Guillain–Barre syndrome following subclinical COVID-19 infection in a child

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Abstract

The entire world is coping up with the challenges imposed by COVID-19 pandemic caused by a novel coronavirus, which started from a single case in Wuhan city of China in November 2019. Its outcomes range from asymptomatic cases to most severe diseases like severe acute respiratory syndrome. Various neurological manifestations as an outcome of coronavirus infection are known and Guillain–Barre Syndrome (GBS) is one of them. In our present case, we describe the correlation of GBS with subclinical SARS-CoV-2 in a pediatric patient. The patient was successfully managed with intravenous immunoglobulin and physiotherapy. In the current pandemic, any case of GBS should be evaluated for recent or remote SARS-CoV-2 infection.

Keywords: Child, Guillain–Barre syndrome, SARS-CoV-2, subclinical COVID-19

Introduction

The entire world has been coping up with COVID-19 pandemic caused by the novel coronavirus, which started in Wuhan, China in December 2019. COVID-19 outcomes range from complete recovery to death due to the most severe diseases like severe acute respiratory syndrome. Various neurological manifestations as an outcome of coronavirus infection are known and Guillain–Barre Syndrome (GBS) is one of them. However, very little information is available for subclinical infection of COVID-19 presenting as GBS. We present a case of GBS in a pediatric patient following subclinical SARS-CoV-2 infection.

Case Report

We report a 2.5-year-old female child who presented with complaints of bilateral lower limbs weakness with inability to walk in the past two days and difficulty in sitting in the past one day. Initially, weakness was noticed in the left lower limb, which gradually progressed to bilateral lower limb weakness. This led to disturbed gait and inability to walk with the progression of the disease. There were no complaints of vomiting, loose stools, fever, cough, seizures, trauma, or injury in the recent past. Parents denied any history of acute febrile illness or acute respiratory tract illness in the family or any recent contact with anyone who tested positive for COVID-19 or was a suspect for the same, but father gave a history of his traveling to other places for job purposes. There was no significant past medical, surgical, or family history. She was fully immunized as per age.

The patient was admitted to the Pediatric Intensive Care Unit for further assessment and management. On Admission the patient was afebrile (36.70°C) with a heart rate of 101 beats per minute, respiratory rate of 28 breaths per minute, blood pressure 100/60 mmHg, and oxygen saturation of 99% on room air. She was conscious and cooperative. Cranial nerves were normal on examination. Predominantly muscle strength was diminished with 4/5 in the upper limbs and 2/5 in bilateral lower limbs. Deep tendon reflexes were absent in bilateral lower limbs, but normal...
muscle tone was preserved in upper limbs. Pain, temperature, and fine touch sensations were intact in all the limbs. Common laboratory investigations were performed on the first day of admission [Table 1].

Nerve conduction study on the day of admission was within normal limits. It was repeated on the seventh day of admission [Table 2], which showed prolonged latencies with reduced compound muscle action potential and normal conduction velocity in bilateral tibial, peroneal, and median nerve. Bilateral median nerve and left ulnar nerve showed conduction block. Sensory nerve conduction was normal and results were suggestive of demyelinating neuropathy. Cerebrospinal fluid (CSF) analysis was performed on the sixth day of admission, and it showed albuminocytologic dissociation [Table 3]. The AFB and Gram staining of CSF did not show any organism. Chest X-ray was normal.

Based on the clinical features and laboratory investigations we confirmed that the disease was GBS and taking into consideration the current COVID-19 pandemic, we performed rapid antigen test (RAT) and reverse transcription polymerase chain reaction (RT-PCR), which was negative but the IgG antibodies to SARS-CoV-2 tested positive in high titer (5.73). There was no history of COVID-19 infection or vaccination against the same. Considering the clinical findings and laboratory investigations, the patient was diagnosed with GBS as a manifestation of subclinical COVID-19.

Treatment for GBS was started on day 1 of her admission. She was given intravenous immunoglobulin (IVIG) (0.4 g/kg over 5 days). No deterioration in symptoms was noticed during the hospital stay. As the patient was stable, she was shifted to the pediatric ward. Physiotherapy was started to prevent limb atrophy and rebuild muscle strength. She was discharged after a week from the day of her admission. At the time of discharge, the patient was vitally stable and power in the lower limb was increased from 2/5 to 3/5. The patient was advised regular physiotherapy exercise at home and regular follow-up.

**Discussion**

Coronavirus Disease-2019, a novel respiratory tract disease caused by SARS-CoV-2, has become a major health problem across the globe with a wide range of signs and symptoms. Also, some patients may remain asymptomatic.[1]

COVID-19 can present with a variety of systemic involvement like neurological, cardiovascular, gastrointestinal, etc. Recently, a few studies have reported neurological manifestations of COVID-19. The signs and symptoms of neurological system involvement are classified into central nervous system related manifestations including headache, dizziness, impaired consciousness, acute cerebrovascular disease, epilepsy, and peripheral nervous system related manifestations such as hyposmia/anosmia, hypogeusia/ageusia, muscle pain, and GBS.[3] Mostly, neurological symptoms of COVID-19 are seen in adults but are rare in children.[3]

Till date, only a few cases have been reported that show neurological manifestations of SARS-CoV-2 in the pediatric age group. They include a pediatric patient presenting with episodes of upward gaze and bilateral leg stiffening,[8] status epilepticus (report suggesting viral encephalitis),[9] and GBS in pediatric patients with SARS-CoV-2 infection.[5,6]

Since the beginning of the COVID-19 pandemic, there have been reports of the possible link between GBS and the COVID-19 infection.[9] The infecting organism induces humoral and cellular immune responses and because of the sharing...
of homologous epitopes (molecular mimicry), it cross-reacts with ganglioside surface components of peripheral nerves. Immune reactions against target epitopes in Schwann-cell surface membrane or myelin result in acute inflammatory demyelinating neuropathy (85% of cases); reactions against epitopes contained in the axonal membrane cause the acute axonal forms of GBS (15% of cases).[9] A review of 220 cases of GBS with COVID-19 found that the incidence has increased and outcome is worse in GBS associated with COVID-19. Early diagnosis and treatment is required to improve outcome.[10]

In the current case report, we describe a case of a 2.5-year-old female child who was diagnosed with acute GBS after a subclinical COVID-19 infection. The diagnosis of acute GBS was confirmed by CSF sample analysis and nerve conduction studies. Our patient had subclinical COVID-19 infection detected by positive SARS-CoV-2 antibodies as both RT-PCR and RAT were negative and parents denied any recent contact with any COVID-19 suspect or positive patient. This report is in contrast with recent reports showing the development of GBS after clinical SARS-CoV-2 infection in pediatric patients[5‑8] as our patient was asymptomatic for COVID-19. She was given IVIG on the day of her admission for 5 days, which stopped the further progression of symptoms. She was advised regular physiotherapy to regain muscle strength and function. No abnormalities were noticed on her follow-up visits.

Conclusion

GBS can present as the first manifestation of subclinical (asymptomatic) SARS-CoV-2 infection in children. In the current COVID-19 pandemic, any case of GBS should be analyzed by testing for SARS-CoV-2 infection to rule out coronavirus as the cause of this disease as early diagnosis and treatment will improve the outcome.

Key points

The incidence and prevalence of GBS following COVID-19 pandemic is likely to increase. Early diagnosis and treatment can improve outcomes.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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Table 3: CSF analysis

| CSF Analysis       | Normal Range             |
|--------------------|--------------------------|
| Total Leukocyte Count | 0-5 (leukocytes/mm³)     |
| Chlorine          | 110-125 (mEq/L)          |
| Glucose           | 60-80 (mg/dL)            |
| Protein           | 15-45 (mg/dL)            |

Table 3: CSF analysis

| CSF Analysis       | Normal Range       |
|--------------------|--------------------|
| Total Leukocyte Count | 2 (leukocytes/mm³) |
| Chlorine          | 126 (mEq/L)       |
| Glucose           | 55.6 (mg/dL)      |
| Protein           | 133 (mg/dL)       |