Correspondence

Reply to Comment on Peripheral Polyneuropathy Associated with COVID-19 in Two Patients: A Musculoskeletal Ultrasound Case Report

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Dear Editor,

We thank Dr. Finsterer for his Correspondence and insight regarding peripheral polyneuropathy in our case report as being caused by the treatment and immune response rather than SARS-CoV-2 itself. We also appreciate the delineation of the terms electromyography and electroneurography, which we imprecisely used interchangeably.

In our case report of two patients who were diagnosed with peripheral polyneuropathy associated with COVID-19, the involved clinicians, following review of the patients’ histories, did conclude that this novel coronavirus had likely played a direct role in their development of peripheral polyneuropathy. However, we were not suggesting in our case report that the cause of neuropathy was solely from direct viral infection of the nerves, but undeniably, the cause was multifactorial. This is why our case report was entitled, "peripheral polyneuropathy associated with COVID-19…”

As was discussed in our case report as well as in prior publications, these symptoms and complications are thought to be the result of the direct cytopathic effect of viral infection of cells outside of the respiratory tract and a subsequent cascade of systemic inflammation including cytokine release related to the immune response.[1-4] Cipollaro et al. documented that the SARS-CoV-2 virus can cause direct damage to the endothelium of the peripheral nerves.[4] They also mentioned that in COVID-19 patients, interleukin-6 and tumor necrosis factor-α levels, both in the plasma and in upper respiratory secretions, directly correlate with the magnitude of viral replication and systemic symptoms, including peripheral polyneuropathy.[4]

These postinfectious-related neurological symptoms are not unique to COVID-19 but have also been reported in patients with other previously identified SARS-CoV strains, the Middle East respiratory syndrome-CoV, and other viruses including the Zika and Epstein–Barr viruses.[1,5-7] As Dr. Finsterer mentioned, long-term mechanical ventilation in the intensive care unit can also induce proinflammatory conditions in these patients, contributing to the systemic complications.[1-3] Some patients who are intubated long term can also develop a compressive neuropathy, however, this did not explain the finding of a systemic axonal sensorimotor polyneuropathy in both of our patients.[1] Finally, to address the antibiotics as a possible cause in the first patient, these were reviewed by the clinical pharmacist and determined not to be the cause of the neuropathy.

As mentioned in our case report, patients with type 2 diabetes are at an increased risk of developing peripheral neuropathy.[1] However, to address the questions raised, neither patient complained of or demonstrated any of these symptoms prior to presenting with COVID-19, neither had any history of neuropathy or diabetic retinopathy prior to their admission, and furthermore, hemoglobin A1c levels in both patients were controlled prior to admission.

Unfortunately, identifying exactly which of the above contributed the most to the cause is not always clinically feasible, practical, or necessary. Neither patient was stable enough to run an invasive cerebrospinal fluid investigation nor was the risk of exposure to the clinician and technologists performing the procedure appropriate at the time. The goal was not to run extensive tests to isolate each individual cause...
but to quickly identify that the end result is viral-associated peripheral neuropathy and begin the earliest treatment.

Identifying viral-associated peripheral neuropathy early is when musculoskeletal ultrasound becomes instrumental and is the main focus of our case report. We desired to bring to light the use of musculoskeletal ultrasound for diagnosing peripheral neuropathies and demonstrate how, given its portability, it is especially instrumental for patients in isolation, such as those with COVID-19.[1,8]

We appreciate the difficulty in identifying exact causation in these viral-associated peripheral neuropathy cases and agree with Dr. Finsterer that the cause is certainly multifactorial but nonetheless associated with infection with this novel coronavirus, SARS-CoV-2.

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Conflicts of interest
There are no conflicts of interest.

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