

Coronavirus Disease in the Brain: Incidence of Neurologic Complications of COVID-19 and Its Supportive Treatments

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PURPOSE

The purpose of this study was to examine the use of brain imaging in patients with COVID-19 presenting with neurologic complications and assess the incidence of critical findings.

METHOD AND MATERIALS

The total SARS-CoV-2-positive patients admitted at a tertiary health system during January 1-April 27, 2020 was calculated. All CT head and MRI brain reports during this period were searched for 'COVID' or 'coronavirus.' Patient demographics; comorbidities, including hypertension, diabetes, asthma, OSA, COPD, and CKD; laboratory values at the time of neuroimaging; and neuroimaging findings were recorded. Acute/subacute infarct, acute/subacute intracranial hemorrhage, vascular occlusion, infection-inflammation, and hypoxic-ischemic encephalopathy were classified as 'critical' findings and their incidence determined.

RESULTS

A total of 1357 SARS-CoV-2-positive patients were admitted, of which 81 (6%) underwent head imaging (71 CT head, 1 MRI brain, 7 both). Mean age was 66.3±SD 14.7 years, 36 females/45 males. Eighteen (22.2%) had 'critical' findings with mean age of 60.5±12.6 years, 9 females/9 males, 12 black/6 white. Seven (38.9%) of 18 were intubated and 3 (16.7%) were on VV-ECMO at some point. Hypertension (13;72.2%) and type 2 diabetes mellitus (9;50%) were the most common comorbidities. Three (16.7%) had subarachnoid and 3 (16.7%) had intraparenchymal hemorrhage; 12 (66.7%) had acute/subacute infarct; 1 (5.6%) had hypoxic-ischemic encephalopathy; and 4 (22.2%) had large vessel intracranial occlusion. Mean hemoglobin (9.3±2.2 g/dL) was below normal. Serum creatinine (1.73±1.38 mg/dL), D-dimer (16.3±35.2 ug/mL), and fibrinogen (455.9±230.3 mg/dL) were elevated. Mean platelet count was normal (259.2±173.5 microliter⁻¹). Mean PT (14.2±2.3 s), PTT (46.1±29.8 s), and INR (1.5±1.3) were mildly elevated. Three (16.7%) patients expired.

CONCLUSION

Among the small subset of COVID-19 patients who underwent urgent neuroimaging, the rates of critical findings and mortality were high. Critical findings were more common in patients with hypertension and type 2 diabetes mellitus and those requiring critical care.

CLINICAL RELEVANCE/APPLICATION

COVID-19 presents as pneumonia, but the associated cytokine storm it induces and the supportive treatments used in these patients can have critical, life-threatening neurologic consequences. In addition, reports are surfacing of increased risk of thromboembolic complications in COVID-19 patients.