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Case report

CASE REPORT

Myeloperoxidase anti-neutrophil cytoplasmic antibody positive optic perineuritis after mRNA coronavirus disease-19 vaccine

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Learning point for clinicians

We report a rare case of myeloperoxidase anti-neutrophil cytoplasmic antibody-positive optic perineuritis after mRNA coronavirus disease-2019 vaccination. When a patient develops vision loss after vaccination, we should suspect autoimmunological mechanisms and consider an early examination and immunotherapy.

Case report

A 75-year-old woman with Type 2 diabetes and dyslipidemia was referred to our hospital with a chief complaint of blurred vision in the right eye (RE) that progressed for 3 weeks. Four days before she noted her initial symptom of RE discomfort, she had received the first mRNA coronavirus disease-2019 (COVID-19) vaccine (BNT162b2, 30 μg/0.3 ml, intramuscular injection). After that, she gradually developed blurred vision in the RE and visited the eye clinic. She was referred under suspicion of optic neuropathy.

Neurological examination revealed a positive relative afferent pupillary defect (RAPD) in the RE. She did not present with a headache, diplopia or pain due to eye movement. Her best-corrected visual acuity (BCVA) was 6/85, and the critical fusion frequency (CFF) of the RE was not measurable. The Humphrey field analyzer (HFA) showed a central field defect in the RE (Figure 1A). Her fundus examination was normal without papilledema. Magnetic resonance imaging of the head and orbits showed a high signal, surrounding the right optic nerve on short T1 inversion recovery (Figure 1B) and exhibited a gadolinium contrast effect (Figure 1C). Laboratory evaluation revealed an increased erythrocyte sedimentation rate (20 mm/h and 46 mm/2 h), and the patient tested positive for myeloperoxidase anti-neutrophil cytoplasmic antibody (MPO-ANCA) (18.5 IU/ml).

The patient was diagnosed with subacute progressive optic perineuritis (OPN), and she received high-dose intravenous methylprednisolone (1000 mg every 24 h for 3 days) immediately after admission. Her symptoms rapidly improved, and the BCVA and CFF in RE increased to 6/4 and 24 Hz, respectively, on the fourth hospital day. The RAPD turned negative, and the HFA recovered to an almost normal range (Figure 1D). The abnormal findings on the MRI were improved (Figure 1E, F).

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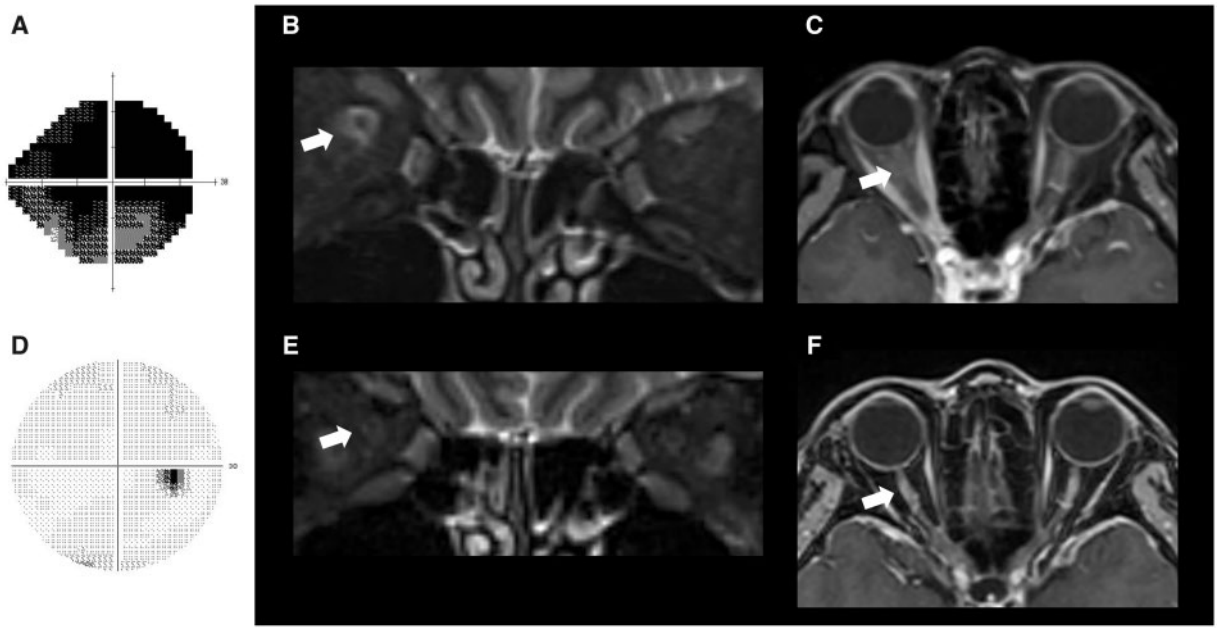

Figure 1. (**A**) Perimetry in the central 24° field using the Humphrey Field Analyzer. A central visual field defect was confirmed in a prior eye clinic the day before admission. (**B**) Short T1 inversion recovery (STIR) magnetic resonance imaging (MRI) showed a high-intensity signal surrounding the right optic nerve, producing a 'donut configuration'. (**C**) Gadolinium-enhanced T_1-weighted MRI showed an enhancement around the optic nerve and soft tissue around the optic nerve sheath. (**D**) Perimetry is the central 30° field using the Humphrey Field Analyzer. Visual field defect remarkably improved on the seventh hospital day. (**E**) The high-intensity signal surrounding the right optic nerve in STIR MRI was diapered on the fourth hospital day. (**F**) Gadolinium-enhanced T_1-weighted MRI showed that the abnormal enhancement had disappeared.

Discussion

We present a case of OPN that developed after mRNA COVID-19 vaccination. She was positive for MPO-ANCA, and immunotherapy with corticosteroids was highly effective.

The BNT162b2 mRNA COVID-19 vaccine has been used worldwide based on its proven efficacy and safety in a mass vaccination setting.[1] The mRNA carries the genetic information of the spike protein on the surface of the severe acute respiratory syndrome coronavirus-2 particle. Upon injection of the vaccine, dendritic cells perform protein synthesis, inducing an immune response. Various adverse effects have been reported with this vaccine, but these event-specific mechanism and frequency have not been investigated thoroughly.[2]

To our knowledge, OPN after mRNA COVID-19 vaccination has not been reported. In previous studies, patients developed various forms of vasculitis after influenza vaccination.[3] Some cases involved MPO-ANCA-positive small vessel vasculitis, similar to the present case. In addition, there have been several reports of autoimmune-related adverse events, including leukocytoclastic vasculitis and ANCA glomerulonephritis, in patients who received the mRNA COVID-19 vaccine.[4] Additionally, recent research pointed out that the severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) infection may trigger autoimmunity and cause ANCA-associated vasculitis.[5]

The relationship between COVID-19 vaccination and MPO-ANCA-positive OPN remains unclear because we did not evaluate the serum antibody profile before the onset of the disease. However, the clinical course of the disease and previous reports imply the possibility of a rare autoimmune complication of COVID-19 vaccination. Assuming that the onset was vaccine-related, the marked responsiveness to immunotherapy suggested that her OPN was secondary to an immune response to a novel antigen, resulting from mRNA administration. Further studies are required to examine the neurological complications caused by this vaccine as well as SARS-Cov-2 infection.

In conclusion, when acute to subacute vision loss is observed after mRNA COVID-19 vaccination, this disease should be identified since early immunotherapy is effective.

Declaration of consent

Patient consent has been obtained for the purpose of this case report.

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Conflicts of interest. None declared.

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