DOI: 10.7860/JCDR/2025/76713.20957

Case Report

Transfusion Medicine Section

Therapeutic Plasma Exchange in Guillain-Barré Syndrome during Pregnancy: A Case Report

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ABSTRACT

Guillain-Barré Syndrome (GBS), also known as Acute Inflammatory Demyelinating Polyradiculopathy (AIDP), is an autoimmune disease affecting motor and sensory peripheral nerves. While the exact cause of GBS is not fully understood, it is commonly triggered by viral or bacterial infections. GBS is relatively rare during pregnancy. Therapeutic Plasma Exchange (TPE) is an effective and well-established treatment for GBS, classified as Category I by the American Society for Apheresis (ASFA). The primary objective of TPE is to remove plasma containing antibodies, immune complexes, and other toxic proteins from the patient, replacing it with a different solution, such as colloids and crystalloids. Hereby, authors report an interesting case of a 22-year-old multigravida female diagnosed with GBS during her first trimester, who was successfully treated with multiple cycles of TPE.

Keywords: Acute inflammatory demyelinating polyradiculopathy, Autoimmune disease, Plasmapheresis

CASE REPORT

A 22-year-old multigravida female (G2P1L1) was admitted to the hospital at six weeks of gestation with a two-day history of numbness in both lower and upper limbs, difficulty in walking, followed by difficulty in getting up from a squatting position and in climbing stairs. The muscle weakness started in the lower limbs and then progressed to the upper extremities. She had no other medical history and no history of recent travel.

On examination, the patient was conscious and oriented. Her temperature was 97.8°F, pulse rate was 101 beats per minute, systemic blood pressure was 120/80 mmHg, respiratory rate was 24 breaths per minute, and SpO_2 was 99% in room air.

Neurological examination showed muscle power of three for bilateral lower limb proximal muscles, two for distal muscles, and three for bilateral upper limb distal muscles. No abnormal findings in the cardiovascular, respiratory, and gastrointestinal systems were noted.

An Magnetic Resonance Imaging (MRI) of the brain - Plain was performed and showed no infarcts or haemorrhage, with no significant abnormalities in the brain. An MRI whole spine screening was done, which showed a normally appearing spinal cord, with no intra or extra-dural mass lesions.

Baseline laboratory investigations including complete blood count (Haemoglobin: 12 g/dL, Total leukocyte count: 16,030 per microliter, Platelet: 3.80 L/microliter, Red Blood Cell (RBC) Count: 4.55 per microliter), coagulation profile {Activated Thromoplastin (APTT): 29.3 s, Prothrombin Time (PT): 12.1 s, International Normalised Ratio (INR): 1.07}, renal function tests (blood urea: 5 mg/dL, serum creatinine: 0.6 mg/dL), serum electrolytes (serum sodium: 135 mmol/L, serum potassium: 3.8 mmol/L, serum chloride: 105 mmol/L, serum bicarbonate: 20 mmol/L), liver function tests {Serum Glutamic-Oxaloacetic Transaminase (SGOT): 16 U/L, Serum Glutamic-Pyruvic Transaminase (SGPT): 14 U/L, Alkaline Phosphatase (ALP): 67 IU/L, total protein: 6.9 g/dL, serum albumin: 4.2 g/dL, total bilirubin: 0.41 mg/dL, direct bilirubin: 0.10 mg/dL, indirect bilirubin: 0.10 mg/dL}, thyroid function tests (FT3: 3.29 pmol/L, FT4: 1.32 pmol/L, TSH: 2.44), and lipid profile (Total Cholesterol: 156 mg/dL, triglyceride: 41 mg/dL, High-density Lipid (HDL): 29 mg/dL, Low-density Lipid (LDL): 104 mg/dL) were performed. Autoantibody screening results were within normal limits. The serologic tests for Human Immunodeficiency Virus (HIV), Hepatitis B surface Antigen (HBsAg), and Anti-hepatitis C Virus (HCV) were negative. Preprocedural serum calcium was 9.6 mg/dL.

The nerve conduction study showed motor radiculomyelopathy (demyelinating and axonal) in the bilateral lower limbs and motor neuropathy in the bilateral ulnar nerves, leading to the diagnosis.

The patient was referred to the Department of Transfusion Medicine for Therapeutic Plasmapheresis or Plasma Exchange (TPE). After obtaining high-risk informed consent, five cycles of TPE were performed on alternate days in the intensive care unit through central venous access using a temporary double-lumen haemodialysis catheter [Table/Fig-1]. The COM. TEC Fresenius Kabi machine, loaded with a PL1 kit, was used for all TPE cycles. Anticoagulant Citrate Dextrose-A (ACD-A) was employed as the anticoagulant. To prevent hypocalcemia, the anticoagulant-to-blood ratio was maintained at 1:18, and Inj. calcium gluconate was administered throughout the procedures via a separate peripheral intravenous line. Fresh frozen plasma, 5% human albumin, and 0.9% saline were used as replacement fluids. The patient's vital signs were monitored and remained stable throughout all the procedures. Foetal monitoring was conducted regularly after each cycle of TPE. Following the obstetrician's opinion, an early pregnancy scan was

TPE cycles	Number of plasma volumes exchanged	Adverse effects during each TPE cycle	Clinical improvement
1	0.7 (1600 mL)	Nausea	No improvement
2	0.8 (2000 mL)	Nil	Muscle power both upper limb distal muscles-4/5, No improvement in muscle power in lower limb
3	1 (2500 mL)	Nil	Muscle power of bilateral upper limb distal muscles-4/5, bilateral lower limb proximal muscle-4/5, and distal muscles-3/5
4	1 (2500 mL)	Nil	Muscle power of bilateral upper limb distal muscles-5/5, bilateral lower limb proximal muscle-4/5, and distal muscles-4/5
5	1 (2500 mL)	Nil	Muscle power of bilateral upper limb distal muscles-5/5 Proximal muscles and distal muscles in bilateral lower limbs-5/5

[Table/Fig-1]: Details of each session of Therapeutic Plasma Exchange (TPE).

performed, and the reports showed a single intrauterine gestation corresponding to a gestational age of six weeks and three days. The patient tolerated the procedure, and no adverse reactions were noted. She completed five cycles during a 10-day admission and underwent physiotherapy and occupational therapy. The patient's symptoms showed an improving trend after each plasma exchange. Post-procedure, the patient demonstrated clinical improvement and was discharged on day ten with vitamin supplements.

DISCUSSION

Guillain-Barré Syndrome (GBS), also known as Acute Inflammatory Demyelinating Polyneuropathy (AIDP), is an autoimmune disorder that affects the motor and sensory peripheral nerves, characterised by progressive symmetric motor weakness, usually beginning in the legs and advancing proximally [1]. While the exact cause of GBS is not fully understood, it is often preceded by infections, such as upper respiratory tract infections or gastroenteritis, one to three weeks prior to the onset of symptoms. GBS is relatively rare during pregnancy but poses significant risks to maternal health [2].

The TPE is an effective and well-established treatment for GBS, classified as category I by the American Society for Apheresis (ASFA) [3]. When managing pregnant patients with TPE, it is important to carefully consider certain technical aspects related to the physiological changes of pregnancy, particularly the increase in circulating blood volume [4]. Although pregnancy is not a contraindication for TPE, the lack of evidence-based guidelines and the potential risks to maternal and foetal health have contributed to a general resistance in its application [5]. TPE carries inherent risks of adverse events, with factors including the underlying disease, anticoagulation methods, type and volume of replacement fluids, vascular access issues, and the type and technique of the therapeutic apheresis procedure [6].

The time interval between two cycles of TPE procedures is typically determined by the patient's condition, the time needed for the relevant component {e.g., Immunoglobulin (Ig)G} to re-equilibrate in the intravascular space, and the necessity of minimising bleeding risks associated with the depletion of coagulation factors [7]. The primary objective of TPE is to remove plasma containing antibodies, immune complexes, and other toxic proteins from the patient, replacing it with different solutions like colloids and crystalloids [8]. As GBS is an autoimmune condition, TPE targets the removal of antibodies from the blood.

The TPE has been demonstrated to have significant clinical value in many clinical conditions, with well-established guidelines and recommendations. However, technical support for providing this procedure to pregnant patients is largely absent from these recommendations [9].

The GBS is a demyelinating condition of the lower motor neurons; patients are often areflexic, although deep tendon reflexes may be present early in the course. Symptoms may also include paresthesia if the sensory nerves are involved and autonomic dysfunction, which can lead to respiratory failure.

The degree of weakness is often graded using the British Medical Research Council (MRC) scale for muscle strength. On this scale, 5 indicates normal power; 4 indicates active movement against gravity and resistance; 3 indicates active movement against gravity; 2 indicates active movement with gravity eliminated; 1 indicates a flicker or trace of contraction; and 0 indicates no contraction [10]. Severe weakness is defined as MRC grade 2 or below [11].

The diagnosis of GBS is usually clinical, based on symptoms and neurological examination, including diminished or loss of deep tendon reflexes, with support from serological tests, nerve studies, and Cerebrospinal Fluid (CSF) investigations [12].

Pregnancy often triggers abnormal immune-mediated diseases, and its symptoms can be confused with normal pregnancy symptoms. The use of TPE during pregnancy is uncommon, and its application largely relies on data from studies involving non pregnant populations [13]. GBS can occur in any trimester of pregnancy or during the postpartum period [14]. Early diagnosis and active treatment using Intravenous Immunoglobulin (IVIG) or plasmapheresis, along with the prevention of complications are key to successfully managing pregnant women with GBS [15].

The patient was diagnosed early and successfully managed with a multidisciplinary approach involving physicians, obstetricians, and transfusion medicine team, effectively using plasmapheresis alone without any complications.

CONCLUSION(S)

According to ASFA guidelines, GBS is a category IA indication for TPE. Treatments such as TPE or IVIG should be initiated early in the disease progression to prevent ongoing demyelination and subsequent axonal damage, which can result in permanent disability. TPE is often more cost-effective for treating GBS compared to IVIG. The case report highlights the effectiveness and safety of TPE in managing GBS during pregnancy, demonstrating that it can be safely performed under close monitoring.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Nov 09, 2024
- Manual Googling: Jan 04, 2025
- iThenticate Software: Jan 23, 2025 (15%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Nov 08, 2024**
Date of Peer Review: **Dec 18, 2024**
Date of Acceptance: **Jan 25, 2025**
Date of Publishing: **May 01, 2025**