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Letter to the Editor Regarding "Acute Hemorrhage After Intracerebral Biopsy in COVID-19 Patients: A Report of 3 Cases"



We read with great interest the article by Degeneffe et al.¹ reporting on the hemorrhagic complications after brain biopsy in patients with coronavirus disease 2019 (COVID-19). With the current scenario of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, we surely must expect such complications in most of our neurosurgical patients.¹ Recently, Fotuhi et al.² categorized the neurotropism of the virus into 3 stages. The first stage is the involvement of the olfactory cells and the taste buds, leading to anosmia and ageusia.² In the second stage, the cytokine storm will result in a heightened risk of brain strokes through the involvement of the vascular epithelium. Finally, in the third stage, the cytokine crisis will lead to disruption of the blood–brain barrier, leading to a spectrum of neurological sequelae such as seizures and encephalopathy.

Therefore, the neurotropism of the virus and, thereby, the risk of strokes in such cohorts can be dichotomized by the initial assessments for any altered olfactory and taste symptoms. In addition, the viral load of SARS-CoV-2 in the cerebrospinal fluid can be used in the screening of such high-risk patients.³

These steps could certainly help in taking corrective and precautionary measures to safeguard these subsets of patients from the hemorrhagic complications that infection with SARS-CoV-2 harbingers.

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REFERENCES

1. Degeneffe A, Bruneau M, Spitaels J, Gilis N, De Witte O, Lubansu A. Acute hemorrhage after intra-cerebral biopsy in COVID-19 patients: a report of 3 cases. *World Neurosurg.* 2020;141:157-161.
2. Fotuhi M, Mian A, Meysami S, Raji CA. Neurobiology of COVID-19. *J Alzheimer Dis.* 2020;76:3-19.
3. Al Saiegh F, Ghosh R, Leibold A, et al. Status of SARS-CoV-2 in cerebrospinal fluid of patients with COVID-19 and stroke. *J Neurol Neurosurg Psychiatry.* 2020;91:846-848.