**Dengue Fever: Transient Variable AV Conduction Block (2:1 with Mobitz Type I Second Degree) During Recovery Phase**

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**Abstract**
We report a case with serologically (MAC ELISA) proven acute dengue virus infection and variable atrio-ventricular (AV) conduction block (2:1 with Mobitz type I second degree). A 23 years old boy was referred to the hospital on the 7th day of the illness for thrombocytopenia (19000/cmm) with fever and body aches. On day 11th of the illness, during recovery phase he developed variable AV conduction block. There was no other abnormality in the 12-lead electrocardiogram (ECG) except occasional VPCs and echocardiogram showed normal ventricular systolic function. CPK-MB, serum electrolytes were normal. Trop-T was negative. The pulse and rhythm resolved to normal on day 13th. AV block during recovery from dengue fever may be a transient functional phenomenon, in which altered autonomic tone may play a role and conservative but vigilant management may be justified.

**Introduction**

Dengue is often self-limited, systemic viral infection transmitted between humans by mosquitoes. The global burden of dengue is large with an estimated 50 million infections per year and occur across approximately 100 countries, with potential for further spread. Various electrocardiographic abnormalities have been reported previously like ST segment abnormalities, low QRS voltage sinus bradycardia, first degree AV block, Mobitz type I second degree AV block, premature atrial contraction (PAC), and premature ventricular contraction (PVC). We report a patient who developed transient variable AV conduction block (2:1 with Mobitz type I, second degree) during recovery from dengue fever without myocarditis, which was transient and never been reported from India as far as literature is concerned. Variable AV conduction block (2:1 with Mobitz type I second degree) in asymptomatic patient during the recovery phase of dengue hemorrhagic fever may be benign and careful observation alone in such a patient may be justified. Only two cases are published from Thailand (Khongphatthallayothin et al.) in past with Mobitz type I, second degree heart block in dengue patient, which resolved after few days as in our patient also. Cardiac involvement in dengue patient should be kept in mind and actively searched for, as it may be a transient conduction abnormality so conservative but vigilant management may be justified.

**Case Report**

Our patient, 23 years old male, resident of Delhi was referred to us on day 7th of illness for thrombocytopenia at Baba Saheb Ambedkar Hospital, Rohini, Delhi-110085, India with presenting complaint of fever without chills with onset 7 days back, which persisted for 6 days and afebrile for 1 day before admission. Fever was moderate to severe grade and continuous type in character, associated with generalized body aches and headache. There was no history of petechial rash, gum bleed or any other bleeding manifestations. He was treated outside by fluids and paracetamol 500 mg during febrile episodes. His dengue IgM MAC Elisa report was positive.

On day 4 of admission (day 11th of illness) patient, during examination, his pulse was found to be regularly irregular, though the patient was clinically asymptomatic, no rash/bleeding, BP 110/70, TLC 6100, DLC: Polymorphs 75%, Lymphocytes 17%, Monocytes 5%, Basophils 2% and Eosinophils 1%. Platelets 19000/cmm and Hematocrit 34.4%. LFT: Bilirubin (total) 0.4 mg/dl, SGOT 114 U/L, SGPT 70 Serum creatinine 0.7 mg/dl, Electroytes; Na+ 134 mmol/dl, K+ 3.4 mmol/dl. Widal titer was not suggestive of typhoid and malaria parasite was not seen on P/S. In view of thrombocytopenia and high suspicion for vector born diseases prevalent from July up to October, possibility of dengue was kept and dengue IgM MAC Elisa was sought. On day of admission his ECG and chest X-ray were normal. He was given 10ml/kg IV saline bolus and 6ml/ kg/hour maintenance normal saline fluid, in view of mild dehydration and borderline BP, and his hydration and BP improved and urine output was adequate. He was started on empirically on Ceftriaxone 1 gm twice a day intravenously and oral paracetamole 500 mg during febrile episodes. His dengue IgM MAC Elisa report was positive.

On day 4 of admission (day 11th of illness) patient, during examination, his pulse was found to be regularly irregular, though the patient was clinically asymptomatic, no rash/bleeding, BP 110/70, TLC 4900, DLC: Polymorphs 65%, Lymphocytes 25%,
and platelets increased to the level of 1,12000/cmm. His ECG (Figure 1) showed AV conduction block (2:1 with Mobitz type I second degree). Further cardiac evaluation and electrolytes profile was done. His Echo was normal with EF – 60 %, no Regional wall motion abnormality and, no myocardial dysfunction and no pericardial effusion. Electrolytes were normal. CPK MB was 4.0 IU/ ml, Trop T was negative and HIV was non-reactive.

Patient was closely monitored clinically and with daily ECG. Patient remained asymptomatic throughout the course and after 2 days (on 13th day of illness), his ECG (Figure 2) showed resolution of heart block and ventricular arrhythmia. Further, during hospital stay he remained afebrile and was asymptomatic or have mild cardiac symptoms despite relative bradycardia, transient atrioventricular block, and/or ventricular arrhythmia and the other severe end; patients may experience acute pulmonary edema and/or cardiogenic shock due to severe myocardial cell damage with left ventricular failure or as acute pericarditis. Although rare, a fatal outcome was reported in some cases of dengue with cardiac complications.2,3

Electrocardiographic abnormalities have been observed in as many as 44-75% of patients with viral hemorrhagic fever.4 Although sinus bradycardia and prolongation of the PR interval were commonly observed; atrioventricular block beyond first degree appeared to be rare in these reports. In one review, varying degrees of nodal block during convalescence was said to be frequently seen, although descriptions of the patients were not given in this review.5

Two similar case reports were described from the Thailand6 in which patients with serologically-proven dengue virus infection had Mobitz type I second degree atrioventricular (AV) block and responded to autonomic alteration. During the period of the AV block, sympathetic stimulation (exercise) resulted in improvement and vagal stimulation (Valsalva maneuver) resulted in worsening of the AV block. These observations lead to conclude that the site of heart block in these 2 cases was at the atrioventricular node (rather than the His-Purkinje system).

While the mechanisms for conduction abnormalities in dengue are still not clear and needs further investigation. Genetic studies have identified a number of candidate genes associated with disease susceptibility. These include several genes encoding HLA molecules; cell receptors, including type 1 interferons, vitamin D receptor (VDR), intercellular adhesion molecule 3, ICAM3; DCSIGN or CD209; and blood antigens, including platelet antigens and ABO.7

AV block in our patient was transient and occurred during the recovery period, in which transient sinus bradycardia is also commonly seen. Because of similarities in the cellular electrophysiological properties of the sinus (SA) and the atrioventricular (AV) node, these transient abnormalities may represent a transient functional (rather than anatomical) impairments resulting from the same mechanism. Some of them are abnormalities in the autonomic tone, adenosine metabolism or other abnormalities in the cells that use predominantly calcium current for depolarization. Subendocardial hemorrhage, mostly in the interventricular septum has been reported in 47% of autopsy cases of patients who died from dengue hemorrhagic fever.8 It is possible that hemorrhages in the vicinity of the AV node may result in transient AV block although it is difficult to explain why a higher degree of AV block is hardly seen.

Most available antimalarial drugs include cardiac side effects. Side effects may include heart rate changes (amodiaquin), QT prolongation (halofantrine), which may lead to lethal torsade de pointes (TdP), via mechanism of ion channel inhibition.9 AV block though rare side effect, has been described as side effect of chloroquine therapy.10 But in this case use of antimalarial drugs was ruled out by history and treatment records.

In summary, we believe that the transient AV block in our case without myocardial dysfunction or signs of myocardial injury (ECG changes or elevated CPK/Troponin-T/2-D Echo) made diagnosis of acute myocarditis unlikely and a clinical implication exists from this observation. Although, by definition, the type of 2:1 block

Discussion

The clinical manifestations of cardiac complications in dengue illness are rare and vary considerably. At one end of the clinical spectrum, patients are asymptomatic or have mild cardiac symptoms despite relative bradycardia, transient atrioventricular
cannot be specified from a surface ECG. In general, blocks at the AV node (compared to infra-nodal blocks) carry a better prognosis and in many cases, represent functional rather than permanent pathology. Thus, variable AV conduction block (2:1 with Mobitz type I second degree) in asymptomatic patient during the recovery phase of dengue hemorrhagic fever may be benign and careful observation alone in such a patient may be justified. Further study of the incidence and clinical courses of this phenomenon may prevent unnecessary transferring of these patients to tertiary centers.

References