

A 15-year report of indications, adverse events, and effectiveness of therapeutic plasma exchange in patients with rheumatic diseases

Saeedeh Shenavandeh¹, Seyed Hosein Fallahzadeh^{2*}

¹ Department of Internal Medicine, Division of Rheumatology, Shiraz University of Medical Sciences, Shiraz, Iran.

² Department of Internal Medicine, Shiraz University of Medical Science, Shiraz, Iran.

Therapeutic plasma exchange (TPE) is a type of treatment, which eliminates harmful antibodies, immune complexes, cytokines, and inflammatory products. Due to the lack of sufficient data on indications, effectiveness, and side effects of TPE in patients with rheumatic disease, we evaluated TPE in our center. All consecutive patients registered in university hospitals with definite rheumatologic indications for TPE during 15 years were evaluated. 680 sessions of TPE were performed on 166 patients, aged between 19 and 83 years. The most common underlying causes were collagen vascular diseases (60%) including systemic lupus erythematosus (SLE) (98%), and antiphospholipid antibody syndrome (APS) (1%); and then, primary small vessel vasculitis (SVV) (39.8%). The main indications for TPE in all patients were rapidly progressive glomerulonephritis (RPGN) (69.8%) and pulmonary hemorrhage (39.1%). During 12 months follow-up, in SLE and SVV patients 17 (17.3%) and 20 (30.3%) entered complete remission; 37 (37.3%) and 12 (18.1%) entered partial remission; 44 (44.8%) and 34 (51.5%) had no recovery; and 37(37%) and 19 (28.7%) died, respectively. A total of 18 (10.8%) patients experienced TPE-related adverse events during TPE [hypotension 15 (9%), allergic reaction 1 (0.6%), fever 1 (0.6%), and hypocalcemia 1 (0.6%)]. The most common indication for TPE is SLE and primary vasculitis. The RPGN and pulmonary hemorrhage were the main indications. Although the rate of response to treatment was acceptable according to the fatal nature of these complications, further case-control studies are suggested to assess the effectiveness of TPE.

Keywords: plasmapheresis; therapeutic plasma exchange; adverse event; vasculitis; systemic lupus erythematosus

Introduction

Therapeutic plasma exchange (TPE), also known as plasmapheresis, is an extracorporeal treatment for separating the plasma from blood-forming components and eliminating large-molecular-weight substances such as harmful antibodies, immune complexes, cytokines, and pro-inflammatory and inflammatory products with replacement fluids such as plasma or albumin into the patients' blood [1, 2]. TPE was performed by Schwab and Fahey in 1960 for the

first time in patients with macroglobulinemia [3]. Then in 1975, Lockwood et al. [4] introduced TPE as the treatment of choice in patients with immunologic, renal, and rheumatic diseases. Nowadays, TPE is commonly used in combination with other disease-modifying treatments, including immunosuppressive medications [2, 5]. Several studies confirmed the improvement of renal function and alveolar hemorrhage in patients who had undergone TPE in combination with other modifying treatments

There were several limitations to our study. As to the retrospective method of this study, selection and information bias were inevitable. Moreover, we excluded several patients who had undergone TPE in our center due to the missing information. The sample size of several diseases in our study was small, which is another limitation to our study. Therefore, further evaluations with a larger sample size and longer duration of follow-up with frequent short intervals compared to the control group will be the best way to evaluate the efficacy of TPE in patients.

Conclusion

The current study showed that the most common indication for TPE in patients with rheumatic diseases in the south of Iran was SLE and primary vasculitis which presented with RPGN, TTP, and pulmonary hemorrhage, respectively. The most common causes of mortality in patients who underwent TPE in patients with SLE was the simultaneous occurrence of RPGN with pulmonary hemorrhage and TTP; also, in patients with primary vasculitis, RPGN with pulmonary hemorrhage was the cause of death. The side effects of plasmapheresis were rare, being mostly hypotension, allergic reaction, fever, and hypocalcemia. Although the rate of response to treatment is acceptable according to the fatal nature of these diseases in their exacerbations, further controlled studies are recommended to be performed to assess the effectiveness of applying other medications on the improvement of response to treatment and complete recovery.

Acknowledgement

The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran and Center for Development of Clinical Research of Namazi Hospital and Dr. Nasrin Shokrpour for editorial assistance.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this study.

Funding

This thesis was supported by the Dean of the

School of Medicine based on research project number 18224 and sponsored by the Vice Chancellor of Shiraz University of Medical Sciences.

References

- 1- Sergeant SR, Ashurst JV. Plasmapheresis. [Updated 2023 Jul 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK560566/>
- 2- Fernández-Zarzoso M, Gómez-Seguí I, de la Rubia J. Therapeutic plasma exchange: Review of current indications. *Transfus Apher Sci* 2019; 58(3):247-53. doi: 10.1016/j.transci.2019.04.007.
- 3- Udani MM, Neogi AJ, Dhote SW, Singh I. Therapeutic Plasma Exchange – A 2 years experience at a tertiary care centre in Mumbai, Maharashtra, India. *J Evol Med Dent Sci* 2021. DOI: 10.14260/jemds/2021/228
- 4- Lockwood CM, Pussell B, Wilson CB, Peters DK. Plasma exchange in nephritis. *Adv Nephrol Necker Hosp* 1979; 8:383-418.
- 5- Kaplan AA. Therapeutic plasma exchange: a technical and operational review. *J Clin Apher* 2013; 28(1):3-10. doi: 10.1002/jca.21257.
- 6- Fernandez J, Gratacos-Ginès J, Olivas P, Costa M, Nieto S, Mateo D. et al. Plasma exchange: An effective rescue therapy in critically ill patients with coronavirus disease 2019 infection. *Crit Care Med* 2020; 48(12):e1350-e55. doi: 10.1097/ccm.0000000000004613.
- 7- Honore PM, Redant S, Kugener L, Barreto Gutierrez L, Attou R, Gallerani A. et al. Plasma exchange dramatically reduced inflammatory markers, including main cytokines, ferritin, triglycerides, and d-dimers, thereby improving clinical outcomes: The true reality is far more complex! *Crit Care Med* 2021; 49(4):e485-e86. doi: 10.1097/ccm.0000000000004837.
- 8- Toyoda T, Yates M, Watts RA. Is there still a role of plasma exchange in the current management of ANCA-Associated