

Therapeutic Plasma Exchange in Various Clinical Settings at a Tertiary Hospital – A Retrospective Analysis from a Technical Point of View

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Abstract

Introduction: Therapeutic plasma exchange (TPE) is an extracorporeal blood purification procedure widely used in neurological and immunological diseases. While established protocols exist, patient variability necessitates individualized approaches to optimize efficacy and safety. **Methodology:** This retrospective observational study analyzed all TPE procedures performed in a tertiary hospital and blood center from January to December 2024. Clinical indications were categorized, and key parameters—including demographic characteristics, body mass index (BMI), hematocrit, calculated plasma volume (PVcalc), exchanged plasma volume (PVex), and PVex/PVcalc ratio—were recorded. Replacement fluid strategies and treatment cycles were evaluated, and statistical significance was set at $p < 0.01$. **Results:** A total of 723 TPE procedures were performed on 181 patients. Neurological disorders accounted for 83.4% of cases, mainly Guillain–Barré syndrome (62.5%), transverse myelitis (11%), and neuromyelitis optica (3.3%). Immunological diseases and vasculitis comprised 14.4%, including myasthenia gravis (11%), TTP (1.2%), and SLE (0.96%). Neurological patients had higher median hematocrit (40.2%) than the immunological group (35.7%), resulting in lower PVcalc (2376 mL vs. 2728 mL; $p < 0.01$). Despite these differences, treatment cycles remained around five across groups. Neurological patients exhibited a higher PVex/PVcalc ratio (0.92 vs. 0.77; $p < 0.01$), suggesting a more aggressive exchange approach. **Conclusion:** Significant clinical improvements occurred across all groups, even with lower-than-recommended plasma exchange volumes. These findings highlight the need for individualized TPE protocols based on disease-specific plasma dynamics. Further multi-center studies are warranted to refine evidence-based guidelines for optimal TPE outcomes.

Keywords: Therapeutic plasma exchange (TPE), neurological disorders, immunological diseases, plasma volume.