Medicon Medical Sciences
Volume 4 Issue 6 June 2023
Case Report

Miller-Fisher Syndrome following Single-dose J&J COVID-19 Vaccine

Wilson Rodriguez[1]*, Margarita Fedorova[2], Gunjanpreet Kaur[3], Lissette Orozco[4], Karthik Narayanan[5] and Jafar Kafaie[6]

[1,3,5,6]*Department of Neurology, Saint Louis University, USA*

[2]*Saint Louis University School of Medicine, USA*

[4]*St. Joseph Mercy Ann Arbor hospital, USA*

***Corresponding Author:** Wilson Rodriguez, Department of Neurology, Saint Louis University, USA.

Received: May 19, 2023; **Published:** June 01, 2023

DOI: 10.55162/MCMS.04.133

Abstract

GBS and its rare subtype MFS are autoimmune diseases characterized by inflammatory demyelination. Cases of MFS have recently been documented following the SARS-CoV-2 infection and some SARS-CoV-2 vaccines. We describe a 64-year-old Caucasian male who developed gait ataxia, diplopia and bilateral facial paresis within 3 weeks following the J&J vaccine. Diagnosis of MFS was established based on the clinical presentation, CSF analysis, electrophysiology, and serology. He received a 5-day course of IVIG with initial mild improvement of symptoms but with long-term favorable clinical recovery showing favorable prognosis of postvaccination GBS documented in literature. Although the benefits of SARS-CoV-2 vaccination largely outweigh its risk, and the incidence of MFS is rare, it is pertinent to monitor for neurological complications, for an early intervention could be lifesaving.

Keywords: Polyradiculoneuropathy; weakness; immunization; ophthalmoplegia; ataxia

Introduction

Guillain-Barre Syndrome (GBS) is an acute polyradiculoneuropathy classically characterized by acute onset of ascending motor weakness and diminished reflexes. Symptoms within 4 weeks of an antecedent event, such as upper respiratory tract infections, gastroenteritis, certain vaccinations, and most recently severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. Miller-Fisher Syndrome (MFS) is a rare variant of GBS characterized by the triad of ataxia, areflexia, and ophthalmoplegia. The incidence of GBS is estimated to be 1 to 2 in 100,000 people, with MFS being a small fraction of that [2]. MFS is classically associated with dysfunction of the third, fourth, and sixth cranial nerves. Antibodies against ganglioside GQ1b are a typical serological finding and are detected in approximately 85% of patients [2, 3]. GQ1b is mainly expressed at the paranodal regions of motor nerves that are involved in extraocular movements, which is compatible with ophthalmoplegia seen in MFS [3].

SARS-CoV-2 has been associated with a multitude of neurological complications, with headache, loss of taste and smell being the most common. MFS is among rare nervous system complications seen following the COVID-19 infection [4-6]. Cases of MFS after COVID-19 vaccine are even more rare with a reporting rate of 0.62 per 10 million vaccinations [7, 8]. We present a case of MFS developing after the Johnson & Johnson single-dose SARS-CoV-2 vaccine. The main purpose of our case report is to increase awareness regarding the recognition of MFS as an early complication after immunization.

Case

A 64-year-old man was evaluated in our institution following an outside hospital diagnosis of GBS. His past medical history was significant for hypertension, obesity, chronic kidney disease, and osteoarthritis.

He received the J&J COVID-19 vaccine on 04/04/2021 and started experiencing new-onset back and joint pain 9 days later. Over the following 2 weeks he developed progressive gait ataxia, facial weakness, dysarthria, dysphagia, diplopia, and paresis in extremities, prompting an admission to an outside hospital 19 days after vaccine administration. He was diagnosed with GBS based on clinical presentation and albuminocytologic dissociation seen in CSF (0 WBC, 241 protein). No electrophysiologic testing was done at the time. During the admission, he was treated with doxycycline and ceftriaxone due to suspected Lyme disease. He underwent extensive workup for neurologic and infectious etiologies. Conditions such as myasthenia gravis, neurosyphilis, Lyme disease, HIV myelopathy, West Nile virus, and viral, bacterial, or fungal meningitis were ruled out. Due to severity of the symptoms, he was started on a 5-day course of IVIG (10% infusion, 55 g) with marginal improvement and discharged home on the tenth day of hospitalization with physical and occupational therapy.

The patient was re-evaluated in our neuromuscular clinic two months after being discharged. Neurological examination was remarkable for bilateral facial weakness that was worse on the left compared to the right (Figure 1), loss of patellar and ankle reflexes, and absent vibration below the knees. His gait was ataxic with positive Romberg sign.

We obtained electrodiagnostic tests which indicated a length-dependent sensorimotor polyneuropathy with both axonal and demyelinating features. Active denervation was noted in the left orbicularis oculi and orbicularis oris muscles, suggestive of an axonal left-sided facial neuropathy. F-wave latencies from both tibial and peroneal nerves are prolonged (Figure 2). Laboratory results were significant for elevated titers of IgG GQ1b (15000), supporting the diagnosis of MFS.

Patient was re-evaluated eight months after his original hospital admission, and a significant symptomatic improvement was appreciated. His dysarthria was minimal; right face paresis resolved and was minimal on the left (Figure 1), diplopia completely resolved. He returned to work and resumed a fully functional life.

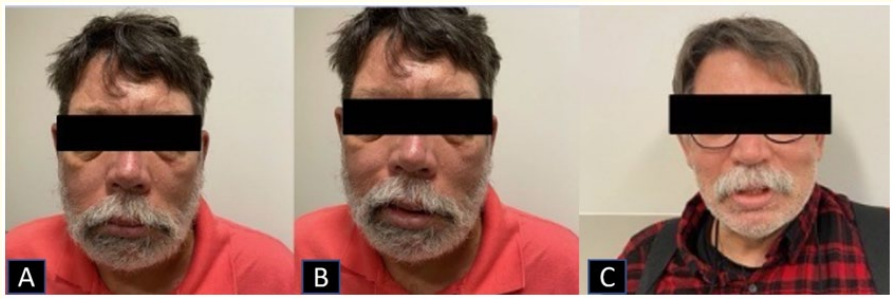

Figure 1: *A-B:* Two month after discharge, there is bilateral facial paresis more predominant in left side. *C:* Eight months after discharge, Right face paresis resolved and was minimal on the left.

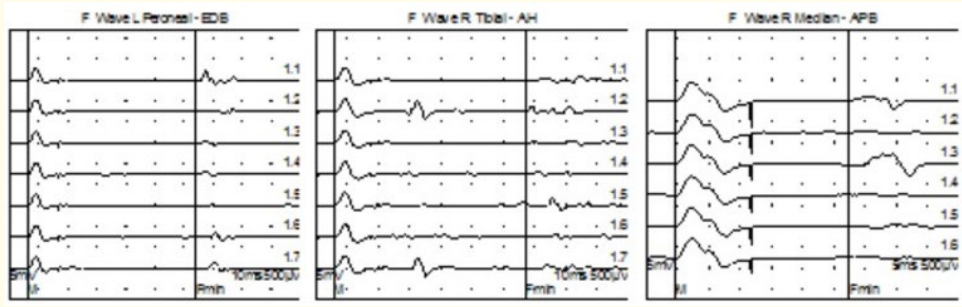

Figure 2: F-wave latencies from both tibial and peroneal nerves are prolonged.

Discussion

MFS is a rare GBS variant that is commonly associated with ophthalmoplegia, ataxia and areflexia [2]. It has been described as a rare complication of COVID-19 infection, and an even more rare complication of COVID-19 vaccines [6, 9-11].

Ad26.COV2.S is a recombinant, replication-incompetent human adenovirus type 26 vector encoding full-length SARS-CoV-2 spike protein. It is a single-dose vaccine produced by Johnson & Johnson and was shown to be protective against symptomatic COVID-19 infection and effective against severe-critical disease [12].

GBS and its subtypes are diagnosed using the Brighton criteria, which accounts for the level of diagnostic certainty [13, 14]. This patient's presentation is consistent with level 1, the highest level of certainty for diagnosis of GBS spectrum disorders. His clinical findings of ataxia, ophthalmoplegia, and residual areflexia in the lower extremities and positive anti-GQ1b serology more specifically point to MFS.

According to the literature review, the documented cases of MFS post SARS-CoV-2 infection and vaccination can be anti-GQ1b negative or positive [6]. The only two published cases of MFS after COVID-19 vaccine with positive anti-GQ1b had a limited clinical presentation without ataxia or neuropathy [8, 11]. We demonstrate a unique case of classic MFS with positive anti-GQ1b antibody, suggestive of GQ1b molecular mimicry as the possible immunopathogenic etiology. Additionally, it's the second case reported in literature after J&J vaccine.

Regarding the prognosis, we aim to emphasize our patient's significant improvement within 8 months of diagnosis, which has also been documented in the other cases of MFS post SARS-CoV-2 vaccination. This can be taken as an encouraging feature of the natural progression of this condition.

Conclusion

In conclusion, this case highlights one of the potential neurological complications of SARS-CoV-2 vaccination. MFS is exceedingly rare but seems to harbor good prognosis with early identification and treatment. There is still a lack of medical evidence regarding factors influencing the prognosis of MFS post SARS-CoV-2 vaccination, and we hope to raise awareness among physicians about MFS given potentially detrimental outcomes if left untreated.

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