Case Report: A 28-year-old male with bilateral lower extremities paresthesia, a characteristic presentation of Guillain-Barre Syndrome and Innovative Treatments.

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Background

Guillain-Barre Syndrome (GBS) is a rare, acute inflammatory demyelinating polyradiculoneuropathy that usually appears following an upper respiratory or gastrointestinal viral infection. The most common viral pathogens associated with GBS include *Campylobacter jejuni,* EBV, and Zika Virus.[1] Its overall incidence is 1-2 cases per 100,000 per year worldwide and an estimated cost of 1.7 billion dollars annually in the United States.[2] GBS is thought to occur due to molecular mimicry secondary to antecedent viral infection, leading to autoantibodies forming against gangliosides. These autoantibodies can have differing targets along axons, the nodes of Ranvier, and the neuromuscular junction of peripheral and cranial nerves. This results in the characteristic ascending, flaccid paralysis and paresthesias seen clinically.[2] If left untreated, the paralysis can progress to respiratory failure and bulbar palsies.[2,3] Diagnosis requires the presence of clinical features and CSF analysis demonstrating increased protein levels with normal leukocyte levels (e.g., albuminocytologic dissociation). Electromyography and nerve conduction studies may help differentiate mimics but are not required for diagnosis.[4] Treatments for GBS have remained mainly unchanged for many years. This case report examines the classical presentation of GBS and introduces novel treatments.[5]

Case Description

HPI:
A 28-year-old man with a medical history of Gastroesophageal Reflux Disease (GERD) and Rheumatoid Arthritis (RA) taking Hydroxychloroquine presented to the Emergency Department (ED) on August 1, 2023, with complaints of numbness and tingling weakness below his waist that began four days prior to arrival. His symptoms started in the feet and progressed to the umbilicus by the time he decided to come to the ED. Since the onset, he reports associated generalized weakness, weakness with chewing, and difficulty walking. The patient said that about a week ago, he was ill with nausea, vomiting, and diarrhea. He was diagnosed with Gastroenteritis and was treated successfully with Ondansetron. His Gastroenteritis symptoms had fully resolved three days before he arrived at the ED.

Past Medical History: GERD, Rheumatoid Arthritis, Depression
Past Surgical History: Non-contributory
Medications: Esomeprazole, Hydroxychloroquine, Fluoxetine

Vital Signs Upon Admission: BP: 132/85, HR: 74 bpm, Temp: 36.2, RR: 18 bpm, O2 %: 94%

Physical Exam:
General: No acute distress. Awake. Alert. Cooperative.
HEENT: Normocephalic. Atraumatic. EOMI. Pupils are symmetric.
Abdominal: Soft. Non-tender. No distension. No guarding. No rebound.
Musculoskeletal: No apparent deformities. No bony tenderness to palpation. Full range of motion.
Neurologic: Awake. Alert. Orientation normal per age. No tremors. Decreased sensation to touch and vibration to distal lower extremities bilaterally, worse in the toes and slightly improved just distal to the knees. Toe proprioception intact bilaterally. Absent S1 reflexes bilaterally. 2+ L4 reflexes bilaterally with paradoxical L4 reflexes to left knee. Otherwise DTR 2+ to C5, C6, C7, C8 bilaterally.

Differential Diagnosis:
1. Guillain Barre Syndrome
2. Transverse Myelitis
3. Chronic Inflammatory Demyelinating Polyneuropathy

Clinical Course

Admission Day 0:
Labs: CBC, CMP
- Pertinent Findings: Elevated AST, ALT, ALP

Imaging: Cervical, Thoracic, and Lumbar MRI with contrast
- No acute or chronic findings

Admission Day 1:
- Lumbar Puncture:
  - Pertinent Findings: albuminocytologic dissociation with normal neutrophils but elevated CSF Total protein (64 mg/dl, ref: 8 to 32 mg/dl). No growth of organisms from CSF was noted.
  - Diagnosis of Guillain Barre Syndrome confirmed

Admission Day 2:
- Serology Studies: elevated EBV viral capsid Ag, IgG antibody
- Octagam 10% (Immune Globulin) 400mls IV was initiated
- Administered until admission day 6

Admission Days 5 and 6:
- Methylprednisolone (Solu-Medrol) 125 mg IV

Admission Day 7:
- Patient declined plasmapheresis

Follow Up
- A review of the patient records indicated that the patient fully recovered.
- The patient greatly benefited from physical therapy at a tertiary location.
- Complete resolution of the patient's symptoms was noted. No additional follow-up visits were found.

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Discussion

The importance of quick diagnosis and treatment of GBS may help alleviate some of the symptomology quickly. Proper and timely treatment has decreased time spent in the hospital—however, early treatment. GBS is an autoimmune demyelination disease, most often occurring after a respiratory or gastrointestinal process. About 20 to 30% of cases in the US can be attributed to *C jejuni*; however, HSV, CMV, EBV, Zika, *Mycoplasma pneumonia,* and some vaccinations are all possible triggers of GBS.[1,6] Specifically, the Influenza vaccine accounts for one additional case per year and constitutes a small portion of GBS cases.[7] GBS is theorized to be caused by both a humoral and cellular immune response, with most evidence pointing to an immune response to non-self antigens.[8] Diagnosis of GBS is mostly done clinically, given the recognizable features of the disease progression. CSF findings indicate elevated CSF protein levels without changing the CSF WBC count. However, CSF studies within 48 hours of symptom onset are often noncontributory.

Treatment of GBS should be initiated as soon as possible. Although, after about two weeks without initiation of therapy, it is less effective. Treatment of GBS follows one of two modalities supported by several randomized control trials: IVIG or plasmapheresis.[1] IVIG is thought to provide direct immune-modulatory functions, while plasmapheresis physically removes pathogenic antibodies, humoral mediators, and complement proteins involved in the pathogenesis of GBS.[1] These methods' complete mechanisms of action are not entirely understood; however, both have demonstrated equal efficacy. Moreover, both of these modalities may be initiated in severe cases. As noted in our clinical course above, we treated our patient with IVIG at 2 g/kg divided over five days.

According to current literature, this case of GBS was relatively straightforward in its presentation and management. Considering the nature of how rare GBS is, it was of clinical value to us as clinicians to review the importance of keeping such a syndrome on our differential when a patient presents with weakness following a recent gastrointestinal or upper respiratory viral infection. This was quite simple for us in this case, considering our patient presented with gross numbness and weakness upon exam. Additionally, it may be of value to educate patients who may present to the hospital with a gastrointestinal or respiratory viral illness on the risk of developing GBS and what symptoms they should be cognizant of. We also wanted to take this opportunity to explore alternative and upcoming therapies for GBS.

Future Novel Therapeutics

As mentioned before, current medication regimens for GBS include IVIG and plasmapheresis. Novel treatments can address the pathology of GBS through other mechanisms. For example, the Neonatal Fc receptor (FcRn) works to decrease the production of antibodies that lead to the destruction of myelin in GBS.2 Naturally made compounds such as immunoglobulin degrading enzymes found in certain bacteria species can help remove harmful antibodies from circulation.9,10 Similarly, addressing the complement system activation has also decreased respiratory distress in some instances of GBS.11 Even though many potential therapeutics may one day be used to address GBS, for the time being, these new therapeutics are less cost-effective than current treatment standards. Furthermore, much more research must go into the development and effectiveness of these modalities.

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