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Transient Oculomotor Palsy Following the Administration of the Messenger RNA-1273 Vaccine for SARS-CoV-2 Diplopia Following the COVID-19 Vaccine

Mariella C. Pappaterra, BS, Enrique J. Rivera, MD, Armando L. Oliver, MD

The first 2 vaccines approved by the United States Food and Drug Administration for emergency use during the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic were the BNT162b2 vaccine and the messenger RNA-1273 (mRNA-1273) vaccine. Adverse effects reported after the administration of the mRNA-1273 vaccine have been mild to moderate in severity and of short duration; these included fever, fatigue, headache, myalgia, and nausea, among others (1).

We report a case of binocular diplopia following the first dose of the mRNA-1273 SARS-CoV-2 vaccine. To our knowledge, this is the first report of this kind following any SARS-CoV-2 vaccine administration.

On February 8, 2021, an 81-year-old man presented for evaluation complaining of binocular oblique diplopia. He had SARS-CoV-2 infection in September of 2020, which symptoms included fever, myalgia, general malaise, and mild respiratory symptoms, as well as lower extremity weakness and gait instability. He denied having headache, neck stiffness, double vision, eyelid droop, nausea, vomiting, or upper extremity weakness due to the infection. On February 4, 2021, he received the first dose of the mRNA-1273 SARS-CoV-2 vaccine. Upon waking up the following day, he felt dizzy and noticed that he had ptosis of his left upper eyelid, along with binocular diplopia. He had no pain with ocular movements. His medical history included hypertension, hypercholesterolemia, and uncontrolled diabetes mellitus.

Upon examination, his visual acuity was 20/40 in the right eye and 20/30 in the left eye. He had limited adduction and infraduction of his left eye and full motility of his right eye. His pupils were round and equally responsive to light, without evidence of an afferent pupillary defect or of anisocoria. A sensorimotor evaluation revealed an exotropia of 3 prism diopters (PD) in the primary position. The deviation decreased to an exotropia of 2 PD on the right

gaze and increased to an exotropia of 10 PD on the left gaze, combined with a left hyperopia of 5 PD. Remarkably, there was no evidence of the left upper eyelid ptosis, which the patient had noticed several days earlier. A slit-lamp examination was normal bilaterally. There were no retinal lesions or any optic nerve swelling. The patient was diagnosed with partial oculomotor nerve palsy of the left eye. A brain magnetic resonance (MR) image scan and MRA, ordered to rule out ischemia or aneurysmal compression, showed no pathology to explain the patient's complaints. Specifically, there was no contrast enhancement along the course of the left oculomotor nerve. There were no ischemic changes at the level of the left oculomotor nucleus in the midbrain, nor evidence of a mass effect on the nerve as it entered or left the cavernous sinus. No abnormalities were identified within the cavernous sinus or the superior orbital fissure. He had a normal erythrocyte sedimentation rate and an elevated C-reactive protein (CRP) level.

The patient returned for a follow-up visit on February 19, 2021. He had full extraocular motility in both eyes and minimal residual exodeviation in the primary position, indicating a spontaneous near-total resolution of his cranial neuropathy.

Severe acute respiratory syndrome coronavirus 2 has been known to have manifestations outside the respiratory system (2). Neurological manifestations, which can occur independently from the respiratory symptoms, include headache, dizziness, consciousness impairment, and anosmia (2).

There have been previous reports of patients exhibiting binocular diplopia after coronavirus infection (2,3). Adverse reactions to vaccines due to immunomediation to a given vaccine's excipient, to the active components of that vaccine, or to an individual host's immunodeficiency are rare (4). As SARS-CoV-2 may produce neurological manifestations, we hypothesize that the oculomotor palsy occurred because of a reactivation of a SARS-CoV-2-associated, immune-mediated mechanism taking place after the vaccine's administration.

Oculomotor nerve palsies are known to occur in patients with diabetes mellitus or giant cell arteritis and are linked to microvascular ischemia (5). Even though the patient had uncontrolled glycemia and an elevated CRP, his condition's speedy and spontaneous resolution is uncharacteristic of a vasculopathic cranial neuropathy.

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The authors report no conflicts of interest.

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