

Teaching NeuroImage: Imaging and Pathologic Findings in SARS-CoV-2–Related Acute Demyelinating Encephalomyelitis

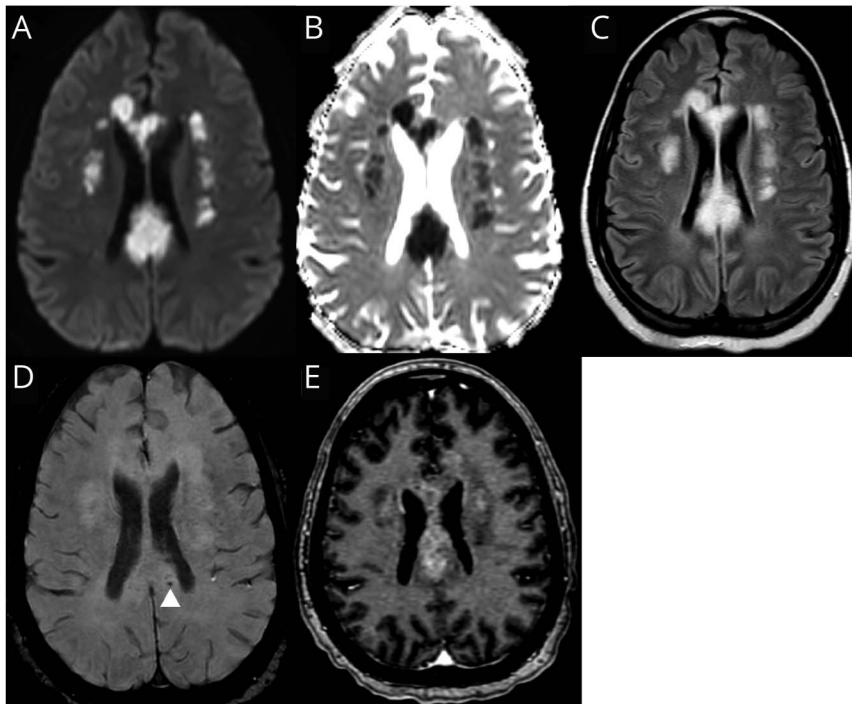
Rakhee Lalla, DO, Ramya Narasimhan, MD, Mohamad Abdalkader, MD, Deepti Virmani, MD, Kushak Suchdev, MD, Brian Moore, MD, MEd, and Anna Cervantes-Arslanian, MD

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Correspondence

Dr. Cervantes-Arslanian
anna.cervantes@bmc.org

Figure 1 MRI of the Brain With Contrast



Diffusion-weighted image (A) with Apparent Diffusion Coefficient (B) showing confluent areas of restricted diffusion with associated FLAIR hyperintensity (C) involving the corpus callosum and bilateral corona radiata. Microhemorrhages (D) in the corpus callosum. Postcontrast images (E) demonstrate heterogeneous enhancement.

A 41-year-old woman with type 1 diabetes admitted with SARS-CoV-2 PCR confirmed respiratory failure developed altered mental status. EEG was unrevealing, and CSF showed an elevated protein (110 mg/dL) and normal glucose (159 mg/dL), without pleocytosis or oligoclonal bands and normal IgG index. MRI demonstrated FLAIR hyperintensities in the corpus callosum and periventricular white matter (Figure 1). She was treated with plasmapheresis for presumed SARS-CoV-2–related acute demyelinating encephalomyelitis (ADEM) but succumbed to cardiopulmonary arrest. Postmortem histology revealed irregular zones of demyelination with axonal sparing and perivascular inflammatory infiltrate, consistent with ADEM (Figure 2). There was no inflammation within the vessel walls as is seen in vasculitis. SARS-CoV-2 ADEM has variable clinical presentations. Involvement of deep white matter and the corpus callosum has been previously reported,

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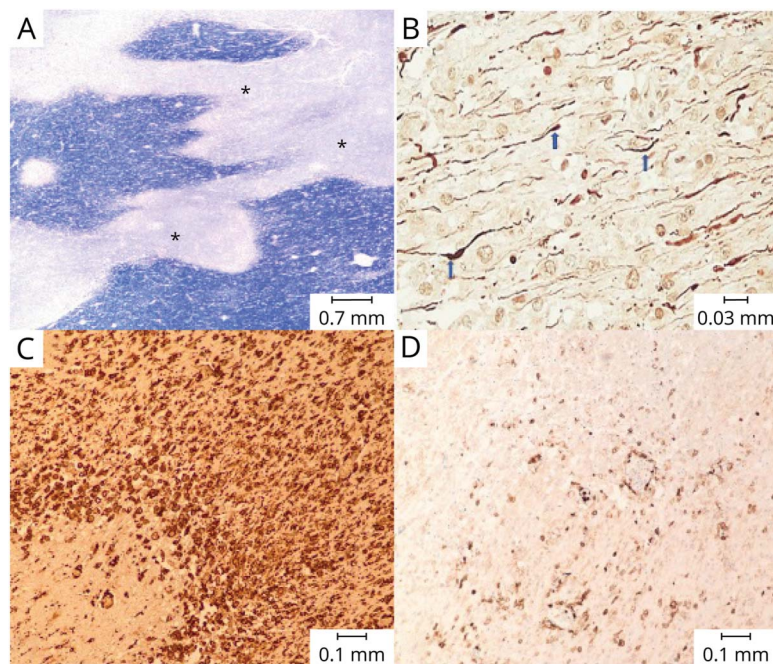
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From the Department of Neurology (R.L., D.V., K.S., A.C.-A.); Department of Pathology (R.N., B.M.); Department of Radiology (M.A.); Department of Neurosurgery (K.S., A.C.-A.); and Department of Medicine (Infectious Disease) (A.C.-A.), Boston University School of Medicine and Boston Medical Center, MA.

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(A) Areas of pallor representing demyelination (*) on Luxol Fast Blue stain. (B) Relative preservation of axons (blue arrows), shown by neurofilament immunohistochemistry. (C) Dense macrophage infiltration as evidenced by CD163 immunohistochemistry. (D) Scattered lymphocytic infiltration as demonstrated by leukocyte common antigen immunohistochemistry.

as well as hemorrhagic leukoencephalopathy, although only minimal microhemorrhage was present for this patient.¹ ADEM can be difficult to diagnose, and outcomes are often poor.²

Author Contributions

R. Lalla: drafting/revision of the manuscript for content, including medical writing for content; major role in the acquisition of data; study concept or design; analysis or interpretation of data. R. Narasimhan: drafting/revision of the manuscript for content, including medical writing for content; major role in the acquisition of data. M. Abdalkader: drafting/revision of the manuscript for content, including medical writing for content; major role in the acquisition of data. D. Virmani: study concept or design. K. Suchdev: drafting/revision of the manuscript for content, including medical writing for content. B. Moore: drafting/revision of the manuscript for content, including medical writing for content; major role in the acquisition of data; study concept or design; analysis or interpretation of data. A. Cervantes-Arslanian: drafting/revision of the manuscript for content, including medical writing for content; major role in

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References

1. Reichard RR, Kashani KB, Boire NA, Constantopoulos E, Guo Y, Lucchinetti CF. Neuropathology of COVID-19: a spectrum of vascular and acute disseminated encephalomyelitis (ADEM)-like pathology. *Acta Neuropathol.* 2020;140(1):1-6.
2. Wang Y, Wang Y, Huo L, Li Q, Chen J, Wang H. SARS-CoV-2-associated acute disseminated encephalomyelitis: a systematic review of the literature. *J Neurol.* 2022; 269(3):1071-1092.

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