Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Clinical and radiographic course of a patient with late-onset, rapidly progressive, MRI-negative myelitis after COVID-19 illness

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Dear Editor,

We are writing in reference to a previously reported case of late-onset, rapidly progressive, MRI-negative myelitis after COVID-19 illness [1] to report our patient's remarkable recovery. A 60-year-old woman with obesity (BMI 45.6) and borderline diabetes had presented with late-onset partial myelitis that progressed to complete myelitis over 3 months, which manifested 9 weeks after she had COVID-19. As a result, the patient developed paraplegia, became wheelchair-bound, and developed weakness in her hands. Extensive infectious, inflammatory autoimmune, neoplastic, and paraneoplastic investigations were negative, while serum SARS-CoV-2 IgM and repeat IgG tests were reactive. Initial brain and spinal magnetic resonance imaging (MRI) had been normal, but later MRIs revealed bilateral corticospinal tracts affecting the posterior limbs of internal capsules extending to the cerebral peduncles and pons, as well as multifocal T2 signal changes in the cervical cord (C2-C6) on sagittal STIR without associated enhancement. She had been treated with intravenous methylprednisolone (1 g for 5 days), which led to no improvement. Afterward, she received 5 rounds of plasma exchange (PLEX), which did result in mild improvement. The patient had also reported further improvement after discharge from rehabilitation, where she was able to stand with bilateral assistance and move her legs against antigravity. Also, we apologize for having initially reported the wrong age (65 years) for this patient; she was 60 years old at the time of the presentation.

The patient subsequently received prednisone 20 mg daily for over a month followed by a slow taper over 3 months, and she recovered considerably 8 months after hospitalization. She regained significant strength in her lower extremity, ambulated with a walker, and continued to receive outpatient physical and occupational therapy. Follow-up brain and cervical spine MRI with and without contrast 8 months after her last MRI showed significant improvement of the T2/FLAIR signal abnormality that had been seen involving the corticospinal tracts within the corona radiata extending to the posterior limb of the internal capsules bilaterally, without restricted diffusion or enhancement (Fig. 1 A). She has also shown progressive normalization of the high signal intensity that was previously seen within the cervical cord. No new areas of cord signal abnormalities have been identified (Fig. 1 B). Repeat aquaporin-4 IgG and myelin oligodendrocyte glycoprotein IgG antibodies tested with cell-based assays were also negative.

Our patient made a remarkable recovery despite having accumulated significant disability from myelitis. Unfortunately, there had been an initial delay in the treatment. Interestingly, the previously seen abnormal signal changes on MRI of brain and spine also improved over time. However, we thought that the bilateral corticospinal tract findings could have been a feature of Wallerian degeneration, perhaps an intense axonal degeneration without demyelination due to viral-induced pathogenesis. The patient is delighted with the care and treatment that she received, and she has consented to publication of her progress to help the medical community understand the pathogenic disease mechanisms involved in her case. (Note that the patient was made aware of the initial error regarding her age.).

The SARS-CoV genome has been detected in the cytoplasm of neurons in the brain; thus, it is likely that SARS-CoV-2, given its similar invasion mechanism, can lead to neuronal dysfunction either directly or indirectly through immune-mediated mechanisms [2]. Related to but distinct from meningoencephalitis are the possible para-infectious or post-infectious complications of the nervous system due to SARS-CoV-2 infection, such as acute disseminated encephalomyelitis, transverse myelitis, and Guillain-Barré syndrome. These are generally considered to result from an adaptive immune response against endogenous or "self" molecules; i.e., molecular mimicry. However, these sequelae are consistently found in older individuals (> 50 years old), particularly those with underlying vascular, metabolic, pulmonary, and obesity comorbidities. The exaggerated immune response may stem from a dysregulated or impaired regulatory immune function responsible for suppressing the immune response after it has been mounted [3]. Older individuals are more likely to have dysregulated immune function due to immunosenescence [4], and individuals with metabolic diseases, hypertension, and obesity also have a deficiency in immune regulatory mechanisms [5,6]. Nonetheless, we speculate that immunotherapy may play a role in helping individuals such as our patient, who had continued to decline until she received high-dose pulse steroids and PLEX.

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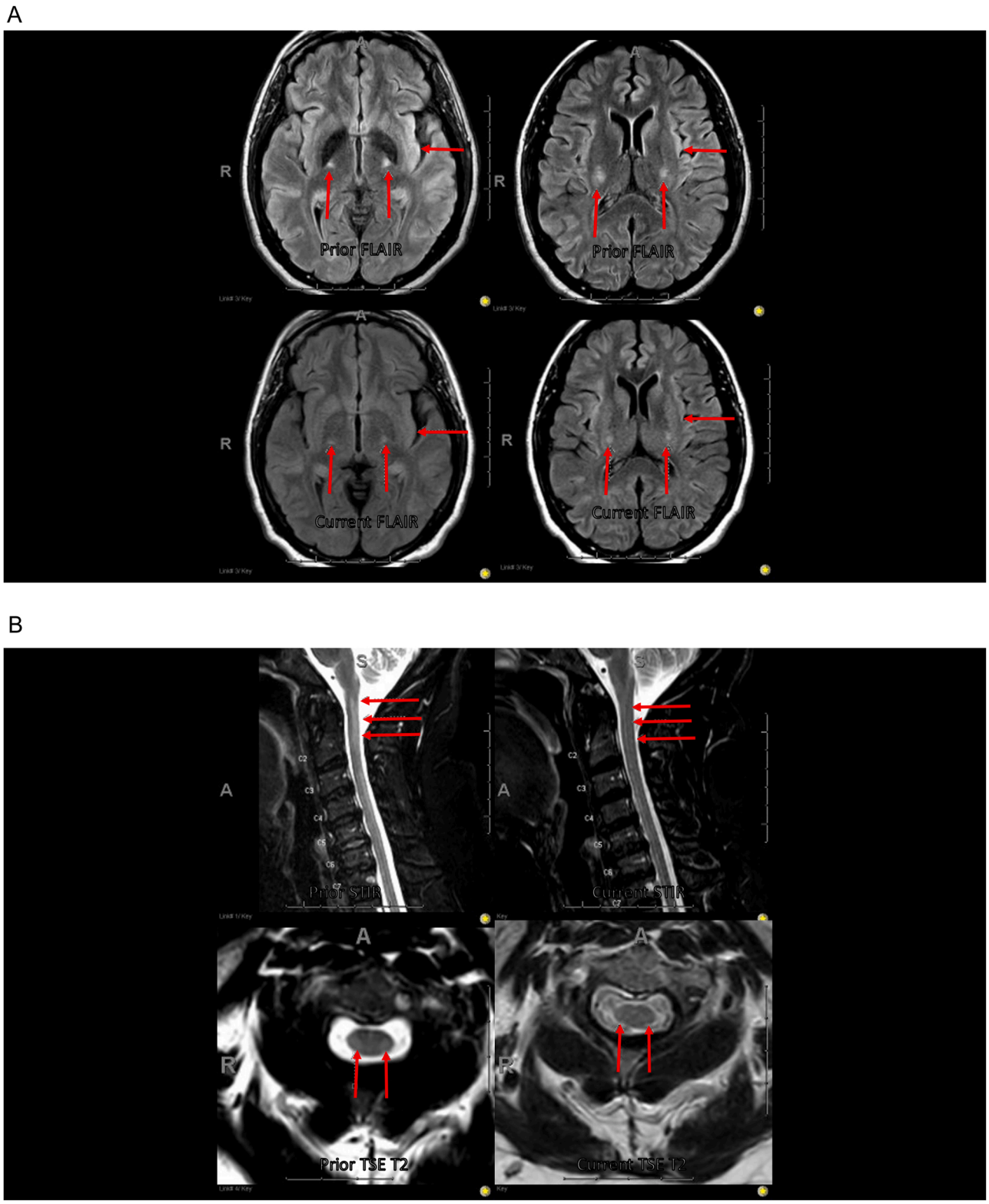

Fig. 1. A): Significant improvement of the T2/FLAIR signal abnormality that had been seen involving the corticospinal tracts within the corona radiata extending to the posterior limb of the internal capsules bilaterally, without restricted diffusion or enhancement. (B): Progressive normalization of the high signal intensity that was previously seen within the cervical cord. No new areas of cord signal abnormalities have been identified.

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Anza B. Memon[a,b,*], Rami Al-Hader[a], Frederick Sherburn[a], John Corrigan[b,c]
[a] *Department of Neurology, Henry Ford Hospital, Detroit, MI, USA*
[b] *Wayne State University, School of Medicine, Detroit, MI, USA*
[c] *Department of Radiology, Henry Ford Hospital, Detroit, Michigan, USA*

[*] Correspondence to: Department of Neurology, Henry Ford Hospital, 2799 W Grand Blvd, Detroit, Michigan, USA 48202.
E-mail address: amemon2@hfhs.org (A.B. Memon).