever, rigours, headache, vomiting, muscle pain	All are present
Thrombocytopaenia	Present	Absent	Present
Anaemia	Usually absent	Present	Present
Lymphocytosis	Present	Absent	Present
Parasitaemia	Absent	Present	Present
Clinical complications	Haemoconcentration, bleeding, shock	Cerebral malaria, haemolysis, hypoglycaemia, shock	All are present

Based on current knowledge, there is no specific treatment recommended for patients with concurrent infection. Hence, the combination of both dengue and malaria treatment protocols simultaneously will be sufficient, provided that the early diagnosis is being made (Wiwanitkit, 2011). However, the choice of antimalarial drugs differs according to the specific species of the parasite involved.

CONCLUSION

This case highlights the importance of history taking and a high index of suspicion among clinicians when dealing with patients who present with acute febrile illness. Missing the above condition will lead to treatment failure and potentially mortalities.

CONFLICT OF INTEREST

The authors declare that they have no competing interests in publishing this article.

CONSENTS

Written consent was obtained from the patient to publish the case. A copy of the written consent is available for review by the Chief Editor.

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