

Hypokalemic Paralysis as a Presenting Symptom of Dengue Fever: A Case Series

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Abstract: Dengue virus is one of the leading causes of viral hemorrhagic fever, especially in tropics countries like India. It can manifest from being asymptomatic to life-threatening complications. Although it is considered a non-neurotropic virus, there has been increasing evidence of neurological complications associated with the dengue virus. It is one of the leading causes of death in tropical and subtropical regions. The neurological involvements include Acute Disseminated Encephalomyelitis, Transverse Myelitis, Guillan-Barre Syndrome and Encephalitis. Here, we wished to investigate an unusual increase in cases of quadriparesis following fever. We report 3 such cases of acute onset proximal and distal symmetric pure motor reversible flaccid quadriparesis due to hypokalemia in dengue fever patients, who recovered completely on treatment. Thus, recognition and early treatment for hypokalemia in such patients must be undertaken to avoid complications.

Keywords: Dengue Fever, Hypokalemia, Quadriparesis

1. Introduction

Dengue is an arboviral disease endemic in tropical countries including India and commonly presents with non-specific symptoms such as fever, headache, retro-orbital pain, myalgias, maculopapular rash, and hemorrhagic manifestations like ecchymosis, petechia, bleeding gums, epistaxis and other complications related to thrombocytopenia. It was largely considered a non-neurotropic virus; however, evidence has been gathered against it. There are now increased reports of dengue virus neurotropism and resulting neurological complications such as Dengue encephalopathy, encephalitis, Guillain-Barre syndrome, Intra-cranial hemorrhage, myositis, Lumbosacral plexopathy, neuro-ophthalmic involvement, and pure motor quadriparesis [1, 2].

Pure motor quadriparesis due to hypokalemia is an important neuromuscular complication of dengue which is usually a pure motor, moderate to severe quadriparesis, usually without a sequela. However, it is to be noted that all the cases of dengue with hypokalemia do not present as quadriparesis.

2. Case Report

2.1. Case 1

A 36 years old male with no comorbidities, presented with sudden onset weakness of all 4 limbs for 1 day. The weakness was sudden in onset which started from bilateral lower limbs and then progressed to bilateral upper limbs over the next 2 hours. It was associated with a giveaway sensation, and the patient was unable to bear his weight and grasp his footwear and was unable to lift his arm above his head, or hold any items with his hand. There was no history of higher mental function, cranial nerve or bladder bowel involvement, paresthesia, and band-like sensation. There was no history of neck trauma, neck pain, headache, consumption of heavy carbohydrate meals, drug intake, or strenuous exercise. There was also a history of fever for 4 days which was high-grade, continuous, associated with chills and rigors, and lasted for 2 days, however, the patient was afebrile on presentation. There were no associated complaints of sore throat, vomiting, diarrhea, skin rash, or any bleeding manifestation. There was

no history of a similar episode of illness in the past and no family history.

On examination, the patient was conscious, oriented, and vitally stable. There was no pallor, icterus, pedal edema, or skin rash.

On neurological examination; higher mental functions, cranial nerves, and sensory system examination were normal, with no local spine tenderness. The tone was decreased in all 4 limbs. Power in proximal and distal muscles across all major joints was 4/5 in both upper limbs and 3/5 in bilateral lower limbs as per the MRC scale. Deep tendon reflexes were absent in all 4 limbs, and the bilateral plantar was flexor. Other systemic examinations showed no abnormality.

Laboratory parameters showed hemoglobin-13.9mg/dl, TLC-2300 cells/mm³, platelet count-10,000 cells/mm³, with PCV-41.7. With blood urea-30mg/dl, serum creatinine-0.6mg/dl, AST/ALT 184/120 U/l and serum potassium-2.9meq/dl. Serum magnesium level and ABG analysis were normal. Urinary Potassium was normal (20 meq/l). Malarial antigen by rapid card test was negative. Muscle enzymes were raised CK- 367. His thyroid profile was normal. NCCT-head showed normal study and CSF studies of the patient were within normal limits. The Nerve conduction study was suggestive of normal F wave latency and normal conduction velocities.

In the background of fever with thrombocytopenia, leucopenia, and transaminitis, Dengue serology showed positive NS1 antigen on day 5 of illness; Dengue IgM and IgG antibodies were negative.

The patient was managed with i.v. fluids, antipyretic, and Intravenous and oral potassium supplementation. The patient showed a dramatic response to treatment and over the course of 1-day the patient improved symptomatically, with power restored to 5/5 in all 4 limbs, and he was able to stand on his own and walk with support, the next day. And then patient went on to resume his daily activities, over the next 2 days and was discharged with normal serum potassium levels.

2.2. Case 2

A 27-year-old male with no comorbidities, with similar complaints of high-grade fever with chills and rigor for 5 days, weakness of all 4 limbs for 2 days, starting in lower limbs and involving both upper limbs in around 6 hours, with no history suggestive of higher mental function, cranial nerve or bladder/bowel involvement, paresthesia and band-like sensation. There was no history of similar illnesses in the past. The patient was vitally stable with a normal general examination. On CNS examination, the tone was decreased in all 4 limbs, and power was 4/5 in all 4 limbs, except the hip joint where it was 3/5. Superficial reflexes were normal, with bilateral ankle jerk 1+, absent knee jerk, and all reflexes in upper limb were 1+. All other nervous system examination was normal.

Laboratory parameters were normal, except platelets-40,000 cells/mm³, TLC-3000 cells/mm³ and serum potassium 3.2 mEq/dl. ECG showed normal sinus rhythm. Dengue serology done on day 6 of onset of illness showed NS1

antigen-positive, IgM, and IgG negative. The Nerve conduction study of the patient was normal with normal F wave latency and normal conduction velocities. All other tests including ABG, Thyroid profile, Urinary electrolytes, and NCCT Head were normal.

The patient showed excellent recovery to potassium supplementation and the next day power reached 5/5 in all 4 limbs with the patient being able to stand and walk on his own.

2.3. Case 3

A 35-year-old with no comorbidities, with similar complaints of high-grade fever with chills and rigor for 3 days associated with redness and itching all over the body for 1 day; mild abdominal pain for 1 day and weakness of all 4 limbs starting from both lower limbs and gradually involving both upper limbs within 2 hours; with no history of higher mental function, cranial nerve or bladder/bowel involvement, paresthesia and band-like sensation and no history of similar illness in the past. The patient was vitally stable and oriented. On general examination, a blanching erythematous rash was present over the patient's chest, back, and all 4 limbs. On neurological examination, power was 4/5 in proximal joints, while it was 3/5 in distal joints of all 4 limbs. The tone was reduced in all limbs. Deep Tendon Reflexes were absent in all 4 limbs, and both plantar reflexes were mute.

Laboratory parameters showed slightly raised creatinine-1.23mg/dl, Serum potassium 2.44 mEq/dl, and platelet count of 80,000 cells/mm³. Spot urinary potassium was 88 mEq/l. ABG was suggestive of respiratory alkalosis. ECG showed normal sinus rhythm. Dengue serology done on day 4 of onset of illness showed NS1 antigen-positive, IgM, and IgG negative. The Nerve conduction study of the patient was normal with normal F wave latency and normal conduction velocities. All other tests including Thyroid profile, and NCCT Head were normal.

The patient was managed conservatively with IV fluids, analgesics, and potassium replacement. Over the course of 2 days, the patient improved symptomatically, and power increased to 5/5 in all 4 limbs. Serum potassium and creatinine returned to normal levels.

3. Discussion

Dengue fever is an arthropod-borne disease occurring due to the bite of a female *Aedes* mosquito [3]. It can manifest from being asymptomatic to life-threatening complications. A new entity "Expanded Dengue Syndrome" was added to the classification of dengue to incorporate a wide spectrum of manifestations affecting various organ systems including hepatic, pulmonary, renal, gastrointestinal, and neurological manifestations. As dengue is an important cause of morbidity and mortality in India, it is vital to know about various clinical manifestations of this disease.

There are several case reports of dengue virus-associated hypokalemic paralysis across India [4-7, 9, 11, 14]. The exact mechanism underlying hypokalemia in dengue patients is

unknown however, several mechanisms underlying it can be; transient renal tubular abnormalities [12] resulting in increased urinary potassium loss [4, 8, 9, 11], secondary insulin resistance causing potassium to move inside cells, stress-induced catecholamine release [4], resulting in intracellular potassium shift and release of GM-CSF and associated cytokines in response to neutropenia causing the shift of potassium into the cells [10].

All the 3 patients in our study had hypokalemia as the cause of quadriparesis, out of which the obvious cause of hypokalemia was found to be acute kidney injury in only one of our patients. Raised muscle enzyme was found in one of our patients, which can be attributed to vasoconstriction and muscle ischemia caused by hypokalemia [13, 15].

Other differential diagnoses of acute onset quadriparesis may include AIDP, periodic paralysis, trauma to the spine, vascular causes, transverse myelitis, and stroke. However, the possibilities of the same were ruled out. To rule out AIDP, Nerve conduction studies were done which were normal in all of our patients, CSF studies did not show albumin-cytological dissociation; there was no history of similar illness in the past or family history making periodic paralysis less likely, and NCCT head was normal in all the patient ruling out the possibility of stroke and there was no history of fall or trauma making spinal trauma less likely. The main point of highlight was the rapid recovery of weakness after potassium supplementation, which makes other diagnoses less likely.

4. Conclusion

Dengue fever is one of the most common infections in tropical countries like India, especially during the rainy season. Although the classical presentation of dengue fever is fever with chills and rigor, thrombocytopenia, and bleeding manifestations, it can rarely cause neurological manifestations in the form of quadriparesis. Hypokalemia should be considered as one of the causes of this presentation to avoid delay in diagnosis and management as it is a readily treatable condition and a delay in diagnosis and management can lead to respiratory muscle involvement, cardiac arrhythmias, and death.

Conflict of Interest

The authors declare that they have no competing interests.

Declaration of Interests

1. The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
2. The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: There was no conflict of interest.

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