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Simultaneous bilateral optic neuritis and longitudinally extensive transverse myelitis following vaccination against COVID-19: A case report

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ABSTRACT

Case report: a 42-year-old man presented with bilateral longitudinally extensive optic neuritis, associated with longitudinally extensive hyperintensity ranging from cervical to thoracic spinal cord. Anti-MOG and Anti-AQP4 antibodies were negative, as well as IgG and IgM antibodies against SARS-CoV-2. The patient showed dramatic recovery after 5 days of high dose intravenous methylprednisolone.

Discussion: Vaccination is imperative, but clinicians should be aware of its potential adverse events, particularly when immediate treatment can avoid debilitating consequences. Considering the speed up approval processes of vaccines against SARS-CoV-2, permanent pharmacovigilance of severe adverse events in the real world is a paramount.

Introduction

Vaccines against the SARS-CoV-2 have been a hallmark in the control of the COVID-19 pandemic. However, neurological complications have been associated with vaccination. Neuromyelitis optica spectrum disorder (NMOSD) is a rare but severe demyelinating disease, presenting with unilateral neuritis and/or longitudinally extensive myelitis. Herein, we present a case of a patient with a severe NMOSD-like episode following the first dose of COVID-19 vaccination.

Case presentation

A previously healthy, 42-year-old male patient was admitted in the emergency ward with loss of visual acuity and left hemiparesthesia. He received the first dose of the Oxford/AstraZeneca vaccine for SARS-CoV-2 3 days before starting with moderate binocular pain. This symptom was associated with myalgia and tiredness within the following 4 days, with spontaneous remission. Four days after initial improvement, he presented paresthesia in his left arm. Eleven days after vaccination, he reported sudden loss of visual acuity bilaterally.

In admission, he presented left eye blindness and markedly reduced visual acuity (20/400) in his right eye. He also had mild proximal weakness in lower limbs (Strength grade ⅘ on MRC scale) and a thoracic sensory level at Th8. There was no fever or other signs of systemic infection and nasopharyngeal swab was negative for SARS-CoV-2-RT-PCR. Magnetic resonance imaging (MRI) revealed bilateral optic nerve thickening associated with longitudinally extensive hyperintense lesion in T2/FLAIR (Fig. 1 A, B). Cerebrospinal fluid (CSF) analysis showed 80 leukocytes, with lymphocyte predominance (97%), increased proteins (60.8 mg/dL) with normal glucose level. Bacterial culture of CSF and blood were negative, while his blood tests were unremarkable, including infectious screening (syphilis, HIV, HCV, HBV), B12, antinuclear antibody, Reactive C Protein, Erythrocyte sedimentation rate and serum complement levels. Due to NMOSD suspicion, he was evaluated for Anti-myelin oligodendrocyte glycoprotein (Anti-MOG) and Anti-Aquaporin-4 (Anti-AQP4) antibodies by cell-based assay (CBA), which were both negatives. Oligoclonal bands and CSF viral panel were negative, as well as IgG and IgM antibodies for SARS-CoV-2.

Due to the severity of visual symptoms, the patient immediately received high-dose intravenous methylprednisolone (1 g) for the 5 following days. He had a dramatic improvement of visual acuity, motor and sensory symptoms. He was discharged on day 10 with complete motor recovery and visual acuity of 20/30 in his left eye and 20/40 in his right eye, with mild left papilledema and bilateral euchromatopsia (Fig. 1C). An oral corticoid tapering scheme and a rehabilitation program were prescribed.

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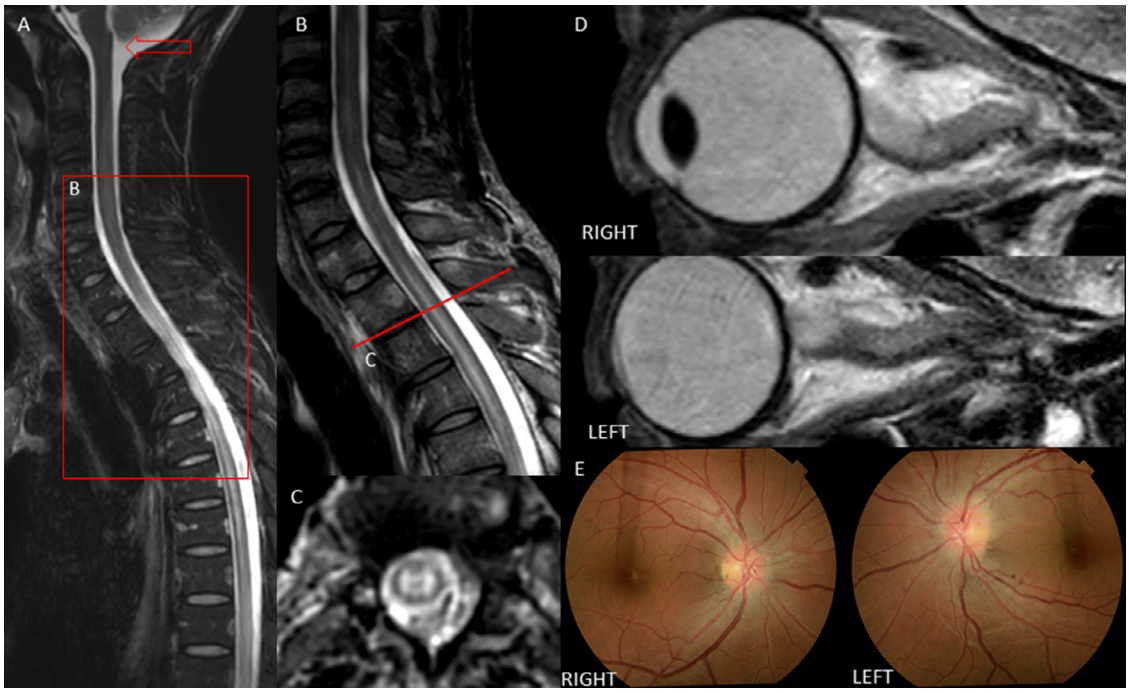

Fig. 1. (A) Sagittal 3T MRI short tau-inversion recovery (STIR) image shows longitudinally extensive hyperintense signal in the cervical and thoracic spinal cord at arrival. Red arrow indicates the preservation of area postrema. (B) Magnified thoracic spinal cord. (C) Axial STIR image of spinal cord at level of T3. (D) Sagittal T2 weighted image shows increased thickening of optic nerves bilaterally, predominantly in the retrobulbar segmentat arrival, measuring 5 mm (right eye) and 5.2 mm (left eye). (E) Fundoscopic exam shows poorly defined optic nerve definition in both eyes, more severe in the left eye (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article).

Discussion

We report a case of simultaneous severe bilateral longitudinally extensive optic neuritis and longitudinally extensive myelitis starting 3 days after the first dose of Oxford/AstraZeneca vaccine for SARS-CoV-2. Increasing evidence suggests that the immune response may mediate central nervous system damage more frequently than direct SARS-CoV-2 damage (Roy et al., 2021). A rather immune mediated response may be considered the major component of clinical findings described in this case.

In the present case, we speculate that the vaccine might have triggered an autoimmune response leading to a NMOSD presentation. Onset of bilateral optic neuritis (Jun and Fraunfelder, 2018) and myelitis (Pagenkopf and Südmeyer, 2021) associated with vaccination have been previously observed. Simultaneous bilateral optic neuritis and myelitis have been reported in a patient with both anti-MOG positive antibodies and SARS-CoV-2 infection (Zhou et al., 2020). A potential immune-based pathogenesis triggered by viral infection may have occurred, which led to demyelination. It is noteworthy that a possible causal relationship between transverse myelitis has been reported for AZD1222 (Lareb, 2021).

The case presented here shows a close temporal association to SARS-CoV-2 vaccination. Symptoms of optic neuritis have started 3 days after the vaccination, and progressed to severe visual loss within 21 days after the vaccination. An extensive diagnostic work up has been performed to rule out other diagnoses, including asymptomatic infection bySARS-CoV-2. High lymphocyte count and elevated total protein in the CSF suggested an inflammatory process related to NMSOD, in which high fraction of lymphocytes during relapse have been pointed as a potential biomarker, (Melamed et al., 2015) though serum Anti-MOG and Anti-AQP4 antibodies were negative. It is also important to mention that a number of individuals with NMOSD may be seronegative for Anti-AQP4 and Anti-MOG, which requires further elucidation (Narayan et al., 2018). The rapid and dramatic recovery of clinical symptoms after high-dose corticoid is consistent with inflammatory response rather than NMOSD-related myelitis.

To our knowledge this is the first report of a severe NMOSD-like episode associated with a single dose of SARS-CoV-2 vaccine. A high suspicion for adverse effects of vaccines with immediate treatment may avoid debilitating consequences of such conditions. Importantly, neurological complications associated with SARS-CoV-2 vaccines seem to be very rare and that these rare complications should not dampen the use of vaccines, as widespread vaccination strategies are crucial to fight the COVID-19 pandemic.

Declaration of Competing Interest

Authors declare they have no conflict of interest.

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Disclosure

None.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.nerep.2021.100041.

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