CASE REPORT

Paediatric Bickerstaff brainstem encephalitis: A rare case report

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Abstract

Bickerstaff Brainstem Encephalitis, a rare variant of Guillain-Barre Syndrome has an estimated prevalence of eight per 100 million individuals. It presents with the classic triad of ataxia, ophthalmoplegia and altered consciousness. We report the case of a 10-year-old child who presented with low grade fever, hypersomnia and inability to walk. Central nervous system examination revealed ophthalmoplegia and multiple cranial nerve palsies. However, CSF examination showed lack of albuminocytological dissociation with no previous history of respiratory or gastrointestinal tract infection. Unavailability of Anti-GQ1b antibodies led to a diagnosis based on suggestive clinical features, abnormal MRI signals and prompt response to corticosteroid administration. Intravenous Methyl Prednisolone in a dose of 30mg/kg/day was administered for 10 days followed by oral Prednisolone 2 mg/kg/day. After complete recovery the patient was discharged, Prednisolone was tapered gradually and eventually discontinued after four months.

Keywords: Bickerstaff, encephalitis, brainstem, paediatric encephalitis, Guillain-Barre Syndrome.

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Introduction

Bickerstaff's brainstem encephalitis (BBE) is a rare autoimmune disorder of the brainstem presenting with the classic triad of ataxia, ophthalmoplegia and altered consciousness.[1,2] The annual incidence of BBE is estimated to be eight per 100 million individuals, with a small number of patients belonging to the paediatric population.[2-4] Although the pathophysiology of BBE is not completely understood, it is believed to be part of a spectrum with other immune-mediated polyneuropathies, mainly Guillain-Barre syndrome (GBS) and Miller-Fischer syndrome (MFS).

We present herein a case of paediatric BBE which was managed successfully despite certain atypical features and unavailability of anti-GQ1b antibodies.

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Case Report

A 10-year-old male child, who was fully vaccinated, presented to the emergency department of Civil Hospital Karachi in January 2019, with a three-day history of low-grade fever, hypersomnia and inability to walk. He was also complaining of headache, generalised body ache and reported one episode of vomiting. The parents denied any history of respiratory or gastrointestinal tract infection. Birth and development history were unremarkable and there was no family history of similar disease.

On physical examination the child had an altered level of consciousness (GCS 13/15) with irregular pattern of breathing. His vitals were as follows: heart rate: 127 beats/minute, respiratory rate: 36 breaths/min, blood pressure: 125/85 mmHg and temperature: 99.5^{O}F. On motor system examination, bulk was normal, tone and power were decreased in all four limbs, deep tendon reflexes were normal in upper limbs and brisk in lower limbs, and plantar reflex was bilaterally down going. Signs of meningeal irritation and clonus were absent. On cranial nerve examination, the pupils were bilaterally equally reactive to light but the patient had difficulty in opening both eyes, i.e ophthalmoplegia. There was loss of nasolabial fold on the right side and deviation of angle of the mouth on the left side indicating right facial nerve paralysis. He was also unable to protrude his tongue, shrug his shoulder, and gag reflex was absent, indicating involvement of IX, X, XI and XII cranial nerves. Gait could not be assessed because he was unable to walk. Other systemic examinations were unremarkable.

On investigations, serum biochemistry was within normal range except C reactive protein which was raised (8.1 mg/L). Computed tomography scan (plain) and funduscopy were normal. Lumber puncture was planned after stabilisation of the child. Initially, he was managed as a case of meningoencephalitis and Ceftriaxone, Vancomycin and Vcyclovir were given intravenously (IV). Within 24 hours of presentation, his respiratory distress worsened, he was unable to maintain adequate oxygenation and GCS dropped further to 8/15. The child was intubated and put on the ventilator. Later, expecting prolonged intubation, early tracheostomy was performed. Cerebrospinal fluid (CSF) analysis revealed no albuminocytological dissociation with normal protein content and opening CSF pressure. CSF PCR was negative

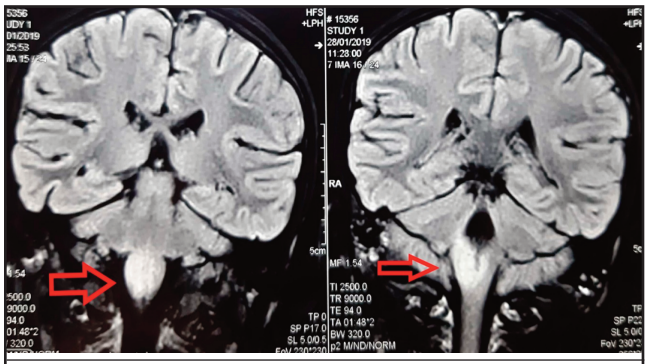

Figure: MRI with intravenous contrast administration.

for Herpes simplex virus 1 and 2. MRI revealed an abnormal high intensity signal area in the medulla oblongata predominantly to the right of the midline and no enhancement was noted after intravenous contrast administration (Figure). 30 mg/kg/day intravenous Methyl Prednisolone pulse therapy was administered once daily for five days, to which the child responded clinically and his GCS improved.

Once the patient became stable, after 10-days stay in the intensive care, he was shifted to the ward with GCS 15/15 and improvement in ophthalmoplegia and other cranial nerve palsies. Nasogastric feeding was established and IV Methylprednisolone was switched to oral Prednisolone 2mg/kg/day. After complete recovery the patient was discharged and followed up regularly. Oral Prednisolone was tapered gradually and stopped after four months. Tracheostomy tube was successfully removed with no residual damage to voice or gag reflex. He is being followed up till date and has not developed any complications. Consent of the patient's guardian was taken prior to writing of the report.

Discussion

GBS is an immune-mediated disease associated with antibodies against self-antigens with an estimated prevalence of 1.65 to 1.79 per 100,000 persons in the United States.[5] Uncommon variants of GBS include MFS and BBE; they are considered a spectrum with an underlying similar pathophysiology due to a common isolation of anti-ganglioside antibodies in all three disorders.[6]

We describe a case of paediatric BBE, a rare disorder accounting for 6.8% of cases of GBS,[7] first described by Bickerstaff and Cloake in 1951.[8] Both BBE and MFS involve the central nervous system while GBS involves the peripheral nervous system. In addition, patients with BBE and MFS demonstrate anti-GQ1b antibodies while those with GBS manifest anti-GM1 antibodies.[6]

The major distinction between MFS and BBE is made on the basis of impairment of consciousness only seen in the latter. Previous literature has proposed certain mechanisms which may be responsible for this distinction. Saito et al[9] explained the differences between MFS and BBE based on the integrity of the blood-brain barrier. In patients with BBE, the disrupted blood-brain barrier was associated with increased secretion of matrix metalloproteinase from brain microvascular endothelial cells (BMECs), whereas in MFS the blood-barrier remained intact. Furthermore, a review article stated that altered consciousness occurs secondary to involvement of the brainstem reticular activating system — one of the several areas of the brain where the blood-brain barrier is absent allowing large molecules to enter the brainstem parenchyma at this site. This mechanism may be responsible for entry of anti-GQ1b antibodies in the brainstem but experimental confirmation is yet to be established.[10]

In addition to the classic triad of ataxia, ophthalmoplegia and altered consciousness, some patients with BBE also demonstrate hypersomnia, bulbar palsy and abnormal MRI signals in the brainstem, cerebellum, thalamus and lateral ventricle.[11] The neuromuscular junctions of cranial nerves III, IV and VI express high levels of GQ1b.[10] This explains the ophthalmoplegia and ptosis encountered in BBE. Similarly, cranial nerves IX and X have also demonstrated high expression of GQ1b accounting for oropharyngeal and bulbar involvement seen in some cases.[10]

The main differential diagnosis of BBE includes MFS, viral encephalitis and acute demyelinating encephalomyelitis (ADEM).[12] Initially, the patient was managed with suspicion of viral encephalitis due to the high risk of morbidity if left untreated. However, a lack of CSF pleocytosis, classical MRI findings and prompt response to corticosteroids supported the diagnosis of BBE. Although the available literature highlights the importance of anti-GQ1B antibodies in the diagnosis of BBE,[11] we were unable to perform it due to unavailability of the investigation at major laboratory services throughout the city. Additionally, a lack of albuminocytological dissociation and absence of recent infection represent atypical features of BBE. Therefore, our case presents a unique approach of diagnosing BBE based on suggestive clinical features, abnormal MRI signals in the brainstem and prompt improvement upon corticosteroid administration. This may be a useful diagnostic approach in the presence of atypical features and unavailability of anti-GQ1b antibodies.

Conclusion

The diagnosis of BBE is particularly difficult in developing countries, such as Pakistan, due to unavailability of anti-

GQ1b antibodies and delays in performing imaging, such as MRI. Therefore, physicians must be aware of this rare entity to enable early diagnosis, prompt treatment and prevention of complications. Further research is needed to explain the mechanisms responsible for BBE and to determine its relationship to the pathophysiology of MFS and GBS. Nonetheless, these questions remain unanswered due to the rarity of the condition.

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Conflict of Interest: None.

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