Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editors

Reply to the letter to the editor: "impact of SARS-CoV-2 vaccines on the nervous system"

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Dear Editor,

We thank the authors[1] for their interest in our paper on neurological symptoms and neuroimaging alterations related with vaccines against Coronavirus Disease-2019 (COVID-19),[2] since this allows a more in-depth debate on the topic. After carefully reading the letter, we understand that the authors concerns are based on the fact that some of the clinical investigations performed on the patients were not expressly included in the body of the text. However, due to this opportunity, we can expose more information about the clinical cases.

Patient 1 were a 64-year-old man, who presented an ischemic stroke two days after vaccination. He was hospitalized in an intensive care unit, having been monitored with a long-term electrocardiogram, which did not reveal any arrhythmia. As we indicated in the paper, the hemogram, including the red blood cells and platelets counts, was normal. During hospitalization and clinical follow-up, the patient did not present any signs or symptoms of heart failure. In addition, the electrocardiogram and the echocardiogram were normal. The echocardiogram did not show any sign of systolic dysfunction or atrial or intra-ventricular thrombus. Also, the troponin serum level was normal. A brain magnetic resonance angiography was also normal. The patient remains under outpatient follow-up, with no evidence of cardiac symptoms, and a new echocardiogram was normal. Therefore, the medical team considered that there was no need to perform a heart magnetic resonance imaging (MRI) to rule out myocarditis.

Regarding patient 2, a 42-year-old man who presented with a left facial palsy, 7 days after vaccination, as we indicated in the paper, the cerebrospinal fluid (CSF) analysis was normal, including a normal cell count, as well as normal protein and glucose levels. Therefore, there was no albumin-cytological dissociation in the CSF. Furthermore, the patient was evaluated by an experienced neurologist, who did not detect other neurological abnormalities. The patient did not present symptoms related with peripheral nerves involvement. There were no sensory abnormalities or motor deficits, in the four limbs and trunk, neither autonomic dysfunction, on clinical neurologic exam. As the patient did not present with progressive bilateral limb weakness and/or sensory deficits, hypo or areflexia, did not have bulbar palsy, ophthalmoplegia and ataxia, we could rule out Guillain Barré syndrome.[3] The medical team considered that there was no need to perform electrophysiological studies. The patient presented complete recovery after oral prednisone, with no need of additional treatment.

Patient 3 was a 65-year-old man who presented with a transverse myelitis, 8 days after vaccination. The patient did not show any signs of encephalopathy during the clinical course and hospitalization. Also, as we included in the paper, the brain MRI was normal. Therefore, we could exclude acute disseminated encephalomyelitis (ADEM), due to the absence of brain lesions, as well as absence of multifocal lesions in the central nervous system, and no signs of encephalopathy.[4,5] Furthermore, the patient did not meet the criteria for the diagnosis of multiple sclerosis and neuromyelitis optica spectrum disorders.[6] In addition, other causes of myelitis were excluded,[7] since the patient had negative serology for human immunodeficiency virus, human T-lymphotropic virus-1 and 2, and the CSF analysis was negative for toxoplasmosis,

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influenza, herpes simplex virus, varicella zoster virus, cytomegalovirus, and syphilis. Also, serum vitamin B12, folate and copper levels were normal.

Adverse effects of COVID-19 vaccines are still being described and need to be carefully evaluated. Risks and benefits exist for all vaccines, but there is no doubt that mass vaccination is the best option for controlling the current pandemic. We believe that this discussion adds a lot to the medical literature and hope that future studies will provide additional information on the incidence of adverse effects of COVID-19 vaccines and their risk factors.

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

CRediT authorship contribution statement

Diogo Goulart Corrêa: Conceptualization; Writing the original draft.

Luiz Celso Hygino da Cruz Jr.: Formal analysis; Reviewing the original draft; Supervision.

Declaration of competing interest

None.

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