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

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**Abstract-*Guillain-Barré syndrome (GBS) is an acute immune-mediated polyradiculoneuropathy characterized by rapidly progressive symmetrical weakness, areflexia, and variable sensory or autonomic involvement. Therapeutic plasma exchange (TPE) is a Category I indication for GBS as per the American Society for Apheresis (ASFA) guidelines and is recommended by the Directorate General of Health Services (DGHS) for the clinical application of therapeutic apheresis. We report a 54-year-old female with the acute motor-sensory axonal neuropathy (AMSAN) variant of GBS, who had already received intravenous immunoglobulin (IVIg) at another hospital five days prior to presentation, and who subsequently underwent five alternate-day sessions of one-plasma-volume TPE using the Spectra Optia® apheresis system via right femoral venous access. 5% albumin and normal saline were used as replacement fluids, with ACD-A anticoagulation and calcium gluconate supplementation. Plasma exchange volumes ranged from 2432-3114 mL per session. A transient hypotensive episode occurred during the first session, after which all subsequent procedures were hemodynamically stable. Upper-limb power remained stable at 4/5 bilaterally throughout, while lower-limb power improved progressively from 1/5 (Cycles 1-2) to 2/5 (Cycles 3-4) and 3/5 after Cycle 5. Deep tendon reflexes remained absent throughout the TPE sessions, with no sensory loss noted at any stage. The GBS disability score improved from 5 to 4 after the first cycle and remained stable at 4 through the remaining sessions. At the Day 14 follow-up, lower-limb power remained 3/5, deep tendon reflexes had returned, sensory examination was normal, and the GBS disability score had further improved to 3, indicating functional recovery with assisted ambulation. Five sessions of TPE were completed safely and were associated with progressive improvement in lower-limb motor power and functional status. Apart from a transient hypotensive episode and manageable electrolyte abnormalities, no major procedure-related complications occurred, supporting the safety and effectiveness of TPE in this patient with GBS.*

Keywords: Guillain-Barré syndrome, therapeutic plasma exchange, apheresis, AMSAN, GBS disability score

1. Introduction

Guillain-Barré syndrome (GBS) is an acute immune-mediated polyradiculoneuropathy characterized by rapidly progressive symmetrical limb weakness, areflexia, and variable sensory or autonomic involvement. It commonly follows an antecedent infective illness and results from an aberrant immune response that cross-reacts with peripheral nerve components. The Directorate General of Health Services (DGHS) has established guidelines and recommendations for the clinical application of therapeutic apheresis, and GBS is classified as a Category I indication for therapeutic plasma exchange (TPE).

TPE is an extracorporeal procedure that involves separation and removal of plasma from whole blood, followed by replacement with crystalloid and/or colloid solutions, most commonly 5% albumin or plasma. By removing circulating pathogenic autoantibodies, complement components, and inflammatory mediators, TPE is thought to reduce ongoing immune-mediated nerve damage and hasten neurological recovery. Here, we describe the clinical course, laboratory parameters, and neurological recovery of a patient with the acute motor-sensory axonal neuropathy (AMSAN) variant of GBS who was managed with TPE at our centre.

2. Aims and Objectives

The aim of this case report was to evaluate the effectiveness and safety of therapeutic plasma exchange in a patient with Guillain-Barré syndrome. The specific objectives were to assess neurological improvement, monitor relevant laboratory parameters, and document procedure-related adverse events over the course of treatment.

3. Materials and Methods

This was a single-patient observational case study conducted at a tertiary-care teaching hospital. A 54-year-old female with a diagnosed case of GBS (AMSAN variant), who had received IVIg at another hospital five days earlier, underwent five alternate-day sessions of one-plasma-volume TPE using the Spectra Optia® apheresis system (Terumo BCT) through right femoral venous access. 5% albumin and normal saline were used as replacement fluids, with ACD-A used as the anticoagulant and calcium gluconate supplementation given during the procedure.

Pre- and post-procedure vital parameters, laboratory investigations, electrolyte status, neurological findings, and procedure-related adverse events were monitored at each session. Treatment response was assessed by serial evaluation of motor power, deep tendon reflexes (DTR), sensory examination, and the GBS disability score.

4. Results and Discussion

The patient completed five alternate-day sessions of one-plasma-volume TPE using 5% albumin and normal saline, with plasma exchange volumes ranging from 2432-3114 mL. A transient hypotensive episode occurred during the first session; all subsequent procedures were hemodynamically stable, with no further major adverse events. Neurologically, upper-limb power remained stable at 4/5 bilaterally throughout the treatment course, whereas lower-limb power improved progressively from 1/5 during Cycles 1-2, to 2/5 during Cycles 3-4, and to 3/5 after Cycle 5.

Deep tendon reflexes remained absent throughout the TPE sessions, with no sensory loss at any point. The GBS disability score improved from 5 after the first cycle to 4 after the second cycle and remained at 4 during the subsequent sessions. At the Day 14 follow-up, lower-limb power remained at 3/5, deep tendon reflexes had returned, sensory examination remained normal, and the GBS disability score had further improved to 3, indicating functional recovery with assisted ambulation. Table 1 summarizes the day-wise neurological findings across TPE cycles, and Table 2 summarizes the corresponding laboratory parameters.

Table 1: Neurological findings across TPE cycles

Day	TPE Cycle	Plasma Volume Exchanged	Lower-Limb Power (B/L)	Upper-Limb Power (B/L)	DTR	Sensory Loss	GBS Disability Score
1	1st	1 PV	1/5	4/5	Absent	No	5
3	2nd	1 PV	1/5	4/5	Absent	No	4
5	3rd	1 PV	2/5	4/5	Absent	No	4
7	4th	1 PV	2/5	4/5	Absent	No	4
9	5th	1 PV	3/5	4/5	Absent	No	4
14	Follow-up	—	3/5	4/5	Present	No	3

Table 2: Laboratory parameters across TPE cycles

TPE Cycle	Hb (g/dL)	Hct (%)	WBC ($\times 10^3/\mu L$)	Platelets ($\times 10^3/\mu L$)	PT/INR	Total Protein (g/dL)	Na+/K+ (mEq/L)	Ionized Ca2+ (mmol/L)	Urea/Creatinine (mg/dL)
Cycle 1	12.5	38.3	10.5	194	18 sec / 1.57	7.9	137 / 4.62	0.80*	32 / 0.82
Cycle 2	10.6	33.2	11.3	134	19.6 sec / 1.57	5.4	139 / 3.3	1.03	23 / 0.50
Cycle 3	9.7	29.1	12.06	150	19 sec / 1.57	5.1	138 / 3.5	0.83	23.3 / 0.58
Cycle 4	12.9	37	11	144	18.5 sec / 1.65	4.9	134 / 2.9	0.86	20 / 0.78
Cycle 5	11.8	35.4	8.68	116	16.8 sec / 1.60	5.2	139 / 4.2	0.88	28 / 0.89

**Ionized calcium level for Cycle 1 recorded prior to calcium gluconate supplementation.*

Serial laboratory monitoring showed a gradual decline in total protein across successive cycles, consistent with the expected effect of repeated plasma removal, along with mild, manageable fluctuations in electrolytes and ionized calcium that were corrected with calcium gluconate supplementation. Coagulation parameters (PT/INR) remained relatively stable throughout the treatment course. These findings, together with the absence of major procedure-related complications, are consistent with existing literature supporting TPE as a safe and effective modality in GBS, particularly when initiated early in the disease course.

5. Conclusion

Five sessions of therapeutic plasma exchange were safely completed in a patient with the AMSAN variant of GBS and were associated with progressive improvement in lower-limb motor power and overall functional status. Apart from a transient hypotensive episode during the first session and manageable electrolyte abnormalities, no major procedure-related complications occurred. This case supports the effectiveness and safety of TPE as a therapeutic option in patients with Guillain-Barré syndrome.

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