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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Correspondence

Miller Fisher Syndrome Associated With COVID-19 Infection

We read with interest the report of transverse myelitis in a child with coronavirus disease 2019 (COVID-19).[1] COVID-19-associated Guillian-Barré syndrome has been documened, albeit uncommonly in children.[2]

We report a seven-year-old child who developed post-COVID-19 Miller Fisher syndrome (MFS) manifested by acute diplopia, nasal twang, drooling, and an unsteady gait. Neurological examination revealed bilateral ophthalmoplegia and VII, IX, and X nerve palsies. He was ataxic and hyporeflexic with power of 4/5 in all limbs. He was brought to us 10 days after he had suffered from an acute respiratory illness during which he was not tested, although prior history of contact with a positive COVID-19 household member was revealed.

Investigations showed normal creatine phosphokinase, serum electrolytes, immunoglobulin G (IgG), and liver and renal function tests. Cerebrospinal fluid (CSF) analysis showed protein 58 mg/dL (normal 12 to 45 mg/dL), glucose 67 mg/dL, and cell count 2/μL (one neutrophil, one lymphocyte). CSF meningitis (film array) polymerase chain reaction (PCR) panel, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) PCR, autoimmune panel (anti-glutamate receptor, gamma-aminobutyric acid antibody receptor), and culture were negative. CSF IgG was 60.20 mg/L (normal<34 mg/L); oligoclonal bands were absent. Nerve conduction velocity studies and magnetic resonance imaging of the brain and spine were normal. Evaluation for infections that could have triggered MFS revealed positive SARS CoV-2 antibody IgG (80.6 AU/mL). Respiratory viral PCR panel, SARS CoV-2 reverse transcription PCR, scrub typhus ELISA, and blood, urine, and stool cultures were negative.

A clinical diagnosis of MFS was made, and 2 g/kg intravenous immunoglobulin (IVIg) was given. However, his neurological symptoms persisted and he underwent plasmapheresis 10 days later. Five daily sessions of plasma exchange were done after which he improved. Facial and eye movements and gag reflex were restored. He was discharged after 30 days of hospitalization. On teleconsultation at four weeks postdischarge, he had recovered completely.

This is the first documented child with post-COVID MFS. Until now, seven adults with COVID-19-associated MFS have been reported.[3] Post-COVID MFS appears to be an immune-mediated response rather than direct neuropathogenic effect of the virus. This is supported by the absence of SARS-CoV virus in CSF in the cases described so far, including ours. Also, as anti-GQ1b antibody has not been identified in any of the reported cases, it appears that a different target antigen could be responsible. We were unable to obtain antiganglioside antibodies in our patient. Our patient did not respond to IVIg, which is unusual because IVIg directly interferes with the pathogenic effects of anti-GQ1b antibodies and hence is an effective therapy for MFS.[4] This also suggests a non-anti-GQ1b mediated pathogenesis.

It appears that MFS is a potential COVID-19-related complication. Knowledge of target antigens and the pathophysiology in pediatric COVID-related neurological manifestations could be important for development of safe vaccines in children.

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Veena Raghunathan, MD, FNB
Senior Consultant, Pediatric Intensive Care Unit, Medanta, the Medicity, Gurugram, Haryana, India
E-mail address: drvraghunathan@gmail.com.

Maninder Dhaliwal, MD
Associate Director, Pediatric Intensive Care Unit, Medanta, the Medicity, Gurugram, Haryana, India

Pratibha Singhi, MD
Director, Pediatric Neurology, Medanta, the Medicity, Gurugram, Haryana, India

Sunit Singhi, MD
Chairman, Division of Pediatrics, Medanta, the Medicity, Gurugram, Haryana, India

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