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Guillain-Barré Syndrome of Facial Variant Post COVID-19 Vaccination: A Case Report

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Abstract

Introduction: Guillain-Barré syndrome(GBS) is an autoimmune condition commonly triggered post-infection and/or post-vaccinationwith various vaccines,such as the influenza, measles-mumps-rubella, and meningococcal vaccines,when the antibodies generatedby the immune system react with gangliosides at nerve membranes.

Importance: Theearly recognition of GBS variants and immediate intervention with intravenous (IV) immunoglobulin or plasma exchange is recommended to prevent life-threatening complicationswith the development of respiratory muscle weakness.

Case presentation:A 34-year-old male patient presented to the Emergency Department at King Abdullah Medical Cityin Makkah, Saudi Arabia, with a sudden onset of perioral numbness and left facial weakness two weeks after he was vaccinated with the Pfizer COVID-19 vaccine.A brain MRI with IV contrast showed that the left trigeminal nerve was thickened, and the fascial nerve had a subtle enhancement, which could be related to the post-infection process. A GBSCOVID-19 variant was suspected due to recent vaccination history. Anti-ganglioside antibodies GD1b were positive, and cerebrospinal fluidanalysis showed a high white blood count,a high glucose level, and a very slight high protein level.The patient was hospitalized, received five doses ofIV immunoglobulin, and was discharged in good condition. Data were collected from the hospital's electronic medical records, including clinical notes, radiological imaging, and laboratory investigations.

Conclusion: GBS diagnosis is a clinical diagnosis.Electrophysiological studies, CSF, and neuroimaging supportthediagnosis of GBS; however, recognizing the early symptoms and signs of GBSand recognizing patients at risk who need close monitoring and treatment of adverse events following vaccination with COVID-19 vaccinesarecrucial.Further vaccination may be warranted when the benefit outweighs the risk of adverse events following vaccinations.

Keywords: Guillain-Barré syndrome (GBS), COVID-19 vaccine, GBS post-COVID-19 vaccine.

Introduction

Guillain-Barré syndrome (GBS) is a rare clinical condition that has an incidence rate of one to two per 100,000 person-years (1). GBS is characterized by the rapid progression of symmetrical extremity weaknesses, which can be lifethreatening with the development of respiratory muscle weakness. The most common GBS subtypes are acute inflammatory demyelinating polyneuropathy (AIDP) and acute motor axonal neuropathy (AMAN) (2,3). Common triggers of GBS occur post-infection, when the antibodies the immune system generates react with gangliosides at nerve membranes (3,4).GBS can develop after bacterial or viral infections, and only about a quarter of patients are diagnosed with GBS at their initial encounter at the healthcare facility (3). A common cause of GBS is post-vaccination of any vaccine; symptoms mainly manifest two weeks after vaccination (5).

GBS following COVID-19 infection and COVID-19 vaccinationhas been encountered in different countries.It has been found to occur at any age but incidences increase in patients older than 50 years of age and it is more common in males than females (4,5).

GBS is a clinical diagnosis, but laboratory testing, cerebrospinal fluid analysis (CSF), and neuroimaging are carried out to exclude other diagnoses (2,3). As GBS causes rapidly progressing muscle weakness, a neuro consultation is recommended early on to assess the severity of muscle weakness and neuropathy, to

anticipate the need for airway protection, and to effectively manage it with IV immunoglobulin (IVIG) and plasma exchange (PLEX) (2,3).

Case presentation

A 34-year-old male patient, who was previously healthy and was not on any medications presented to the primary care outpatients department (OPD) at King Abdullah Medical City (KAMC) with left neck pain and lymph node swelling that started two weeks after he was vaccinated with the Pfizer COVID-19 vaccine. The patient's history started by experiencing continuous fever for three days following the COVID-19 vaccination, associated with generalized fatigue and a moderate frontal headache that lasted for seven days.Ten days later, the patient felt left neck pain with a tender, swollen lymph node on the same side. He sought medical attention at the otolaryngology clinic, where he was prescribed antibiotics, Augmentin 1 gm, twice daily for seven days,as well as ibuprofen 400 mg thrice daily. Following this, the patient described a slight improvement but not a complete recovery.

Examination at the primary care OPD showed a vesicular rash on the patient's chest following the distribution of dermatome C5. Peripheral pulses and neurologic exam were intact at the time. Cardiovascular, chest, and abdominal examinations were normal. And the patient started on valacyclovir 1000 mg three times per day for seven days. However, the patient had a sudden onset of perioral numbness and left facial weakness the following day and sought emergency care. On presentation to the Emergency Department (ED), the patient was alert and oriented, withno signs of dehydration. His vital signs included blood pressure of 115/80 mmHg, a heart rate of 90 bpm, a temperature of 36.4 °C, and oxygen saturation of 98% on room air. A neurological exam showed a lower motor neuronal left facial weakness (left facial weakness of lower motor neuron and left trigeminal nerve) with a slight decrease in pinprick sensation in his left face, no pronator drift, intact lower and upper limbs power and tone with good reflex with no ataxia, dysarthria, diplopia, and dysphagia.The initial evaluation considered a diagnosis of Bell's palsy and dexamethasone was startedbut testing was continued to rule out other causes.Upon emergency evaluation and neurology consultation, the decision was made to hospitalize the patient in the neurology ward, and magnetic resonance imaging (MRI) was ordered along with a lumbar puncture. His laboratory results at the ED showed a normal complete blood count (CBC), normal electrolyte panel, and normal liver function. Vitamin D was deficient at 19ng/ml (normal range 30–100 ng/ml). A polymerase chain reaction (PCR) result was negative for the varicella-zoster virus. Cerebrospinal fluid (CSF) analysis showed a high white blood count (WBC) of 50 mm3, high lymphocytes of 75% **(shown in Table 1)**, slightly high protein and a high glucose level of 75 mg/dl **(shown in Table 2).**

Table 1: Body fluid cerebrospinal fluid (CSF) for hematology.

Test	Result	Reference range
Color	Colorless	Colorless
Appearance	Clear	Clear
Lymphocyte	75%	40–80%
Monocyte	25	15–45%
Polymorphs	Not seen	0-6%
RBC count	0.0	0–10 mm3
WBC count	50 mm3	0-5 mm3

RBC: Red blood cell, **WBC:** White blood cell.

Table 2:Body fluid cerebrospinal fluid (CSF) chemistry.

Test	Result	Reference range
Glucose CSF	75	40–70 mg/dl
Total protein CSF	45.8	15–45 mg/dl

CSF culture and sensitivity showed no pus, normal epithelial cell count, and no organism seen or growing after 48 hours of incubation. Axial computed tomography(CT) neck with coronal and sagittal reformat results were unremarkable and showed no lymphadenopathy by CT size criteria. The brain MRI with IV contrast concluded that the left trigeminal nerve was thickened **(Figure 1),** and the fascial nerve hada subtle enhancement **(Figure 2).** It further mentioned that these could be related to the post-infection process, and GBS variants were suspected due to recent vaccination history. No space-occupying lesion was found in the MRI. The contrast-enhanced whole cervical spine MRI was unremarkable.

The autoimmune essay showed that anti-ganglioside (GD1b antibodies (IgG, IgM) were high, 91(51-100 % positive). A follow-up MRI brain was conducted two months after the arrival of our patientat the ED, which showed interval resolution of the previously noted left trigeminal nerve thickening and enhancement **(Figure 3).**Subtle left fascial nerve smooth enhancement involving the labyrinthine, tympanic, and mastoid segments was again noted **(Figure 4).**The patientwas hospitalized under neurology care for seven days, treated with five doses of IVIG, and discharged home in good condition.

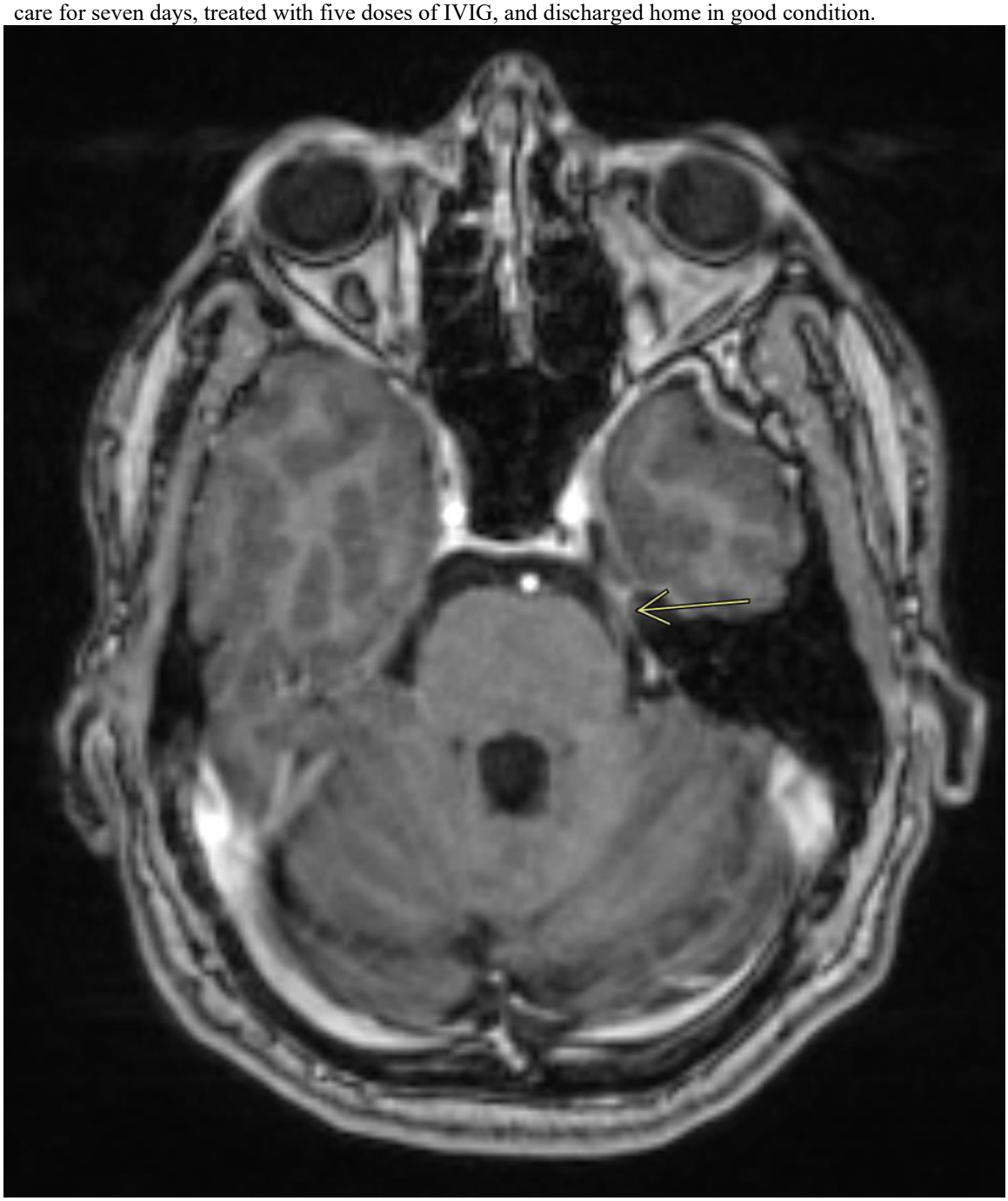

Figure 1: Brain MRI with IV contrast showed a thickened left trigeminal nerve at the initial presentation

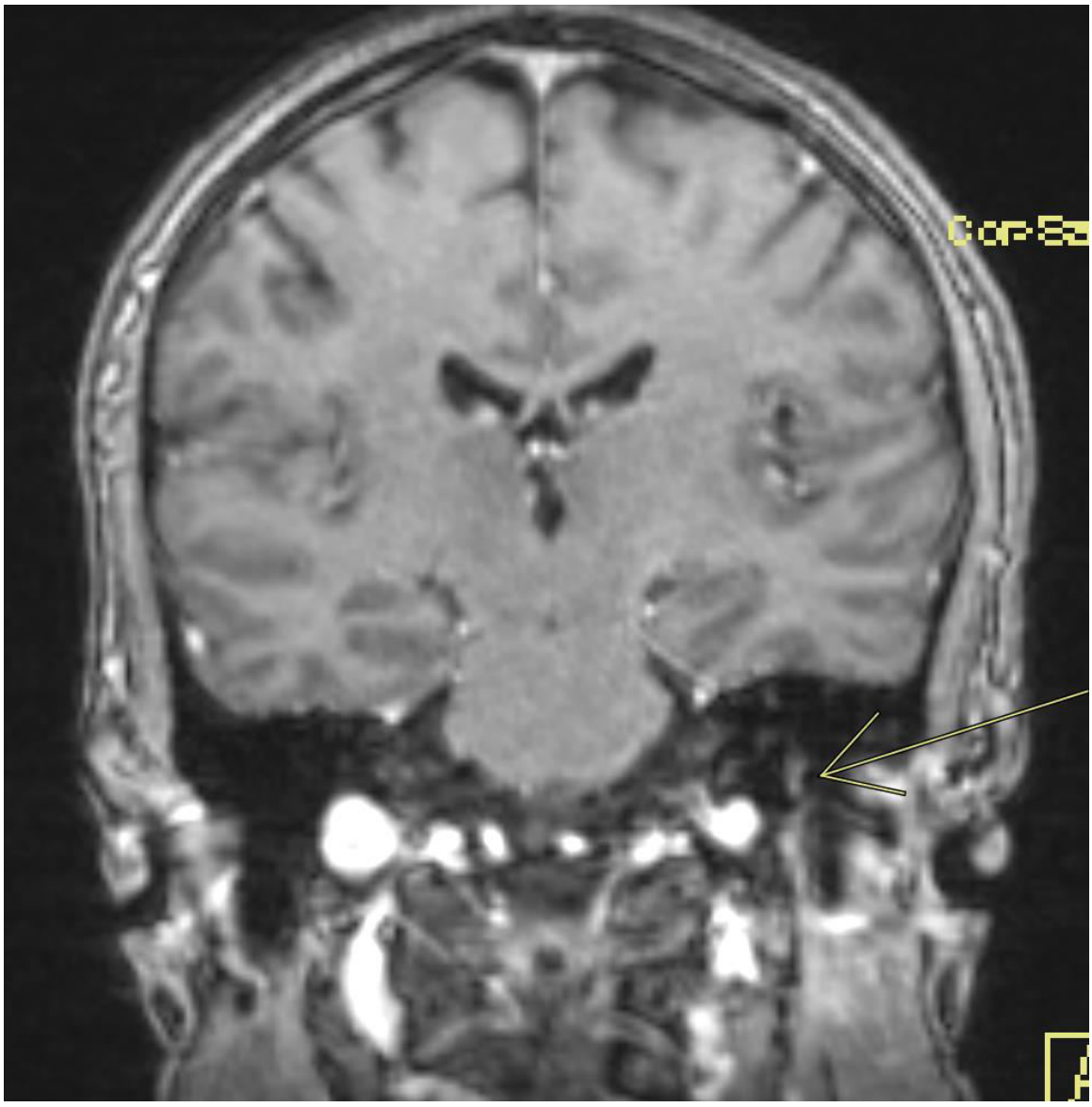

Figure 2: Brain MRI with IV contrast showed a subtle enhancement at the fascial nerve at the initial presentation

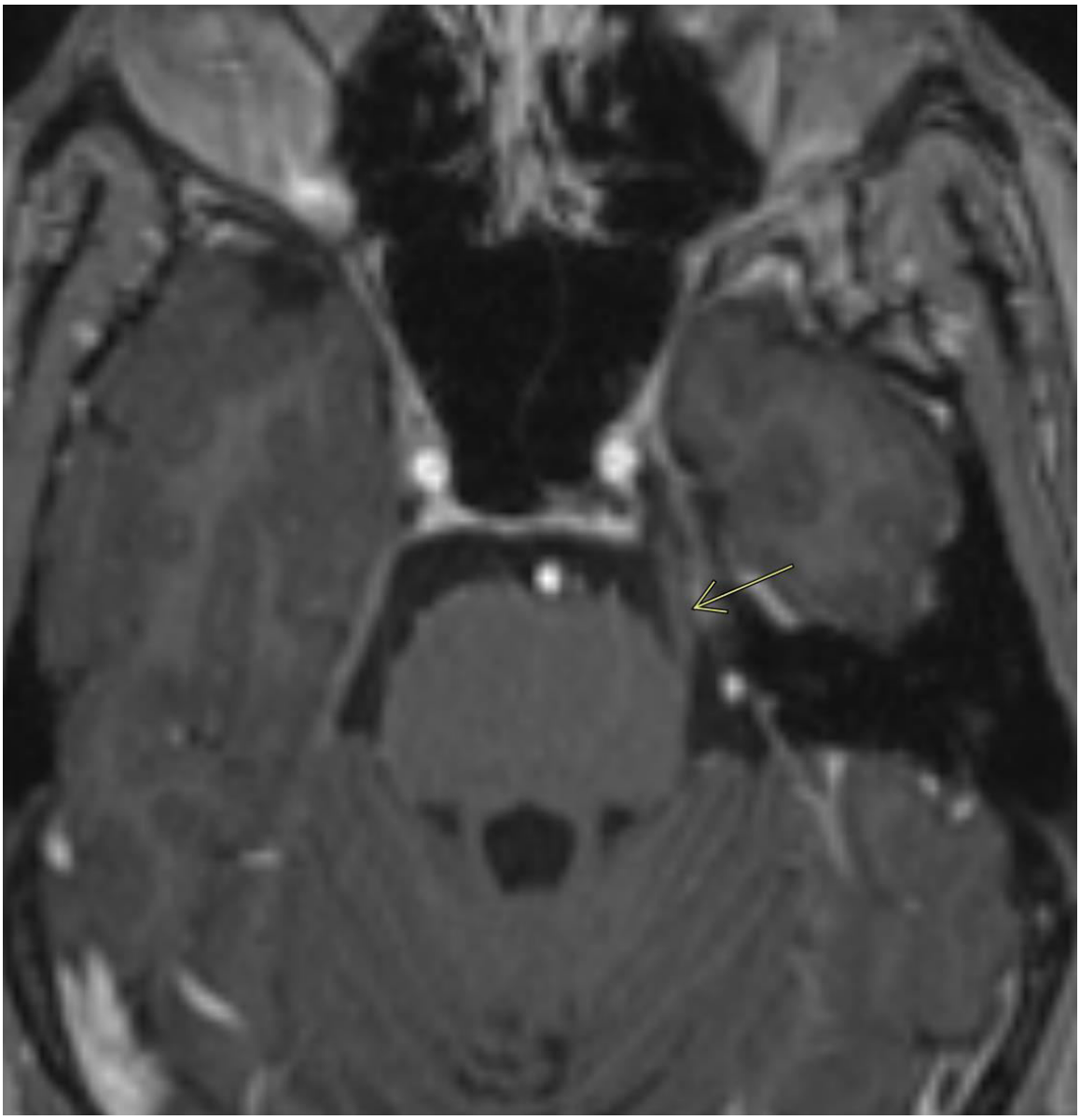

Figure 3: Follow-up brain MRI showed interval resolution of the previously noted left trigeminal nerve thickening

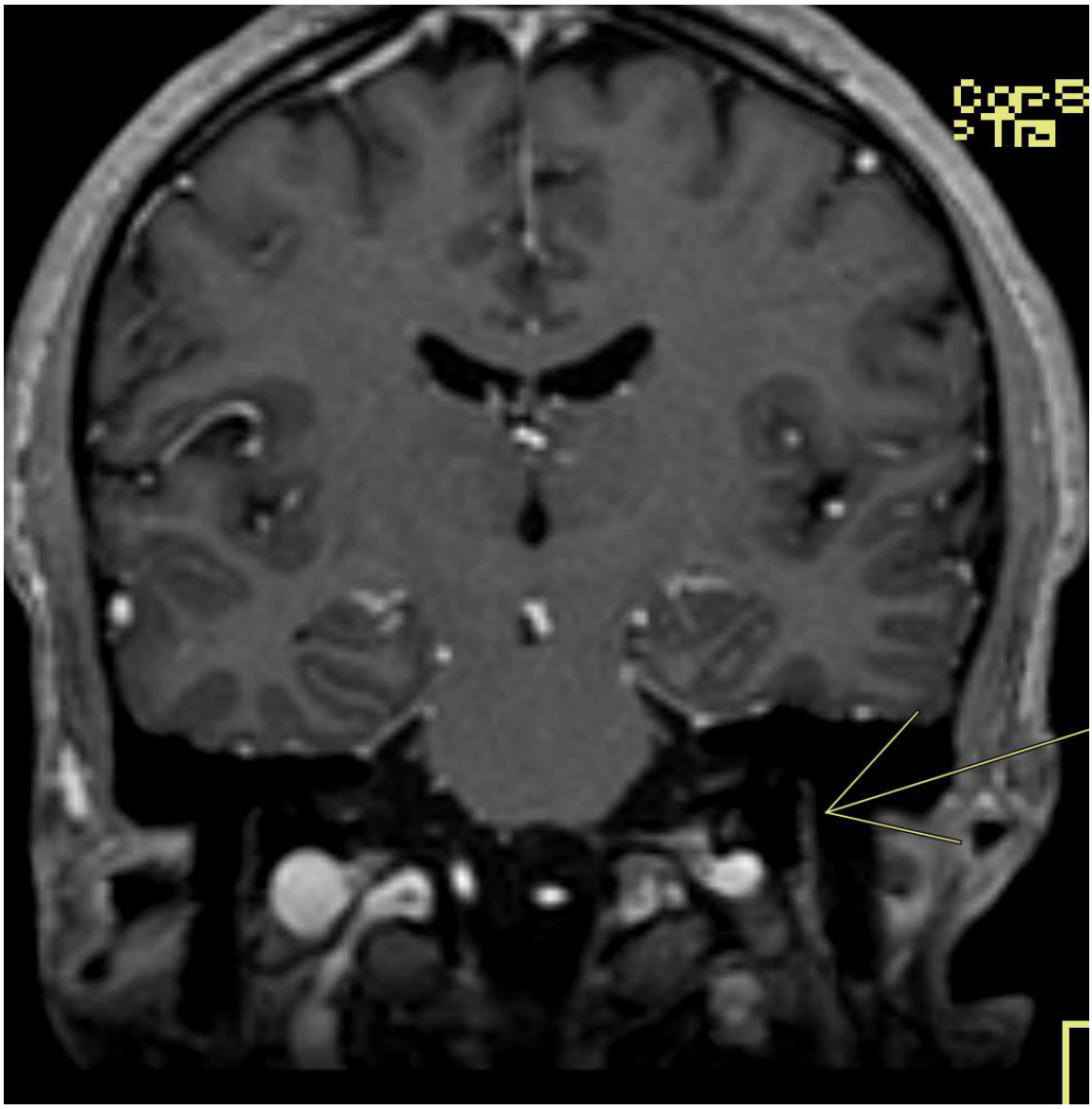

Figure 4: Follow-up brain MRI showed subtle left fascial nerve smooth enhancement involving the labyrinthine, tympanic, and mastoid segments

Discussion

Our patient experienced the GBS facial variant, which is a clinical subtype of GBS (5). A lower motor neuronal facial weakness is a common presentation for GBS post-COVID-19 vaccination. Evidence has shown that bifacial weakness and facial nerve palsy are characteristically evident with GBS occurring after COVID-19 vaccination (5,6).

The most likely explanation is that the patient developed GBS after he was vaccinated with the Pfizer-BioNTechCOVID-19 vaccine. Similar cases reported the occurrence of GBS following vaccination with Vaxzevria, the AstraZeneca COVID-19 vaccine (6),and the Pfizer-BioNTech COVID-19 vaccine (7).A retrospective cohort was conducted to compare the incidence of reported cases of GBS with the use of various COVID-19 vaccines between December 2020 and January 2022. The included vaccines in the analysis of the reported adverse events were the Ad26.COV2.S (Janssen), BNT162b2 (Pfizer-BioNTech), and mRNA-1273 (Moderna) COVID-19 vaccines (8). The reporting rate ratios and the risk of GBS were

higher among those vaccinated with Ad26.COV2.S (Janssen) than those who were vaccinated with BNT162b2 (Pfizer-BioNTech) and/or mRNA-1273 (Moderna) (8).

The risk of GBS increases following the first dose of a COVID-19 vaccine but mainly the DNA vaccines (5).A lower positive rate of anti-ganglioside antibodies is another characteristic feature of the AMAN neurophysiological subtype of GBS post-COVID-19 vaccines, as anti-ganglioside antibodies mainly attack axons; however, the anti-ganglioside antibodies are serologically negative in the AIDP neurophysiological subtype of GBS post-COVID-19 vaccines (5). Most of the reported cases in 227 patients who were diagnosed with GBS post-COVID-19 vaccination showed albumin-cytological dissociation, which is a combination of elevated protein and normal cellularity; however, normal CSF analysis was evident in 56 patients, and the sole elevation of protein was evident in another 20 patients with GBS post-COVID-19 (9). GBS diagnosis is a clinical diagnosis, as no biomarkers have shown good sensitivity and specificity; however, electrophysiological studies, CSF, and neuroimaging can assist in diagnosing GBS (9).

Full recovery was achieved for a reported case of GBS following the first dose of the Pfizer-BioNTech COVID-19 vaccine when the patient restored his functional status, and neurological assessment was normal one month after discharge (7).In our patient, the facial weakness and decreased sensation in the face were improved substantially after receiving the fifth dose of IVIG, which also supports the diagnosis of GBS post-COVID-19 vaccination.Dyslipidemia was associated with the risk of GBS and severe GBS in one study (10). Given that the remnant cholesterol could activate monocytes in GBS patients, controlling blood lipid parameters would prevent the development of GBS and severe GBS (10).The safety of further vaccinated patients who experienced GBS with other doses of the COVID-19 vaccine is yet to be determined as the evidence is not conclusive (5).

Conclusion

This study emphasizes the importance of recognizing the early symptoms and signs of GBS and recognizing patients at risk who need close monitoring of adverse events following vaccination with COVID-19 vaccines. The prognosis of GBS following COVID-19 vaccination is generally good. Still, early detection and management to prevent life-threatening complications is key when the benefit of vaccination outweighs the risk of adverse events following vaccinations.

Highlights

- Healthcare providers must be able to recognize the signs and symptoms of Guillain-Barré syndrome following COVID-19 vaccination and provide immediate management to prevent incidences of life-threatening complications.
- Healthcare providers must be able to recognize patients at risk of Guillain-Barré syndrome who need close monitoring of adverse events following vaccination with COVID-19 vaccines.
- Further vaccination with COVID-19 may be warranted when the benefit outweighs the risk of adverse events following vaccinations.

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Authors' contributions

All authors wrote and approved the final manuscript and the resultant recommendations.

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Declarations

Ethics approval and consent to participate

The study protocol was reviewed and approved by King Abdullah Medical City's Institutional Review Board (study reference number **#23-1092**).

Consent for publications

Written informed consent was obtained from the participant for the publication of this case report.A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Competing interests

The authors declare that they have no competing interests.

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