Dengue fever as a cause of perimyocarditis and low-pressure cardiac tamponade

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ABSTRACT

We describe a case of dengue shock syndrome, perimyocarditis, and low-pressure cardiac tamponade following a trip to the Caribbean. The case was managed in the critical care unit and 6 weeks after discharge the patient was asymptomatic with a normal ejection fraction. Dengue fever presenting as cardiac tamponade is exceedingly rare and emphasizes the importance of taking a thorough travel history as well as being aware of atypical manifestations of rare diseases to make a correct diagnosis.

KEYWORDS Critical care; dengue fever; low-pressure cardiac tamponade; perimyocarditis

Dengue fever produces a spectrum of disease, from asymptomatic infection to life-threatening disease. Dengue shock syndrome, defined by hemodynamic compromise with evidence of plasma leakage, hemorrhagic complications, and thrombocytopenia, is associated with high morbidity and mortality.¹ While the reported cardiac involvement of dengue fever varies from 8% to 62.5%, more severe cardiac involvement including myocarditis and cardiac tamponade is rare.² We describe a case of dengue shock syndrome, perimyocarditis, and low-pressure cardiac tamponade following a trip to the Caribbean.

CASE PRESENTATION

A 20-year-old woman presented to the emergency room with 4 days of abdominal pain, nausea, emesis, and chills and 1 day of chest pain and dyspnea. She had been in the Dominican Republic for the previous 3 weeks. Her past medical history was not significant. Her initial vital signs were significant for a heart rate of 146 beats per minute, respiratory rate of 24 breaths per minute, oral temperature of 99.4°F, and blood pressure of 110/72 mm Hg. Exam findings were significant for distant heart sounds, moderate epigastric tenderness without rebound or guarding, and 1+ bilateral upper and lower extremity edema. Electrocardiogram showed sinus tachycardia, PR depression, and

diffuse ST elevation and low voltage, which are suggestive of pericarditis with possible pericardial effusion (*Figure 1*). Admission laboratory results are shown in *Table 1*. Echocardiogram showed a globally reduced ejection fraction (30%) and moderate pericardial effusion with significant mitral inflow respiratory variation, an echocardiographic sign of cardiac tamponade. Right heart catheterization showed near equalization of diastolic pressures (right atrium 8 mm Hg, right ventricle 9 mm Hg, pulmonary capillary wedge 11 mm Hg) and a Fick calculated cardiac index of 2.18 L/min/m². When interpreted together with echocardiographic findings, the right heart catheterization results were consistent with low-pressure cardiac tamponade. A pericardiocentesis was performed with the removal of 300 cc of serous fluid, and her right atrial pressure decreased to 4 mm Hg.

The case was managed supportively in the critical care unit. Due to low filling pressures and severe rhabdomyolysis, the patient was aggressively fluid resuscitated, and despite an initial decline in her status with hypotension requiring vasopressors, renal failure with oliguria, and development of petechiae, she slowly recovered. Assays for immunoglobulin M dengue virus returned positive (sent 5 days after symptom onset), and repeat testing showed seroconversion of the immunoglobulin G antibody, confirming the diagnosis of dengue shock syndrome.

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Figure 1. Admission electrocardiogram. Findings are significant for sinus tachycardia, diffuse ST elevations, PR depressions, and low voltage.

Table 1. Admission laboratory findings

Test	Level ^a	Reference level
Complete metabolic panel		
Sodium (mmol/L)	139	132–145
Potassium (mmol/L)	4.9	3.5–5.1
Chloride (mmol/L)	109	96–108
Carbon dioxide (mmol/L)	18	22–31
Glucose (mg/dL)	91	70–99
Blood urea nitrogen (mg/dL)	14	7–23
Creatinine (mg/dL)	0.7	0.5–1.3
Calcium (mg/dL)	4.7	8.5–10.5
Total protein (g/dL)	4.2	6.4–8.2
Albumin (g/dL)	1.5	3.4–5
Bilirubin, total (mg/dL)	0.5	0.2–1
Alkaline phosphatase (U/L)	52	50–135
Alanine aminotransferase (U/L)	481	12–78
Aspartate aminotransferase (U/L)	2674	15–37
Lactate dehydrogenase (U/L)	4390	84–246
Troponin (ng/mL)	34.3	0.015–0.045
Creatine kinase (U/L)	153,380	26–192
Myocardial band fraction (ng/mL)	119.7	0.5–3.6
Myocardial band/creatinine kinase ratio	0.10%	
Haptoglobin (mg/dL)	147	31–200
Lactic acid (mmol/L)	1.9	0.4–2
Complete blood count		
White blood cell count ($10^3/\mu\text{L}$)	23.9	3.8–10.5
Red blood cell count ($10^6/\mu\text{L}$)	5.1	3.80–5.20
Hemoglobin (g/dL)	15.1	11.5–15
Hematocrit	46%	34.5%–44%
Mean corpuscular volume (fL)	90	80–100
Mean corpuscular hemoglobin (pg)	29.4	27–34

(continued)

Table 1. Continued

Test	Level ^a	Reference level
Red blood cell distribution width	14.7%	10.3%–16.9%
Platelets ($10^3/\mu\text{L}$)	95	150–400
Neutrophils	84.2%	38%–78%
Lymphocytes	4.9%	10%–46%
Monocytes	10.8%	0–12%
Eosinophils	0	0–7%
Basophils	0.1%	0–2%
Prothrombin time (sec)	15.3	9.7–13
International normalized ratio	1.34	0.87–1.16
Activated partial thromboplastin time (sec)	29.7	27.5–36.5
Fibrinogen (mg/dL)	394	202–395
D-Dimer (D-DU ng/mL)	2847	0–230
Urinalysis		
Color	Yellow	Light yellow-amber
Clarity	Cloudy	Clear
Glucose (mg/dL)	Negative	Negative
Bilirubin	Small	Negative
Ketone	Negative	Negative
Specific gravity	1.015	1.003–1.030
Blood	Large	Negative
pH	5.5	4.0–8.0
Protein (mg/dL)	100	Negative
Urobilinogen (EU/dL)	0.2	0.1–1
Nitrite	Negative	Negative
Leukocyte esterase	Negative	Negative
White blood cells	<5	<5/HPF
Red blood cells	<5	<5/HPF
Casts	Few granular	None
Urine toxicology	Negative	Negative

^aAbnormal values are in bold.

Table 2. Dengue virus serology results

Days after symptom onset	IgM ^a	IgG ^a
5	5.77	0.73
12	5.27	2.72
13	5.20	3.46

^aReference range <0.9 for both IgM and IgG.

Ig indicates immunoglobulin.

Table 3. Results for other diagnostic testing

Test	Result
Adenovirus	Negative
Antinuclear antibodies	Negative
Blood culture	Negative
Cytomegalovirus Ab, IgM, IgG	Both negative
Double-stranded DNA	Negative
Echo virus	Negative
Enterovirus	Negative
Epstein-Barr virus VCA IgG Ab	Positive ^a
Epstein-Barr virus VCA IgM Ab	Negative
Hepatitis A, IgM	Nonreactive
Hepatitis B (HBcIgM, HBsAg, HBsAb)	Nonreactive
Hepatitis C Ab	Negative
HIV	Negative
Herpes simplex virus, Type 1 and 2 Ab	Negative
Influenza A, B	Negative
Leptospira Ab	Negative
Malaria	Negative
Parainfluenza	Negative
Rheumatoid factor	Negative
Respiratory syncytial virus, IgG	1:640 (normal <1:10) ^b
Respiratory syncytial virus, IgM	Negative
Stool culture	Negative
Tuberculosis Quantiferon Gold	Negative
Typhoid	Negative

^aSuggests prior exposure.

^bSuggests past infection with respiratory syncytial virus.

Ab indicates antibody; Ig, immunoglobulin; VCA, viral capsid antigen.

(Table 2). All other serologies and test findings were negative (Table 3). At 6-week follow-up, the patient had complete resolution of her symptoms, and echocardiography showed a normal ejection fraction and minimal pericardial effusion.

DISCUSSION

Dengue fever is endemic in the Dominican Republic and spread by the mosquito vector *Aedes aegypti*. Symptomatic disease is seen 3 to 14 days after infective bite and begins as an acute febrile illness with malaise, retro-orbital headache, myalgia, nausea, and vomiting.³ The critical phase, 3 to 7 days after illness onset, is associated with thrombocytopenia and defervescence. In addition, increased acute vascular leakage is seen and represented by hypoalbuminemia, hemoconcentration, and anasarca, all of which were seen in our patient.²

Our patient experienced dengue shock syndrome and presented with atypical manifestations of the disease, including perimyocarditis and low-pressure cardiac tamponade. Myocarditis and pericarditis have been reported but are rare.^{4,5} This case also had the very rare finding of low-pressure cardiac tamponade, which has been reported only twice in the literature to our knowledge.^{2,6} Low-pressure cardiac tamponade is confirmed by lower-than-expected right and left heart pressures, with near equalization of diastolic pressures and a right atrial pressure below 4 mm Hg after pericardiocentesis and is thought to represent a state of hypovolemia.⁷ In this case, the intravascular depletion was likely secondary to the increased vascular permeability, hypoalbuminemia, and third spacing.

This case highlights the importance of taking a thorough travel history, as without this knowledge the differential diagnosis would have been significantly reduced and the diagnosis missed. It emphasizes the need to not only recognize common findings of a rare disease but also be aware of the atypical manifestations and presentations of such diseases. In addition, this case exemplifies the need for travelers to be aware of endemic infectious agents and how to take precautions to prevent illness.

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