Case Report

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Isolated Painful Oculomotor Nerve Palsy as a Rare Complication of the Sinopharm COVID-19 Vaccine: A Case Report and Review of the Literature

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ABSTRACT

There are limited reports of oculomotor nerve palsy following vaccination. Herein, we aimed to report a case of acute oculomotor nerve palsy following the first dose of the Sinopharm vaccine. A 17-year-old woman presented with a history of acute painful diplopia and right ptosis within a week after receiving the first dosage of the Sinopharm vaccine. The neurological examination was compatible with acute right third nerve palsy sparing pupils. All the para-clinical tests were unremarkable. With a diagnosis of possible oculomotor nerve palsy as an adverse event of the COVID-19 vaccine, she was treated with steroids leading to a significant recovery. We reported the first case of acute oculomotor nerve palsy associated with the Sinopharm vaccine. However, our findings dose not conclude a causal association between oculomotor nerve palsy and COVID-19 vaccination.

Introduction

Since the emergence of COVID-19 disease, a large number of neurological manifestations of COVID-19 have been reported, ranging from a mild headache to severe involvement of the peripheral and central nervous systems. However, the neurological complications of COVID-19 vaccine immunization are just beginning to disclose [1]. Peripheral facial cranial nerve palsy has been widely suggested as a possible complication of COVID-19 vaccination, either in isolation or in the context of Guillain-Barré syndrome [2]. Nonetheless, to the best of our knowledge, there is no report of isolated oculomotor nerve palsy associated with COVID-19 vaccination.

The true incidence of oculomotor nerve palsy is poorly described. A few studies have reported a rate of 4.0 per 100 000 in the United States. Early recognition and diagnosis of isolated oculomotor nerve palsy

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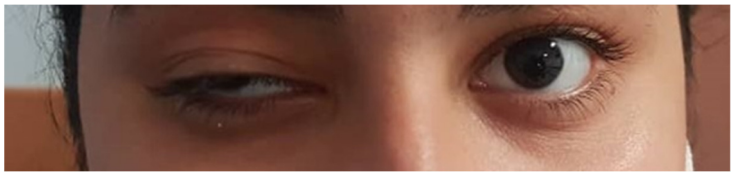

Fig. 1. Right oculomotor palsy (complete ptosis)

Fig. 2. Right oculomotor palsy (eye deviated downward and outward)

are paramount to the broad spectrum of underlying etiologies ranging from mild migraine to potential life-threatening causes. However, microvascular etiologies and trauma have been identified as the leading causes in adults and children, respectively [3, 4].

In the current report, we aimed to report a case of acute painful oculomotor nerve palsy that was eventually diagnosed as an isolated third nerve palsy associated with the SinopharmRS-CoV-2 vaccine.

Case presentation

Clinical presentation

The patient was a 17-year-old healthy woman presenting with a four-day history of painful binocular diplopia followed by right-side complete ptosis. The medical history was unremarkable except for a self-limited non-thunderclap headache with retro-orbital radiation a month before arrival and history of first dose COVID-19 vaccination six days ago.

On examination, the patient was alert and conscious. She was found to be hemodynamically stable. There were no signs of ocular erythema, proptosis, or palpable orbital mass. Cranial nerve examination revealed a lack of upward movement of the right eyelid. In a passive eyelid opening, it was diverted outwards and downwards with restricted ocular movements except in lateral eye movement (Fig. 1, 2). The pupils were both mid-size and reactive to light. The other cranial nerve functions were normal, and the remainder of the examination was unremarkable.

Investigation

Assuming the presence of acute-onset third nerve palsy with pupillary sparing, a comprehensive workup was performed. Serum and Cerebrospinal Fluid (CSF) evaluation for angiotensin-converting enzyme (ACE), inflammatory, metabolic, collagen vascular, infectious, and the neoplastic causes were unrevealing.

Radiological investigations consisted of brain and orbital magnetic resonance imaging (MRI), brain and cervical MRA, and cerebral digital subtraction angiography (DSA) revealed no prominent abnormal findings.

Treatment and follow up

With suspicion of an isolated oculomotor nerve palsy associated with the COVID-19 vaccine, the patient went under pulse steroid therapy with methylprednisolone 1 gr/d for five consecutive days leading to a dramatic recovery of the symptoms. A partial recovery of ptosis and paralysis of the medial rectus and superior rectus were found at discharge. The patient was followed up in the outpatient department with a tapering dosage of oral steroids within 14 days. At follow-up three months later, his ptosis and limited extraocular muscle movement problems remained. However, the pain and diplopia significantly improved.

Discussion

Isolated oculomotor nerve palsy can result in several different conditions along the nerve pathway between the midbrain and the extraocular muscles. Complete oculomotor palsy when the pupil is affected is generally observed in compressive nerve lesions such as an aneurysm of the posterior communicating artery. The incomplete oculomotor palsy with sparing pupils is usually associated with inflammation or ischemia in patients with atherosclerosis risk factors

[3, 4]. Regarding the lack of clinical, laboratory, or imaging evidence of the possible underlying etiologies, it is suggested that oculomotor nerve palsy may occur as an adverse event after the administration of the COVID-19 vaccine. Accordingly, in the light of demyelinating hypothesis, corticosteroid was started for her, which led to a significant recovery. However, we are apprehensive about attributing the clinical improvement to steroids or the natural history of the disease.

Post-vaccination oculomotor nerve palsy has been rarely described—only a few reports of oculomotor nerve palsy associated with measles-mumps-rubella and influenza vaccination (5,6). Although the pathological mechanism of post-vaccination-related cranial neuropathy is not well understood, it is assumed to be immune-mediated damage resulting in demyelination or localized vasculitis. A recent report of oculomotor nerve palsy after the influenza vaccine with evidence of enhancement along the neural sheath of the oculomotor nerve and fast recovery of the symptoms corroborated a hypothesis of demyelination [5].

On the other hand, in the current COVID-19 pandemic, the neurologic complications associated with COVID-19 vaccination are increasingly recognized. As regards the reports of COVID-19 vaccine adverse events in the Centers for Disease Control (CDC)'s Vaccine Adverse Event Reporting System (VAERS), there are limited reports of ocular adverse events in association with mRNA COVID-19 vaccine [6].

Daniela P et al. reported a healthy 59-year-old woman who developed an acute right abducens nerve palsy following the Pfizer-BioNTech mRNA COVID-19 vaccine. They suggested abducens palsy as an adverse event of the COIVD-19 vaccine regarding the temporal relationship between vaccination and the symptoms, the absence of atherosclerotic risk factors, and the negative results of extensive diagnostic tests [7]. However, compared to our case, their patient's ocular paralysis remained persistent.

Since the pandemic's beginning, there have been reports of isolated oculomotor nerve palsy associated with COVID-19 infection. Several mechanisms have been proposed as a direct invasion of the virus to the endothelial cells or the indirect pro-inflammatory mechanisms of the virus [8]. However, this is the first oculomotor palsy associated with COVID-19 described in the literature.

Considering the overall incidence of isolated oculomotor palsy following vaccination and limited reports of isolated oculomotor palsy in association with COVID-19 vaccination, the benefits of immunization appear superior to the associated risks.

Conclusions

We reported the first case of acute third nerve palsy associated with the Sinopharm vaccine. However, our findings do not conclude a causal association between vaccination and cranial neuropathy.

Ethical Considerations

Author Contributions

Conceptualization NA; methodology, software, validation, formal analysis none; investigation NA and SP, resources NA; data curation NA, writing SP; visualization, supervision NA; project administration NA; funding None. Both authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

Editorial review and approval were waived for this study because it was a case report. However, as it was related to COVID-19 vaccination, according to the local guideline, it was notified to the Tehran University of Medical Sciences and Health. Moreover, informed consent was obtained from the patient to publish this report.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study

Data Availability Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to the protection of patients' privacy and confidentiality.

Conflicts of Interest

The authors declare that they have no conflict of interests

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