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Case report

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Acute fulminant myocarditis in a case of dengue fever: A case report

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ABSTRACT

Dengue is one of the most important mosquito-borne viral diseases in the world. Of note, a variety of cardiac complications have been reported in dengue-affected patients. We reported a 5-year-old boy who presented with fulminant viral myocarditis due to dengue infection and died within 24 h. Biopsy of heart revealed lymphocytic infiltration.

1. Introduction

Dengue fever is a potentially life-threatening vector-borne tropical disease caused by a single-stranded positive-sense ribonucleic acid virus belonging to the Flaviviridae family. Outbreaks have increased in severity over the past few years, especially in developing countries in South Asia[1]. While dengue fever is a self-limiting illness in the majority of patients, about 0.5% of patients develop a complicated course requiring specialised therapy[2]. A total of 20000 deaths are reported annually worldwide due to complications associated with severe dengue fever[2].

Hypotension caused by intravascular depletion due to capillary leak is common in dengue hemorrhagic fever and dengue shock syndrome. However, myocardial dysfunction is also seen with dengue hemorrhagic fever/dengue shock syndrome and could be responsible for hypotension and shock[3]. Cardiac involvement in the form of decreased left ventricular performance[4] is known. Although isolated myocarditis has previously been reported in association with the disease, it is still rare. We reported a 5-year-old boy who presented with fulminant viral myocarditis due to dengue infection and died within 24 h. Biopsy of heart revealed lymphocytic infiltration.

2. Case report

A 5-year-old male admitted to the paediatric emergency with complaint of fever, headache, dyspnea and chest pain for 6 days. This was followed by one episode of generalized tonic-clonic seizures followed by unconsciousness. At presentation the patient

was unconscious with Glasgow Coma Scale 7 and was having severe respiratory distress. Oxygen saturation measured by cutaneous pulse oximeter was 70%. Capillary filling time was delayed. Pulse was 160/min and blood pressure was 60/40 mmHg. Cardiopulmonary examination showed an S3 gallop with no audible murmur or rub. The patient's jugular venous pressure was elevated and scattered crepitations were found on respiratory examination. On abdominal examination, abdominal tenderness was present and there was hepatomegaly.

Echocardiography revealed a left ventricular ejection fraction (LVEF) of 20% with generalized hypokinesis and small pericardial effusion. Intraventricular septal thickness and posterior wall thickness were increased. And his electrocardiography showed low voltage complexes in limb leads and tachycardia.

Laboratory findings include haemoglobin of 9.8 g/dL, and white blood cell count of 25200/cumm. Erythrocyte sedimentation rate was raised (36 mm/h), creatine phosphate kinase-MB fraction level of 42.5 ng/mL (negative \leq 4.3 ng/mL) and troponin I level was 7.75 ng/mL (negative \leq 0.01 ng/mL) and platelet count was 20000/cumm. Liver enzymes (serum glutamic-oxaloacetic transaminase: 94 IU/L; serum glutamic pyruvic transaminase: 114 IU/L) were also raised. Electrolytes were within normal limits. On chest X-ray there was cardiomegaly and pulmonary congestion.

His dengue IgM by ELISA was positive. He was thus diagnosed as a case of dengue myocarditis.

The patient was put on oxygen with intravenous fluids and decongestive therapy in the form of diuretic furosemide. Inotropic support was initiated with dobutamine. Two hours after this, patient could not maintain the SpO₂ (70%) and then he was put on ventilator. The patient's condition deteriorated. Oxygen saturation did not improve and he had sudden cardiac arrest 24 h after admission.

Post mortem cardiac biopsy was performed after taking consent from patient's father using a Tru-cut soft tissue biopsy needle. From a single puncture site on the anterior chest wall, tissue was sampled

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from multiple directions and depths, sampling the entire heart. Myocardial tissue was placed in formalin for 24 h. Tissue specimen was routinely processed, formalin fixed and stained with hematoxylin-eosin. Histological examination of formalin fixed sections of the myocardium showed intense diffuse lymphocytic inflammatory infiltrates along with degenerating cardiomyocytes (Figure 1).

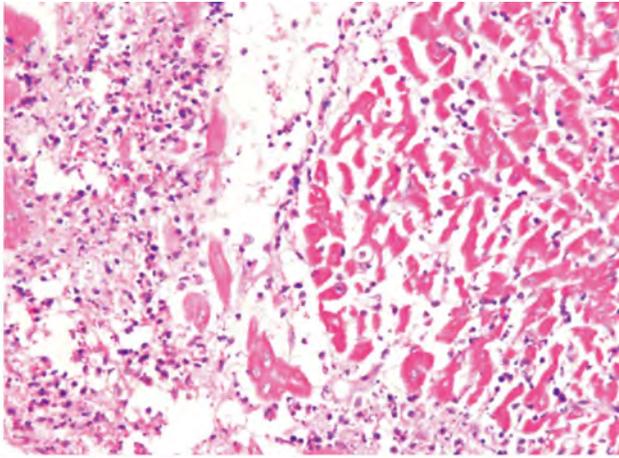


Figure 1. Histological examination of formalin fixed sections of the myocardium showed intense diffuse lymphocytic inflammatory infiltrates along with degenerating cardiomyocytes.

3. Discussion

Dengue is a non-specific febrile illness, presenting most commonly as either dengue fever or the more severe dengue shock syndrome[5]. Heart involvement and cardiac abnormalities in association with dengue fever have previously been reported in the literature, though they are rare complications[2-4,6,7]. The clinical manifestations of heart involvement in dengue fever greatly differ; patients can be completely asymptomatic, have very mild symptomatology or as in our case, can suffer from severe myocardial damage leading to ventricular failure, global hypokinesia and cardiogenic shock[2,8]. The incidence of cardiac complications in patients with dengue illness varies greatly from one series to another. Sengupta *et al.*, showed reduced LVEF in patients with dengue haemorrhagic fever at presentation compared with control[6]. In a more recent outbreak of dengue fever in India, 9% of patients showed evidence of myocarditis during the course of their illness[8]. Yadev *et al.* compared the sensitivity of LVEF by echo with the Tei index in a cohort of 67 children with dengue. LVEF was low in 42% of patients on admission, and low ejection fraction was seen in half of the patients with shock and the Tei index was abnormal in 72% of patients[3]. A recent report from Sri Lanka showed that 62.5% of 120 adults with dengue fever had an abnormal electrocardiogram[4]. These series suggest that cardiac complications in patients with dengue illness are not uncommon.

Fatal outcomes as in our case have also been reported. Miranda *et al.* reported a 37-year-old woman with dengue fever who developed fulminant cardiopulmonary failure[2]. Despite treatment with mechanical ventilation, vasoactive drugs and inotropic support with dopamine and noradrenaline, the patient died of cardiogenic shock[2].

This disparity in the proportion of cardiac abnormalities likely arises due to the fact that dengue fever is a spectrum disease which can present with atypical manifestations, haemorrhagic fever or shock syndrome. While tachycardia and a transient decline in cardiac function may vary in intensity, they are present across the spectrum[9]. The majority of the patients in the aforementioned studies exhibited diminished cardiac performance, hypotension and reduced ejection fraction, however, some did show electrocardiographical changes[4].

Hypotension and decreased cardiac function during the course of dengue fever could be attributable to capillary leakage and intravascular volume depletion, leading to haemodynamic instability

in these patients[9]. The latter seemed to be unlikely in the current patient, given the fact that our patient had persistent hypotension which was non-responsive to fluid resuscitation and required inotropic support with dopamine to maintain adequate blood pressure. In such cases, fluid management may need to be reassessed if haemodynamic stability is not achieved with conservative management and fluid resuscitation to avoid volume overload and prolonged tissue hypoperfusion. Children require very specific volumes for fluid resuscitation/therapy and are prone to volume overload states such as pulmonary oedema or superimposed infections[2,4]. In such circumstances it is necessary to heighten the index of suspicion by reporting to physicians cases with myocarditis as an underlying cause, allowing them to change their approach rather than pursuing vigorous fluid therapy which might be detrimental to the child[2,4].

The pathophysiology of myocardial cell injury in dengue illness is not yet fully understood. Myocardial involvement in dengue may result either from direct DEN invasion of the cardiac muscles or a cytokine-mediated immunological response, or both[2,10]. The upsurge in serum TNF- α , interleukins-6, -13 and -18, and cytotoxic factors in patients with dengue illness lead to increased vascular permeability and shock[11], whether these cytokines play a role in the development of myocardial cell injury or not. Further studies are needed to clarify this and also the role that DEN serotype plays, if any, in cardiac complications in dengue-affected patients.

Conflict of interest statement

We declare that we have no conflict of interest.

References

- [1] Murray NE, Quam MB, Wilder-Smith A. Epidemiology of dengue: past, present and future prospects. *Clin Epidemiol* 2013; **5**: 299-309.
- [2] Miranda CH, Borges Mde C, Schmidt A, Pazin-Filho A, Rossi MA, Ramos SG, et al. A case presentation of a fatal dengue myocarditis showing evidence for dengue virus-induced lesion. *Eur Heart J Acute Cardiovasc Care* 2013; **2**: 127-30.
- [3] Yadav DK, Choudhary S, Gupta PK, Beniwal MK, Agarwal S, Shukla U, et al. The Tei index and asymptomatic myocarditis in children with severe dengue. *Pediatric Cardiol* 2013; **34**: 1307-13.
- [4] Kularatne SA, Pathirage MM, Kumarasiri PV, Gunasena S, Mahindawanse SI. Cardiac complications of a dengue fever outbreak in Sri Lanka, 2005. *Trans R Soc Trop Med Hyg* 2007; **101**: 804-8.
- [5] Simmons CP, Farrar JJ, Nguyen vV, Wills B. Dengue. *N Engl J Med* 2012; **366**: 1423-32.
- [6] Sengupta SP, Nugurwar A, Jaju R, Khandheria BK. Left ventricular myocardial performance in patients with dengue haemorrhagic fever and thrombocytopenia as assessed by two-dimensional speckle tracking echocardiography. *Indian Heart J* 2013; **65**(3): 276-82.
- [7] Neeraja M, Iakshmi V, Teja VD, Lavanya V, Priyanka EN, Subhada K, et al. Unusual and rare manifestations of dengue during a dengue outbreak in a tertiary care hospital in South India. *Arch Virol* 2014; **159**: 1567-73.
- [8] Guadalajara-Boo JF, Ruiz-Esparza ME, Aranda Frausto A, Soto Abraham MV, Gaspar-Hernández J. Histologic and angiographic imaging of acute shock dengue myocarditis. *Rev Esp Cardiol (Engl Ed)* 2014; **67**: 226-7.
- [9] Yacoub S, Wertheim H, Simmons CP, Screaton G, Wills B. Cardiovascular manifestations of the emerging dengue pandemic. *Nat Rev Cardiol* 2014; **11**: 335-45.
- [10] Hober D, Poli L, RoblinB, Gestas P, ChungueE, Granic G, et al. Serum levels of tumor necrosis factor-alpha (TNF-alpha), interleukin-6 (IL-6), and interleukin-1 beta (IL-1 beta) in dengue-infected patients. *Am J Trop Med Hyg* 1993; **48**: 324-31.
- [11] Chen RF, Liu JW, Yeh WT, Wang L, Chang JC, Yu HR, et al. Altered T helper 1 reaction but not increase of virus load in patients with dengue hemorrhagic fever. *FEMS Immunol Med Microbiol* 2005; **44**: 43-50.