



## Acute disseminated encephalomyelitis-like presentation after an inactivated coronavirus vaccine

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Dear Editor,

We are facing a global pandemic with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection, according to the definition of the World Health Organization (WHO), since 11 March 2020. There are several types of vaccines being used all over the world against SARS-CoV-2 infection. Turkey has already started the vaccination program with an inactivated SARS-CoV-2 vaccine of *Sinovac* (Vero Cells, Beijing Institute of Biological Products Co., Ltd., Beijing, China), and an mRNA-based COVID-19 vaccine of Pfizer-BioNTech, Germany. Although studies to date indicate the vaccines for COVID-19 have an excellent safety profile, severe complications may occur, as seen with previous virus vaccines [1]. Vaccines are one of the etiological factors of Acute Disseminated Encephalomyelitis (ADEM), an immune-mediated demyelinating disease of the brain and the spinal cord, although it is extremely rare [2, 3].

Herein, we report a 46-year-old woman who presented to the hospital, and reported that she had experienced the first tonic–clonic seizure of her life 4 days ago. She denied any prior illness other than Hashimoto's thyroiditis for which she was taking levothyroxine 100 mg/daily. She received her second dose of SARS-CoV-2 vaccination with *Sinovac* 1 month before the seizure. She is a smoker, but did not use illicit drugs or heavy alcohol. She did not have fever, cough, malaise, or headache. Her neurological examination was entirely normal. She had cranial magnetic resonance imaging (MRI) to investigate the etiological cause of her seizure. There were scattered hyperintense lesions in the left thalamus, bilateral corona radiata, left diencephalon, and

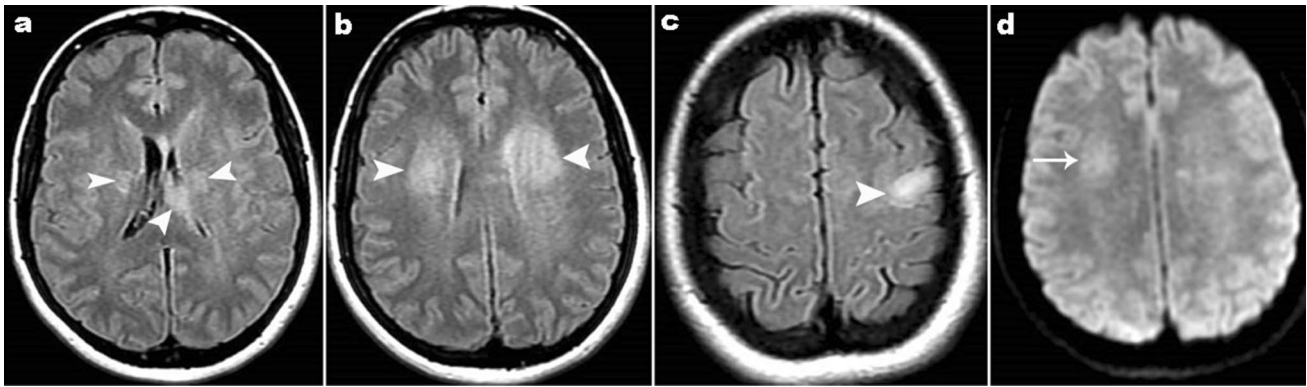
right parietal cortex on T2 and FLAIR sequences on MRI. Some of these lesions showed mild restricted diffusion on DWI (Fig. 1). We detected no enhancement on post-gadolinium contrast-enhanced images. MRI spectroscopy was performed to rule out a diffuse glioma, and did not show choline (Cho) elevation. Her serum thyroid-stimulating hormone (TSH) level was 0.21 IU/ml (0.35–4.949), and free triiodothyronine was 2.4 (normal). The findings of other laboratory tests, including extensive cerebrospinal fluid (CSF) studies, were normal except ANA (1/100) and Anti-SOX1 antibody positivity. In particular, CSF was acellular with normal protein content (45 mm/dL), an IgG index of 0.64 and no oligoclonal bands. CMV IgM and IgG, EBV IgG, VZV IgM, HSV-1 IgM, and IgG antibodies were all negative in CSF. Anti-double-stranded DNA and extractable nuclear antigen (ENA) panel, anti-aquaporin-4 and anti-myelin oligodendrocyte (MOG) antibodies were negative in serum. Her C3 and C4 levels were normal. She denied any rash or arthritis or sun sensitivity in her history. She had a negative nasal swab test for SARS-CoV-2, and her SARS-CoV-2 IgG antibody was 877 AU/mL. Thorax CT, and whole-body positron emission tomography–computed tomography (PET-CT) were unremarkable. She was put on a 1 g/day steroid treatment for 7 days, and her *Euthytrox* (Levothyroxine Sodium tablets, USP) 100 mg/daily treatment was reduced to 75 mg/daily accordingly. After 2 weeks of treatment, she had a control MRI, in which the lesions showed prominent prolonged restricted diffusion without any change in the lesions' size (Fig. 2). On her clinical follow-up, she did not have any new signs, symptoms, or seizures.

Since the patient's clinical findings do not fulfill the clinical criteria for the diagnosis of ADEM due to the absence of encephalopathy, we prefer to define this clinical situation and MRI findings as an ADEM-like presentation after an inactivated coronavirus vaccine. After reviewing the literature, we have found only one case of ADEM after vaccination for SARS-CoV-2 [4]. The cases had symptoms like

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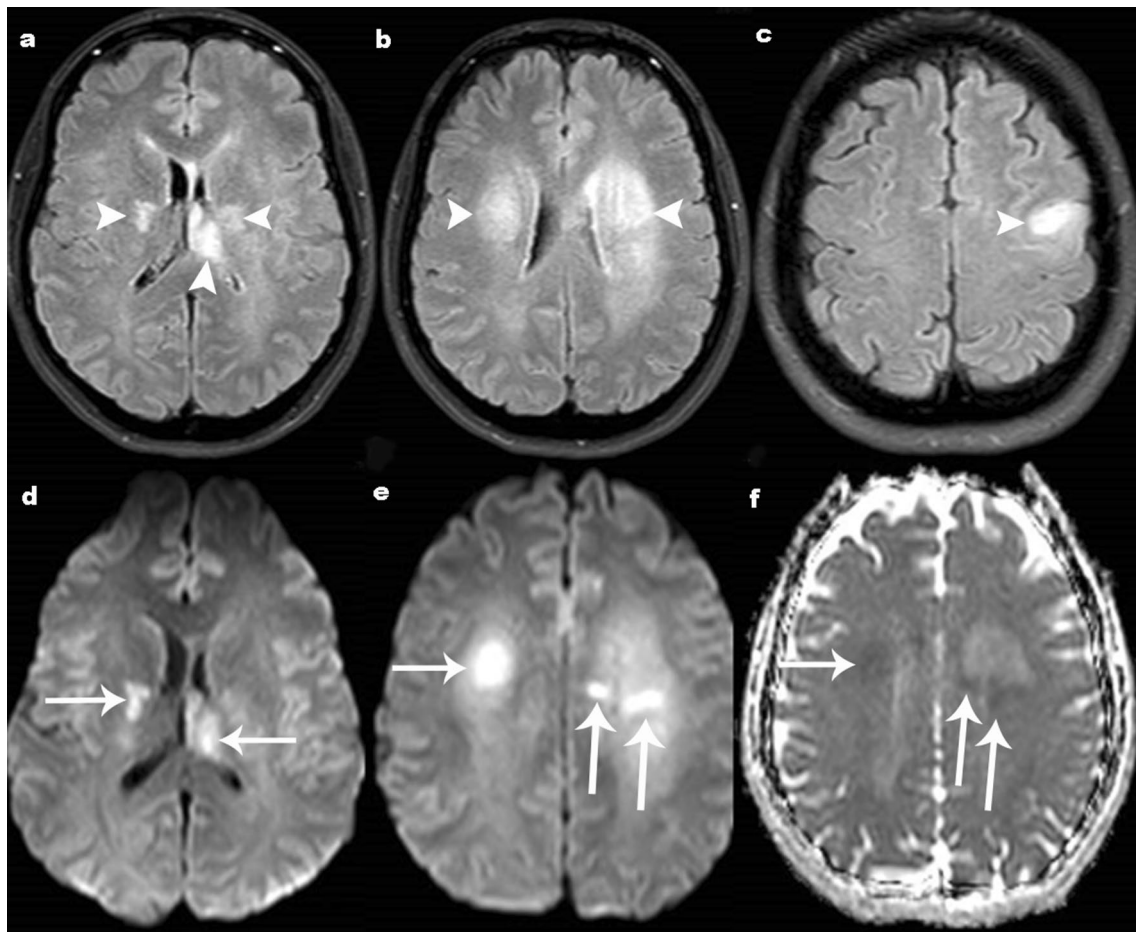
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**Fig. 1** a–c Axial fluid-attenuated inversion recovery (FLAIR) MRI of the brain demonstrates multifocal areas of hyperintensity in both cerebral hemispheres involving bilateral corona radiata, bilateral cen-

trum semiovale, corpus callosum, and left frontal cortical gray matter (arrowheads). d The diffusion-weighted image shows the lesion in the left centrum semiovale to be mildly hyperintense (arrow)



**Fig. 2** a–c Repeated MRI after 2 weeks of treatment. There is no significant change on FLAIR images (arrowheads). However, some of the lesions show prominent hyperintensity on DWIs (arrows) (a,

b), and hypointensity on corresponding apparent diffusion coefficient (ADC) map due to increased and prolonged restricted diffusion (arrows) (c)

headaches, muscle stiffness, extremity weakness, fever, and more restricted lesions in the brain, but not a seizure.

In conclusion, an ADEM-like presentation similar to the presented case has not been reported following SARS-CoV-2 vaccination before. Moreover, this case informs us

that, even though it is an extremely rare condition, clinicians should be aware of the possible atypical neurological complications in patients receiving this vaccine to initiate the appropriate treatment.

## Declarations

**Conflict of interest** The authors declare that they have no competing interests.

**Ethical approval** This article does not contain any studies with human participants performed by any of the authors.

**Informed consent** Informed consent was obtained from the patient.

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