

Autoimmune Encephalitis Secondary to COVID-19 Infection

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Coronavirus disease-2019 (COVID-19), first detected at the beginning of 2019, has been reported to cause the novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). However, this manifestation is not the only one to be reported. There have been an increasing number of reports regarding numerous neurological symptoms including acute behavioral disturbances that have been related to COVID-19 [1]. Ellul and colleagues [2] reported the cases of eight patients who presented with encephalitis as a result of a COVID-19 infection. We report another case of encephalitis secondary to a COVID-19 infection.

PATIENT DESCRIPTION

During the COVID-19 pandemic a 56-year-old man, presented to our emergency department [ED] in a confused state. He was acting aggressive and disobedient. His family reported recent changes in his behavior accompanied by heavy perspiration and three episodes of emesis prior to his arrival at the ED. There was no history of fever.

A neurological examination was performed during which the patient was conscious but not oriented to time, place, or person. A PERRLA eye assessment was performed without photophobia or neck rigidity with no other neurological deficit. Moreover, the patient's lung, heart, and abdominal examination were

unremarkable. His vital signs were within the normal range.

His medical history included type 2 diabetes mellitus, dyslipidemia, hypertension, and heavy smoking. For each of the later medical conditions he had been receiving the proper medical treatments.

His blood test results showed normal electrolytes as well as normal kidney and liver functions. His hemoglobin was 18 g/dl. He had a white blood cell count of 13000/ul while his lactate and C-reactive protein levels were within the normal range.

An electrocardiogram showed a sinus tachycardia without any signs of myocardial ischemia or other arrhythmia. A brain computed tomography (CT) without contrast and CT angiography were performed to rule out bleeding or stroke without any abnormal finding.

As part of the neurological workup, the patient underwent a lumbar puncture. His cerebrospinal fluid (CSF) analysis showed high protein (1335 mg/L), $10 \times 10^9/L$ lymphocytes, $5 \times 10^7/ml$ polymorphonuclear leukocytes, 3 red blood cells/mm³, and glucose level that was not reduced. These results are suggestive of encephalitis. The patient was admitted to the intensive care unit and was immediately started on ampicillin, ceftriaxone, and acyclovir regimen.

During his hospitalization, the patient was found to be positive for SARS-CoV-2 in polymerase chain reaction (PCR) from a nasopharyngeal swab. PCR for HSV1, HSV2, VZV, COVID-19, and enterovirus from CSF returned negative. Gram stain and culture of CSF were also negative. Acyclovir and antibiotics were stopped. The patient was diagnosed with auto-

immune encephalitis secondary to his COVID-19 infection. Under supportive care and high dose intravenous steroids the patient's symptoms improved. He became fully oriented, his aggression ceased, and his vital signs and laboratory results returned to normal levels. The patient's respiratory levels were stable and did not require therapy with remdesivir. A COVID-19 test at his discharge was negative.

COMMENT

Since the beginning of the COVID-19 pandemic, world leaders and healthcare providers have become aware of the respiratory challenges that COVID-19 poses. However, it has been reported that patients with COVID-19 may present with severe neurological symptoms by indirect mechanisms such as encephalopathies and neuropathies due to systemic critical illness and secondary immune phenomena, as we found here. We believe this report can contribute to the current literature and encourage further research to find specific antibodies against SARS-CoV-2 in the CSF.

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