

LETTERS

OPEN ACCESS



SARS-CoV-2 vaccinations complicated by transverse myelitis

Josef Finsterer 

Neurology & Neurophysiology Center, Vienna, Austria

We read with interest the article by Maroufi et al. about a 31 years old female who was diagnosed with transverse myelitis 5 weeks after the first dose of the Astra Zeneca vaccine¹ Various alternative causes were excluded and the patient was treated with steroids, which resulted in incomplete remission of paraparesis and sphincter dysfunction at the 3 months follow-up.¹ The study is appealing but raises concerns that need to be discussed.

The latency between vaccination and onset of symptoms was 21 days, thus fairly long. Therefore, the cerebrospinal fluid (CSF) should have been investigated for alternative viral or bacterial infections. Particularly excluded should have been an infection with human immunodeficiency virus (HIV), varicella zoster virus (VZV), Epstein Barr virus (EBV), hepatitis viruses, herpes simplex virus (HSV), and a bacterial infection with *Mycobacterium tuberculosis*. A negative nasal swab PCR test for SARS-CoV-2 not necessarily excludes an infection with SARS-CoV-2. We should know if the CSF was also negative for SARS-CoV-2.

Missing is an investigation of the CSF for cytokines, chemokines, and glial factors. Previous studies have shown that central nervous system (CNS) involvement in SARS-CoV-2 infections as well as neurological compromise following a SARS-CoV-2 vaccination can be associated with elevation of interleukines and chemokines.^{2,3}

Another limitation is that no cerebral MRI had been carried out to exclude or confirm concomitant cerebral lesions.

Transverse myelitis as a complication of SARS-CoV-2 vaccinations is not infrequent. It has been previously reported in at least 16 patients as a complication of a SARS-CoV-2 vaccination (Table 1). Age of these ranged between 23 and 85y. Eight were males. Latency between vaccination and onset of myelitis ranged from 1d to 21d (Table 1). All patients received steroids, some additional plasma exchange, and one additional immune-adsorption (Table 1). Only two patients achieved a full recovery at the last follow-up. One patient died.



We do not agree that only 254 patients with neurological complications following a SARS-CoV-2 vaccination have been reported.¹ In a recent review about the neurological side effects of SARS-CoV-2 vaccination almost 4000 patients with neurological complications have been reported as per the end of September 2021.¹⁹ The most frequent of the neurological side effects were headache, venous sinus thrombosis (VST), and Guillain Barre syndrome (GBS). The number of neurological side effects is presumably much higher since this study did not include patients with hypogeusia/dysgeusia or hyposmia/dysosmia and as not all patients with neurological side effects were also published

Another limitation is that the patient was not investigated for thyroid dysfunction.

Table 1. Patients with transverse myelitis following a SARS-CoV-2 vaccination and exclusion of alternative causes.

Age	Sex	Brand	Latency	Treatment	Outcome	Reference
23	f	BPV	21	steroids	IR	[4]
81	m	BPV	3d	steroids	IR	[4]
26	f	BPV	2d	steroids	IR	[5]
85	m	BPV	1d	steroids	FO	[6]
75	m	BPV	3d	steroids	IR	[7]
36	m	AZV	8d	steroids	CR	[8]
63	m	MOV	2d	steroids	CR	[9]
45	m	AZV	8d	steroids	IR	[10]
41	m	AZV	14d	steroids	IR	[11]
25	f	AZV	16d	steroids	IR	[12]
76	f	MOV	6d	steroids	IR	[13]
58	m	AZV	10d	steroids, PE	IR	[14]
67	f	MOV	1d	steroids, PE	IR	[15]
44	f	JJV	7d	steroids, PE	IR	[16]
78	f	SVV	3d	steroids	IR	[17]
40	f	AZV	14d	steroids, PE IAD	IR	[18]

AZV: Astra Zeneca vaccine, BPV: Biontech Pfizer vaccine, CR: complete recovery, FO: fatal outcome, IAD: immune adsorption, IR: incomplete recovery, JJV: Johnson and Johnson vaccine, MOV: Moderna vaccine, PE: plasma exchange, SVV: Sinovac vaccine.

CONTACT Josef Finsterer  ffigs1@yahoo.de  Neurology & Neurophysiology Center, Postfach 20 1180, Vienna, Austria.

© 2022 The Author(s). Published with license by Taylor & Francis Group, LLC.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

We should be informed why it took 14 days after onset of symptoms that the patient visited the doctor.

Overall, the interesting study has some limitations which challenge the results and their interpretation. Addressing these limitations would strengthen the conclusions and could result in more precise advice how to manage patients with SARS-CoV-2 vaccination associated transverse myelitis.

Author contribution

Josef Finsterer: design, literature search, discussion, first draft, critical comments, final approval, WS: literature search, discussion, critical comments, final approval.

Data availability

All data are available from the corresponding author.

Consent to participate

Consent was obtained from the patient.

Consent for publication

Consent was obtained from the patient.

Ethics approval

Conducted in accordance with ethical guidelines. The study was approved by the institutional review board.

Disclosure statement

No potential conflict of interest was reported by the author.

Funding

The author reported there is no funding associated with the work featured in this article.

ORCID

Josef Finsterer  <http://orcid.org/0000-0003-2839-7305>

References

1. Maroufi SF, Naderi Behdani F, Rezaia F, Tanhapour Khotbehsara S, Mirzaasgari Z. Longitudinally extensive transverse myelitis after Covid-19 vaccination: case report and review of literature. *Hum Vaccin Immunother.* 2022 Mar;3:1–4. doi:10.1080/21645515.2022.2040239.
2. Domingues RB, Leite FBVM, Senne C. Cerebrospinal fluid analysis in patients with COVID-19-associated central nervous system manifestations: a systematic review. *Arq Neuropsiquiatr.* 2022 Feb;25:S0004–282X2022005004205. doi:10.1590/0004-282X-ANP-2021-0117.
3. Pilotto A, Masciocchi S, Volonghi I, De Giuli V, Caprioli F, Mariotto S, Ferrari S, Bozzetti S, Imarisio A, Risi B, et al. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) encephalitis is a cytokine release syndrome: evidences from cerebrospinal fluid analyses. *Clin Infect Dis.* 2021 Nov 2;73(9):e3019–e3026. doi:10.1093/cid/ciaa1933.
4. Eom H, Kim SW, Kim M, Kim YE, Kim JH, Shin HY, Lee HL. Case reports of acute transverse myelitis associated with mRNA vaccine for COVID-19. *J Korean Med Sci.* 2022 Feb 21;37(7):e52. doi:10.3346/jkms.2022.37.e52. PMID: 35191229; PMCID: PMC8860770.
5. Fernandes J, Jaggernauth S, Ramnarine V, Mohammed SR, Khan C, Panday A. Neurological conditions following COVID-19 vaccinations: chance or association? *Cureus.* 2022 Feb 4;14(2):e21919. PMID: 35155043; PMCID: PMC8816955. doi:10.7759/cureus.21919.
6. Nakano H, Yamaguchi K, Kawabata K, Asakawa M, Matsumoto Y. Acute transverse myelitis after BNT162b2 vaccination against COVID-19: report of a fatal case and review of the literature. *J Neurol Sci.* 2021 Dec 20;434:120102. doi:10.1016/j.jns.2021.120102.
7. Miyaue N, Yoshida A, Yamanishi Y, Tada S, Ando R, Hosokawa Y, Yabe H, Nagai M. Refractory longitudinally extensive transverse myelitis after severe acute respiratory syndrome coronavirus 2 vaccination in a Japanese man. *Intern Med.* 2022 Mar 1;61(5):739–42. doi:10.2169/internalmedicine.8747-21.
8. Malhotra HS, Gupta P, Prabhu V, Kumar Garg R, Dandu H, Agarwal V. COVID-19 vaccination-associated myelitis. *QJM.* 2021 Nov 5;114(8):591–93. doi:10.1093/qjmed/hcab069.
9. Fitzsimmons W, Nance CS. Sudden onset of myelitis after COVID-19 vaccination: an under-recognized severe rare adverse event. *SSRN.* 2021;7:3841558. doi:10.2139/ssrn.3841558.
10. Pagenkopf C, Südmeyer M. A case of longitudinally extensive transverse myelitis following vaccination against Covid-19. *J Neuroimmunol.* 2021 Sep 15;358:577606. doi:10.1016/j.jneuroim.2021.577606.
11. Hsiao YT, Tsai MJ, Chen YH, Hsu CF. Acute transverse myelitis after COVID-19 vaccination. *Medicina (Kaunas).* 2021 Sep 25;57(10):1010. doi:10.3390/medicina57101010.
12. Tan WY, Yusof Khan AHK, Mohd Yaakob MN, Abdul Rashid AM, Loh WC, Baharin J, Ibrahim A, Ismail MR, Inche Mat LN, Wan Sulaiman WA, et al. Longitudinal extensive transverse myelitis following ChAdOx1 nCoV-19 vaccine: a case report. *BMC Neurol.* 2021 Oct 12;21(1):395. doi:10.1186/s12883-021-02427-x.
13. Gao JJ, Tseng HP, Lin CL, Shiu JS, Lee MH, Liu CH. Acute transverse myelitis following COVID-19 vaccination. *Vaccines (Basel).* 2021 Sep 10;9(9):1008. doi:10.3390/vaccines9091008.
14. Notghi AA, Atley J, Silva M. Lessons of the month 1: longitudinal extensive transverse myelitis following AstraZeneca COVID-19 vaccination. *Clin Med (Lond).* 2021 Sep;21(5):e535–e538. doi:10.7861/clinmed.2021-0470.
15. Khan E, Shrestha AK, Colantonio MA, Liberio RN, Sriwastava S. Acute transverse myelitis following SARS-CoV-2 vaccination: a case report and review of literature. *J Neurol.* 2022 Mar;269(3):1121–32. doi:10.1007/s00415-021-10785-2.
16. Tahir N, Koorapati G, Prasad S, Jeelani HM, Sherchan R, Shrestha J, Shayuk M. SARS-CoV-2 vaccination-induced transverse myelitis. *Cureus.* 2021 Jul 25;13(7):e16624. doi:10.7759/cureus.16624.
17. Erdem NŞ, Demirci S, Özel T, Mamadova K, Karaali K, Çelik HT, Uslu FI, Özkaynak SS. Acute transverse myelitis after inactivated COVID-19 vaccine. *Idegyogy Sz.* 2021 Jul 30;74(7–8):273–76. doi:10.18071/isz.74.0273.
18. Helmchen C, Buttler GM, Markewitz R, Hummel K, Wiendl H, Boppel T. Acute bilateral optic/chiasm neuritis with longitudinal extensive transverse myelitis in longstanding stable multiple sclerosis following vector-based vaccination against the SARS-CoV-2. *J Neurol.* 2022 Jan;269(1):49–54. doi:10.1007/s00415-021-10647-x.
19. Finsterer J. Neurological side effects of SARS-CoV-2 vaccinations. *Acta Neurol Scand.* 2022 Jan;145(1):5–9. doi:10.1111/ane.13550.