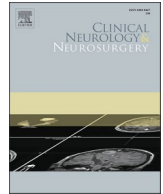




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Case report

Acute cervical dystonia following the BNT162b2 mRNA COVID-19 vaccine

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ABSTRACT

The coronavirus disease of 2019 (COVID-19) pandemic is caused by a novel coronavirus SARS-Cov-2. Four major vaccine types are being used to fight against this deadly pandemic and save precious human lives. All types of vaccines have been associated with a risk of neurological complications ranging from mild to severe. Cervical dystonia occurring after a COVID-19 vaccine was not previously reported in the literature. In this article, we describe a case of acute cervical dystonia occurring after the first dose of the BNT162b2 COVID-19 vaccine. We attribute the occurrence of cervical dystonia to the vaccine due to the temporal relationship. This report adds to the literature a possible rare side effect of a COVID-19 vaccine and contributes to the limited literature on potential neurological side effects of mRNA-based vaccines. The likely mechanism is autoimmune. Further research is needed to probe and study the exact mechanism.

1. Introduction

The coronavirus disease of 2019 (COVID-19) pandemic caused by a novel coronavirus SARS-Cov-2 is characterized by rapid spread and dominant involvement of the lungs with lung damage and hypoxia. The first case was isolated and reported in Wuhan, China in December 2019. Subsequently, in March 2020, COVID-19 was declared a pandemic by the World Health Organization (WHO) [1]. Four major vaccine types are being used to fight against this deadly pandemic and save precious human lives including viral vector-based vaccines (Gam-COVID-Vac, ChAdOx1 nCoV-19, Ad26. COV2. S), COVID-19 mRNA-based vaccines (BNT162b2, mRNA-1273), inactivated or attenuated virus vaccine (PiCoVacc, BBIBP-CorV, BBV152), and protein-based vaccines (NVX-CoV2373). All types of vaccines have been associated with a risk of neurological complications ranging from mild to severe. These include thrombotic thrombocytopenia, aseptic meningitis, Guillain-Barré syndrome, acute disseminated encephalomyelitis, status epilepticus, and different cranial neuropathies [2]. Cervical dystonia occurring after a COVID-19 vaccine was not previously reported in the literature. In this article, we describe a case of acute cervical dystonia occurring after the first dose of the BNT162b2 COVID-19 vaccine.

2. Case report

A 38-year-old male visited the neurology clinic for stiffness, twist, and pain in the neck that had persisted for three months. He felt spasms and twisting of the neck 24 h after receiving the first dose of the BNT162b2 COVID-19 vaccine. His twisting movement improved on supporting his chin with his hand. He denied any similar history before or any neurological complaints including headache, diplopia, dysarthria, sensory symptoms, or gait difficulties. He also denied any symptoms suggestive of COVID-19 infection. He was healthy before with no past medical history of chronic illnesses including endocrine disorders, autoimmune diseases, or cancer. There was no family history of any neurological condition including movement disorders. He denied illicit drug abuse, alcohol intake, or even over-the-counter medications. Physical examination showed a dystonic posture with laterocollis to the left and increased tone in all muscles of the neck (Fig. 1). He had a normal examination of higher mental functions, cranial nerves, motor and sensory systems, coordination, and gait. Reflexes were normal and symmetrical bilaterally with downgoing toes. MRI of the brain and cervical spine was normal. Laboratory investigation including basic biochemical profile, connective tissue screen, vitamin B12 level, and workup for Wilson disease (serum copper, serum ceruloplasmin, and 24 h urine copper) were all unremarkable. The urine toxicology screen was

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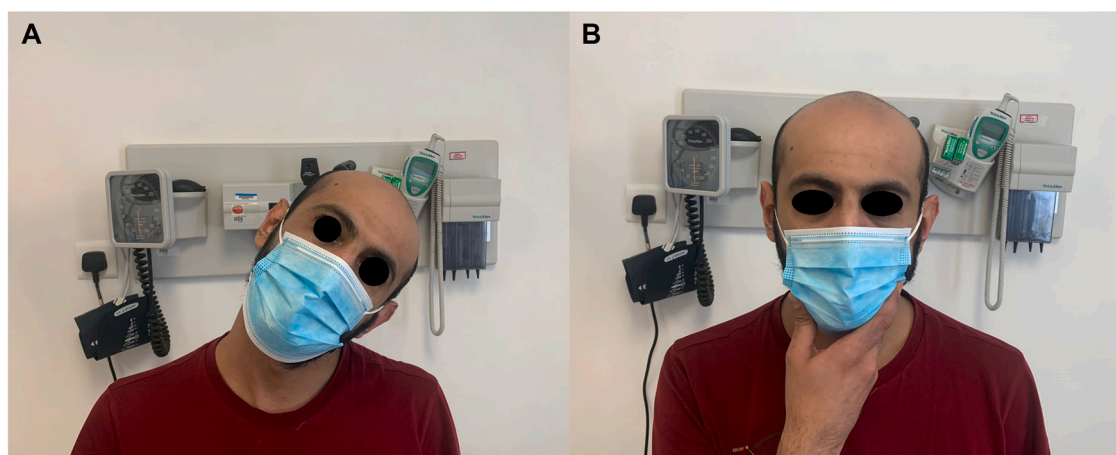


Fig. 1. Patient's image showing (A) laterocollis and (B) geste antagoniste.

negative. Given the negative family history and temporal relationship to vaccination, genetic testing was not done. The patient was managed with oral clonazepam 0.5 mg at night and botulinum toxin injection to scalenus medius, semispinalis cervicis, levator scapulae, and trapezius. His neck posture improved significantly.

3. Discussion

Cervical dystonia is a focal dystonia that manifests with a varying degree of twisting neck posturing, neck pain, and neck tremor. It is a hyperkinetic movement that is often under-recognized and misdiagnosed with a significant disability if untreated. The cause of cervical dystonia can be either idiopathic, acquired, or hereditary. The most common form is the idiopathic type. Most of the acquired cervical dystonias are related to exposure to dopamine-receptor blocking agents [3]. The occurrence of cervical dystonia following the COVID-19 vaccination has not been previously reported in the literature. In our case, the temporal relationship between taking the vaccine and the development of cervical dystonia, the negative family history, lack of exposure to drugs and toxins, and the normal investigations including neuroimaging may suggest a causal relationship of the vaccination. More studies and further review of similarly described cases in the future may uncover this relationship.

A literature search in the databases google scholar and PubMed using the search terms “vaccination, SARS-Cov-2, anti-COVID vaccination, and immunization” in combination with the terms “dystonia and movement disorders” was conducted for the period of December 2019 to December 2021. Although several titles were detected, all of them, except one, were excluded already after reading the title or the abstract. The only case identified was a young Hispanic woman who developed acute transient akathisia following the second dose of the BNT162b2 COVID-19 vaccine with complete resolution of her symptoms spontaneously within 24 h after the vaccine administration [4]. Our case is different since dystonic posturing was chronic, persistent, and responding transiently to medical therapy.

Although the exact mechanism of cervical dystonia following the COVID-19 vaccination is unknown, we speculate an autoantibody-mediated immunological dysfunction of the “head neural integrator”, which is a central network that governs head posturing. The potential relationship between immune mechanisms and cervical dystonia has been observed in several studies [5]. Since the exact immune mechanism could not be delineated more precisely, aggressive immunological therapy such as plasmapheresis or high dose intravenous

immunoglobulin was not utilized in our patient.

4. Conclusion

We report a rare case of acute cervical dystonia after the first dose of the BNT162b2 COVID-19 vaccine. We attribute the occurrence of cervical dystonia to the vaccine due to the temporal relationship. This report adds to the literature a possible rare side effect of a COVID-19 vaccine and contributes to the limited literature on potential neurological side effects of mRNA-based vaccines. The likely mechanism is autoimmune. Further research is needed to probe and study the exact mechanism.

Informed consent and ethical approval

Informed consent was obtained from the patient to publish this case report, and the study was approved by the Institutional Review Board (IRB) of King Abdullah International Medical Research Center (KAIMRC) with approval number IRB/0136/22.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Acknowledgment

Conception and Design: All coauthors; Acquisition of data: All coauthors; Interpretation of data: All coauthors; Drafting of the manuscript: All coauthors; Critical review of the draft: All coauthors; Final approval of the submitted manuscript: All coauthors.

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