Clinical Outcomes of Early Therapeutic Plasma Exchange in Pediatric Guillain-Barré Syndrome : A case series

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Introduction

Guillain-Barré Syndrome (GBS) is an acute, immune-mediated polyneuropathy characterized by rapid-onset muscle weakness, areflexia, and sensory disturbances, which can lead to significant morbidity in children. The condition often progresses to involve respiratory muscles, necessitating mechanical ventilation in severe cases. Early recognition and prompt intervention are critical for optimizing outcomes.1

Guillain-Barré Syndrome (GBS) falls under the American Society for Apheresis (ASFA) Category I indications for therapeutic plasma exchange, which recommends TPE as a first-line therapy in acute neurological disorders due to strong evidence of efficacy.

Therapeutic Plasma Exchange (TPE) is a well-established treatment modality for GBS, aimed at removing circulating autoantibodies and immune complexes. While extensively utilized in adults, the application of TPE as a first-line therapy in pediatric populations remains less explored due to limited data, logistical challenges, and concerns regarding procedural complications. This case series presents five pediatric GBS patients treated with TPE as the initial therapeutic modality, evaluating its efficacy and safety.2

Case Series

Case 1: An 8-year-old female presented with bilateral upper limb weakness, difficulty sitting in upright position and difficulty swallowing over 2 days with a history of fever 7 days ago. TPE was initiated on day 2 of admission, with five sessions performed. The patient does not require mechanical ventilation. Significant improvement in muscle strength and functionality was observed, with the patient achieving independent ambulation by the end of one month.

Case 2: An 10-year-old male exhibited progressive lower limb weakness and difficulty waking over 3 days. TPE was started on day 2 of admission, with a total of five sessions. Mechanical ventilation was

needed for 3 days as the patient exhibited respiratory muscle weakness. The patient showed a complete recovery of motor function within four weeks.

Case 3: An 11-year-old female with quadriparesis, unable to hold urine, breathing difficulty and dysarthria underwent TPE starting on day 2. Five sessions were administered, and the patient required mechanical ventilation for 10 days. During the TPE procedure anaphylactic reaction occurred which was managed temporarily stopping TPE and administering appropriate medications. By the end of the first month, the patient regained mobility with minimal support.

Case 4: A 14-year-old female with quadriparesis, unable to walk and speak since 1 day was initiated on TPE within 24 hours of admission. Mechanical ventilation was required from day 1 due to severe respiratory distress for five days. After completing five TPE sessions, the patient demonstrated significant recovery and was ambulatory by the fourth week.

Case 5: A 9-year-old male presented with paraparesis and autonomic dysfunction, including urinary retention. TPE was initiated on day 2, with five sessions completed. No mechanical ventilation was necessary, and the patient achieved independent ambulation and restored bladder function by one month.

The following table summarizes the clinical characteristics, treatment details, and outcomes of these cases:

Details	Case 1	Case 2	Case 3	Case 4	Case 5
Age (years)	8	10	11	14	9
Presentation	Bilateral upper limb weakness, difficulty swallowing	Bilateral lower limb weakness, unable to walk	Quadriparesis, unable to hold urine, respiratory distress	Quadriparesis, unable to walk and speak	Paraparesis, urinary retention
Diagnosed GBS Variety	AMAN	AMAN	AMSAN	AMAN	AMAN
Time to TPE Initiation	2 days	3 days	2 days	1 day	2 days
Baseline Hughes Score	3	3	2	1	3
Number of TPE Sessions	5	4	5	5	5

Mechanical Ventilation Duration	None	3 days	10 days	14 days	None
Duration of Hospital Stay	13 days	12 days	18 days	26 days	14 days
Complications	Hypocalcemia, hypotension	None	Hypotension, Anaphylactoid reactions	Line infection, hypotension, hypocalcemia	None
Outcome at 1 Month	Independent	Independent	Minimal support	Able to take feeds orally and walk with cane	Independent

Discussion

This case series underscores the potential efficacy of TPE as a first-line treatment in pediatric GBS, particularly in severe presentations. Early initiation of TPE was associated with rapid clinical improvement and favorable outcomes, aligning with findings from previous studies. For instance, a study involving 40 pediatric patients reported significant improvement following TPE, with minimal complications.3

The safety profile of TPE in our series was acceptable, with complications such as hypotension and allergic reactions being manageable. This is consistent with existing literature, which reports complications like hypotension (44.9%) and allergic reactions (24.6%) in pediatric populations undergoing TPE. Notably, serious complications were rare, and no mortality was observed.4

Despite these promising results, the application of TPE in pediatric GBS is limited by factors such as the need for specialized equipment, vascular access challenges, and the requirement for trained personnel. Additionally, the comparative efficacy of TPE versus Intravenous Immunoglobulin (IVIg) remains a topic of ongoing research. Some studies suggest that TPE is not superior to IVIg in reducing the duration of mechanical ventilation in children with severe GBS.5

Conclusion

Therapeutic Plasma Exchange appears to be a viable first-line treatment option for pediatric Guillain-Barré Syndrome, demonstrating efficacy in hastening recovery and a manageable safety profile. Early initiation, particularly in cases with respiratory involvement, may optimize patient outcomes. However, larger, controlled studies are necessary to establish standardized protocols, assess long-term benefits, and compare cost-effectiveness with other treatment modalities such as IVIg.

References

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