Commentary

An acute onset of neuromuscular weakness associated with some of the arboviral infections aresuch as Dengue fever,[1] Chikungunya fever, West Nile encephalitis, Japanese encephalitis. Clinical examination plays an important role in diagnosis of neuromuscular weakness. Specific findings include muscle wasting or swelling, muscle tenderness, fasciculations or myokymia, myotonia, presence of tendon reflexes, and skin lesions. Electrophysiological studies like EEG can pinpoint the involvement of CNS in arboviral infections[2]. A biopsy of nerve or muscle and ancillary investigations, namely EMG, NCV, can be invaluable in typing and sub-classifying the neuromuscular pathology. Advanced radiological techniques like magnetic resonance imaging (MRI), PET scan or fMRI (functional MRI) of the brain and spinal cord need to be done when there is a suspicion of upper motor neuron involvement.

Virus isolation as a gold standard should be attempted in susceptible cell lines, namely C6/36, Vero, BHK-21, LLC-MK2. If any cytopathic effect (CPE) is observed then it should be characterised by molecular diagnostic techniques like RT- PCR. Serological confirmation should be done by MAC-ELISA, NS1 ELISA.[3] Immunocytochemistry should also be performed to show localization of viral antigens in muscle tissue/skin.

West Nile Virus (WNV) is known to produce a meningo-encephalitis with an acute flaccid paralysis.[4] Severe WNV infection can also mimic Guillain-Barré syndrome (GBS) but is differentiated by fever; encephalopathy; predominantly proximal, asymmetric weakness; axonal pathology on nerve conduction studies;[5] and cerebrospinal fluid variables. The cerebrospinal fluid typically shows lymphocytic pleocytosis with elevated proteins. Enzyme-linked immunosorbent assay for immunoglobulin IgM antibody to WNV is highly sensitive and should be considered. As IgM antibodies can persist for up to a year after primary infection, serial IgM titers or IgG avidity studies can help to differentiate primary infection from past infection. MRI may show enhancement of the cauda equina, spinal cord signal changes, and cerebral parenchymal or leptomeningeal signal changes. Treatment is mainly supportive, and no antiviral medications have any proven benefit in the management of WNV.

Immunohistology on muscle biopsies from chikungunya virus-infected patients with myositic syndrome showed that viral antigens were found exclusively inside skeletal muscle progenitor cells (designed as satellite cells) and not in muscle fibers. Muscle cells have been proposed to be target cells for alphavirus infection. However, these studies were either performed on animal models, or only based on clinical observations in man, and the cellular target of virus infection was either not identified within the muscle, or identified as muscle fibers and/or infiltrating cells.[6] Cases of GBS have been described in association with the arboviruses such as *Dengue* and *West Nile* and also with *Chikungunya virus*.

The electrolyte disorders mainly potassium imbalance are among the most common causes that produce neuromuscular weakness. Recurrent muscular weakness is caused by hypokalemic periodic paralysis or thyrotoxic periodic paralysis. Generally, patients with hypokalemic periodic paralysis do not lead to respiratory failure. Acquired hypokalemia from causes such as diarrhea or gastroenteritis can also produce muscular weakness and respiratory failure.[7] The patients with serum potassium levels less than 3.5 mEq/L require oral or intravenous potassium infusion. Potassium should be co-administered only with normal saline as glucose infusions further depletes potassium ions leading to severe hypokalemia. Other, more

rarely, severe hypophosphatemia can cause muscular weakness.[8]

If the presence of myopathy is uncertain, electromyography may be indicated. Although changes seen on electromyography are not pathognomonic for any specific disease process, an abnormal electromyogram can indicate if a neuropathy or neuromuscular disease is present or can help solidify the diagnosis of a primary myopathy. Muscle inflammation, atrophy, necrosis, denervation, or neuromuscular disease can alter these components, giving rise to patterns that may help illuminate the underlying pathology.

If the diagnosis is still inconclusive after the history, physical examination, and laboratory, radiologic, and electromyographic evaluations, a muscle biopsy is required for patients who have a suspected myopathy. The technology of this method, especially regarding the use of genetic markers, is advancing rapidly, making a definitive diagnosis possible for a wider range of myopathies.

Clinicians must therefore consider arboviral infections as an important cause of neuromuscular weakness which must be corroborated by virological studies, namely serology, virus isolation and PCR, in view of emerging and re-emerging viral infections.

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