Brain and spinal cord small vessel infarctions in a patient with COVID-19 exposure and poorly controlled type 1 diabetes mellitus

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Background

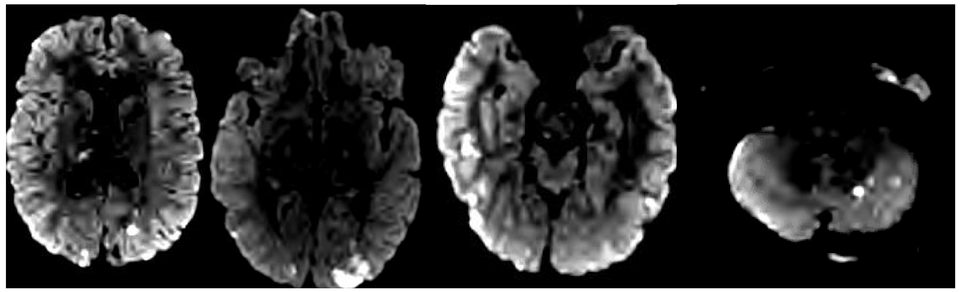
SARS-coV-2 (COVID-19) has been found to cause widespread CNS disease by multiple pathogenic mechanisms, including encephalitis and cerebral edema, and especially stroke, including large vessel occlusions, cerebrosinus venous thrombosis, and embolic arterial occlusion due to hypercoaguable state and vascular endothelial injury.[1] Numerous publications have discussed the range of radiographic findings with CNS involvement iin COVID-19 infections, and neurologic manifestations can be seen both in patients who are symptomatic or asymptomatic.[2]

Methods

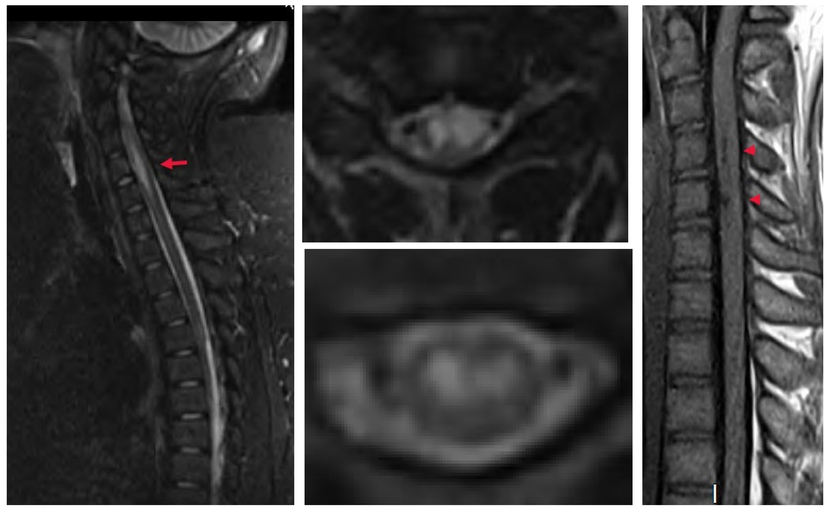
This is a 15 year old female with a past history of poorly controlled type I diabetes mellitus who had a prior history of 2 recent episodes of diabetic ketoacidosis requiring admission to the pediatric intensive care unit, the most recent of which was 4 months prior, who presents to the HDVCH ED with worsening headache, right visual field loss, and acute bilateral arm weakness (right 2/5, left 3/5) and right leg weakness (3/5). Her symptoms started with headache with first visual field cut and then arm weakness. Her PNIHSS score was 8. The patient was found to be COVID-19 antibody positive but PCR negative. She endorsed a prior COVID-19 exposure but denied prior symptoms. Her labs were reflective of poorly controlled IDDM (HgbA1c 11) but she was not in DKA. Infectious disease work up on blood and CSF was negative except for the presence of COVID-19 antibodies. Autoimmune work up including ANA and demyelinating disease was negative. Venous dopplers and echocardiogram showed no evidence of thrombus and the echo showed normal cardiac anatomy and function.

Conclusion

This patient suffered strokes involving small vessels in the brain and spinal cord caused by a comorbidity of COVID-19 exposure and poorly controlled Diabetes Mellitus Type I. The involvement of both brain and spinal cord is striking, as is the apparent predilection for CNS specific vasculature



Above: DWI brain 10/31/21. Below: Spinal cord, 11/2/21 STIR and T2, left and middle. Right, follow up 4/5/22



NIH Stroke Scale	Score
1a. LOC	0
1b. Questions	0
1c. LOC commands	0
2. Best Gaze	0
3. Visual	0
4. Facial Palsy	0
5. Motor Arm: Left	3
Right	2
6. Motor Leg: Left	1
Right	0
7. Ataxia	0
8. Sensory	1
9. Best Language	1
10. Dysarthria	0
11. Extinction and inattention	0
Total Score:	**8**

Results

The MRIs show multiple are areas of thromboembolic small vessel infarctions in the brain and spinal cord. This is presumably from a transient disease state, likely causing small vessel endothelial injury. The patient had no new deficits nor worsening of prior deficits. She was started on 81 mg ASA and did well with inpatient rehabilitation. She was seen in follow up on 1/20/2022 at which time she was found to have significantly improved hand and shoulder strength but continued to have bilateral bicep and tricep weakness, with only mild right dorsiflexion weakness on gait evaluation Her visual field cut was improved as well. Follow up MRI of brain and spinal cord on 4/5/22 showed expected involutional changes in the brain, cerebellum and spinal cord. As can be seen on follow up MRI of Spine (lower right image), there is considerable involutional change in the cervical spine consistent with her presentation.

References

1. Acute and chronic neurological disorders in COVID-19: potential mechanisms of disease, Balcolm, BRAIN 2021: 144; 3576–3588
2. The neurological manifestations of COVID-19: a review article, Niazkar, Neurological Science, 2020, volume 41, pages 1667–1671 ,

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