A rare case of death in a patient with Guillain-Barrè syndrome after COVID-19 vaccination

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Abstract

The "Severe Acute Respiratory Syndrome Coronavirus 2" (SARS-CoV-2) causes potentially fatal disease.The Covid-19 vaccine is the most effective weapon to reduce the virus spread. We describe a rare post-vaccine effect like Guillian Barré Syndrome. We reported a 66-years-old female patient with acute manifestations four weeks after vaccine administration.

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introduction

The "Severe Acute Respiratory Syndrome Coronavirus 2" 1 (SARS-CoV-2) potentially causes fatal disease named "Covid-19" 2 . The Incubation period is between 2 days to 2 weeks after being exposed to the virus3 .

Most common clinical manifestations at the onset of disease include rhinorrhea, fever, cough, headache and myalgia. SARS-COV-2 seems to have particular affinity with nervous system; manifestations like hyposmia and hypogeusia are pathognomonic4.

In more severe cases, individuals may require hospitalization and even admission into the intensive unit care because the disease may unexpectedly cause different complications like Acute Respiratory Distress Syndrome (ARDS), which eventually may lead to death in a short time5. Pregnant women represent a patient population vulnerable to covid 19 virus infection due to their reduced immune defense. They are a challenge for anesthesiological management6,7,8.

Many strategies were performed to reduce the virus spread but the Covid-19 vaccine is certainly the most effective weapon.

The nucleic acid-genetic approach is a new way of developing vaccines. Before the COVID-19 pandemic. Because of the pandemic, the research in this area has progressed very fast and some mRNA vaccines for COVID-19 are getting emergency use authorization9.

Like any vaccine, COVID-19 vaccines can cause side effects, most of which are mild or moderate and vanish within a few days on their own. Typical side effects include pain at the injection site, fever, fatigue, headache, muscle pain, chills and diarrhea, even though more serious or long-lasting side effects are possible. National authorities and international bodies, including World Health Organization (WHO), are closely monitoring for any unexpected side effects following COVID-19 vaccine us9.

The aim of our case report is to present a rare post-vaccine side effect like Guillian Barré Syndrome (GBS).

Case presentation

In May 2021 a 66-year-old woman with a medical history of hypertension and anxious- depressive syndrome in treatment with bupropion, pregabalin and lorazepam was admitted to the emergency department with symptoms of acute progressive weakness of distal lower extremities, especially to the right leg, she had associated symptoms like headache, nausea and vomiting, no urinary and fecal incontinence, no rigor. No previous neurologic history was reported from patient. Neurological manifestations of the patient began with progressive paraesthesia of distal lower extremities, almost four weeks after she received COVID-19 vaccination with a live-attenuated virus.

Brain, cervical and lumbosacral Computed Tomography (CT) was done, it showed a normal finding except for mild herniation of some intervertebral discs and a widespread arthritic degeneration.

On physical examination, the patient was not in hemodynamic instability. She was afebrile and her vitals were: SpO2 98% in ambient air , blood pressure 130/80 mmHg, respiratory rate 18 breaths/minute and heart rate 72 bpm.

The patient was admitted to our Neurology department where the neurological examination revealed a Bell's palsy with facial asymmetry. Except for the seventh, no other cranial nerve was involved. Upper limbs examination revealed normal trophism and muscle tone in upper limbs. The patient showed progressive failure during Mingazzini I test , without evident lateral deficit. The upper limbs' examination also revealed a weakness of the interosseous muscles of the hands. Tendon reflexes were absent. Lower limbs examination revealed normal muscle tone but with reduced trophism. The right leg was in an posture of external rotation. The patient could not assume the Mingazzini II position , the iliopsoas muscles were plegic and all limb' reflexes were absent. Laboratory investigations were blood count, glucose, urea, electrolytes, lactic dehydrogenase, interleukin, PCR, fibrinogen,D-dimer.

Lumbar puncture was performed urgently and the cerebrospinal fluid examination (CSF) revealed clear fluid, normal opening pressure, high protein with normal glucose and cell counts (albumin cytologic dissociation).

Based on physical examination, laboratory investigations, instrumental examinations and CSF findings, a provisional diagnosis of acute, rapidly progressive, inflammatory polyneuropathy like Guillain-Barrè syndrome. Differential diagnosies was made with inflammation or infection of the brainstem or spinal cord for example sarcoidosis, Sjögren syndrome and acute transverse myelitis, brainstem stroke, vitamin deficiency, acute flaccid myelitis were excluded ; also metabolic or electrolyte disorders, some infection for example: Lyme disease, cytomegalovirus, HIV, Epstein–Barr virus or varicella zoster virus, and neuromuscolar junction disease for example: myasthenia gravis and Lambert–Eaton myasthenic syndrome were excluded .

Electrophysiological studies revealed a demyelinating polyneuropathy consistent with Guillain-Barrè syndrome and excluded the subtypes of GBS: acute inflammatory demyelinating polyradiculoneuropathy (AIDP), acute motor axonal neuropathy (AMAN) and acute motor sensory axonal neuropathy (AMSAN).

The patient satisfied the level 1 diagnostic certainty of Brighton criteria for GBS. The

Table 1 | **Brighton criteria for Guillain-Barré syndrome**

	Level of diagnostic certainty			
Diagnostic criteria	**1**	**2**	**3**	**4**
Bilateral and flaccid weakness of limbs	+	+	+	+/–
Decreased or absent deep tendon reflexes in weak limbs	+	+	+	+/–
Monophasic course and time between onset-nadir 12 h to 28 days	+	+	+	+/–
CSF cell count <50/μl	+	+*	-	+/–
CSF protein concentration > normal value	+	+/–*	-	+/–
NCS findings consistent with one of the subtypes of GBS	+	+/–	-	+/–
Absence of alternative diagnosis for weakness	+	+	+	+

+, present; –, absent; +/–, present or absent; GBS, Guillain–Barré syndrome; NCS, nerve conduction studies. *If CSF is not collected or results not available, nerve electrophysiology results must be consistent with the diagnosis of Guillain-Barré syndrome. Level 1 is the highest level of diagnostic certainty, level 4 is the lowest level of diagnostic certainty. Reproduced with permission from Oxford University Press © Fokke, C. *et al.*

Brighton diagnostic criteria for GBS can be found in Table 1.

High- dose intravenous immunoglobulin (IVIG) (2gr/kg) over 5 days and heat therapy were started 24 hours after the hospitalization.

Nevertheless, limb ' weakness got worse and severe respiratory failure developed almost 11 days after admission. The patient was transferred to the Intensive Care Unit (ICU) and required mechanical ventilation.

According to the clinical and arterial blood gases (ABG) parameters the patient stared a cycle of non-invasive ventilation (NIV) with helmet interface in assist pressure control ventilation (APCV) mode (PS 1O mmHg, PEEP 7 mmHg, FiO2 60%) with good response.

She also stared intravenous continuous infusion of dexmedetomidine (0,8 γ/kg/h) with a Glasgow coma scale (GCS) 15 and a plasmapheresis cycles of five sessions 48 hours after the hospitalization in the intensive care unit. At the end of the plasmapheresis cycle, a new neurological assessment revealed a mild improvement of the neurological system

After nine days, considering the clinical and hemodynamic stability (FC 58 bpm, SpO2 98%, PA 111/56 mmHg), the good respiratory mechanics and the invariability of the neurological clinical picture the patient ended the NIV cycle and a Venturi mask at FiO2 60% was applied. She also started a plasmapheresis cycles of five sessions 48 hours after the hospitalization in the intensive care unit.

At the end of the plasmapheresis cycle, a new neurological assessment revealed a mild improvement of the neurological system. Therefore, the patient was moved from the ICU to the Neurology department.

During the hospitalization, the patient started presenting problems of psycho-motor agitation treated with the administration of antipsychotic drugs such as an aliphatic phenothiazine neuroleptic. The hyposthenia of the lower limbs raised and the patient started showing bilateral Bell's palsy. Simultaneously, a deterioration of respiratory function arised, and the patient was treated once again with the application of oxygen therapy (FiO2 50%).

A new plasmapheresis cycle was started but based on the results of the emogas analysis (pH 7.45, pO2 51 mmHg, pCO2 30 mmHg) and considering the vital signs (FC 120 bpm, SpO2 80%, PA 170/80 mmHg), the patient was once again transferred to ICU where she started a new cycle of NIV with helmet interface in pressure support ventilation (PSV) mode (PS 12 cmH2O; PEEP 10; FiO2 100%) and intravenous continuous infusion of dexmedetomidine (0,6 γ/kg/h) considering the psychomotor agitation.

Almost 14 hours after admission in the Intensive Care Unit (ICU) the control arterial blood gases (ABG) revealed a serious deterioration of respiratory gas exchange. The patient was intubated and connected to

the Mechanical Artificial Ventilation (VAM).

One hour after intubation the electrocardiogram heart tracing revealed ST segment depression, severe bradycardia (FC 20 bpm) with following cardiac arrest. Cardiopulmonary resuscitation maneuvers with the use of an automatic external defibrillator were performed according to Advanced Cardiovascular Life Support (ACLS).

After 30 minutes there was no evidence of cardiac response so the patient's death was declared.

Discussion

Guillain– Barré Syndrome is a rare but serious health disorder, triggered by an infection or immune stimulus, in which a person's own immune system damages his/her peripheral nerve cells as a result of molecular mimicry, causing muscle weakness, sometimes paralysis, and infrequently death10,11. Several diagnostic criteria for Guillain Barré Syndrome have been proposed, including the recent one set by the Brighton Collaboration12.

Vaccine-associated Guillain–Barre syndrome is defined as those with the onset of GBS symptoms within the six-week period after receiving the vaccine, as reported by Vaccine Adverse Event Reporting System (VAERS) 13.

Yong Chen et al suggest that previous case reports of Gg shortly after administration of several other vaccines probably represent coincidental temporal associations rather than real causal associations14.

COVID-19 infection creates an immunomediate systemic response characterized by cytokine storm15. It is still the subject of research if GBS linked to COVID- 19 is due to antibody production against specific gangliosides as seen in some forms of GBS or T-cell- mediated actions or straight neuroinvasive events16,17.

Filosto et al, carried out a study in two Italian regions with the highest number of COVID-19-positive patients. It, showed a considerably higher GBS incidence in March and April 2020 than in the same months of 2019 with a 2.6-fold increase. The majority of GBS cases (88%) were COVID-19 positive with an estimated incidence of 47.86/100 000 COVID-19-positive cases and of 236/100000 in the hospitalized COVID-19-positive population18.

The real connection between the vaccination for COVID-19 and the development of GBS is still controversial , although GBS cases have been reported following a wide range of vaccines such as meningococcal vaccine, poliovirus vaccine, flu vaccine and rabies vaccine19.

Conclusions

To conclude, we found no evidence which demonstrate an association of vaccines with an increased risk of GBS. Probably previous case of GBS shortly after administration of several other vaccines represent coincidental temporal associations rather than real causal associations. However, risk of GBS following vaccination should be weighed against the potential benefits of vaccination. The hypothesized, risks of adverse events cannot be considered a valid reason to avoid the administration of currently recommended vaccines.

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Declaration statement for conflict of interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome

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