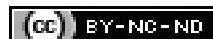


Case of Dengue Myocarditis Mimicking as Acute Myocardial Infarction: A Diagnostic Dilemma

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ABSTRACT

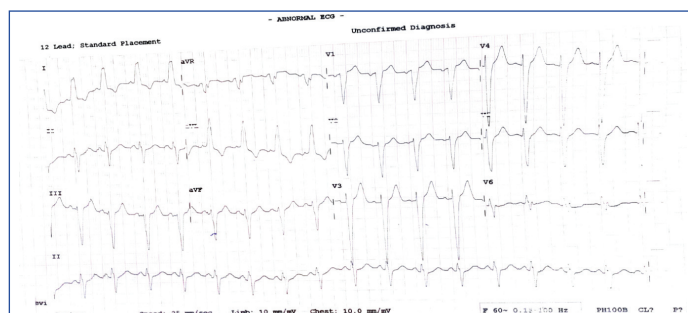
Atypical manifestations of dengue, also known as expanded dengue syndrome, causing isolated single organopathy (including acute fulminant liver failure, acute kidney injury, Disseminated Intravascular Coagulation (DIC), aplastic anaemia and myocarditis) are less reported and poorly characterised. Hereby, authors present a case of an elderly woman who presented with acute febrile illness and symptomatic myocarditis, mimicking Acute Myocardial Infarction (AMI), posing a diagnostic challenge. A 73-year-old female presented with recurrent fever (up to 102°F) over three days, accompanied by weakness, dizziness and syncope. Clinical examination revealed bilateral wheezing. During hospitalisation, she experienced further syncopal episodes and bradycardia without hypotension. Continuous Electrocardiogram (ECG) monitoring demonstrated intermittent bradycardia and tachycardia, along with a Left Bundle Branch Block (LBBB). Elevated cardiac biomarkers, including Creatine Kinase-Myocardial Band (CK-MB) (31.70 U/L) and troponin I (117.6 pg/mL, rising to 125.50 pg/mL), suggested myocardial injury. Laboratory tests showed leucopenia and thrombocytopenia. Initial dengue serology {Immunoglobulin M (IgM) Antibody Capture Enzyme-Linked Immunosorbent Assay (MAC-ELISA) and Reverse Transcription-polymerase Chain Reaction (RT-PCR)} was negative. A 2D echocardiogram revealed mild left atrial dilation, preserved systolic function {Left Ventricular Ejection Fraction (LVEF) 55-60%} and paradoxical interventricular septal motion. Given the LBBB, elevated biomarkers and echocardiographic findings, cardiac Magnetic Resonance Imaging (MRI) was performed, revealing no myocardial infarction but delayed mid-myocardial enhancement in the basal anteroseptum and anterior wall, indicative of subacute myocarditis. Holter monitoring showed sinus rhythm with premature atrial contractions, tachycardia and Ventricular Premature Contractions (VPCs). Repeated dengue IgM testing was positive, confirming dengue myocarditis. The patient was managed with antipyretics, intravenous fluids, nebulisation and hydrocortisone, leading to symptomatic improvement. She was discharged on day 13 in a stable condition with normal sinus rhythm and made a full recovery at follow-up.

Keywords: Acute febrile illness, Cardiovascular manifestations, Expanded dengue syndrome, Viral myocarditis

CASE REPORT

A 73-year-old female presented to the emergency department with fever and chills, reaching 102°F, occurring six times over three days, accompanied by general weakness. Fever was not associated with joint pains. The patient also complained of breathlessness. On the fourth day, she experienced dizziness followed by syncope, which recurred on the sixth day. The patient had a 10-year history of obstructive airway disease and intermittently used rotahalers. There was no history of diabetes, hypertension, or ischaemic heart disease. Clinical examination revealed bilateral wheezing. Throughout her hospital stay, she experienced another syncopal episode with bradycardia but no hypotension. Continuous ECG monitoring revealed intermittent bradycardia and tachycardia over 24 hours, with an ECG showing an LBBB [Table/Fig-1]. Cardiac biomarkers were elevated: CK-MB at 31.70 U/L (normal <24 U/L) and troponin I at 117.6 pg/mL, increasing to 125.50 pg/mL in 24 hours. Her complete blood count showed leucopenia with a decrease in total leukocyte count from 3300/ μ L to 1220/ μ L, alongside thrombocytopenia (145,000/ μ L). Initial dengue serology was negative (MAC ELISA) as was dengue RT-PCR. A 2D echocardiogram revealed mild dilation of the left atrium with good systolic function (LVEF 55-60%) and paradoxical interventricular septal motion. The differential diagnoses included acute coronary syndrome, viral myocarditis, sepsis with cardiac involvement, drug-induced hypersensitivity myocarditis, infective endocarditis, pericarditis and autoimmune conditions (systemic lupus erythematosus and rheumatic fever). A cardiac MRI was planned as the 2D echocardiogram was not fully informative. MRI showed a nondilated left ventricle (LVEF 56%) with no evidence of myocardial infarction but showed delayed mid-myocardial enhancement in the basal anteroseptum and anterior

wall, suggestive of subacute myocarditis [Table/Fig-2]. Holter monitoring showed sinus rhythm with premature atrial contractions and episodes of tachycardia related to the LBBB. The patient also had VPCs with a burden of 14.5%. Other laboratory tests, including renal and liver function tests, were normal. Given the high suspicion of dengue, dengue Immunoglobulin M (IgM) Enzyme-Linked Immunosorbent Assay (ELISA) was repeated on the eighth day and was positive, confirming dengue myocarditis. The patient was treated with intravenous ceftriaxone 1 g twice daily (empirical treatment for bacterial sepsis), intravenous hydrocortisone 100 mg three times daily for five days, nebulisation with budesonide (one resolute twice daily) and intravenous paracetamol 1 g as needed for three days. She improved symptomatically, did not require inotropic support and was discharged on the 13th day with a stable heart rate of 84 beats per minute. Follow-up after one week showed full recovery with a heart rate of 88 beats per minute and normal sinus rhythm.



[Table/Fig-1]: A 12-lead ECG showing sinus tachycardia with Left Bundle Branch Block (LBBB).



[Table/Fig-2]: Short-axis Late Gadolinium Imaging (LGE) of heart shows mid myocardial enhancement in the basal anteroseptum and adjacent part of anterior wall (arrow). No myocardial infarction or LV thrombus seen.

DISCUSSION

Dengue fever is endemic in India, with Indian Council of Medical Research (ICMR) data indicating that between 2014 and 2017, 28.4% of suspected cases were serologically confirmed [1]. Dengue can range from asymptomatic to severe forms like dengue shock syndrome and dengue haemorrhagic fever. However, atypical presentations, termed expanded dengue syndrome, involving isolated organ damage such as acute liver failure, acute kidney injury, or myocarditis, are less commonly recognised. Cardiovascular complications of dengue, including rhythm disturbances, hypotension, myocarditis and pericarditis, can lead to severe outcomes such as cardiogenic shock and heart failure, highlighting the need for early diagnosis and management [2].

A systematic review and meta-analysis from India indicated that the proportion of severe dengue among laboratory-confirmed cases was 28.9%, according to a random effects model [3]. Evidence linking severe dengue to myocarditis primarily comes from a 2014 cohort study in China, which observed a 46.67% prevalence of myocarditis in patients with severe dengue or warning signs, a marked increase from the 9.72% prevalence in those with non severe dengue without warning signs [4]. Furthermore, a population-based study highlighted an elevated risk of major adverse cardiovascular events, including AMI, heart failure and stroke, during the initial two weeks of dengue virus infection [5].

The findings in the present case offer several key insights into the cardiovascular complications of dengue, the diagnostic challenges and the patient's management. The patient's initial symptoms of fever and chills, along with generalised weakness and breathlessness, were non specific and overlapped with a wide range of potential diagnoses. It was not until the patient experienced dizziness and recurrent episodes of syncope, along with the development of arrhythmias, that more specific cardiovascular involvement became evident. The patient had a history of obstructive airway disease, which may have contributed to her underlying respiratory symptoms but did not seem directly related to her acute cardiovascular presentation. The lack of a history of diabetes, hypertension, or ischaemic heart disease suggested that her cardiovascular risk was lower, although her age and co-morbid condition (obstructive airway disease) could have made her more vulnerable to the effects of acute viral infections, including those affecting the heart.

The patient's clinical examination revealed bilateral wheezing, consistent with her chronic obstructive airway disease, but the key findings were her episodes of bradycardia and tachycardia, along with the development of an LBBB, which was seen on continuous

ECG monitoring. An LBBB can be a concerning finding, often indicative of conduction system abnormalities and in this context, it raised suspicion for myocarditis, as the heart's conduction system is typically affected in this condition. Additionally, the elevated cardiac biomarkers (CK-MB and troponin I) further supported the likelihood of myocardial injury, especially in the context of the patient's arrhythmias and clinical presentation. These findings are typical in viral myocarditis, where there is direct myocardial injury and subsequent release of these biomarkers into the bloodstream.

Initial negative dengue serology (MAC ELISA and RT-PCR) added to the diagnostic complexity. At first glance, this could suggest an alternative diagnosis such as sepsis with cardiac involvement, acute coronary syndrome, or autoimmune conditions, among others listed in the differential diagnosis. However, the persistent suspicion of dengue myocarditis prompted repeat testing, which ultimately confirmed the diagnosis with a positive dengue IgM ELISA on day eight. The delayed positive serology is not uncommon in dengue, as IgM antibodies usually appear several days into the course of the illness and this delayed serological response underscores the challenges of diagnosing dengue in its early stages.

Diagnostic imaging, including the 2D echocardiogram and cardiac MRI, played a crucial role in identifying the myocardial involvement. The initial echocardiogram showed mild dilation of the left atrium and good systolic function, but it was unable to fully explain the patient's arrhythmias and other symptoms. This led to the use of cardiac MRI, which confirmed subacute myocarditis with delayed mid-myocardial enhancement in the basal anteroseptum and anterior wall. The MRI findings were consistent with the presence of myocarditis, highlighting the importance of advanced imaging in diagnosing this condition, especially in cases where the echocardiogram alone does not provide sufficient information. In terms of treatment, the patient received supportive care with empirical antibiotics (ceftriaxone) to cover for bacterial sepsis, along with corticosteroids (hydrocortisone) to manage inflammation. Given the viral aetiology of the myocarditis, corticosteroids likely helped control the inflammatory response in the myocardium.

When compared to the case presented by Ramanathan K et al., where a 33-year-old woman experienced severe left ventricular dysfunction and chest pain due to dengue-associated myocarditis, some similarities and differences become apparent. Both cases exhibited significant cardiovascular involvement, such as tachycardia and chest pain [6]. However, the key difference lies in the age and underlying risk factors. The younger patient had a more favourable outcome with complete recovery and normal left ventricular function, whereas the elderly patient's condition was more complicated by age-related factors such as co-morbidities (possibly hypertension, diabetes, etc.), which are more likely to contribute to a prolonged recovery and higher cardiovascular risk. In comparison to the 56-year-old woman described by Koh KC and Hong HC who also developed dengue fever complicated by myocarditis, similarities are observed in the persistence of fever and generalised fatigue as early signs of the illness, followed by the development of tachycardia and chest pain [7]. Both cases showed myocardial injury, evidenced by elevated cardiac biomarkers and required diagnostic imaging for confirmation. However, the key difference lies in the severity of left ventricular dysfunction. In the case of Koh KC and Hong HC the patient did not have significant dysfunction, whereas the elderly woman in the original case was more prone to arrhythmias and conduction disturbances, such as the development of an LBBB [7]. The presence of an LBBB in the elderly patient points to a more complex presentation that may require more advanced monitoring tools such as Holter monitoring and a broader differential diagnosis to rule out other potential cardiovascular causes, such as ischaemic heart disease.

The case by Cristodulo R et al., provides an interesting comparison, as it initially presented with a clinical picture resembling MI, due to

severe chest pain and ST-segment elevation on ECG, but was later confirmed as myopericarditis through imaging [8]. This scenario has notable similarities to the present case, where the elderly woman developed arrhythmias and conduction abnormalities suggestive of myocardial involvement. Both cases underscore the diagnostic challenge of differentiating between viral myocarditis and other cardiovascular conditions such as MI or ischaemic heart disease, particularly when presenting symptoms overlap. However, the major difference lies in the overall severity of the cardiovascular involvement. While the case of Cristodulo et al., was ultimately diagnosed with myopericarditis, the present case demonstrated more pronounced conduction issues (LBBB and syncope) [8].

In the case presented by Kashyap A et al., a 58-year-old woman developed dengue fever complicated by STElevation Myocardial Infarction (STEMI) [9]. Interestingly, the patient did not have any cardiac symptoms, however, an ECG performed routinely showed ST elevations in inferior and septal leads. Angiography showed significant coronary artery stenosis (80-90%) in the Left Anterior Descending artery (LAD), requiring immediate Percutaneous Coronary Intervention (PCI), aspirin, clopidogrel and statins, followed by recovery. A key difference, however, lies in the underlying pathology: while the present case focused on myocarditis and conduction abnormalities, which are more common, the Kashyap A et al., report described a more rare complication of AMI due to dengue infection [9].

Finally, in the case of Navinan MR et al., a 26-year-old woman developed dengue-induced haemodynamic shock followed by bradycardia progressing to complete heart block, which resolved spontaneously [10]. Both cases involved conduction abnormalities, but the spontaneous resolution of the younger patient's heart block suggests a less complicated course of the disease compared to the more severe manifestation in the elderly woman, whose arrhythmias were more persistent and symptomatic. This difference underscores the variability in the clinical course of dengue myocarditis and the significant impact age and co-morbidities can have on disease progression.

CONCLUSION(S)

In conclusion, dengue myocarditis represents a complex and multifaceted complication of dengue fever, with clinical presentations ranging from mild, subacute myocarditis to life-threatening arrhythmias and myocardial infarction. The importance of early recognition, advanced diagnostic imaging and supportive care is clear across the case reports. While management remains largely supportive, the variability in clinical outcomes highlights the need for a personalised approach based on the patient's overall condition and risk factors. Further studies and increased clinical awareness are necessary to refine diagnostic protocols and therapeutic strategies for managing dengue myocarditis effectively.

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