CASE REPORT

Falciparum Malaria and Dengue Co-infection in a Malaysian Returning From Nigeria: A Case Report

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ABSTRACT

A 39-year-old Malaysian Indian woman presented with a five-day history of high-grade fever, myalgia, arthralgia, poor oral intake, and diarrhoea. She had recently returned from a trip to Nigeria. Initial blood tests were positive for NS1, Dengue IgM, and IgG. Due to a low index of suspicion, a blood film for malarial parasites (BFMP) was not performed initially. However, her high-grade fever persisted despite the resolution of dengue warning signs. Given her recent travel to a malaria-endemic region, a BFMP was conducted on the eighth day of illness, revealing severe Plasmodium falciparum parasitemia, with a parasite count of 56,430 parasites/μL (asexual forms) and no gametocytes detected. She was treated with intravenous artesunate and discharged in good health after 12 days of hospitalisation. This case underscores the importance of detecting and diagnosing dengue-malaria co-infection in endemic regions to prevent severe complications.
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INTRODUCTION

Malaria and dengue are among the most common vector-borne illnesses in tropical countries. Climate change, urbanisation, deforestation, and agricultural activities have contributed to their increasing prevalence. The co-infection rates of malaria and dengue are rising, particularly among children in malaria-endemic regions. Therefore, timely diagnosis is essential to mitigate the risk of severe complications. This case highlights the diagnostic challenge of identifying dengue-malaria co-infection, as overlapping clinical features and an overlooked travel history to a malaria-endemic region can delay early and accurate detection (1). Despite their distinct aetiologies, malaria and dengue share several non-specific symptoms, including fever, headache, myalgia, arthralgia, rash, nausea, vomiting, and diarrhoea (2). However, distinguishing between these two infections is critical, as their management strategies differ. Dengue requires close monitoring during the critical phase, whereas malaria necessitates urgent antimalarial therapy to prevent severe haemorrhagic complications, including hemorrhagic manifestations and cerebral malaria.

CASE REPORT

A 39-year-old Malaysian woman presented with a five-day history of fever, myalgia, arthralgia, poor oral intake, and diarrhoea, along with an episode of presyncope while en route to the hospital. Further history revealed that she had recently returned from a three-week business trip to Nigeria. Her symptoms began two weeks after her return to Malaysia. She also reported frequent travel to the same region for business purposes.

At the Emergency Department (ED), she was alert but lethargic, hypotensive (blood pressure: 80/66 mmHg), tachycardic (heart rate: 125 beats per minute), and febrile (38.4°C). Abdominal tenderness was noted, though hepatosplenomegaly was absent. An initial full blood count (FBC) revealed thrombocytopenia with a normal haemoglobin level (Table I). Her dengue serology returned positive for IgM and IgG; therefore, the patient was treated for dengue with warning signs. However, her fever persisted until day 8 of illness which was unusual for a typical dengue case. Consequently, an urgent blood film for malaria parasites (BFMP) was requested, which confirmed *Plasmodium falciparum*

infection with a parasitemia count of 56,430 parasites/μL. Malaria co-infection was not initially suspected due to the overlapping clinical symptoms of dengue and malaria, compounded by the overlooked travel history to a malaria-endemic region.

Table I: Patient's blood investigation results

Blood investigation parameters (unit)	Day of illness				
	Day 5	**Day 6**	**Day 8** (day 1 of antimalarial initiation)	**Day 10**	**Day 12** (day 5 of antimalarial initiation)
Haemoglobin (reference range : 12-16 g/dL)	12.5	11.4	8.7	7.8	8.2
White Blood Cell (reference range : 4.5-11 x10^9/L)	8.2	8.4	7.3	4.9-	7.2-
Platelets (reference range : 150-400 x10^9/L)	27	29	80-	133-	188
C- Reactive Protein (reference range: < 0.9 mg/dl)	18.62	-	-	-	-
ALT (reference range: < 34 U/L)	41	36	37	26	19
ALP (reference range: < 30 - 120 U/L)	83	72	62	56	51
TBilirubin (reference range: 5.1 – 19 umol/l)	27	13.1	30.4	12	9.9
BFMP/parasitaemia count (per μL of blood)	-	-	56430	240	NEGATIVE
NS1 Ag	Positive	-	-	-	-
Dengue serology	IgM and IgG POSITIVE	-	-	-	-

Table I shows a series of investigations performed on this patient. BFMP on day 5 of IV Artesunate showed a negative result.

She was initially started on Riamet (20 mg/120 mg tablets). However, after re-evaluation by an infectious disease physician and upon receipt of the formal BFMP report, her treatment was switched to intravenous (IV) artesunate at a dosage of 2.4 mg/kg. During her admission, her haemoglobin level dropped from 12.5 g/dL to 7.8 g/dL. A full blood picture (FBP) indicated red blood cell haemolysis, with an elevated serum lactate dehydrogenase (LDH) level of 641 mg/dL. Following IV artesunate administration, her parasitaemia count markedly decreased to 240 parasites/μL. By day 5 of antimalarial treatment, she showed clinical improvement, and her BFMP was negative for malarial parasites (Table I). After completing four doses of IV artesunate, she was discharged in stable condition with oral Riamet to complete a total of six doses. She was advised to follow up at the nearest health clinic for a full blood count (FBC) assessment and symptom review.

DISCUSSION

Since 2018, Malaysia has not reported any indigenous human malaria cases, with most malaria cases attributed to *P. knowlesi* infections (4). In this case report, the patient contracted malaria in Nigeria, a highly endemic region where the disease contributes to a significant number of deaths. Dengue and malaria co-infection have been reported in the literature. However, published data on the prevalence of this co-infection in endemic areas remain scarce. Shah and Mehta (2017) reported that 3.14% of dengue cases were co-infected with malarial parasites (1). The rarity of this co-infection is attributed to the distinct habitats of malaria and dengue vectors. While malaria vectors predominantly inhabit forested areas, dengue vectors typically thrive in urban environments (1, 2). The Anopheles mosquito has a flight range of 1 to 2 kilometers, suggesting that co-infection may occur when it migrates to Aedes breeding sites (3).In this case, it is plausible that the patient was exposed to different mosquito species at different times, given the prevalence of dengue in her hometown, Malaysia, and her frequent travel to malaria-endemic regions. Her fever began two weeks after returning home. The positivity of the NS1 antigen, dengue IgM/IgG serology, and BFMP findings aligned with the expected incubation periods of both infections.

Diagnosing dengue and malaria during acute febrile illness can be challenging due to overlapping clinical features, which may obscure the recognition of co-infections. This overlap makes diagnosis even more difficult in the absence of early laboratory testing (1). In this case, the patient's travel history to a malaria-endemic region was a crucial factor. However, due to a low index of suspicion, a BFMP was not performed alongside dengue serology at the time of presentation. The positivity of dengue serology, which corresponded with the initial clinical presentation, contributed to the delayed recognition of the co-infection (1, 2).Typically, the defervescence phase of dengue fever begins between days 3 and 5 of illness, with most patients showing clinical improvement within a week (1). However, this patient experienced persistent high-grade fever until day 8, accompanied by thrombocytopenia an atypical course for dengue fever. Therefore, other co-infections, such as malaria, should be considered and ruled out. As seen in this case, the detection of both antigens and antibodies confirmed an acute dengue infection. However, when only IgM is positive, a diagnostic dilemma arises, as IgM can persist for months and may not necessarily indicate an active infection (2).

Patients recovering from dengue are immunocompromised, making them more susceptible to other infections (1, 2). Theoretically, this phenomenon arises from an enhanced host immunological response to co-infection, leading to elevated levels of TNF and IFN-γ. Consequently, dengue co-infection may also exacerbate malaria severity (1, 2). Severe dengue induces IL-6 production and TPA activation, further worsening bleeding sequelae, malaria-induced hemolysis, and marrow suppression (2). The well-documented biological effects of the dengue virus on the human endothelium have been considered a major contributor to severe malaria (2).

This patient exhibited symptoms consistent with dengue shock syndrome and severe malaria. The literature indicates that malaria and dengue co-infection are frequently associated with anemia, thrombocytopenia, and altered liver and renal function, with a higher incidence observed in *P. falciparum* infections (3, 4). Severe anemia in *P. falciparum* infection can result from both direct red blood cell (RBC) destruction and bone marrow suppression. If left untreated, it can progress to metabolic acidosis and respiratory distress (2).

A critical pathogenic event in *P. falciparum* infection is microvascular obstruction, which occurs due to the adherence of infected RBCs to the endothelial cells lining the microvasculature. This process is mediated by specific surface proteins on infected RBCs, known as *P. falciparum* erythrocyte membrane protein-1 (PfEMP-1). PfEMP-1 plays a central role in malaria pathogenesis by acting as a variant surface antigen that enables infected RBCs(iRBCs) to adhere to endothelial cell receptors (2). This cytoadherence leads to the sequestration of iRBCs in the microvasculature of the brain, lungs, and kidneys, triggering the production of inflammatory cytokines and leading to potentially fatal complications (2).

These findings highlight the importance of maintaining a high index of suspicion for malaria and dengue-malaria co-infection, especially in patients with recent travel to endemic regions. Fortunately, this patient survived without severe complications.

CONCLUSION

It is crucial to consider malaria and dengue co-infection, particularly in patients with a recent history of travel to malaria-endemic regions. The overlapping clinical manifestations of both diseases can lead to misdiagnosis, delaying appropriate treatment. Accurate detection is essential for guiding optimal therapy and improving patient outcomes. Therefore, increased co-infection awareness is vital in ensuring timely diagnosis and management.

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