

## Myocarditis as a presentation form of dengue: A case report

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*Este artículo también está disponible en español*

### ARTICLE INFORMATION

Received: December 9, 2019

Accepted: January 14, 2020

### Competing interests

The authors declare no competing interests.

### Figures

Images from complementary tests are shown with patient's consent.

### Abbreviations

CPK: creatinephosphokinase

ECG: electrocardiogram

LVEF: left ventricle ejection fraction

### ABSTRACT

Dengue is an acute febrile viral disease produced by the dengue virus, mainly transmitted by the bite of mosquitoes of the genus *Aedes*. It can take place with or without symptoms and it can cause serious clinical conditions. The case of a 47-year-old man is presented, who was admitted due to fever of three days of evolution, skin rash, nausea, dry cough and lipothymias. Two days later, the rash worsened and extreme bradycardia appeared. The echocardiogram showed left ventricular dysfunction, with an ejection fraction of 38%. The patient was discharged after 14 days with the diagnosis of dengue complicated by myocarditis. It is evident that it was a viral myocarditis from the beginning of symptoms, which is described as unusual in the bibliography; cough and lipothymias were the expression of the low cardiac output, that together with the bradycardia, and the electro- and echocardiographic alterations, helped to establish the diagnosis.

**Keywords:** Dengue, Complications, Myocarditis

### *Miocarditis como forma de presentación de dengue: Informe de un caso*

### RESUMEN

*El dengue es una enfermedad viral febril aguda producida por el virus del dengue, transmitido, principalmente, por la picadura de mosquitos del género Aedes. Puede cursar con o sin síntomas, hasta ocasionar cuadros clínicos graves. Se presenta el caso de un hombre de 47 años de edad, que ingresó por fiebre de tres días de evolución, erupción cutánea (rash), náuseas, tos seca y lipotimias. Dos días después empeoró la erupción y apareció bradicardia extrema. El ecocardiograma demostró disfunción del ventrículo izquierdo, con fracción de eyección de 38%. El paciente fue egresado a 14 días con el diagnóstico de dengue complicado con miocarditis. Es evidente que fue una miocarditis viral desde el comienzo de los síntomas, descrita como inusual en la literatura; la tos y las lipotimias fueron la expresión del bajo gasto cardíaco, que unidas a la bradicardia y las alteraciones electro y ecocardiográficas, ayudaron a establecer el diagnóstico.*

**Palabras clave:** Dengue, Complicaciones, Miocarditis

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### INTRODUCTION

Dengue is an acute febrile viral disease produced by the four serotypes of

the dengue virus, which are transmitted by the bite of mosquitoes of the *Aedes* genus and, secondly, of the *Albopictus* genus<sup>1</sup>. It is estimated that 390 million infections take place yearly worldwide, that it may occur in an asymptomatic and subclinical form and it can cause severe clinical pictures<sup>2,3</sup>. This disease is widely spread in tropical and subtropical countries<sup>4,5</sup>. In major epidemics in India, several changes in producing serotypes of dengue have been reported, and, in some, the gathering of several of them. This phenomenon makes it necessary to monitor the germ<sup>6,7</sup>.

According to the 2009 classification of the World Health Organization, dengue can be divided into: non severe without warning signs, non-severe with warning signs and severe<sup>3</sup>. Dengue is a disease that has three phases, not three different types, as indicated in the previous 1997 classification: dengue fever, dengue hemorrhagic fever and dengue shock<sup>8</sup>.

Infection due to dengue virus has been associated with cardiac involvement, evidenced by the reports of acute myocarditis, pericarditis and cardiac rhythm disorders<sup>2</sup>. Myocarditis is pointed as a common complication of severe dengue and its frequency increases in direct proportion to the severity of the disease<sup>3</sup>. It indicates that the cardiac involvement here is not rare and often transient, but it can be a significant cause of death<sup>5</sup>.

## CASE REPORT

A 47-year-old man was admitted for high fever (39-39,5 °C) with three days of evolution, accompanied by skin rash, nausea, dry cough and lipothymias. On admission, the patient was feverish with a skin rash, he had cough and sweating when he assumed the standing position. He had no pulmonary rales, and bradycardia was found with a heart rate of 40-50 beats per minute (bpm).

The fever subsided two days after admission, and the skin rash, which had become petechial, after the fever disappeared became ecchymotic (**Figure 1**). The patient maintained a persistent dry cough to changes in position and, on the fourth day of hospitalization, he presented lipothymia and extreme bradycardia (38 bpm), for which he was transferred to the intensive care unit; there, oxygen was administered through a nasal catheter and he was treated with dobutamine, but it was not necessary to maintain this drug due to having a discrete hypertensive reaction (BP 160/90 mmHg), which is why a treat-



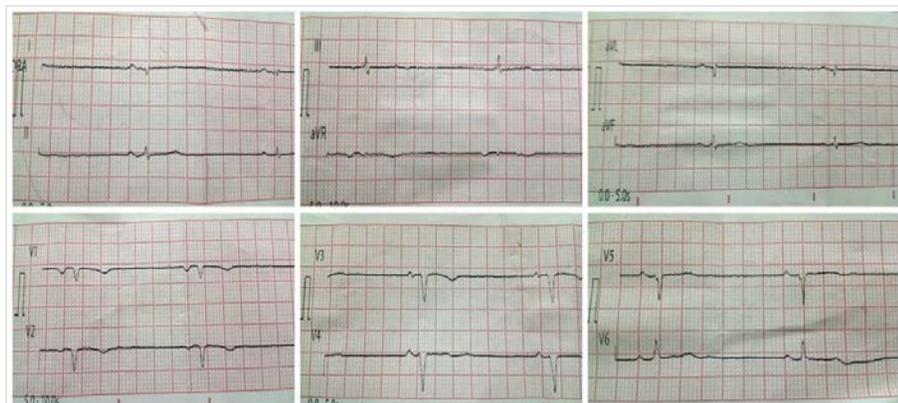
**Figure 1.** Photograph of the patient's left thigh showing intense vasculitis due to dengue.

ment with intravenous furosemide and supportive measures was continued, as well as a more strict observation.

The chest X-ray revealed opacity of the costophrenic sinuses, without other relevant data. The electrocardiogram (ECG) showed generalized microvoltage, sinus bradycardia with a heart rate between 38 and 40 bpm, and Q waves in several leads (**Figure 2**).

In the initial echocardiogram, a global hypokinesia of the left ventricle was exposed, predominantly the *septum*, with a left ventricular ejection fraction (LVEF) of 38% and laminar pericardial effusion. The evolutionary study, carried out four days later, showed almost complete recovery of myocardial function (LVEF 55%).

The patient was monitored and ECGs were performed every 12 hours throughout his stay. Creatinephosphokinase (CPK) was normal and the hae-



**Figure 2.** 12-lead electrocardiogram showing microvoltage, sinus bradycardia and Q waves in leads aVL, V1 and V2, with embryonic r in I and from V3 to V5.

matological tests showed, as a positive finding, the presence of leukopenia and mild thrombopenia that improved from the fourth day of hospitalization. The patient developed intense vasculitis throughout the body, which progressively disappeared from the seventh day on; his entire clinical picture improved and he was discharged, without symptoms, 14 days after the hospital admission.

## COMMENT

Myocarditis is defined as an inflammatory disease of the heart muscle and it is a major cause of acute heart failure, sudden death, and dilated cardiomyopathy. Viruses are the cause of most cases of myocarditis or inflammatory cardiomyopathy, and they can induce an immune response that causes inflammation, despite the elimination of the pathogen.

Only the endomyocardial biopsy can establish the nature of the etiologic agent. This examination, both in the right and left ventricles, has a very low complication rate when performed by an expert operator<sup>9</sup>.

Myocarditis is a serious manifestation of dengue virus infection<sup>3,10</sup>, but its asymptomatic form appears commonly in this viral infection and the standard is that it reverts spontaneously<sup>5</sup>. The pathophysiology of the cardiac cell's damage by dengue virus is not yet well elucidated. The direct attack of the virus on the cardiomyocyte<sup>3</sup> and the immune response with production of cytokines and other mediators<sup>2</sup>, which can result in myocarditis, are responsible for cardiac manifestations during infection. Other authors point out that the virus raises calcium levels within the

myocardial cell, which opens pores in the mitochondrial membrane and activates the apoptosis pathway. In this way, dengue increases capillary permeability, responsible for part of the clinical picture of the disease<sup>5,9,11,12</sup>.

Myocardial damage is suspected with clinical symptoms such as: chest pain, dyspnea, palpitations, amaurosis, and syncope. What is designated as common in these cases are the tachycardia and atrial fibrillation<sup>3</sup>. The first case of sinus node dysfunction was found in

a thirteen-year-old boy, who developed low blood pressure and bradycardia after recovering from dengue hemorrhagic fever<sup>3</sup>. In the study by Agudelo-Salas *et al*<sup>2</sup>, no patient had a diagnosis of myocarditis; however, symptoms that predominate in patients with dengue myocarditis were found, such as: bradycardia (15.4%), low blood pressure (12.8%) and tachycardia (23.1%).

The effect of myocarditis is not limited to functional mechanisms of the heart, it can also involve electrical conduction, therefore it includes atrial fibrillation, ST-segment abnormalities, decreased QRS amplitude, sinus bradycardia, first-degree atrioventricular block, and premature atrial and ventricular contractions. All of which can occur asymptotically, but can lead to fatal cardiac arrhythmias<sup>11</sup>.

Symptoms, ECG, cardiac enzymes and imaging methods are combined for diagnosis<sup>3</sup>. A high index of suspicion is necessary to identify cardiac involvement early. The presence of electrocardiographic abnormalities may suggest damage, but the echocardiography is a more useful research method<sup>5</sup> since hypokinesia of the left ventricle or biventricular, decreased LVEF, and pericarditis can be demonstrated. Aslam *et al*<sup>11</sup> report a patient with generalized hypokinesia and LVEF less than 52%, with no evidence of pericardial involvement<sup>11</sup>. In addition, there is an increase in myocardial damage markers (total CPK and its fraction MB [Myocardial band] [CPK-MB] and troponins)<sup>2,3</sup>.

The presented patient had an intense febrile picture with retroocular pain, but his symptoms did not resemble a flu as indicated by some studies reviewed<sup>3,4</sup>. He did presented the general clinical signs and symptoms (chills, asthenia, myalgia, arthralgia,

retroocular pain, anorexia and skin rash), which are perfectly described<sup>1,2</sup>. As a hemorrhagic manifestation, he presented a petechial and ecchymotic rash on the seventh day of evolution, after the mild thrombopenia that appeared on the second day had disappeared, and we believe it was related to a vasculitis in the course of the immune process triggered by dengue. This coincides with other studies and with the pathophysiological mechanisms mentioned in this disease<sup>1,2,5,9</sup>. The patient never had chest pain or dyspnea, which would have suggested myocardial damage<sup>3</sup>, it was only the cough and the presence of bradycardia, which became more marked on the fourth day of the disease, indicating that the patient had evident myocardial damage<sup>2</sup>.

The diagnosis was based on the described clinical picture, the ECG findings (microvoltage, bradycardia and signs of necrosis) and the hypokinesia of the left ventricle with a significant decrease in LVEF that appeared on the echocardiogram, which was, ultimately, the examination that further corroborated the medical reasoning<sup>3,11</sup>. In this center, an endomyocardial biopsy is not performed, which would have been a diagnosis of certainty<sup>9</sup>, but we think it was not necessary; and there was no increase in CPK, as reported in these patients<sup>2</sup>.

In the case presented, no other analytical diagnostic parameters of the disease were used due to limitations of the institution where the patient was treated. The severity of the case did not allow its transfer to a specialized center for further studies, but he could be diagnosed and treated effectively with the available clinical-epidemiological data.

Dengue myocarditis is not uncommon, but it is described as a complication of the severe course of the disease<sup>5,10-12</sup>.

## CONCLUSIONS

The case was discussed on several occasions by the attending physicians and it was concluded with the diagnosis of severe dengue myocarditis which, happily, resolved spontaneously, as some authors point out<sup>5</sup>. The cough and the lipothymic state were the expression of the low cardiac output, since the clinical evolution of the patient suggests that the cardiac affection was present since the infection by the dengue virus began. Myocarditis, therefore, was the form of presentation of the disease, despite being considered unusual.

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