Neuro-Ophthalmologic Symptoms Associated With the Moderna mRNA COVID-19 Vaccine: A Case Report

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Abstract

Multiple neuro-ophthalmological symptoms, such as visual field defects, optic neuritis, and eye movement abnormalities, have been reported with coronavirus disease 2019 (COVID-19) infection. It is unknown whether the COVID-19 vaccine can result in similar neuro-ophthalmological symptoms post-vaccination. Here, we describe a case of optic neuritis after the administration of the mRNA COVID-19 Moderna vaccine.

A 47-year-old female presented eight days after receiving the first dose of the Moderna COVID-19 vaccine with impaired vision in the left eye and symptoms consistent with optic neuritis. The patient underwent a workup for infectious etiology, autoimmune diseases, and allergies, which was negative. The patient was treated with a high dose of steroids resulting in the complete resolution of her symptoms. The patient was recommended against the second dose of the mRNA COVID-19 vaccine.

Early detection and treatment of optic neuritis are important to prevent the long-term sequelae of neuritis with impaired vision.

Categories: Ophthalmology, Preventive Medicine, Allergy/Immunology
Keywords: covid-19, sars-cov-2, mrna covid-19 vaccine, moderna vaccine, optic neuritis, coronavirus

Introduction

In 2019, a severe acute respiratory syndrome (SARS-CoV-2) causing pulmonary infection was reported in Wuhan city in China, which was termed coronavirus disease 2019 (COVID-19) [1]. Since then, the infection has evolved into a pandemic, and at the time of this writing, the pandemic is still ongoing.

Numerous COVID-19 vaccines have been developed and are in various stages of development. In the United States, two COVID-19 mRNA vaccines by Pfizer-BioNTech and Moderna have been approved for the prevention of COVID-19 [2], in addition to the Johnson and Johnson vaccine.

COVID-19 infection has manifested with multiple neuro-ophthalmological symptoms, such as optic neuritis, visual field defects, and eye movement abnormalities [3]. It is unclear whether patients may have a possible manifestation of neuro-ophthalmological symptoms post-COVID-19 vaccination. Data regarding optic neuritis post-COVID-19 vaccination are limited.

Case Presentation

A 47-year-old female healthcare worker presented to the hospital with impaired vision in her left eye. She could not see letters on the computer with her left eye due to blurred vision. Her vision in the right eye was normal. The patient complained of discomfort in the left eyebrow and on the left side of the head. She reported shooting pain between the left ear and in the left eye. The patient noted a gritty sensation around her left eye. She denied any fever, chills, dyspnea, or cough. She did not complain of dizziness, diplopia, or dysphagia. She had no focal neurodeficit or dysarthria. She was alert and oriented to place, time, and person. She had a medical history of well-controlled hypertension treated with amlodipine for one year. She complained of persistent fatigue since she received the first dose of the Moderna vaccine eight days prior to the onset of her visual symptoms. The patient had no prior history of impaired vision or autoimmune disorder.

According to the institutional stroke protocol, she underwent computed tomography (CT) of the head and a CT angiogram of the head and neck, which were negative. She underwent magnetic resonance imaging (MRI) of the head, C spine, and optic nerve, which was also normal.

The ophthalmology examination showed normal external examination with no signs of ptosis. The...
Optic neuritis is an inflammatory condition that causes acute monocular visual loss most likely due to optic neuritis. Ophthalmologic complications have been reported following the administration of the measles vaccine [10,11], and neuro-ophthalmologic complications following the AstraZeneca-Oxford vaccine, Moderna COVID-19 vaccine, and Sinopharm vaccine [9]. Other studies have reported similar neuro-ophtalmologic complications following other COVID-19 vaccines: Ad26.COV2.S vaccine (Janssen Pharmaceutical Companies) [8], Pfizer-BioNTech vaccine, AstraZeneca-Oxford vaccine [7], Covishield vaccine [8], and Sinopharm vaccine [9]. Similar neuro-ophtalmologic complications have been reported following the administration of the measles vaccine [10,11].

Optic neuritis is an inflammatory condition that causes acute monocular visual loss most likely due to optic neuritis. In COVID-19 infections, symptoms of optic neuritis, diplopia, and ptosis have been described. Eye movement abnormalities, nystagmus, and visual field defects have been reported as well. In a study examining the neurological complications of COVID-19, one case of optic neuritis was reported during the recovery phase of a COVID-19 infection [5]. We report a patient who developed neuro-ophthalmic symptoms following the mRNA COVID-19 vaccine.

Discussion

Adverse reactions to vaccines are usually rare and often attributed to various vaccine components [4]. At present, the etiology of adverse reactions to Moderna mRNA vaccines is not clear. The Centers for Disease Control and Prevention (CDC) recommends avoiding both mRNA COVID-19 vaccines in individuals with a history of anaphylaxis to polyethylene glycol (PEG), PEG derivatives, or polysorbate. Recently, the CDC has published guidelines for the use of mRNA COVID-19 vaccines in individuals with a history of anaphylaxis. Adverse reactions to vaccines are usually rare and often attributed to various vaccine components.
nerve demyelination. A possible mechanism for the demyelination in optic neuritis is immune-mediated, but the specific mechanism and target antigens remain unknown. However, possible mechanisms could be due to an inflammatory response to a specific monoclonal antigen, a post-viral inflammatory syndrome, or sequelae of a pro-inflammatory state. Moreover, systemic abnormalities such as hypoxia and hypercoagulability may play a role.

Early diagnosis and treatment are essential to prevent long-term sequelae. High-dose steroid treatment should be considered in selected patients with optic neuritis as there is some evidence that this treatment may delay the onset of multiple sclerosis and hasten visual recovery. Alternative treatments for acute neuroimmunological diseases include intravenous immunoglobulin and plasma exchange. Further, treatment with immunomodulatory therapies, a so-called disease-modifying therapy for patients with optic neuritis and abnormal brain MRIs, may be considered in select patients.

In patients with a pre-existing condition of autoimmune disorders, careful screening and risk stratification should be considered in conjunction with an allergist and immunologist before vaccination [12]. Every patient should be carefully evaluated for a possible allergic reaction before denying vaccination in view of the potentially life-saving benefit of vaccination in the setting of a global pandemic.

Conclusions
Neuro-ophthalmologic complications can manifest following the COVID-19 mRNA vaccine Moderna. Optic neuritis, an inflammatory, demyelinating condition that manifests with acute, usually monocular visual loss, may be complicated after COVID-19 vaccination. Early detection and treatment of optic neuritis are vital to prevent the long-term sequelae of optic neuritis with impaired vision. High-dose steroids may prevent the long-term consequences of neuritis. Patients with complications of optic neuritis might benefit from clinician recommendations against subsequent vaccine doses.

Additional Information
Disclosures
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