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Letter to the Editor

### Post-SARS-CoV-2 vaccination neurology

Josef Finsterer

Neurology & Neurophysiology Center, Vienna, Austria

Corresponding Author: Josef Finsterer

We read with interest the review article by Mohseni Afshar *et al.* about the neurological side effects of SARS-CoV-2 vaccinations [1]. It was found that neurological side effects to SARS-CoV-2 vaccines include seizures, re-activation of the varicella-zoster virus, stroke, Guillain-Barre syndrome (GBS), Bell's palsy, transverse myelitis, and acute disseminated encephalomyelitis (ADEM) [1]. It was concluded that an acute SARS-CoV-2 infection needs to be ruled out before classifying a neurological manifestation as a vaccination related side effect and that the benefits of vaccination outweigh the risks of the vaccination [1]. The study is appealing but raises concerns that warrant further discussion.

The main limitation of the review is that only a small section of the potential neurological side effects of SARS-CoV-2 vaccinations was discussed [1]. The spectrum of neurological side effects to SARS-CoV-2 vaccinations is much broader than presented. Undisputed central nervous system (CNS) side effects of SARS-CoV-2 vaccination were apoplexy of the pituitary gland, which mainly occurs in patients with a pre-existing pituitary adenoma [2], acute, hemorrhagic, encephalomyelitis (AHM) [3], immune encephalitis [4], multifocal, necrotising encephalitis [5], limbic encephalitis [6], rhombencephalitis [7], opsoclonus myoclonus syndrome [8], giant cell arteritis [6], meningitis, status epilepticus, cytotoxic lesions of the corpus callosum, MOG encephalomyelitis, Bickerstaff encephalitis, Tolosa-Hunt syndrome, and reversible, cerebral vasoconstriction syndrome [9]. Among the SARS-CoV-2 vaccine adverse reactions affecting the peripheral nervous system (PNS) not mentioned in the review were trigeminal neuralgia [10], plexitis (Parsonage Turner syndrome (PTS)) [11], new onset myasthenia [12], rhabdomyolysis [13], and myositis or dermatomyositis [6].

A further limitation of the review is that neurological symptoms have been mixed up with neurological diagnoses. Although they may overlap, they should be distinguished from each other as clearly as possible. For example, seizures are a neurological symptom. They may appear with or without structural lesions on cerebral imaging. Therefore, patients with venous sinus thrombosis (VST), stroke, encephalitis, meningitis, that manifest with seizures, should be delineated from those without a plausible explanation. The term "seizures" should be replaced by epilepsy.

Another limitation is that the term "encephalopathy" was not defined. We should know if the authors mean cerebral manifestations due to infection, intoxication, or vaccination in the absence of any structural lesion on CNS imaging. Surprisingly, seizures can be a feature of encephalopathy [1]. Why were new onset seizures not generally classified as encephalopathy?

We disagree with the classification of reactivation of herpes zoster virus as a neurological side effect of SARS-CoV-2 vaccinations [1]. Although SARS-CoV-2 vaccinations can reduce the immune-competence, precipitating superinfections, re-infection with H. zoster not necessarily manifests in the nervous system but rather on the skin. Only if the vaccination triggers, H zoster encephalitis or zoster neuralgia, it should be classified as a neurological complication of a SARS-CoV-2 vaccination.

Another limitation is that not all complications to SARS-CoV-2 vaccines that secondarily damage the nervous system were mentioned. In addition to vaccine-induced immune thrombotic thrombocytopenia (VITT), SARS-CoV-2 vaccinations can cause myocarditis / pericarditis, which may be secondarily complicated by cardio-embolic, ischemic stroke [14]. Embolic stroke in these patients may derive from intra-cardiac thrombus formation due to concomitant heart failure.

Overall, the study carries obvious limitations that require re-evaluation and discussion. Clarifying these weaknesses would strengthen the conclusions and could improve the study. The spectrum of neurological side effects to SARS-CoV-2 vaccines of any type is broader than usually believed.

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## References

1. Mohseni Afshar Z, Sharma A, Babazadeh A, Alizadeh-Khatir A, Sio TT, Taghizadeh Moghadam MA, *et al.* A review of the potential neurological adverse events of COVID-19 vaccines. *Acta Neurol Belg*, 2022, 1-36. Doi: 10.1007/s13760-022-02137-2.
2. Zainordin NA, Hatta SFWM, Ab Mumin N, Shah FZM, Ghani RA. Pituitary apoplexy after COVID-19 vaccination: A case report. *J Clin Transl Endocrinol Case Rep*. 2022; 25:100123. Doi: 10.1016/j.jecr.2022.100123.
3. Ancau M, Liesche-Starnecker F, Niederschweiberer J, Krieg SM, Zimmer C, Lingg C, *et al.* Case Series: Acute Hemorrhagic Encephalomyelitis After SARS-CoV-2 Vaccination. *Front Neurol*. 2022; 12:820049. Doi: 10.3389/fneur.2021.820049.
4. Mörz M. A Case Report: Multifocal Necrotizing Encephalitis and Myocarditis after BNT162b2 mRNA Vaccination against COVID-19. *Vaccines (Basel)*. 2022; 10(10):1651. Doi: 10.3390/vaccines10101651.
5. Doubrovinskaia S, Mooshage CM, Seliger C, Lorenz HM, Nagel S, Lehnert P, *et al.* Neurological autoimmune diseases following vaccinations against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): A follow-up study. *Eur J Neurol*, 2022. Doi: 10.1111/ene.15602.
6. Walter A, Kraemer M. A neurologist's rhombencephalitis after comirnaty vaccination. A change of perspective. *Neurol Res Pract*. 2021; 3(1):56. Doi: 10.1186/s42466-021-00156-7.
7. Finsterer J, Scorza F. Opsoclonus myoclonus ataxia (Kinsbourne, dancing eye-dancing feet) syndrome due to SARS-CoV-2. *Neuro-Ophthalmol*, 2022. (In press)
8. Finsterer J. First Reported Case of Reversible Cerebral Vasoconstriction Syndrome After a SARS-CoV-2 Vaccine. *Cureus*. 2021; 13(11):e19987. Doi: 10.7759/cureus.19987.
9. Onoda K, Sashida R, Fujiwara R, Wakamiya T, Michiwaki Y, Tanaka T, Shimoji K, Suehiro E, Yamane F, Kawashima M, Matsuno A. Trigeminal neuropathy after tozinameran vaccination against COVID-19 in postmicrovascular decompression for trigeminal neuralgia: illustrative case. *J Neurosurg Case Lessons*. 2022; 3(16):CASE22101. Doi: 10.3171/CASE22101.
10. Lakkireddy M, Sathu S, Kumar R, Madhu Latha K, Maley DK. Parsonage-Turner Syndrome Following Covishield (AstraZeneca ChAdOx1 nCoV-19) Vaccination: A Case Report. *Cureus*. 2022; 14(8):e27867. Doi: 10.7759/cureus.27867.
11. Ramdas S, Hum RM, Price A, Paul A, Bland J, Burke G, Farrugia M, Palace J, Storrie A, Ho P, Standing E, Lilleker JB, Jungbluth H. SARS-CoV-2 vaccination and new-onset myasthenia gravis: A report of 7 cases and review of the literature. *Neuromuscul Disord*. 2022; 32(10):785-789. Doi: 10.1016/j.nmd.2022.09.001.
12. Pucchio A, Akiva MH, Evangelidou H, Papenburg J, Salvadori MI. Severe rhabdomyolysis secondary to COVID-19 mRNA vaccine in a teenager. *Pediatr Nephrol*, 2022. Doi: 10.1007/s00467-022-05808-7.
13. Kobayashi K, Hamatani Y, Moriyoshi K, Iguchi M, Masunaga N, Terashima M, *et al.* Multisystem inflammatory syndrome and lymphohistiocytic myocarditis after Covid-19 vaccine in a middle-aged woman. *ESC Heart Fail*, 2022. Doi: 10.1002/ehf2.14252.