

# Cardiac tamponade in severe dengue: A case report

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## Abstract

Dengue infection is characterized by a wide spectrum of clinical manifestations. Cardiac involvement may include arrhythmias, myocarditis, or pericardial effusion, which in some cases may be asymptomatic, but can also be fatal. We describe the case of a 45-year-old woman with severe dengue infection. She presented with hypotension refractory to fluid therapy requiring vasopressor support without improvement in vital signs. Decreased voltage on electrocardiographic tracing, enlarge cardiac silhouette in chest radiograph, and point-of-care ultrasound confirmed the presence of cardiac tamponade. Ultrasound-guided pericardiocentesis was performed with subsequent correction of clinical parameters. High clinical suspicion and early recognition of this infrequent but important presentation allowed a good outcome in our case.

**Keywords:** Severe Dengue, Cardiac Tamponade, Diagnostic Imaging

## Taponamiento cardíaco en dengue severo: Un reporte de caso

### Resumen

La infección por el virus del dengue se caracteriza por tener un amplio espectro de manifestaciones clínicas. El compromiso cardíaco involucra alteraciones en el ritmo, miocarditis o efusión pericárdica, que en algunos casos puede ser asintomático, pero también puede llegar a ser fatal. Describimos el caso de una mujer de 45 años con infección por dengue, quien se presentó con cuadro de hipotensión refractaria sin respuesta al manejo hídrico inicial ni soporte vasopresor. Se identificó disminución del voltaje en trazado electrocardiográfico, aumento de la silueta cardíaca en la radiografía de tórax, y por medio del ultrasonido a la cabecera del paciente se confirmó la presencia de derrame pericárdico con colapso de cavidades derechas e hipocinesia global. Se realizó pericardiocentesis guiada por ecografía con posterior resolución de la hipotensión. La alta sospecha clínica e identificación temprana de esta presentación poco frecuente pero importante permitió un desenlace bueno en nuestro caso.

**Palabras clave:** Dengue Grave, Taponamiento Cardíaco, Diagnóstico por Imagen

### Introduction

Dengue infection is characterized by a wide spectrum of clinical manifestations ranging from self-limiting febrile illness to severe situations such as shock and multi-organ failure<sup>1</sup>. In endemic countries such as Colombia, the estimated cumulative incidence of severe dengue is 66 cases per 100,000 inhabitants, and its lethality is up to 5%<sup>2</sup>. Clinical scenarios of dengue that include cardiac manifestations have a reported prevalence ranging from 15% to 43%. Sinus bradycardia is the most common alteration, but high-grade atrioventricular block, myocarditis, and pericardial effusion leading to cardiac tamponade may also occur<sup>3</sup>. These conditions have the potential to cause severe myocardial dysfunction. Therefore, it is important for clinicians to be aware of the possibility of atypical presentations of the infection<sup>1,4</sup>. This report presents the case of an adult woman

admitted to the emergency department with acute febrile syndrome with refractory shock who developed signs of cardiac tamponade as an atypical manifestation of severe dengue.

### Case Description

A 45-year-old woman with no known comorbidities presented to the emergency department with a three-day history of fever, diaphoresis, arthralgias, myalgias, and an episode of vomiting. Clinical examination revealed tachycardia (125 beats per minute), hypotension (blood pressure 90/65 mmHg, mean arterial pressure 73 mmHg), and altered state of consciousness. Laboratory findings included leukopenia (4,780 cells/uL), hemoconcentration (hematocrit 47.8%), moderate thrombocytopenia (56,000 cells/uL), and hyperlactatemia (5 mmol/L). Renal function was normal, and no acid-base

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or electrolyte disorders were documented. Serologic tests for dengue were performed and were positive (IgM/IgG/NS1 positive). Chest radiograph showed left pleural effusion and enlarge in cardiac silhouette (Figure 1A).

Hypovolemic shock was initially treated using isotonic fluids and vasopressor support. However, the patient persisted with low systolic blood pressure, tachycardia, and low voltage on the electrocardiographic tracing. POCUS showed global hypokinesia, dilated aortic root (>3.5 cm), significant pericardial effusion with collapse of the right ventricle suggesting cardiac tamponade. These findings were confirmed by transthoracic echocardiography (Figure 1B-C).

### Interventions and follow-up

Emergent pericardiocentesis was performed, draining 330 ml of straw-looking fluid. A hemovac drain was left in place and she was transferred to the intensive care unit. She continued receiving fluid therapy, low-dose vasopressor support, and colchicine. Pericardial fluid examination revealed features of transudate with no relevant findings on cytochemistry and culture.

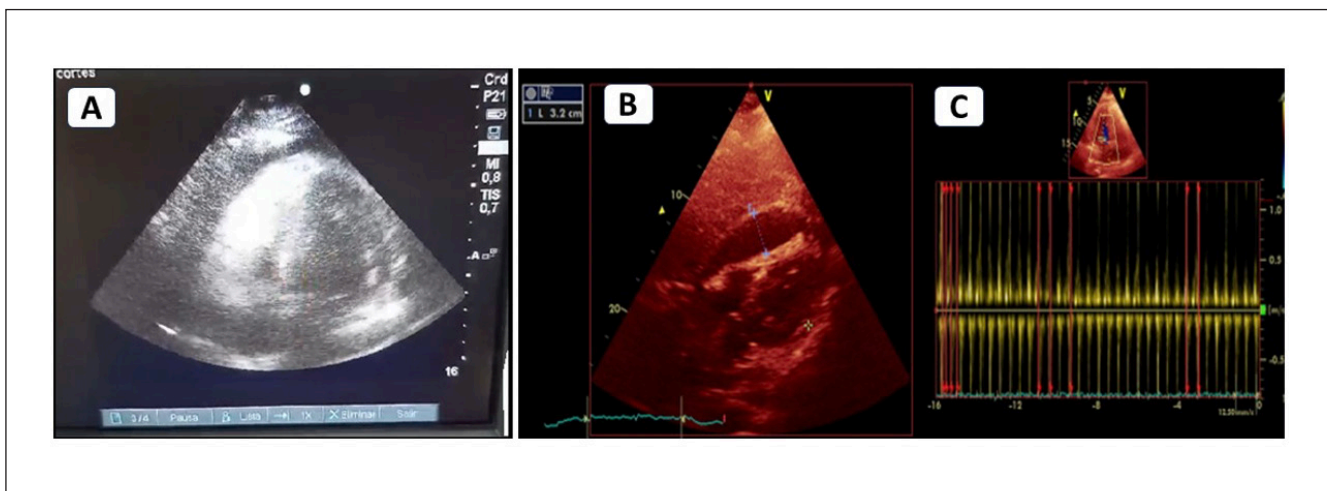
The patient showed recovery of normal platelet count, lactate clearance, and decreased pericardial drainage. Given her clinical improvement, the hemovac drain and vasoactive support were withdrawn and she was transferred to the hospital ward. The follow-up echocardiogram showed a left ventricle of normal shape, size, contractility and volume, with preserved ejection fraction (55%) and no evidence of pericardial effusion. Eight days after admission, the patient was discharged due to resolution of symptoms. Three months after the severe dengue episode, a follow-up transthoracic echocardiogram was performed, which showed no abnormalities.

### Discussion

Severe cardiac manifestations of dengue infection are rare and require a high index of suspicion. Shah et al (2020) des-

cribed in a group of 320 patients with dengue fever several cardiac alterations such as bradyarrhythmias (19%), elevation of cardiac biomarkers (15%), left ventricular dysfunction with reduced ejection fraction (13.1%), and myocarditis (17.5%)<sup>1</sup>. Pericardial effusion is a finding of very low prevalence and usually has a benign course. It is a special situation that progresses to cardiac tamponade with hemodynamic compromise. Miranda et al (2013) conducted a study of 81 patients with dengue fever, in which a single case of pericarditis with cardiac tamponade was reported, requiring urgent pericardiocentesis<sup>4</sup>. Other cases of cardiac tamponade without fatal outcomes have been described in the literature, as individual reports (Table 1)<sup>5-8</sup>.

The pathophysiological mechanism that triggers cardiac complications is not well understood, but several mechanisms have been proposed. The disruption of the endothelial glycocalyx by the presence of the virus or non-structural protein 1 (NS1) would explain the increase in endothelial permeability with consequent capillary leakage in the critical phase of the disease. This would create the phenomenon of the third space, which may well affect a serous area such as the pericardium<sup>9</sup>. Salgado et al (2010) reported the presence of viral antigens in cardiomyocytes using immunohistochemistry techniques and demonstrated direct invasion of the virus into cardiac tissue in *in vitro* studies<sup>10</sup>. However, other authors have not reported direct viral invasion, but rather interstitial changes consisting of edema and infiltrates of mononuclear-predominant inflammatory cells, suggesting a mechanism of immune-mediated cell damage in the myocardium<sup>4</sup>. This is intensified by systemic factors such as electrolyte imbalance, lactic acidosis, hypotension, ischemia, and an increase in pro-inflammatory cytokines (TNF-alpha, IL-6, IL-13, IL-8)<sup>9</sup>. Other theories have suggested that cardiac manifestations depend on differences in the tropism of viral serotypes, associating DENV-2 and DENV-3 serotypes with the development of cardiac complications<sup>3</sup>. A case report in Brazil of a woman with cardiac tamponade described DENV-2 infection; however, more studies are needed to show whether there is a real association<sup>7</sup>.



**Figure 1.** POCUS. A. Subxiphoid window showing severe pericardial effusion with diastolic collapse of the right ventricle. Echocardiogram. B. Significant pericardial effusion with 32 mm lake, right ventricular collapse in diastole. C. Transticuspid flow Doppler with variability compatible with cardiac tamponade.

**Table 1.** Case reports of patients with dengue fever and cardiac tamponade.

Authors (year) - Country	Age	Status at discharge	Comorbidities	symptoms	Platelet count (cells/uL)	Cardiac enzymes	Amount of pericardial fluid drained (ml)
Kumar et al (2010) -Dominican Republic	59	Alive	Lupus nephritis	Fever, headache and dyspnea	120,000	Normal	500
Bendwal et al (2014) -India	34	Alive	None	Fever and dyspnea	42,000	Normal	1500
Fernandes et al (2017) -Brazil	26	Alive	Postpartum	Fever, headache and dyspnea	165,000	-	-
Biswas et al (2019) -USA	30	Alive	None	Fever, chest pain and dyspnea	113,000	Raised	280
Present case (2024) -Colombia	45	Alive	None	Fever, diaphoresis, low back pain	56,000	Raised	330

Although cardiac tamponade is an uncommon manifestation of dengue, its recognition is important because it can be fatal if not treated promptly. The presence of hypotension in a patient with dengue is most often associated with increased vascular permeability and capillary leakage into a third space. However, it is important to recognize that lack of response to fluid management and even vasopressor support suggests the search for other causes of shock. Diminished heart sounds, jugular venous distention, low-voltage electrocardiographic tracing or increase in cardiac silhouette on chest radiograph are suggestive of pericardial effusion<sup>11</sup>. The diagnosis of cardiac tamponade should be made using imaging, such as echocardiography. However, chest radiograph and point-of-care ultrasound (POCUS) are useful and available tools in the emergency department for rapidly identifying the causes of a patient's instability and guiding appropriate treatment.

In conclusion, cardiac abnormalities in dengue infection are not as uncommon as you might think. Some, such as cardiac tamponade has a high potential to produce severe myocardial dysfunction. High clinical suspicion and the use of diagnostic tools such as electrocardiogram, x rays and POCUS are essential in the emergency department to opportunely identify these patients and prevent fatal outcomes.

### Ethical considerations

**Protection of people and animals.** No experiments were performed in animals nor humans for the elaboration of this project.

**Confidentiality of the data.** The authors declare that the text does not contain data that allows patient identification.

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**Conflict of interest.** The authors declare that they did not have a conflict of interest in the execution and writing of this research product.

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**Authors contribution.** Literature review: LB, DT. Case analysis: LB, DT, MT. Production of the text: LB, DT, MT, JR, JM. All authors contributed to read and approved the version of the submitted manuscript.

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