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Cranial Nerve III Palsy in the Setting of COVID-19 Infection

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We report one previously healthy patient diagnosed with COVID-19 presenting with a cranial nerve III palsy.

CASE

A 67-year-old man with COVID-19 diagnosed on March 30th presented to the Vanderbilt Emergency Department on April 20th with complaints of double vision and left ptosis beginning on April 4th. The patient described concomitant symptoms of fever, fatigue, myalgias, and diarrhea. He denied recent trauma, eye redness, orbital pain, headache, motor sensory changes, ataxia, or weakness. His medical history was negative for hypertension, diabetes, hypercoagulable risk factors, or family history of hypercoagulable disorder. He had a remote history of Lyme disease diagnosed 9 years before. Examination was notable for left ptosis and supraduction, adduction, and infraduction deficits. The left pupil was 1 mm larger than the right and similar in light and dark. Both eyes were white without proptosis. Anterior segment and fundus examination were unremarkable.

Head computed tomographic angiography did not demonstrate an aneurysm. MRI brain showed scattered nonspecific T2/fluid-attenuated inversion recovery hyperintensities that could be reflective of microvascular ischemic changes vs inflammatory lesions. There was no contrast enhancement of left third cranial nerve. D-dimer was elevated >500. Prothrombin time and international normalized ratio were normal. C-reactive protein, erythrocyte sedimentation rate, Lyme disease polymerase chain reaction, acetylcholine binding antibody, angiotensin-converting enzyme , and anti-GQ1b immunoglobulin G and immunoglobulin M were normal. The patient was discharged home with close follow-up. At his 1 month visit his diplopia had improved, and after 2 months, his third nerve palsy had resolved. Given his negative laboratory workup, elevated D-dimer, and the lack of typical comorbidities predisposing a patient to microvascular disease, the possibility of COVID-19–related third nerve palsy was postulated.

Multiple recent studies have reported an association between COVID-19 and cranial neuropathies. Several mechanisms have been theorized, including direct viral involvement, inflammatory response, immune mechanisms, and microvascular disease. Neurologic manifestations occurring because of an aberrant immune response to COVID-19 has been reported (1,2). A single case of pupil sparing oculomotor nerve palsy in the setting of the novel coronavirus was reported; however, the patient had multiple risk factors for vascular disease, including hypertension, diabetes, and cigarette smoking (3). Direct viral invasion into the central nervous system through severe acute respiratory syndrome coronavirus 2 viral interaction with the angiotensin-converting enzyme 2 receptor in the nervous system leading to a cranial neuropathy has also been postulated (2).

In our patient, the elevated D-dimer level suggests another possible etiology. Elevated concentrations of plasma D-dimer indicate recent or ongoing intravascular coagulation and fibrinolysis (4). A common theme seen in COVID-19 infection is coagulopathy (5). COVID-19 patients have high venous thromboembolism rates, elevated D-dimer levels, and pulmonary microvascular thrombosis (6). The occurrence of thrombotic phenomenon in COVID-19 has been supported by recent autopsy reports showing microthrombi in the pulmonary vasculature (7). The mechanism of microthrombi formation in COVID-19 is unclear and may involve hypercoagulability, complement activation, or direct endothelial injury. Microthrombi formation secondary to COVID-19 infection should be considered as a possible etiology of the acute cranial nerve palsy as reported in this patient.

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The authors report no conflicts of interest.

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