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Case report

Guillain-Barré syndrome following the first dose of SARS-CoV-2 vaccine: A temporal occurrence, not a causal association

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ABSTRACT

Safety monitoring is of paramount importance for vaccines authorized for emergent use (EUA) by the US Food and Drug Administration (FDA) against SARS-CoV-2. Mass immunization is an essential tool to end the current pandemic, but vaccine surveillance is necessary to identify any potentially associated harms. At the same time, probability of temporal bias should be borne in mind before making conclusions about causality between the vaccine and an attributable undesired effect. We report a case of Guillain-Barré syndrome after the first dose of SARS-CoV-2 vaccine and believe this is a temporal, rather than causal association.

Introduction

SARS-CoV-2 vaccination is an integral part of the global strategy to control the Coronavirus disease 2019 (Covid-19) pandemic. Currently (at the time of this writing), three vaccines have been granted emergency use authorization (EUA) by the FDA (Food and Drug Administration) [1]. The FDA and CDC (Centers for Disease Control and Prevention) are monitoring possible vaccine-associated adverse reactions, including obtaining information through passive reporting systems such as the VAERS (Vaccine Adverse Event Reporting System) [2]. Most recently, the distribution of one of these vaccines has been paused given a potential association with thrombosis [1]. While both health care providers and vaccine recipients should report and share data on all potential vaccine-related side effects, each suspect reaction should also be interpreted in the context of coincidence and temporal association. We report a case of Guillain-Barré syndrome that developed one day after receiving the first dose of Pfizer-BioNTech COVID-19 vaccine.

Case

An 86 year old white female presented with weakness in her bilateral lower extremities in February 2021. She recounted that these symptoms were initially observed one day after receiving the first dose of the COVID-19 vaccine (Pfizer-BioNTech). Four days later, her weakness progressed to balance impairment and ambulatory dysfunction. By day 6, she could no longer walk and thus presented to the emergency department. At her baseline, she was an independent woman, able to perform her daily routine without assistance, and mobilized with a walker. She denied fever, diarrhea, abdominal pain, cough, difficulty breathing, rhinorrhea or nasal congestion prior to the onset of her current symptoms. Her past medical history was notable for hypertension, rheumatoid arthritis, ductal carcinoma in situ (DCIS) of the breast, and osteoporosis. Her medications included amlodipine, denosumab, and prednisone.

On admission, vital signs were noted as oral temperature 36.5 °C, heart rate 78 beats per minute, respiratory rate 16 cycles per minute, blood pressure 158/89 mm Hg and an oxygen saturation 96 % on room air. Her body mass index (BMI) was 18.6 kg/m^2. Neurological examination revealed higher mental functions and sensory systems to be intact. Examination of the motor system demonstrated normal muscle tone without abnormal movements or tremors. Her power was medical research council (MRC) 5/5 in the upper, but 4/5 in the lower extremities. Bilateral areflexia was present in the knees and ankles. No cranial nerve deficits or cerebellar signs were elicited. Examination of the abdomen, cardiovascular and respiratory systems were unremarkable.

Initial laboratory investigations demonstrated a total white cell count of 10,300/μL with a lymphocyte count of 500/μL, blood urea nitrogen (BUN) 24 mg/dL and serum creatinine 0.67 mg/dL. Hemoglobin, platelet count, creatine phosphokinase (CPK), and

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the rest of the comprehensive metabolic panel were within normal limits. Chest x-ray showed no pulmonary infiltrates. The computed tomography (CT) scan of the head showed mild brain atrophy which was reported as age-appropriate. MRI of the whole spine showed spondylotic changes and facet arthrosis involving the cervical, thoracic and lumbar regions which were similar to imaging done two years earlier. No cord signal changes or hemorrhage was seen. Cerebrospinal fluid (CSF) analysis demonstrated a protein of 162 mg/dL, and appropriate level of glucose (49 mg/dL) compared to concomitant serum glucose; CSF white cell count was 2 cells/μL. No organisms were identified on Gram stain. Nasopharyngeal SARS-CoV-2 screen using nucleic acid amplification (NAA) technology was negative.

Based on her clinical symptoms and the evidence of albuminocytologic dissociation, her consulting neurologist made a diagnosis of Guillain-Barré syndrome (GBS). Electromyography and nerve conduction studies (EMG/NCS) were not conducted since the clinical presentation, CSF and MRI findings, and absence of an alternate diagnosis were all consistent with GBS [3].

The patient was treated with a 5-day course of intravenous immunoglobulin (IVIG). On day 4 of receiving treatment, the patient was able to stand and take a few steps. However, she had difficulty using a walker and was eventually discharged for inpatient rehabilitation after 6 days of hospitalization. Following her discharge, she made remarkable recovery and regained her baseline functional status.

Discussion

GBS is the most commonly diagnosed acute paralytic neuropathic disorder [4]. While the exact pathophysiology of this syndrome is unclear, molecular mimicry and immune mediated phenomena are considered to be most likely causes [4]. Antecedent respiratory and gastrointestinal infections have been identified in up to two-thirds of the patients with GBS [4]. Vaccinations have also been associated with this disease, most notably following influenza immunization [4]. However, the extent and magnitude of association between the influenza vaccine and GBS is limited at best. Only one additional case of GBS per 100,000 people was attributed to the vaccine against the H1N1 influenza A virus during the 1976 immunization campaign [5]. An even lower rate of 1.6 excess cases of GBS per 1,000,000 was noted following the 2009 H1N1 influenza A vaccination [6]. Moreover, the probability of developing GBS from influenza exceeds that resulting from influenza vaccination [7].

While there were initial case reports of an association between COVID-19 infection and GBS, this did not necessarily prove causation [8,9]. Moreover, a subsequent epidemiological study did not identify a link between these two disease states [10], as compared to Zika virus where a causal relationship with GBS was evident [4]. Similarly, thus far no evidence exists with development of GBS after the vaccination against COVID-19. Sporadic cases of GBS will likely continue to occur during the current COVID-19 mass immunization campaign. For some patients, as in our case, there may happen to be a coincidental, temporal association between the vaccine administration and the development of GBS. Such events may create a misconception that the COVID-19 vaccine can be a cause of GBS. In our patient, the symptoms suggestive of GBS developed within one day following her first vaccine dose. Even if the vaccine is presumed to be the trigger for GBS, the time between the vaccine-mediated immune stimulation and development of GBS is far too short. Symptoms of GBS generally develop between 1–4 weeks after the antecedent cause [4]. Moreover, our patient's age increases the chance of her developing spontaneous GBS, given the higher incidence in people aged 80 years and above [4].

In the Johnson & Johnson vaccine trial, one patient each in the vaccine arm and placebo arm developed GBS [11]. This again suggests that by coincidence people may spontaneously develop GBS; such events will naturally be observed to occur in close proximity to vaccine receipt during massive, global vaccination campaigns. While vaccine safety surveillance remains crucial, one needs to be judicious in attributing a particular side effect directly to a vaccine. We wish to emphasize that temporal associations should not be translated into causality, as has been recently stated [11].

Our patient subsequently received her 2nd scheduled vaccine dose, without any adverse effects as of the writing this report and has completely recovered from GBS.

Ongoing surveillance and large scale epidemiological information will be crucial to monitor safety profile of vaccines. We hope and believe that COVID-19 vaccine acceptance will improve with transparency and critical interpretation of all safety data for the public.

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Consent

Written informed consent was obtained from the patient for 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.

Author contribution

All authors were equally involved in data gathering and manuscript writing.

CRediT authorship contribution statement

Osakpolor Ogbebor, **Harshit Seth**, **Zaw Min**, and **Nitin Bhanot** contributed to the writing of the manuscript of the case report.

Declaration of Competing Interest

The authors report no declarations of interest.

References

[1] COVID-19 Vaccines. https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines. [Accessed 22 April 2021].
[2] VAERS. Vaccine Adverse Event Reporting System. https://vaers.hhs.gov/about.html [Accessed 22 April 2021].
[3] Fokke C, van den Berg B, Drenthen J, Walgaard C, van Doorn PA, Jacobs BC. Diagnosis of Guillain-Barré syndrome and validation of Brighton criteria. Brain 2014;137:33–43.
[4] Willison HJ, Jacobs BC, van Doorn PA. Guillain-Barré syndrome. Lancet 2016;388:717–27.
[5] Schonberger LB, Bregman DJ, Sullivan-Bolyai JZ, et al. Guillain-Barre syndrome following vaccination in the National Influenza Immunization Program, United States, 1976–1977. Am J Epidemiol 1979;110:105–23.
[6] Salmon DA, Proschan M, Forshee R, et al. Association between Guillain-Barré syndrome and influenza A (H1N1) 2009 monovalent inactivated vaccines in the USA: a meta- analysis. Lancet 2013;381:1461–8.
[7] CDC. Guillain-Barré Syndrome and Vaccines. https://www.cdc.gov/vaccinesafety/concerns/guillain-barre-syndrome.html [Accessed 23 April 2021].
[8] Agosti E, Giorgianni A, D'Amore F, Vinacci G, Balbi S, Locatelli D. Is Guillain-Barrè syndrome triggered by SARS-CoV-2? Case report and literature review. Neurol Sci 2021;42:607–12.
[9] Lunn MP, Cornblath DR, Jacobs BC, Querol L, van Doorn PA, Hughes RA, et al. COVID-19 vaccine and Guillain-Barré syndrome: let's not leap to associations. Brain 2021;144:357–60.
[10] Keddie S, Pakpoor J, Mousele C, et al. Epidemiological and cohort study finds no association between COVID-19 and Guillain-Barré syndrome. Brain 2021;144:682–93.
[11] Márquez Loza AM, Holroyd KB, Johnson SA, Pilgrim DM, Amato AA. Guillain-Barré syndrome in the placebo and active arms of a COVID-19 vaccine clinical trial: temporal associations do not imply causality. Neurology 2021(April (6)), doi:http://dx.doi.org/10.1212/WNL.0000000000011881 Epub ahead of print. PMID: 33824169.