

## Coronavirus Pandemic

# Guillain-Barré syndrome after COVID-19 vaccination: report of two cases from Vietnam

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### Abstract

Coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization in March 2020 and since then it has spread to almost every country around the world. Vaccines against COVID-19 are considered an essential measure to curb this pandemic. However, side effects, including local and systemic reactions, after administering the COVID-19 vaccine have been defined, and some side effects have been reported. We present two cases of Guillain-Barré Syndrome (GBS) after receiving the ChAdOx1 nCoV-19 vaccine (Oxford-AstraZeneca). Both cases were admitted to the 108 Military Central Hospital, Vietnam, and received plasmapheresis therapy with satisfactory recovery after treatment.

**Key words:** Guillain-Barré Syndrome; GBS; COVID-19 vaccination; plasmapheresis.

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### Introduction

The Coronavirus disease 2019 (COVID-19) pandemic continues to spread around the world. The COVID-19 vaccines are expected to reduce the severity of infection and fatality rates associated with the infection. The most common types of COVID-19 vaccines include those manufactured by Pfizer/BioNTech, Moderna, Oxford-AstraZeneca, and Johnson & Johnson. Recently, Guillain-Barré syndrome (GBS) has been identified as a side effect of the Jassen, AstraZeneca, and Johnson & Johnson COVID-19 vaccines [1]. GBS is an autoimmune polyradiculoneuropathy in which patients experience progressive weakness in the body's extremities and areflexia [2,3]. Although the exact cause is undetermined, it mainly occurs after an infection in the respiratory and digestive systems [4]. Patients typically recover fully, although paralysis and death are possible outcomes [4]. Common risk factors of GBS are *Campylobacter jejuni*, influenza virus, Cytomegalovirus, hepatitis E, Epstein Barr virus, and Zika virus infection [2,5]. However, there have been reports of a probable link between GBS and

vaccines, such as the swine flu, anti-rabies, and COVID-19 vaccines [5,6].

### Case report

#### Case 1

A 38 year old male with no relevant medical history presented to 108 Military Central Hospital, Vietnam, with numbness and weakness of all four limbs four days after receiving his first dose of the ChAdOx1 nCoV-19 (Oxford-AstraZeneca) vaccine, rapidly followed by bilateral eyebrow sagging, inability to close the eyes, and impaired balance. He had no prior exposure to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Neurological examination revealed bifacial weakness, reduced motor strength in all four limbs with a motor strength of 4/5 (Medical Research Council scale), and paresthesia of both limbs in a “stocking-glove” distribution. The other clinical examinations were normal. Initial complete blood count was notable for a white blood cell (WBC) count of 13.53 G/L (59.7% neutrophil and 29.3% lymph), and the basic metabolic panel was in the normal range. His cerebrospinal fluid (CSF) examination indicated albuminocytologic dissociation with protein content of

1.94 g/L and WBC content of 4 cells/mL. Nerve conduction studies were consistent with the demyelinating pathology of GBS. Based on these investigations, the patient was diagnosed with GBS associated with the AstraZeneca vaccine. He received plasma exchange five times and his symptoms improved. He was discharged after 17 days of treatment.

### Case 2

A 29 year old male came to 108 Military Central Hospital with weakness in his extremities after receiving the second dose of the ChAdOx1 nCoV-19 vaccine three weeks ago.

His past medical history was unremarkable, with no prior exposure to SARS-CoV-2. Neurological examination indicated limb weakness with motor strength of 4/5 in both upper and lower limbs. In addition, the patient was found to have reduced deep tendon reflexes and paresthesia on both arms and legs bilaterally. The other systems examination indicated normal findings. Cerebrospinal fluid analysis was significant with albuminocytologic dissociation with protein 4.0 g/L and absent pleocytosis. Complete blood count and basic metabolic panel were within normal limits. The electromyography introduced motor-dominant mixed polyneuropathy compatible with GBS. He received plasma exchange therapy five times. The symptoms improved, and he was discharged after 11 days of treatment.

### Consent

Written informed consent was obtained from all the subjects.

### Discussion

Guillain-Barré Syndrome is the most common and severe acute flaccid paralysis with several variants [7]. Variants of GBS mainly include acute inflammatory demyelinating polyneuropathy (AIDP), acute motor axonal neuropathy, and Miller-Fisher syndrome. In AIDP, the myelin sheath and related Schwann-cell components are injured. In acute motor axonal neuropathy, the primary targets are the membranes of the axolemma. The presence of antibody biomarkers directed against neuronal membrane gangliosides, notably GM1 and GD1a, indicate acute motor axonal neuropathy, further supporting this classification [7]. However, the responding mechanism of the immune system that causes the pathogenesis of GBS is still unclear. A proposed theory of the immune system autoreactivity resulting in axonal injury is molecular

mimicry of the microbial agents and nerve cell surface [5,8]. The syndrome often presents with acroparesthesia, prominent weakness of the legs and arms, and hypo/areflexia [9,10]. The characteristics used to diagnose GBS include distal areflexia, proximal hyporeflexia, and cranial nerve involvement, which can be seen in nerve conduction studies. In addition an albuminocytologic dissociation in CSF is also present with an elevation in protein and without an elevation in WBC [3,10].

More than 200 cases of GBS following the administration of the ChAdOx1 nCoV-19 vaccine were reported to EudraVigilance as of 27 June 2021 [11]. A review by Bouttour *et al.* found that 11/19 cases of GBS after vaccination against COVID-19 were of recipients of the BNT162b2 vaccine, 7 of the AstraZeneca vaccine, and 1 of the Johnson & Johnson vaccine [12]. Out of the 43 cases of COVID-19 associated GBS reviewed by Fernandez *et al.*, the COVID-19 vaccines from Pfizer, Moderna, AstraZeneca, Janssen, and Johnson & Johnson were linked to 22, 9, 3, 3, and 1 cases, respectively [13]. The reason for the development of GBS post-vaccination could be a cross-reaction between antibodies produced in response to the SARS-CoV-2 spike protein and those that are a part of the peripheral myelin or the peripheral nerve glycolipids. Previously, data has highlighted the similarity between the spike protein and the lung surfactant proteins, making cross-reactions feasible [14]. Evidence suggested that the spike protein of SARS-CoV-2 can bind to the cell surfaces' glycoprotein to increase its viral transmissibility. Human leukocyte antigen (HLA) haplotype profile can also contribute as it plays a role in other immune-mediated neurological diseases and COVID-19-related GBS [15,16]. The median onset time of SARS-CoV-2-associated GBS is 11 days post-infection. This period is also when the maximum immune response is expected [15]. The mean clinical onset of GBS after COVID-19 vaccination was calculated to be 7 days in a review of 43 reported cases and in two-thirds of the reports it occurred following the first dose [13].

This potentially life-threatening disease often requires both general medical and immunological treatment. IVIg and plasma exchange have been proven effective treatments before irreversible nerve damage occurs [7]. In our cases, patients were successfully treated with plasma exchange.

### Conclusions

The case studies and reports highlight safety concerns but cannot prove a causal link between

COVID-19 vaccination and GBS. The two cases emphasize the importance of monitoring patients who develop neurologic symptoms after receiving COVID-19 vaccinations and the need for post-vaccination surveillance to determine the presence of GBS. Despite this, the advantages of COVID-19 vaccinations outweigh the risk of severe side effects like GBS.

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**Conflict of interests:** No conflict of interests is declared.