

New acute onset of ocular myasthenia gravis after COVID-19 vaccine: A case report

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ABSTRACT

Reports have shown the association of coronavirus disease 2019 (COVID-19) with several neuromuscular disorders. Myasthenia gravis (MG) is an autoimmune disease in which antibodies bind to acetyl choline receptors in the postsynaptic membrane at the neuromuscular junction. The characteristic clinical feature of the disease is weakness of the ocular muscle, bulbar muscle, and extremity muscles; when the weakness is limited to the ocular muscle only, the condition is known as ocular myasthenia gravis. Diagnosis is usually confirmed by the acetylcholine receptor antibodies. Symptoms of MG may be aggravated by various types of infections and medications. Here, we are presenting a rare case of a new and acute onset of ocular MG presented after administration of Covishield vaccine.

Keywords: COVID-19, neuromuscular junction, ocular myasthenia gravis

Introduction

Myasthenia gravis (MG) is an autoimmune disease that affects the neuromuscular junction and in which antibodies bind to acetylcholine receptors in the postsynaptic membrane. Antibodies induce weakness of the skeletal muscle, which can be generalized or localized, and usually always include the ocular muscle, causing ptosis and diplopia.^[1] It is a well-known fact that MG can be induced by various type of drugs, infections, and vaccines.^[2,3] Vaccines against COVID-19 can cause new onset and flaring of immune-mediated diseases.^[4,5] However, a relationship between a new and acute onset of ocular MG and

COVID-19 vaccine is yet to be established. Here, we describe a case of new-onset ocular MG after COVID-19 vaccination.

Case Report

A 61-year-old man reported to the outpatient department (OPD) with a complaint of new-onset ocular symptoms as double vision and drooping of the right eyelid. He had received the first and second dose of the Covishield vaccine approximately at 12 weeks interval. Two weeks after receiving the second dose, the patient complained of diplopia and ptosis of the right eyelid, for which he consulted an ophthalmologist and physician. He tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection with mild symptoms of fever, weakness, body ache, and nausea and completely recovered from the disease one month back, uneventfully. His physical examination showed all vitals and routine blood investigations including HbA1c, thyroid function test, and antinuclear antibody within normal limits. Neostigmine test was performed

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and positive response was seen in 30 minutes [Figure 1]. An ophthalmologist and a neurologist's opinions were taken.

Chest CT was normal including that of the thymus [Figure 2]. Repetitive nerve stimulation studies showed a characteristic decrement response of $>10\%$ in muscle action potential amplitude in 4th and 5th stimuli in both pre-and post-exercise recordings in right orbicularis oculi. Acetylcholine receptor antibodies were elevated to 3.0 nmol/l, which confirmed the diagnosis of MG. Based on history and laboratory investigation, new-onset ocular MG diagnosis was made.

The patient was started on pyridostigmine 30 mg every eight hourly, prednisolone 1 mg/kg, and azathioprine 50mg once a day and show improvement in his diplopia and ptosis on second day of treatment. The Patient was on regular follow-up every month. His steroid dose was tapered over one month and tab. pyridostigmine and azathioprine were stopped after two and three months, respectively. The patient has been off medication for the past seven to eight months and doing well without symptom recurrence during the one-year follow-up.

Discussion

MG is a rare autoimmune disorder in which antibodies against the nicotinic acetylcholine receptors in the postsynaptic membrane at neuromuscular junctions induce weakness of the skeletal muscle. It can be divided into ocular or generalized according to the

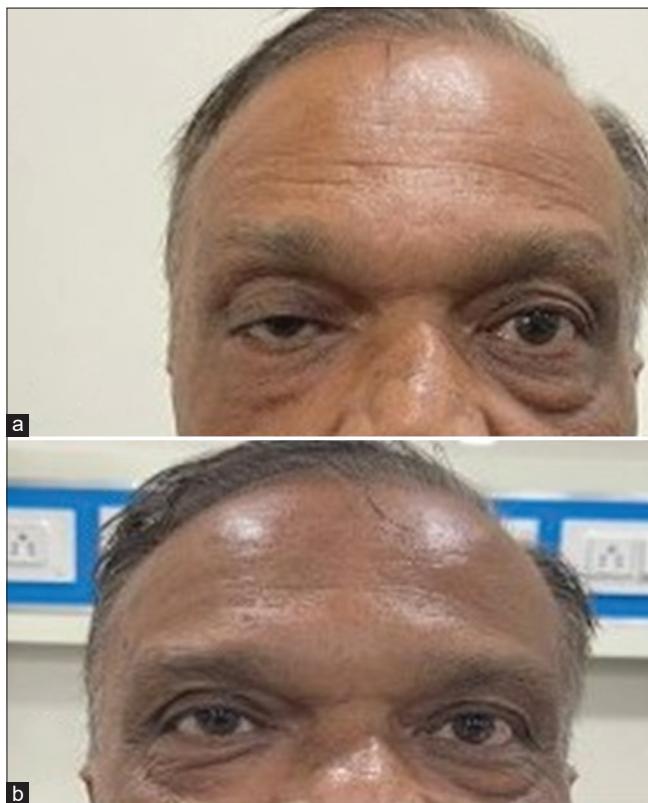


Figure 1: Neostigmine test. (a) Right eye showing ptosis before neostigmine injection, and (b) after neostigmine test

course type. Ocular MG patients may develop generalized MG in 50%–80% of cases. More than 50%–75% of MG patients complained of ocular symptoms such as diplopia and ptosis.^[1]

Vaccines have rarely been associated with new acute MG and their relationship is yet to be determined. However, several published studies have reported on MG exacerbations or MG crisis after COVID-19 infection and vaccination, but no case report has described new acute onset of ocular MG after COVID-19 vaccination.^[2,3,5,6]

Several pharmacological and laboratory investigations are available for confirming the diagnosis of MG like edrophonium test, neostigmine test, anti-acetylcholine receptor antibodies (AChRabs), and repetitive nerve stimulation studies (RNS).^[1] On the basis of all tests, he was diagnosed with new acute onset ocular MG. Infectious diseases and vaccines can occasionally cause flare or new onset of immune-mediated diseases, like MG, especially during the COVID-19 pandemic. SARS-CoV-2—as a natural infection or, less commonly, after vaccination—has been noted as a trigger of immune-mediated disease.^[3–5] In our case, the patient tested negative for SARS-CoV-2 infection, so the latter can be assumed.

The most effective weapon to fight against COVID-19 disease is a vaccine, and several vaccines are available and have been authorized by different countries based on availability, efficacy, and safety. The Central Drugs Standard Control Organisation (CDSCO) in India granted emergency use authorization to two vaccines: Covishield, manufactured by the Serum Institute of India, and Covaxin, manufactured by Bharat Biotech Limited.^[7] Covishield is a recombinant replication deficient chimpanzee adenovirus vector encoding the SARS-CoV-2 spike (S) glycoprotein. The infected cells then produce antigens that mimic natural infection and prompt an immune response. Covishield vaccine is safe and the overall effectiveness to protect against COVID-19 is 88.6%.^[8]

Study on immune-mediated disease flare after SARS-CoV-2 vaccination concluded that out of 27 cases, there were two new cases of new-onset MG after the second dose of BNT162b2 (Pfizer/BioNTech) vaccine.^[4] An infection like

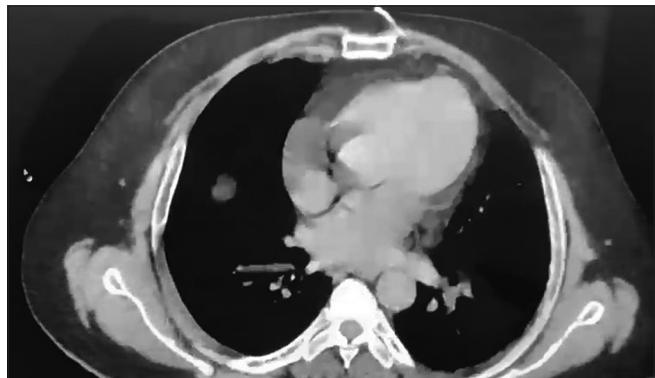


Figure 2: CT scan chest is clear of any pathology

SARS-CoV-2 can activate latent autoimmune diseases like MG.^[2] It has been reported that neurological complications like Guillain–Barré syndrome (GBS) and MG crisis may be provoked after COVID-19 vaccine administration.^[5,9] It is possible that cases that had prior COVID-19 disease could have contributed to immune responses after vaccination.^[6] The time gap between the onset of MG symptoms and COVID-19 may vary from 10 to 30 days.^[2,3,6]

To the best of our knowledge, our case is the first one in which new-onset ocular MG presented after Covishield (ChAdOx1 nCoV-19) vaccination. However, we have not confirmed that prior SARS-CoV-2 immunity is responsible for altered antibody response. In patients who were previously infected with COVID-19, even one dose of vaccine might be enough to generate sufficient neutralizing antibodies.^[10] Still, a detailed study is required regarding this. Till then, the two-dose regime should be continued to be implemented in patients previously infected with COVID-19.

Vaccination is the only preferred and effective modality to combat the virus. However, there is no vaccine which guarantees full proof protection against COVID-19. In conclusion, there may be various confounding factors like prior SARS-CoV-2 infection or subsequent vaccination or pre-existing comorbidities, any of them could possibly contribute to the any altered neuromuscular response like MG which needs to be further investigated before correlating such observation as purely coincidental.

Conclusion

Keep a vigilant eye on new and sudden onset of any neurological symptomatology. Early diagnosis and prompt treatment play a pivotal role in preventing grievous complications or permanent deficit in autoimmune neuromuscular disease. Altered neurological symptomatology during or after SARS-CoV-2 infection or vaccination needs to detailed evaluated. There is no vaccine that guarantees full proof protection against COVID-19, but relationship between MG and COVID-19 vaccine needs to be evaluated further.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and

due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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