



Letter to the Editor

Before attributing COVID-19-related ischemic stroke to hypercoagulability alternative causes should be excluded

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*Letter to the Editor*

We thank Landstrasse et al. for their interest in our work and for raising concerns regarding attributing Corona Virus Disease 2019 (COVID-19) related ischemic stroke to hypercoagulability.

All the four patients described were on continuous cardiac monitoring during hospitalization and EKG on admission showed no atrial fibrillation or other arrhythmias. Patient 1 had elevated hypercoagulability and inflammatory markers except fibrinogen levels. He was monitored with an event monitor which did not show atrial fibrillation.

Patient 2 was encephalopathic on presentation most likely due to severe COVID-19 and respiratory failure. Severe COVID-19 can cause encephalopathy (Umapathi et al., 2020; Shah et al., 2020). Magnetic resonance imaging (MRI) of the brain was not performed as mentioned in the article because the patient deteriorated rapidly and eventually passed away. The findings on CT scan of this patient are in the left MCA distribution which is more suggestive of ischemic stroke than encephalitis. The lesions on this CT scan don't look like old lesions. It is important to mention that this scan was reviewed and reported as a stroke by a neuro-radiologist.

Brain MRI of patient 3 is suggestive of embolic vs border zone infarctions. It was also mentioned in the article that hypotension is a possible cause of infarction in this patient. He didn't have any signs of heart failure and as mentioned in the article, no low blood pressure was recorded during hospitalization.

The cardiac mass was mentioned as a possible cause of stroke in patient 4 in the article in addition to COVID-19. The nature of the cardiac mass is unknown because the patient declined further work up prior to having the stroke and autopsy wasn't performed.

HbA1C was 9.8%, 6.0%, 6.1% and 14% for patients 1,2,3 and 4 respectively. Patient 3 is an ex-smoker and the other patients never smoked.

All the reported patients had vessel imaging as mentioned in the article and table 1. None of them had vasculitis. As mentioned in the article, patient 1 and 2 had a CT angiogram of the head and neck, patient 3 and 4 had a magnetic resonance angiogram (MRA) of the head and neck.

The article concluded that stroke can be a complication of severe COVID-19 because the 4 reported patients had severe infection with

respiratory failure. We recognized that COVID-19 can be a cause of ischemic stroke and we did not mention that this happens "ONLY" in severe infection. There are many articles connecting ischemic stroke to COVID-19 (Avula et al., 2020).

We would not speculate that the prevalence of ischemic stroke has declined during the COVID-19 pandemic but we are of the opinion that the number of patients seeking medical care has decreased. As suggested by Siegler et al. the number of patients with ischemic stroke has declined in one tertiary center during the COVID-19 pandemic but that seems because a smaller number of patients seeking health care evaluation for mild symptoms (Siegler et al., 2020). Underutilization of healthcare resources is also observed during the COVID-19 pandemic (Onteddu et al., 2020). Given the nature of COVID-19 pandemic, this question can only be answered with further epidemiological research.

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Declaration of competing interest

The authors declare no conflicts of interest.

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