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RESEARCH ARTICLE

CO-INFECTION OF FALCIPARUM MALARIA AND DENGUE FEVER: A CASE REPORT

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Abstract

Malaria and dengue fever are two major mosquito-borne infections that significantly impact public health in tropical regions. Furthermore, there are few rare co-infection cases of malaria and dengue due to the differing transmission dynamics, cases are increasingly observed in endemic areas. This report examines a rare case of Plasmodium falciparum malaria and dengue fever co-infection in an 8-year-old boy from Gabon. Clinical challenges included overlapping symptoms such as thrombocytopenia and systemic inflammation, complicating diagnosis and management. Prompt treatment with artesunate, antibiotics, and supportive care led to rapid recovery. This case underscores the importance of early detection, tailored therapeutic approaches, and improved diagnostic tools for managing co-infections, particularly in pediatric populations.

Introduction

Malaria and dengue fever are two of the most significant mosquito-borne infections worldwide, causing substantial morbidity and mortality, especially in tropical and subtropical regions. According to the World Health Organization (WHO), malaria is responsible for approximately 247 million cases annually, with Plasmodium falciparum being the most virulent species. Similarly, dengue fever, caused by the dengue virus (DENV), affects millions globally, with an estimated 3.9 billion people at risk of infection.

While both diseases independently pose major public health challenges, their co-infection is relatively rare. This rarity arises from differing transmission dynamics, as malaria is transmitted by Anopheles mosquitoes, whereas dengue is spread by mosquitoes called Aedes aegypti and Aedes albopictus. Despite this, co-infections have been increasingly reported in endemic areas due to overlapping geographic distributions.

The clinical management of malaria-dengue co-infection is particularly complex due to shared symptoms, including fever, headache, myalgia, and gastrointestinal complaints, which can delay diagnosis and obscure disease severity. Furthermore, these infections may synergistically worsen thrombocytopenia, immune responses, and multi-organ dysfunction, increasing the risk of adverse outcomes. This case report highlights a rare co-occurrence of Plasmodium falciparum malaria and dengue fever in a pediatric patient from Gabon, emphasizing the importance of early recognition and prompt management of such cases.

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Case Presentation

Patient History and Clinical examination

An 8-year-old boy from Gabon was presented to the ER in AJCH with a two-day history of fever, abdominal pain, and vomiting. The patient reported episodes of gum bleeding during the current illness. Past medical history included a prior episode of malaria two years ago. There was no known history of travel outside the endemic region.

Physical Examination

Vital signs on admission: Heart rate- 118/min (tachycardia), Blood pressure- 104/64 mmHg, SpO_2- 99% (room air), Temperature- 36.5°C

Examination revealed pallor, mild hepatomegaly, and petechial rashes over the lower extremities.

Laboratory Findings(27/08/2024)

FBC: Hb 10.8gm/dl(11.5-15.5gm/dl), WBC 7x10^3/ul(5-13x10^3/ul), platelet 76x10^3/ul(170-450x10^3/ul), neutrophils 5.08x10^3/ul(2-8x10^3/ul), lymphocytes 1.09x 10^3/ul(1-5x10^3/ul).

CRP: 65.7mg/L(normal 0-5mg/L)

Procalcitonin: 10.94ng/ml(normal<0.5ng/ml)

Blood Culture: No growth

Comprehensive Metabolic panel: Na 129 mmol/l(normal 135-145mmol/l), K 3.4mmol/l(normal 3.5-5.4mmo/l) Calcium: 8.7mg/dl(normal 8.8-10.8mg/dl), bilirubin 1.25mg/dl(normal 0-1.2mg/dl)

G6PD: Normal

Malarial parasite: Plasmodium falciparum ring form, parasitaemia 0.2%

Dengue virus: IgM positive

Blood film: Ring forms of Plasmodium falciparum (parasitemia -0.3%), red cells are mildly microcytic and hypochromic. Leukocytes show mild leukopenia/mild absolute lymphopenia. Platelets appear moderately reduced on smear. Consistent with pancytopenia and plasmodium falciparum

Repeat FBC same day evening: FBC Hb 8.7gm/dl, WBC 4x10^3/ul, platelet 40x10^3/ul, neutrophils 3x10^3/ul, lymphocytes 0.72x10^3/ul

Repeat Procalcitonin same day evening: 49.05ng/ml

Repeat blood film on 29/08/2024: Known case of Plasmodium falciparum malaria, no parasites seen on current blood film.

Repeat FBC on 29/08/2024: FBC Hb 8.6gm/dl, WBC 3.6x10^3/ul, platelet 97x10^3/ul, neutrophils 1.04x10^3/ul, lymphocytes 1.95x10^3/ul

Repeat Procalcitonin on 30/08/2024: 14.68ng/ml

Treatment and Progress

Child started IV fluids, IV Ceftriaxone, in the ER. He deteriorated in a few hours with hypotension and shock and needed 2 boluses of saline and was admitted to PICU. He started IV Artisunate 2.4mg/kg at 0, 12 and 24 hours. In the PICU his urine output was less, bed side echo done showed collapsible IVC and one more bolus of saline 10ml/kg was given. Blood pressure remained stable and did not require any ionotropic support. Procalcitonin went up from 10 to 49, then back down to 28, and then to 14 and he was kept on IV ceftriaxone. Blood culture was negative for 2 days and so antibiotics were stopped. Repeat blood film after 3 doses of Artesunate was negative for Plasmodium falciparum. The plan was to keep him more for monitoring of BP, CBC and electrolytes but due to social reasons he was discharged against medical advice. CBC before discharge Hb 8.6gm/dl and platelet 97x10^3/ul(76 to 40 to 97). He was advised to continue Artemether lumefantrine (20-120 mg).

Discussion

The co-infection of Plasmodium falciparum malaria and dengue fever presents unique diagnostic and therapeutic challenges. These two vector-borne diseases are endemic in many tropical and subtropical regions, often co-circulating and affecting similar populations. Both diseases share overlapping clinical features, including fever, thrombocytopenia, and systemic inflammation, which can complicate early differentiation (1, 2). The overlapping symptomatology poses a challenge for healthcare providers, especially in regions with limited access to advanced diagnostic tools. Early and accurate differentiation between the two diseases is crucial for initiating timely and appropriate treatment.

Pathophysiological Considerations

-Thrombocytopenia

Thrombocytopenia is a hallmark of both malaria and dengue. In malaria, the destruction of platelets occurs due to immune-mediated mechanisms and sequestration in the spleen, while in dengue, bone marrow suppression and immune-mediated platelet destruction play a major role (3, 4). In co-infected patients, these mechanisms may act synergistically, leading to severe thrombocytopenia and an increased risk of bleeding complications. This risk is particularly concerning in Pediatric patients, where physiological differences may exacerbate the severity of these complications. Close monitoring of platelet counts and bleeding parameters is important in managing such cases.

-Immune Response

Malaria triggers a robust pro-inflammatory cytokine storm characterized by elevated levels of tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6). In contrast, dengue infection induces a mixed immune response involving both pro- and anti-inflammatory cytokines, such as IL-10. In co-infections, these immune responses may interact unpredictably, potentially intensifying systemic inflammation or leading to immune dysregulation (5, 6, 13). Pediatric co-infections may exhibit heightened vulnerability to severe clinical manifestations due to their developing immune systems. This unpredictable interplay emphasizes the importance of understanding the immune dynamics of these infections in children.

Management Challenges

-Early Diagnosis

Accurate and timely diagnosis of co-infections is paramount but remains a challenge in resource-limited settings. Standard diagnostic tools such as microscopy for malaria and serological assays for dengue are often insufficient for detecting both pathogens simultaneously. Advanced diagnostic modalities, including rapid diagnostic tests (RDTs) and polymerase chain reaction (PCR), have shown promise in improving diagnostic accuracy but are not widely available in endemic regions (7, 8, 17). Misdiagnosis or delayed diagnosis can lead to inappropriate treatment, which may worsen clinical outcomes (15). Early recognition of warning signs, such as persistent vomiting, altered sensorium, or severe bleeding, is critical for prioritizing diagnostic evaluation in suspected co-infections.

-Tailored Treatment

The therapeutic approaches for malaria and dengue differ significantly, making co-management a challenging task. Artesunate remains the gold standard for severe malaria due to its rapid parasite clearance and reduced risk of complications. Dengue management, on the other hand, is primarily supportive, focusing on maintaining adequate hydration, managing fever, and monitoring for complications such as plasma leakage and severe bleeding (2, 9, 10). In co-infected pediatric patients, careful attention is needed to balance fluid management to prevent fluid overload, particularly during the critical phase of dengue. Special consideration must also be given to drug interactions and overlapping toxicities, such as liver dysfunction, which is common in both diseases (13, 14).

This case underscores the importance of heightened clinical suspicion for co-infections in endemic regions, particularly among children. Pediatric patients often present with atypical symptoms or progress to severe disease more rapidly than adults, making early detection and intervention crucial. Collaborative efforts between public health organizations, researchers, and clinicians are essential to improve diagnostic accuracy, develop standardized treatment protocols, and ultimately enhance therapeutic outcomes for these vulnerable populations (11, 18, 20).

Authors contribution

AC was responsible for conceptualization and drafting the manuscript, writing the report, updating the reference list.

MH was responsible for selecting the case, approval for publication, reviewing the manuscript.

SC was responsible for reviewing the manuscript.

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Conflicting Interest

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