Case report

Hemorrhagic stroke and COVID-19 infection: Coincidence or causality?

Pedro Fraimana, Mariana Freireb, Manuel Moreira-Netoc,d, Clecio Godeiro-Juniora,c,⁎

a Division of Neurology, Hospital Universitário Onofre Lopes, Universidade Federal do Rio Grande do Norte (UFRN), Av. Nilo Peçanha, S/N, Petrópolis, Natal, RN 59012-300, Brazil
b Division of Radiology, Hospital Universitário Onofre Lopes, Universidade Federal do Rio Grande do Norte (UFRN), Av. Nilo Peçanha, S/N, Petrópolis, Natal, RN 59012-300, Brazil
c Master's in Health Education (MPES), Graduate Program in Health Sciences (PPGC Sa), Universidade Federal do Rio Grande do Norte (UFRN), Av. Nilo Peçanha, S/N, Petrópolis, Natal, RN 59012-300, Brazil
d Division of Radiology, Liga Norte Riograndense Contra o Câncer (LNRCC), Av. Miguel Castro, 1355, Dix-Sept Rosado, Natal, RN 59075-740, Brazil

ARTICLE INFO

Keywords: COVID-19 Stroke Early-onset Alzheimer's disease

ABSTRACT

Amyloid Protein Precursor gene duplication is a rare cause of early-onset Alzheimer's disease that can be associated with Cerebral Amyloid Angiopathy. This condition predisposes cerebrovascular events, specifically, intracerebral hemorrhagic stroke. This report describes a case of first-time intracerebral hemorrhage in a patient with APP gene duplication during SARS-CoV-2 infection, a typically pro-thrombotic and pro-inflammatory condition, as a possible trigger for this condition.

1. Case presentation

A 38-year-old white woman was admitted to the emergency department due to acute impairment of consciousness. She has a past history of early-onset Alzheimer's disease related to a sporadic heterozygous Amyloid Protein Precursor (APP) gene duplication. Before admission, her clinical background was characterized by global aphasia, gait apraxia, myoclonic jerks and sporadic episodes of generalized seizures. There was no previous history of cardiovascular risk factors. Her Brain Magnetic Resonance Imaging presented typical bilateral hippocampus atrophy and scattered microbleeds in the cerebral lobes and cerebellum, sparing the brainstem (Fig. 1A and B). Due to COVID-19 pandemic she was in social isolation with her mother and one caregiver, who was their only link to the outside.

On the day of her admission, her caregiver reported an acute change in the level of consciousness unrelated to seizures. On clinical examination, she presented stupor (Glasgow Coma Scale was 10) and had no signs of localization; her brainstem reflexes were normal. Brain computed tomography scan was performed and showed acute hemorrhage in the right frontal lobe (Fig. 1C).

On day 1, non-productive cough was noted, but not associated with fever. The infectious panel presented uncommon leukocytosis and lymphopenia, C-Reactive Protein level was 100 mg/L (normal range, < 6 mg/L) and D-dimer 3769 ng/mL (NR, < 400 ng/mL). Platelet levels were normal. Thorax CT scan (Fig. 1D) was performed due to clinical context, which shown bilateral ground-glass opacities and crazy paving appearance highly suggestive of COVID-19 infection in the current clinical context of pandemic and patient was isolated. On day 3, Real Time-Polymerase Chain Reaction to SARS-CoV-2 of oropharyngeal and nasal specimens swabs were positive to SARS-CoV-2.

2. Discussion

COVID-19 has been related to thrombotic conditions, including ischemic stroke [1], cerebral venous thrombosis [2], pulmonary embolism [3], disseminated intravascular coagulation [4]. It is hypothesized that SARS-CoV-2 promotes a pro-thrombotic state [5] which predisposes the occurrence of thrombotic diseases, but the mechanism is still unclear to this date.

There are previous reports of intracerebral hemorrhage during SARS-CoV-2 infection [6], but always there were cardiovascular risk factors or low platelets levels. Herein, we describe a case of a patient who presented to the emergency department with altered level of consciousness and revealed a concomitant COVID-19 infection and intracerebral hemorrhage.

Most of the previous patients in the course of acute cerebrovascular...
serve to respect the safety of healthcare workers in unexpected situations.

Acknowledgment

We acknowledge Suzanne Adair, Ph.D. and Frank Adair, pH.D., for providing language help and proof reading. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001

References

[1] R.M. Dafer, N.D. Osteraa, J. Biller, Acute stroke care in the coronavirus disease 2019 pandemic, J. Stroke Cerebrovasc. Dis. 29 (1) (2020) 104881, https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.104881.
[2] C. Hughes, T. Nichols, M. Pike, C. Subbe, S. Elghenzai, Cerebral venous sinus thrombosis as a presentation of COVID-19, Eur. J. Case Rep. Intern. Med. 7 (5) (2020) 001691.
[3] D. Wichmann, J.P. Sperhake, M. Lütgethtmann, S. Steurer, C. Edler, A. Heinemann, F. Heinrich, H. Mushumba, I. Kniep, A.S. Schröder, C. Burdelski, G. de Heer, A. Nierhaus, D. Frings, S. Pfeiferle, H. Becker, H. Bredereke-Wiedling, A. de Weerth, H.R. Paschen, S. Sheikhzadeh-Eggers, A. Stang, S. Schmiedel, C. Bokemeier, M.M. Addo, M. Arpefescher, R. Füchsl, S. Kühne, Autopsy findings and venous thromboembolism in patients with COVID-19. Ann. Intern. Med. 173 (4) (2020) 268–277, https://doi.org/10.7326/M20-2003.
[4] E. Terpos, I. Ntanas-Stathopoulos, I. Elalamy, E. Kastritis, T.N. Sergentanis, M. Politou, T. Psaltopoulou, G. Gerotziafas, M.A. Dimopoulos, Hematological findings and complications of COVID-19, Am. J. Hematol. 95 (7) (2020) 834–847, https://doi.org/10.1002/ajh.25829.
[5] F. Cavallotti, A. Marti, A. Fasano, A.D. Salda, A. Ghimarduzzi, C. Moratti, L. Bonacini, R. Ghadirpour, R. Pausarilla, F. Valzania, M. Zedde, Prothrombotic state induced by COVID-19 infection as trigger for stroke in young patients: a dangerous association, eNeurologicalSci 100247 (2020).
[6] M. Morassi, D. Bagatto, M. Cobelli, S. D'Agostini, G.L. Gigli, C. Ràna, A. Vogrig, Stroke in patients with SARS-CoV-2 infection: case series, J. Neurol. 268 (8) (2020) 2185–2192, https://doi.org/10.1007/s00415-020-09885-2.
[7] T. Coslen, V. Lolli, N. Sadeghi, A. Rovai, N. Trotta, F.S. Taccone, J. Creteur, S. Henzard, J.-C. Goffard, D. Dewitte, G. Naeije, S. Goldman, X. De Tiege, Early postmortem brain MRI findings in COVID-19 non-survivors, medRxiv (2020), https://doi.org/10.1212/WNL.0000000010116.
[8] M. Yamada, Cerebral amyloid angiopathy: emerging concepts, J. Stroke 17 (1) (2015) 17–30.
[9] N. Vaninov, In the eye of the COVID-19 cytokine storm, Nat. Rev. Immunol. 20 (5) (2020) 277.
[10] S. Sebastian, L.K. Stein, M.S. Dhamoon, Infection as a stroke trigger, Stroke 50 (8) (2019) 2216–2218.