

(CASE REPORT)



## A case report on heart failure prevalence in dengue patients with concurrent fluid leakage syndrome: Unveiling a cardio-leakage co-existence

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### Abstract

Dengue fever, a mosquito-borne viral infection, has been a growing global health concern with significant morbidity and mortality. Among the myriad complications that Dengue can manifest, fluid leakage syndrome has emerged as a particularly severe and challenging aspect of the disease. This case study delves into the prevalence of heart failure in patients who not only suffer from Dengue but also concurrently experience fluid leakage syndrome. Through an analysis of clinical data, patient histories, diagnostic criteria, and treatment outcomes, we explore the intricate relationship between these two conditions and their impact on the cardiovascular system. Our findings shed light on the complexities of managing these co-morbid conditions and explore the need for enhanced clinical approaches and awareness in addressing this dual health burden. This case study aims to contribute to the broader understanding of the interplay between Dengue, fluid leakage syndrome, and heart failure, with the ultimate goal of improving patient care and outcomes in such challenging clinical scenarios.

**Keywords:** Dengue fever; Dengue complication; Viral infection; Heart failure; Fluid leakage syndrome

### 1. Introduction

Dengue fever, caused by the Dengue virus and transmitted primarily by *Aedes* mosquitoes, is a significant global health concern prevalent in tropical and subtropical regions (2). Dengue often presents as an acute febrile illness with symptoms such as high fever, severe headache, muscle pain, and rash (1). Although most cases are self-limiting, severe manifestations can lead to vascular leakage syndrome, causing plasma leakage, and potentially resulting in life-threatening complications (2). Vascular leakage syndrome in severe Dengue cases is characterized by increased vascular permeability, leading to plasma leakage into body cavities and interstitial spaces (1). This syndrome causes severe organ dysfunction, potentially culminating in hemorrhagic manifestations and shock (2). Heart failure, a condition where the heart's pumping function is impaired, can occur due to various etiologies, including systemic diseases and hemodynamic changes (3). In Dengue patients with concurrent fluid leakage syndrome, the link between the development of heart failure and the hemodynamic alterations due to plasma loss remains an area of active research (1). The rationale behind selecting a case study investigating the prevalence of heart failure in Dengue patients with concurrent fluid leakage syndrome stems from the critical need to understand and address the multifaceted complications of severe Dengue infections. While Dengue fever is known for its spectrum of clinical manifestations, severe cases often involve complications such as vascular leakage syndrome and hemorrhagic manifestations, challenging healthcare providers in managing these patients (4). The specific prevalence and characteristics of heart failure in Dengue patients concurrently experiencing fluid leakage syndrome have not been extensively explored. Given the potential strain on the cardiovascular system due to fluid loss and shock in severe Dengue, investigating the relationship between these conditions is imperative (6).

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## 2. Case Presentation

A 25 year old male patient was admitted to medicine department with symptoms of severe dengue fever for 4 days. The patient presented with a high-grade fever, severe headache, myalgia, and a characteristic skin rash. Subsequently, 2 days after admission, the patient developed abdominal swelling and bilateral leg swelling which was evidenced by ascites and bilateral pitting leg edema. Initial laboratory investigations revealed thrombocytopenia. Dengue serology tests confirmed the presence of Dengue virus IgM antibodies and a positive NS1 antigen test, supporting the diagnosis of Dengue fever. S. albumin was 25 gm/dl and hematocrit level was 55% which was consistent with fluid leakage syndrome. Despite administration of IV crystalloids and albumin, he developed severe breathlessness 2 days later. On Further investigation, bilateral mild pleural effusion was detected on Chest x-ray and his NT-Pro BNP level was raised (3000 pg/ml). ECG showed evidence of ischemia and Echocardiography showed myocardial dysfunction with low EF. The patient was monitored closely for the development of any cardiac complications due to the coexistence of Dengue and fluid leakage syndrome. As the patient's condition progressed, signs and symptoms suggestive of heart failure, including dyspnea and clinical signs of poor perfusion, became more apparent.

### 2.1. Treatment and Management

Given the coexistence of severe Dengue and fluid leakage syndrome in the presented case, the initial management primarily focused on fluid resuscitation and electrolyte correction. Intravenous (IV) crystalloids were administered to maintain adequate intra-vascular volume while closely monitoring the patient's fluid balance. Frequent assessments of electrolyte imbalances, including hyponatremia and hypoalbuminemia, were conducted and corrected as necessary. As the patient's clinical condition progressed, with emerging signs of heart failure, a comprehensive cardiac evaluation was initiated. Carefully titrated IV Diuretics was initiated and strict monitoring was done for detection of any change of hemodynamic status against the intravenous infusion of colloid solution at the same time, for prevention of further fluid leakage. The challenge was expansion of intra-vascular fluid volume against the failing heart. And it was achieved by the judicious use of drugs, careful monitoring and vigilant assessment by the clinical team. Considering the patient's thrombocytopenia and the risk of bleeding associated with severe Dengue, periodic platelet transfusions were administered. This was complemented by close monitoring of bleeding parameters and platelet counts to guide transfusion decisions. The patient was managed in accordance with Dengue management guidelines 2. Frequent monitoring of hematocrit levels, serial platelet counts, and clinical assessment for warning signs of Dengue were vital components of the patient's care. The clinical team also maintained vigilance for any signs of hemorrhagic complications, which are associated with severe Dengue.

**Table 1** Summary of laboratory investigations of the patient

FBC	Day-1 (admission)	Day-2	Day-3	Day-4	Day-5 (discharge)
Hematocrit	43.1%	55%	53%	50%	43.4%
Platelet Count	10 x 10 <sup>9</sup> /L	55 x 10 <sup>9</sup> /L	50 x 10 <sup>9</sup> /L	110 x 10 <sup>9</sup> /L	120 x 10 <sup>9</sup> /L
TC of WBC	4 x 10 <sup>9</sup> /L	4 x 10 <sup>9</sup> /L	5 x 10 <sup>9</sup> /L	6 x 10 <sup>9</sup> /L	7 x 10 <sup>9</sup> /L
Hb%	10 gm/dl	11 gm/dl	12 gm/dl	13 gm/dl	14 gm/dl
NT Pro-BNP	-	-	-	3000 pg/ml	-
S. Creatinine	-	110 umol/L	-	-	-

### 2.2. Follow-Up Progress

The patient's response to treatment was encouraging. Over the course of his hospitalization and subsequent follow-up visits, the following progress has been noted: his platelet counts stabilized, and there were no further instances of bleeding. The generalized edema subsided, and he experienced a significant reduction in shortness of breath. Echocardiography revealed an improvement in left ventricular ejection fraction (LVEF) from the initial assessment, indicating a positive response to heart failure management. Clinical symptoms associated with heart failure, such as fatigue, decreased exercise tolerance, and orthopnea, notably diminished. The patient has been advised to continue taking his prescribed medications for heart failure and to maintain regular follow-up visits with both the cardiologist and infectious disease specialist. In addition, he has received education on lifestyle modifications, including a low-sodium diet, fluid restriction, and physical activity tailored to his condition.

### 3. Discussion

This case study sheds light on the intricate relationship between dengue infection, fluid leakage syndrome, and the subsequent development of heart failure. The convergence of these conditions presents a multifaceted clinical challenge that necessitates a comprehensive understanding and management strategy. The link between dengue infection and fluid leakage, such as pleural effusion, ascites, and vascular permeability, has been well-documented (9). Concurrently, studies have increasingly recognized the potential for cardiovascular complications in dengue patients, including myocarditis and myocardial dysfunction (7). The case study's findings align with emerging evidence highlighting the significant association between dengue fever and subsequent cardiac complications. The pathological mechanisms contributing to heart failure in dengue patients with fluid leakage syndrome involve a complex interplay of factors, including inflammatory response, endothelial dysfunction, and hypovolemia-induced stress on the heart (11). Moreover, the pro-inflammatory state induced by dengue infection might directly impact cardiac function, leading to myocardial injury and subsequent heart failure (8). Additionally, the increased capillary permeability observed in dengue can contribute to the fluid leakage syndrome, adding to the hemodynamic burden on the cardiovascular system. The clinical implications of recognizing heart failure in dengue patients with concurrent fluid leakage syndrome are significant. Early identification of cardiac involvement in dengue cases presenting with fluid leakage symptoms is crucial for timely intervention and improved patient outcomes (10).

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### 4. Conclusion

This case study has revealed the intricate relationship between dengue infection, fluid leakage syndrome, and heart failure, highlighting the complexity of this medical scenario. It underscores the need for early recognition, multidisciplinary management, and ongoing research. Recognizing heart failure in dengue patients with fluid leakage syndrome is challenging due to its rarity. Various cardiac presentations in dengue, from mild elevations to overt heart failure, stress the importance of suspicion in such cases. Timely diagnosis and intervention are critical to prevent adverse outcomes. Healthcare providers must consider cardiac involvement, especially in endemic regions. Multidisciplinary collaboration between specialists is essential, showcasing the complexity of this scenario and the need for holistic care.

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### Compliance with ethical standards

#### *Acknowledgement*

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#### *Disclosure of conflict of interest*

The author declare no conflicts of interest relevant to this case report.

#### *Statement of ethical approval*

This case report was conducted in accordance with the principles outlined in the Declaration of Helsinki and was approved by the Institutional Review Board (IRB). All procedures performed in this study involving human participant was in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

#### *Statement of informed consent*

Informed consent was obtained from the patient included in this case report.

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