



Guillain-Barré Syndrome During First-Trimester Pregnancy in a Primigravida: Rehabilitation and Clinical Outcomes

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Abstract

Background: In the context of pregnancy, Guillain-Barre Syndrome (GBS) emerges as a rare immune-mediated polyradiculoneuropathy. It is clinically characterized by muscle weakness, hyporeflexia, and dysesthesia. Notably, managing GBS, especially during the first trimester of pregnancy, poses a challenge due to the absence of specific guidelines.

Objective: This abstract seeks to underscore the significance of rehabilitation in the context of pregnant individuals coping with GBS, with a particular emphasis on the early stages of pregnancy. The aim is to address the unique challenges and considerations inherent to GBS during this period. This report details a distinctive case of a nullipara in her early twenties who developed Guillain-Barré Syndrome, Acute Motor Sensory Axonal Neuropathy (AMSAN) variant with autonomic dysfunction during the initial trimester of her pregnancy. The case presented here delves into this rare occurrence of GBS in the first trimester, placing a specific spotlight on the rehabilitation aspect.

Materials and Methods: The patient was treated with Intravenous Immunoglobulin (IVIG), intubated and later tracheostomized. Intensive medical management for autonomic instability with concurrent physical, occupational, speech and swallow therapy facilitated early recovery and functional independence. Her neurological recovery and functional outcomes were assessed using Functional Independence Measure (FIM), Barthel Index, Hughes Functional Grading Scale, and Overall Disability Sum Score (ODSS).

Results: In our case, the primary treatment approach comprised Intravenous Immunoglobulin (IVIG) administration, coupled with ongoing maternal and fetal surveillance, as well as prompt rehabilitation, all of which contributed to substantial improvements. Early rehabilitation interventions significantly enhanced her functional outcomes, ultimately enabling her to give birth to a healthy full-term neonate *via* caesarean section.

Discussion and Conclusion: In pregnant patients with Guillain-Barre Syndrome (GBS), the recommended treatment includes standard therapies like IVIG and plasmapheresis, complemented by supportive care. It's important to highlight that GBS, in and of itself, doesn't necessitate terminating pregnancy. Fetal outcomes don't appear to be directly linked to the severity of polyradiculopathy. This case highlights the crucial role of comprehensive rehabilitation can be the cornerstone of recovery, breathing new life and vitality into the patient's journey. This medical report is among the few ones highlighting the potential utilization of a comprehensive rehabilitation treatment for a woman experiencing substantial disability during the first trimester of pregnancy.

Keywords: Intravenous immunoglobulins; IVIG; Polyradiculoneuropathy; Pregnancy; Guillain Barré syndrome; Rehabilitation

Introduction

Guillain-Barré Syndrome (GBS) is a rare autoimmune neuropathy. The exact etiology of Guillain-Barré Syndrome (GBS) remains incompletely understood. It is widely hypothesized to be associated with autoimmune factors, particularly triggered by infections. This theory suggests that the majority of GBS cases are caused by an autoimmune response, where the body's immune system produces anti-ganglioside antibodies in response to an infection, leading to the development of the syndrome [1]. Clinical manifestations of Guillain-Barré syndrome encompass areflexia (lack of reflexes), limb weakness, and, less frequently, sensory impairment. These symptoms progress to

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neuromuscular paralysis, affecting functions such as speech (bulbar), facial expressions, and respiratory capabilities. Maximum symptom severity typically occurs within 2 to 4 weeks after the onset of the condition [2]. Autonomic nerve involvement can cause issues like cardiac arrhythmias or blood pressure fluctuations. GBS has an acute phase mortality rate of less than 5%, with around 20% of patients experiencing lasting disabilities [3,4]. Its pathophysiology involves molecular mimicry, wherein infections like *Campylobacter jejuni*, *Mycoplasma pneumoniae*, *Haemophilus influenzae*, *Cytomegalovirus*, and Epstein-Barr virus can trigger an immune response against self-antigens [5-7]. The exact factors triggering this undesired immune reaction are not fully understood. GBS can have various subtypes, with Acute Inflammatory Demyelinating Polyradiculoneuropathy (AIDP) being the most common. Diagnosis relies on clinical evaluation, supported by Cerebrospinal Fluid (CSF) analysis and electromyography, while imaging aids in ruling out GBS mimics. Plasma Exchange (PE) and Intravenous Immunoglobulin (IVIG) are both effective treatments, with IVIG being favored due to its minimal side effects. Guillain-Barré syndrome during pregnancy is rare and can be misdiagnosed, often mistaken for common pregnancy-related symptoms. Treatment during pregnancy typically involves supportive care and close monitoring of autonomic functions and fetal growth. In this paper, we present a case of a nulliparous pregnant woman in her early twenties who developed GBS, Acute Motor Sensory Axonal Neuropathy (AMSAN) variant with autonomic dysfunction in the first trimester, with a focus on the medical and comprehensive rehabilitation management leading to successful maternal and fetal outcomes. Our study outlines a guide to intensive rehabilitation in such unusual presentation.

Case Presentation

A nulliparous woman in her early twenties presented with a history of low-grade intermittent fever and progressive tingling sensation in both her legs. Initially, these symptoms were attributed to her recent discovery of pregnancy by her general practitioner. However, her condition worsened progressively. She developed weakness in both legs, leading to difficulty in rising from a chair and eventually requiring support for walking. With time, her mobility declined to the extent that she became bedridden. Due to the atypical nature of her symptoms, she was referred to a specialized medical center for further evaluation.

Upon admission, an ultrasound confirmed her pregnancy at the 10th week. A neurologist was consulted due to the suspicion that her symptoms were unrelated to her pregnancy. The patient reported progressive dysesthesia affecting her lower extremities, hands, mouth,

and tongue, which resulted in unclear speech. Her medical history did not reveal any prior illnesses. On neurological examination, cranial nerves showed no abnormalities. However, her upper extremities exhibited distal muscle weakness with a Medical Research Council (MRC) scale score of 2 and sensory deficits, particularly in the arms. Lower extremities displayed both proximal and distal muscle weakness with an MRC score of 0 and sensory loss. Hyporeflexia was noted in both the upper and lower extremities, and she was unable to perform activities of daily living independently.

Initial imaging with MRI of the brain and spine revealed no abnormalities (Figure 1). The patient was admitted to the neurology unit for continuous monitoring and further evaluation. Electromyography confirmed the diagnosis of Acute Inflammatory Demyelinating Polyneuropathy, a variant of Guillain-Barré syndrome (GBS), characterized by demyelination (Figure 2). Within two hours of admission, she developed progressive muscle weakness, respiratory insufficiency, and swallowing difficulties, as evidenced by an Erasmus GBS Respiratory Insufficiency Score (EGRIS) of 5, indicating a 55% risk of respiratory insufficiency within the first week of symptoms.

In response to her deteriorating condition, she was intubated, and a five-day course of Intravenous Immunoglobulin (IVIG) at a daily dosage of 400 mg/kg was initiated. The Intensive Care Unit (ICU) was alerted for admission, and supportive measures, including a nasogastric tube and indwelling catheter, were put in place. Cerebrospinal Fluid (CSF) analysis revealed elevated protein levels but a normal white blood cell count. In the ICU, she developed hypertension and tachycardia. She was treated with Metoprolol succinate 25 mg once a day. Continuous ECG monitoring was employed due to episodes of sweating and tachycardia. She was treated with IV antibiotics in view of ventilator associated pneumonia and urinary tract infection. The patient's symptoms plateaued after two days, and gradual improvements became apparent in the subsequent days. In anticipation of long-term ventilation, a tracheostomy was performed, and she was eventually weaned from ventilator support.

Physical therapy commenced during her ICU stay, focusing on range of motion exercises and chest physiotherapy. On the 25th day of admission, she was transferred to a rehabilitation department, and by this time, she had regained some muscle strength, MRC score of 2 in upper limbs and 1 in lower limbs. An ultrasound on admission confirmed a viable fetus at 13 weeks' gestation (Figure 3). On admission to rehabilitation unit, she was conscious, oriented with tachycardia (Heart rate- 126 bpm) and blood pressure of 126/82 mmHg. She was on a size 8.0 cuffed tracheostomy tube, nasogastric tube for feeding and an indwelling catheter. Deep tendon reflexes were

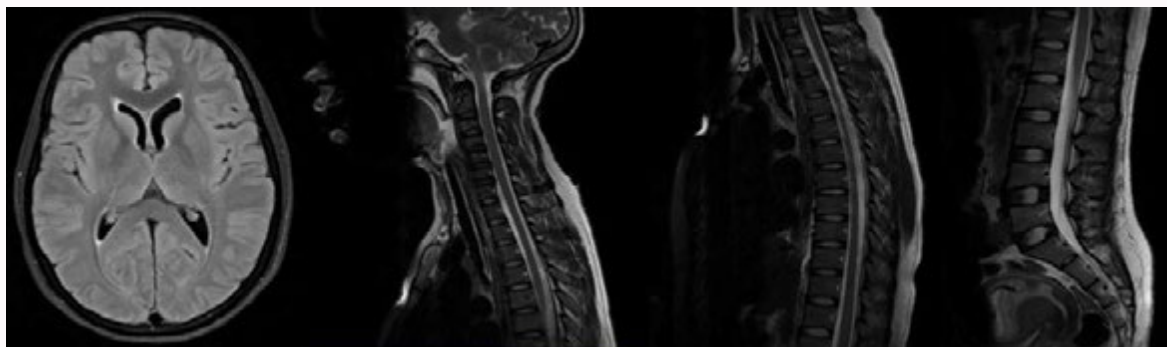


Figure 1: MRI brain and spine showed no abnormalities.

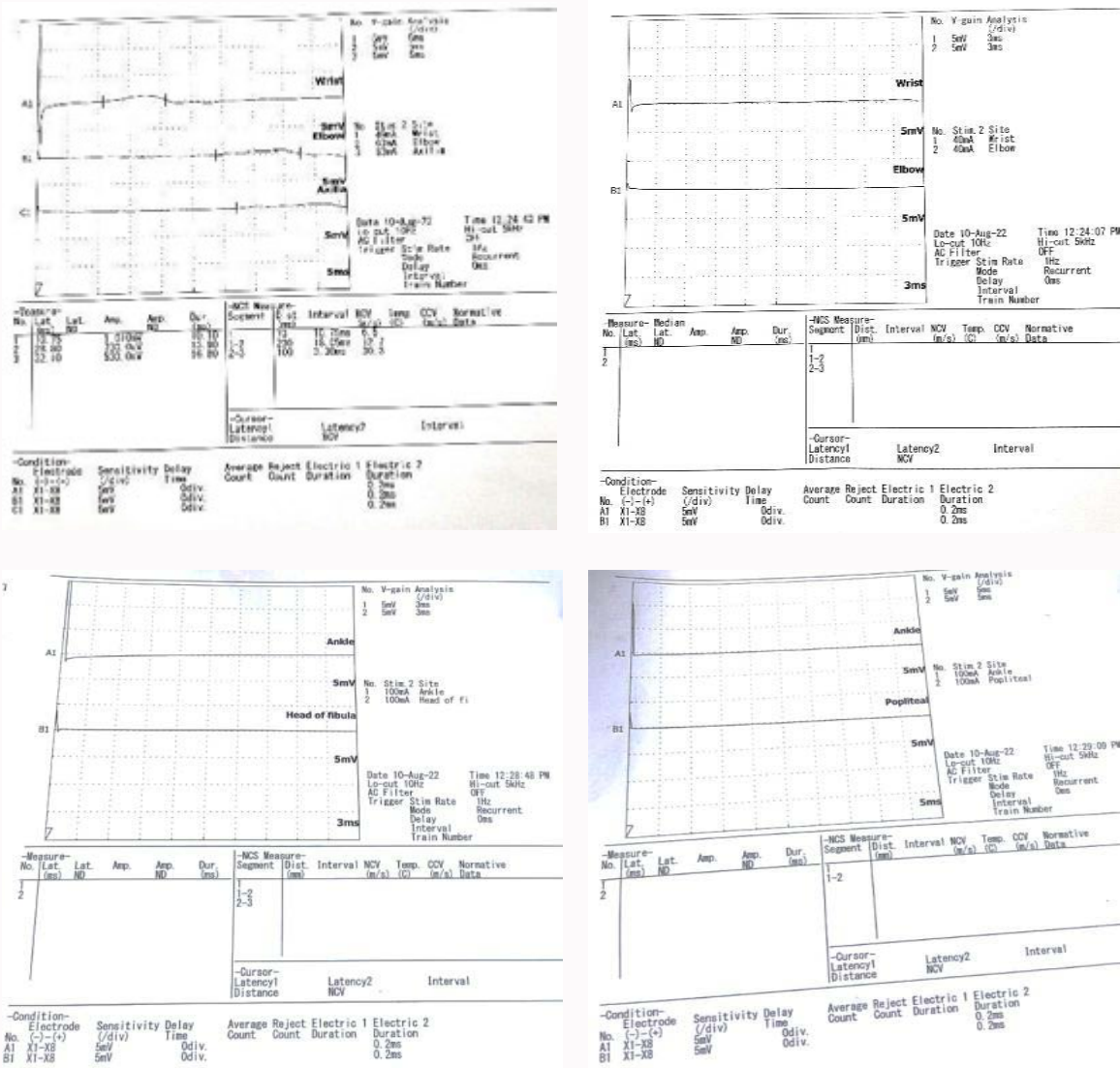


Figure 2: Nerve conduction study suggestive of demyelination of both upper and lower limbs.

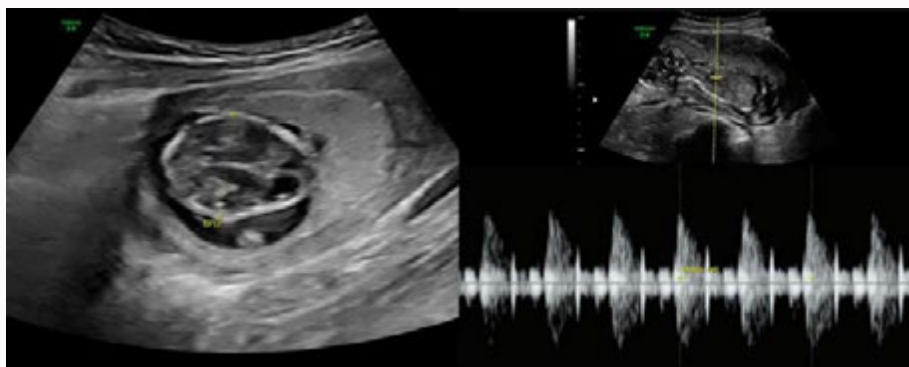


Figure 3: Ultrasonography done of admission revealed a live viable fetus of 13 weeks of gestation.

absent and plantar response was flexion on both sides with sensory (distal > proximal) impairment in both upper and lower limbs.

Over the course of 12 weeks, the rehabilitation regimen included physical therapy with modalities, occupational therapy, swallow therapy, appropriate orthoses and assistive aids, psychological

therapy and caregiver training. Patient and her family counselling was held as they were very anxious about the maternal and fetal outcome. In the initial three weeks, she was started on passive range of motion exercises, chest percussion, and Deep Vein Thrombosis (DVT) prevention exercises which were 3 cycles of 15 mins each.



Figure 4: Ankle Foot orthosis- Bilateral rigid plastic type was given to prevent contractures.



Figure 5: Standing with walker support initiated bedside by the end of 6 weeks of admission under Rehabilitation department.

Occupational therapy covered bed mobility and calming techniques, and swallow therapy involved Oro motor exercises. She was given bilateral ankle-foot orthosis (Figure 4).

Psychological therapy emphasized supportive counselling, while caregiver training was given for bedside positioning and education about tracheostomy care. Autonomic instability gradually subsided and Metoprolol was tapered and stopped. She was continuously monitored during her ward stay and during therapies. In the subsequent weeks, the duration and intensity of therapy sessions were gradually increased. Limb strengthening and deep breathing exercises were prioritized, along with sitting balance and transfer skills were introduced. Swallow therapy incorporated facial massage and oral trials were initiated. She was mobilized in a wheelchair. Psychological therapy was extended to her family, and caregiver training continued for transfer techniques and bowel/bladder care. She was given cryotherapy for knee and ankle pain for 3 days following which the pain subsided. She was periodically followed up in antenatal clinic and necessary tests and scan were done. During weeks 7 to 9, physical therapy advanced to sit-to-stand and to stand with walker support (Figure 5).

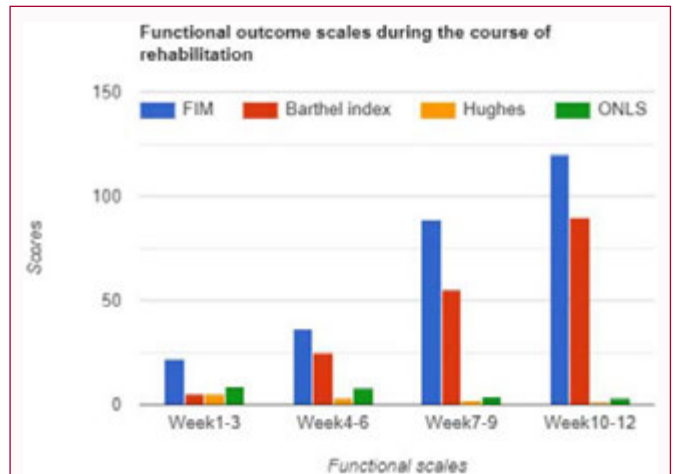


Figure 6: Functional outcomes were recorded at each phase: Functional Independence Measure (FIM) scores improved- 22, 36, 89, 120; Barthel index scores improved- 5, 25, 55, 90; Hughes Functional Grading Scale (HFGS) scores improved- 5, 3, 2, 1; Overall Neuropathy Limitations Scale (ONLS) scores improved- 9, 8, 4, 3 during rehabilitation.

Occupational therapists taught her fine motor skills, and oral feed progression and speech therapy were continued. Special care was taken for her nutrition, and she followed the advice of a nutritionist, receiving a high-calorie and high-protein diet. Childbearing counselling was done, and caregiver training covered diet management. Tracheostomy tube was downsized, and corking trials were initiated. In the next few weeks, physical therapy emphasized supported walking and endurance training. She was able to commence stair climbing. Swallow therapy continued with oral feeding techniques. Psychological therapy shifted to parenting sessions, and caregiver training concluded with home care training. Once she started taking oral feeds for all consistencies, nasogastric tube was removed. After successful tracheostomy tube corking for 72 h, tracheostomy tube was decannulated. The phases of rehabilitation are summarized in Table 1.

Comprehensive rehabilitation played a pivotal role in the patient's remarkable recovery. Functional outcomes were meticulously assessed during the phases of rehabilitation using a battery of measures, including Functional Independence Measure (FIM), Barthel Index, Hughes Functional Grading Scale, and Overall Neuropathy Limitations Scale (ONLS) (Figure 6).

The patient was discharged after 12 weeks of intensive rehabilitation. She continued regular follow-ups in the Outpatient Department (OPD), and by the 26th week of gestation, she had achieved the remarkable accomplishment of walking independently under supervision. During OPD visits, she was taught antenatal exercises like Kegel's exercises, pelvic tilts and home-based yoga. Subsequently, she underwent a caesarean section, delivering a healthy baby girl weighing 3,165 grams at 37th week of gestation. Maternal postoperative recovery remained uneventful, and as of six months post-partum, no signs of relapse has occurred.

Discussion

Guillain-Barré Syndrome (GBS) in pregnancy poses unique challenges due to the absence of specific treatment guidelines and limited understanding of the triggering pathogens and fetal outcomes following maternal GBS. Based on the available literature, the management of GBS in pregnant women mirrors the approach

Table 1: The comprehensive rehabilitation interventions with a multi-disciplinary team approach and important milestones achieved during Rehabilitation admission.

Rehabilitation Interventions				
Modalities	Week 1-3	Week 4-6	Week 7-9	Week 10-12
Physical therapy	1. Passive ROM- upper and lower limb 2. Chest percussion and airway clearing exercises 3. DVT prevention exercises 4. Ankle stretches 5. Bedside isometric strengthening exercises (3 cycles of 15 mins session)	1. Tilt table verticalization- 40-60 degrees 2. Limb strengthening exercises- upper limb, trunk and lower limb 3. Deep breathing techniques 4. Bedside sitting with back support 5. Pelvic bridges bedside (60 mins daily divided in 2 sessions)	1. Sit to stand training 2. Progressive submaximal strengthening exercises 3. Parallel frame training 4. Standing with walker 5. Assisted walking with two-wheeler walking frame (rollator) (75 mins daily divided in 2 sessions)	1. Supported walking with walker 2. Stair climbing 3. Strengthening exercises 4. Endurance training (75 mins divided in 2 sessions)
Occupational therapy	1. Bed mobility- side to side 2. Passive bedside sitting 3. Calming techniques- deep pressure, sound therapy (20 mins session)	1. Sitting balance 2. Transfer skills 3. Activity of daily living retraining (25 mins session)	1. Fine motor skills 2. Wheelchair training 3. Standing balance training 4. Mirror therapy 5. Self-care training (40 mins session)	1. Functional retraining sessions 2. Motor coordination skills (45 mins session)
Swallow and speech therapy	1. Oro motor stimulation 2. Oro motor exercises- tongue strengthening, dry swallow and supraglottic swallow techniques (15 mins session)	1. Facial massage Oral trials- Level 0,1 & 2 consistencies 2. Verbalization (20 mins session)	1. Oral feed progression 2. Pill swallow 3. Speech therapy with tracheostomy tube corking (30 mins session)	1. Oral feeding and safe swallow techniques 2. Speech therapy (45 mins session)
Orthotics/Assistive Aids	Bilateral solid ankle foot orthosis	Wheelchair	Walking frame (Rollator)	-
Psychological therapy	1. Supportive therapy 2. Counselling sessions about foetal outcome 3. Destressing techniques (20 mins session)	Family counselling (20 mins session)	1. Childbearing counselling 2. Motivational sessions (20 mins session)	1. Parenting sessions 2. Financial counselling (20 mins session)
Caregiver training	1. Bedside positioning 2. Tracheostomy care 3. Nasogastric tube feeding 4. Hand hygiene	1. Transfer techniques 2. Bowel and bladder care 3. Bedside kinesiotherapy	Diet management	Home care training
Modalities	-	Cryotherapy- knee and ankle pain (15 mins 3 times a day)	-	-
Milestones*	1. Normal foetal scan 2. Resolution of autonomic instability 3. Bedside sitting	1. Oral feed trials 2. Wheelchair transfers	1. Tracheostomy downsize 2. Assisted bedside standing 3. Normal foetal anomaly scan 4. Initiation of gait training	1. Nasogastric tube removal 2. Tracheostomy tube decannulation 3. Stair climbing

*Rehabilitation milestones during that phase during rehabilitation stay

taken for non-pregnant patients and primarily involves Intravenous Immunoglobulins (IVIG) or plasmapheresis. Vigilant monitoring of autonomic functions and the provision of supportive care as required are also crucial aspects of GBS management in pregnancy.

In the management of GBS, in addition to medical treatment, a multidisciplinary approach is essential. This approach encompasses deep venous thrombosis and pneumonia prophylaxis, artificial ventilation, when necessary, the handling of autonomic complications, and long-term rehabilitation. In a previous systematic review done by Khan et al., it was suggested that rehabilitation should commence as early as possible, typically once circulation and respiration have stabilized, even while the patient is in the ICU. In the initial stages, passive exercises can be initiated to prevent the development of joint contractures and muscle atrophies. It's also crucial to employ chest percussion and breathing exercises to ward off respiratory complications. Traditional massage can complement the treatment, and in cases of limb oedemas, it's advisable to consider lymphatic drainage and limb elevation once venous thrombosis has been ruled out. As the condition of GBS patients improve, rehabilitation efforts should be extended in line with each patient's capabilities. Upon concluding neurological treatment, patients can be transferred to specialized rehabilitation wards [8]. Apart from motor deficits, a significant number of patients face cognitive and psychosocial challenges, resulting in complex disabilities that may, at times,

necessitate specialized rehabilitation services.

In the cases of GBS occurring in the first trimester of pregnancy that are published, maternal CMV infection was linked to adverse fetal outcomes, including Neural Tube Defects (NTD) and Intrauterine Fetal Demise (IUFD) [4]. Notably, a case report by Zeeman, a patient with the most severe GBS, necessitating prolonged mechanical ventilation due to respiratory insufficiency, delivered a healthy baby through elective caesarean delivery which is like our case [9].

Most importantly, we must emphasize the vital role of rehabilitation in managing GBS during pregnancy. While medical treatments are vital, rehabilitation represents a cornerstone in helping patients regain their quality of life. It involves a multifaceted approach that includes physical therapy to rebuild muscle strength, enhance mobility, and regain control over movements. Occupational therapy plays an equally crucial role in improving the patient's ability to perform essential daily activities. Swallow therapy addresses any associated swallowing difficulties, gradually restoring safe and effective swallowing functions. The role of orthotics and assistive aids are key to achieve ambulation and to prevent deformities.

There are not many published data of GBS in first trimester of pregnancy. As it is rare, it requires a high level of suspicion for diagnosis due to symptom overlap with typical pregnancy condition. Similarly, there are not many rehabilitation recommendations available as per

our literature review and hence, we share a comprehensive step wise approach of rehabilitation in such rare cases.

Conclusion

In summary, the treatment of Guillain-Barré Syndrome (GBS) in pregnant patients is like the approaches employed for non-pregnant individuals, centering around Intravenous Immunoglobulins (IVIG) and the provision of essential supportive care. Once the medical treatment is over and patient's condition improves, step wise progressive rehabilitation is equally important. Multiple staged gradual incremental exercise regimen is key to recovery with periodic gynecological assessments.

Significantly, this conclusion underscores the pivotal role of rehabilitation in the comprehensive care of GBS patients during pregnancy. Rehabilitation goes beyond the restoration of physical functionality; it also plays a vital role in improving the overall quality of life for both mother and child. The significance of this holistic approach, which integrates medical treatment with robust rehabilitation, cannot be overstated. It is paramount in achieving the best possible outcomes in the complex context of GBS during pregnancy. We share a successful rehabilitation regimen for a first trimester GBS case in pregnancy as an illustrative example.

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