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(CASE REPORT)

Triple Co-infection with *Plasmodium vivax*, Dengue, and SARS-CoV-2 Presenting as Sepsis in a Young Adult in the United Arab Emirates: A Detailed Case Report

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Abstract

Co-infections with tropical and viral pathogens pose a major diagnostic challenge, especially when symptoms overlap. While co-infections of malaria and dengue are well known in regions where these diseases are common, the presence of SARS-CoV-2 infection adds another layer of complexity. Such triple infections are rarely seen in the United Arab Emirates. In this case report, we describe a 23-year-old man who came in with a prolonged fever, muscle pain, and respiratory symptoms and was initially treated for sepsis at Emirates International Hospital, Al ain. The lab tests confirmed he had *Plasmodium vivax* malaria, dengue IgM positivity, and SARS-CoV-2 was detected within 24 hours of his admission. Despite high levels of inflammatory markers, the patient stayed hemodynamically stable and showed no signs of organ dysfunction. He received care in the intensive care unit with isolation measures and supportive treatment, leading to gradual improvement. This case highlights the importance of considering multiple concurrent infections in patients with compatible epidemiological exposure and emphasizes the need for a comprehensive diagnostic approach in febrile illnesses.

Keywords: Malaria; Dengue; SARS-CoV-2; Co-infection; Sepsis; *Plasmodium vivax*; COVID-19; Tropical infections; Thrombocytopenia

1. Introduction

The coexistence of multiple infectious diseases in a single patient is highly recognized in regions with a high burden of communicable diseases. Malaria and dengue fever are endemic in various tropical and subtropical countries, including Pakistan, India, and regions of Africa. Both diseases hold similar clinical features such as fever, myalgia, thrombocytopenia, and systemic inflammatory response, which mostly leads to diagnostic ambiguity. With the advent of COVID-19 pandemic caused by SARS-CoV-2, the potential for coexisting viral infection has further challenged medical assessment and care.

In the context of coexisting infections like malaria and dengue or COVID-19 have been referenced in previous studies , triple co-infection remains rare, specifically in non-endemic countries like the United Arab Emirates. Imported infections from travel and migration increase the likelihood of encountering such cases. Early diagnosis and proper management are challenging due to overlapping clinical features and variable laboratory findings.

This report presents a rare case of triple infection involving *Plasmodium vivax*, dengue virus, and SARS-CoV-2 in a young adult male presenting with sepsis. The case underscores the importance of maintaining a high index of suspicion and performing a broad diagnostic workup in patients presenting with febrile illness and relevant epidemiological exposure.

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2. Case Presentation

A 23-year-old previously healthy male, originally from Pakistan and residing in the United Arab Emirates for the past three months, presented to the urgent care unit with complaints of a 10-day history of fever associated with chills, generalized myalgia, and productive cough. There was no history of bleeding hematuria, or melena at the time of presentation. The patient denied any significant past medical history or comorbid conditions.

On initial assessment, the patient was febrile but hemodynamically stable. His blood pressure was 122/78 mmHg, heart rate was 100 beats per minute, respiratory rate was 14 breaths per minute, and oxygen saturation was 97% on room air. Neurological examination revealed a Glasgow Coma Scale score of 15/15 with no focal deficits. Respiratory examination showed bilateral equal air entry without any abnormal sounds on auscultation, and abdominal examination was unremarkable. Peripheral perfusion was adequate with warm extremities.

Severity assessment scores were calculated at admission. The qSOFA score was 0, and the CURB-65 score was also 0, indicating low immediate risk as given in *Table 1*. However, the SOFA score was 3, suggesting early sepsis without organ dysfunction. Based on clinical presentation and laboratory suspicion of infection, the patient was admitted to the intensive care unit under pulmonology for further management.

Table 1 Severity Scores at Admission

Score	Value	Interpretation
qSOFA	0	Low risk
CURB-65	0	Low mortality risk
SOFA	3	Sepsis (mild)

2.1. Investigations

Initial laboratory investigations showed mild anemia with a hemoglobin level of 12.4 g/dL and thrombocytopenia, with platelet counts decreasing from 110,000 to 85,000. Renal function tests were within normal limits, with a creatinine level of 0.7 mg/dL. Liver function tests, including total bilirubin, were normal, and serum electrolytes were within normal range as given in *Table 2.*

Table 2 Laboratory Parameters and Trends

Parameter	At Admission	Follow-up	Reference Range
Hemoglobin	12.4 g/dL	Stable	13–17 g/dL
Platelets	110,000	85,000	150–450 $\times 10^9$/L
Creatinine	0.7 mg/dL	Stable	0.6–1.2 mg/dL
CRP	212 mg/L	161 mg/L	<5 mg/L
Procalcitonin	8.8 ng/mL	10.1 ng/mL	<0.5 ng/mL

Inflammatory markers were significantly elevated. C-reactive protein was initially 212 mg/L and showed a decreasing trend to 161 mg/L, while procalcitonin levels increased from 8.8 ng/mL to 10.1 ng/mL, suggesting ongoing inflammatory response. **The trend of inflammatory markers is illustrated in *Figure 1.*** Platelet counts showed a declining trend during the early phase of illness, likely secondary to combined viral and parasitic infection, a**s shown in *Figure 2.***

Microbiological evaluation revealed a positive peripheral blood smear for *Plasmodium vivax*, with parasitemia quantification pending. Dengue serology showed positive IgM antibodies. Within 24 hours of admission, RT-PCR testing for SARS-CoV-2 returned positive.

Computed tomography (CT) of the chest revealed no evidence of consolidation, ground-glass opacities, or features suggestive of viral pneumonia. **A representative CT chest image is shown in *Figure 3.*** Ultrasound examination of the abdomen was unremarkable.

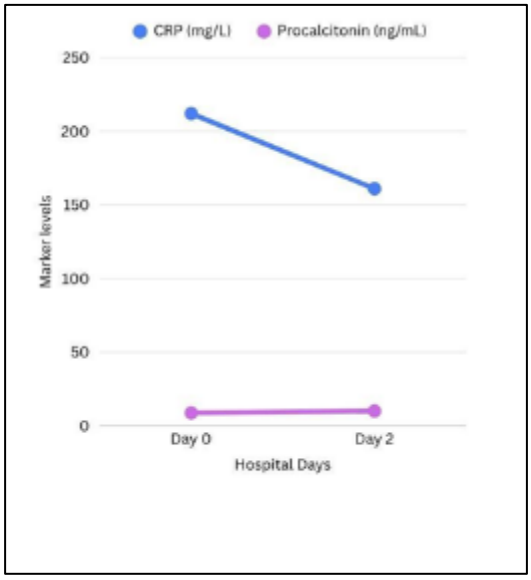

Figure 1 Trend of inflammatory markers showing a declining C-reactive protein level with persistently elevated procalcitonin, suggesting ongoing inflammatory response with possible secondary infection

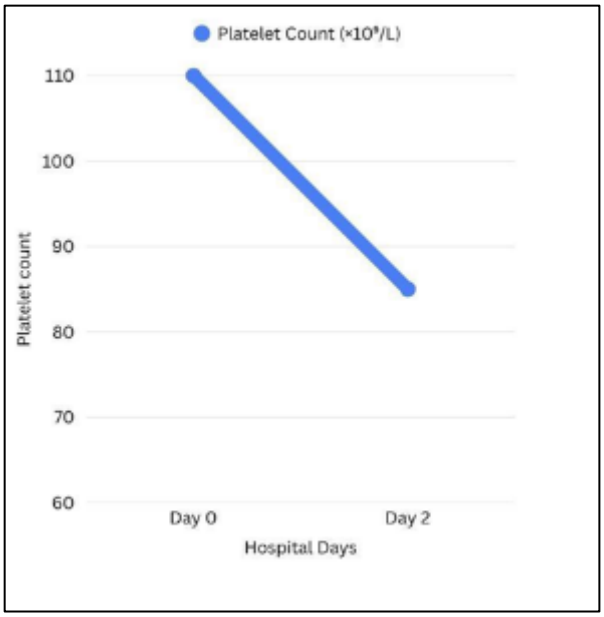

Figure 2 Platelet count trend demonstrating progressive thrombocytopenia, likely secondary to combined effects of dengue and malaria infection

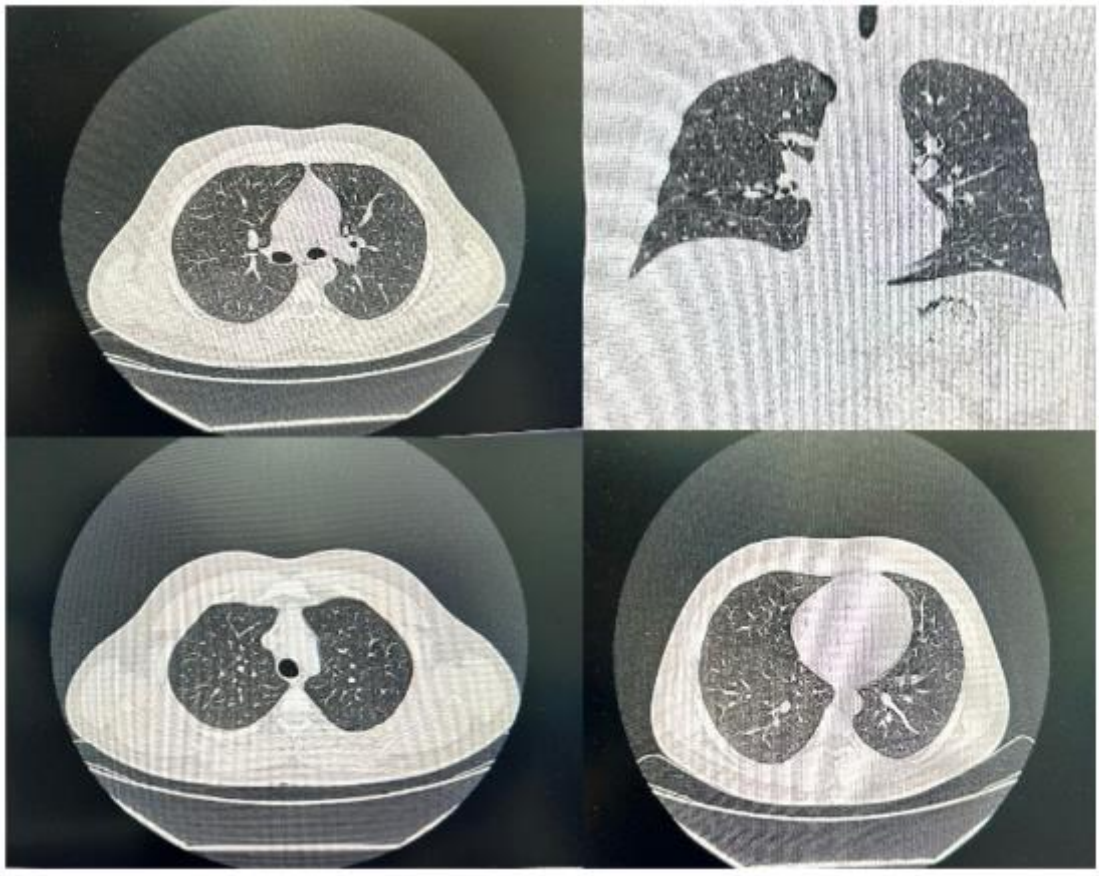

Figure 3 Computed tomography of the chest showing normal lung parenchyma with no evidence of consolidation, ground-glass opacities, or COVID-19-related pulmonary involvement

2.2. Sepsis Scores and Clinical Parameters Over 4 Days

Table 3 Sequential Organ Failure Assessment (SOFA) score parameters and clinical progression during hospitalization, demonstrating transient thrombocytopenia and subsequent recovery

PARAMETER	DAY 1	DAY 2	DAY 3	DAY 4
qSOFA Score	0	0	0	0
Respiratory Rate (qSOFA)	14 (0)	14 (0)	14 (0)	14 (0)
Altered Mentation	No (0)	No (0)	No (0)	No (0)
Systolic BP (qSOFA)	>100 (0)	>100 (0)	>100 (0)	>100 (0)
NEWS2 Score	2	2	0	0
Respiratory Rate (NEWS2)	14 (0)	14 (0)	14 (0)	14 (0)
SpO_2	98% (0)	98% (0)	98% (0)	98% (0)
Oxygen Support	Room Air (0)	Room Air (0)	Room Air (0)	Room Air (0)
Systolic BP (NEWS2)	118 (0)	118 (0)	118 (0)	118 (0)
Pulse (/min)	109 (1)	92 (1)	82 (0)	88 (0)
Consciousness	Alert (0)	Alert (0)	Alert (0)	Alert (0)
Temperature (°C)	38.4 (1)	38.2 (1)	37.5 (0)	37.5 (0)

SOFA Score	1	2	1	0
Respiration (PaO_2/FiO_2 >400)	0	0	0	0
Platelets (/μL)	136,000 (1)	85,000 (2)	111,000 (0)	177,000 (0)
Bilirubin	<1.2 (0)	<1.2 (0)	<1.2 (0)	<1.2 (0)
Cardiovascular (MAP >70)	0	0	0	0
GCS	14/14 (0)	14/14 (0)	14/14 (0)	14/14 (0)
Creatinine	<1.2 (0)	<1.2 (0)	<1.2 (0)	<1.2 (0)
Clinical Status	ICU admission	Platelet drop	Improving	Shifted out of ICU

2.3. Clinical Course and Management

The patient was managed as a case of sepsis in the ICU setting in the beginning. Upon confirmation of SARS-CoV-2 infection, he was transferred to a negative pressure isolation room. Supportive care was immediately initiated including intravenous fluids, antimalarial therapy, and monitoring of vital parameters and laboratory investigations. Antimalarial therapy started after a multidisciplinary team meeting with internal medicine, infectious disease specialist,pulmonologist and intensivist.Given the elevated procalcitonin levels, empirical antibiotics were started for possible secondary bacterial infection.

During his hospital admission, the patient exhibited steady clinical improvement. He became afebrile, remained hemodynamically stable, and maintained adequate oxygen saturation on room air without requiring respiratory support. Persistent thrombocytopenia was observed, but it remained stable with no bleeding events.

The patient complained of occasional nausea but did not report any headache or gastrointestinal bleeding. Urine output remained adequate, and bowel movements were completely normal. A gastroenterology consultation was obtained due to positive stool occult blood; however, no active intervention was required.

2.3.1. Timeline of Events

Table 4 Chronological timeline of major clinical events during hospitalization

Day	**Event**
Day 0	Admission with fever and sepsis; ICU admission
Day 1	Malaria and dengue confirmed
Day 2	SARS-CoV-2 detected; isolation initiated
Subsequent days	Clinical improvement observed

3. Discussion

This case illustrates a unique instance of triple coexisting infection involving *Plasmodium vivax*, dengue virus, and SARS-CoV-2 in a young adult presenting with sepsis. The concurrent clinical features of these infections pose a significant diagnostic challenge, particularly in non-endemic settings where clinicians may have a lower index of suspicion for tropical diseases.

The observed thrombocytopenia was probably due to a combination of dengue and malaria infections in the patient. Elevated inflammatory markers, including CRP and procalcitonin, further complicated the clinical pattern, as these markers can be elevated in viral infections, parasitic infections, and bacterial sepsis. The markedly elevated procalcitonin raised concern for a secondary bacterial infection, although no source was identified.Blood and urine cultures were sent and it showed no growth.

Interestingly, despite testing positive for SARS-CoV-2, the patient did not develop respiratory compromise or radiological evidence of pulmonary involvement. This suggests that COVID-19 infection may have been mild or incidental but still required adequate isolation measures to prevent transmission.

The patient's recent travel history from Pakistan played a critical role in guiding diagnostic evaluation. This highlights the importance of obtaining a thorough epidemiological history in patients presenting with febrile illness, especially in regions with diverse populations.

The patient improved clinically and his platelets levels improved ,afebrile and he responded to antimalarial therapy and empirical antibiotic therapy.All inflammatory markers reduced and he was discharged in a stable condition and requested to follow up with admitting physician and internal medicine for prophylaxis.

4. Conclusion

This case demonstrates the diagnostic and therapeutic complications associated with triple co-infection of malaria, dengue, and SARS-CoV-2. In regions such as the United Arab Emirates, where tropical infections are not endemic but are frequently imported, and so clinicians must maintain a high index of suspicion in patients presenting with fever and compatible travel history.

Shared clinical and laboratory features can complicate diagnostic clarity and delay the appropriate management. Early recognition through multiple comprehensive testing is essential to guide the treatment process, implement infection control measures, and prevent further complications.

This report illustrates the need for heightened clinical awareness, multidisciplinary team management, and consideration of concurrent infections in patients with atypical or prolonged febrile illness. Further more studies on this are required to understand the clinical course, interactions, and outcomes of these multifactorial infections.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical approval was waived for this case report in accordance with institutional policy, as it involves a single patient and does not include any experimental interventions. All patient identifiers were removed to maintain confidentiality.

Statement of informed consent

Informed consent was obtained from the patient for publication of this case report and any accompanying clinical data.

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