

# Thrombocytapheresis: An important therapeutic tool in the management of thrombocytosis in cerebral venous thrombosis

Sadhana Mangwana

## ABSTRACT

**Introduction:** Therapeutic thrombocytapheresis is an effective and useful measure of platelet reduction in patients with severe thrombocytosis from various primary or secondary causes of thrombocytosis to relieve patient of debilitating complications. American Society of Apheresis (ASFA) has recommended platelet reduction by thrombocytapheresis procedures for symptomatic relief in essential thrombocythemia and polycythemia vera indications under category 2C, but other causes are not included in this category by ASFA.

**Case Report:** Here, a case of cerebral venous thrombosis is presented which developed severe thrombocytosis in the post-operative period as secondary (reactive) cause to acute hemorrhage and benefitted after successful therapeutic thrombocytapheresis procedures without any debilitating or residual complications of neurosurgery.

**Conclusion:** This case highlights the importance of therapeutic platelet reduction by a very simple and easy plateletapheresis procedure which is routinely done in many blood establishments globally for other indications.

**Keywords:** Plateletapheresis, Platelet reduction, Thrombocytapheresis, Thrombocytosis

## How to cite this article

Mangwana S. Thrombocytapheresis: An important therapeutic tool in the management of thrombocytosis in cerebral venous thrombosis. Int J Blood Transfus Immunohematol 2020;10:100054Z02SM2020.

Article ID: 100054Z02SM2020

\*\*\*\*\*

doi: 10.5348/100054Z02SM2020CR

## INTRODUCTION

Thrombocytosis is defined as a circulating condition in which platelet count in adults is greater than the upper limit of normal, i.e.,  $450 \times 10^9/L$ , which is broadly classified as reactive (secondary), essential (clonal or primary), or inherited [1]. At least 90% of patients with thrombocytosis have reactive thrombocytosis (RT) seen in infections, inflammatory disorders, malignant diseases, or after splenectomy. Thrombocytosis is caused by cytokines and other acute-phase response mediators active in these circumstances; most important being interleukin-6 (IL-6) and thrombopoietin (TPO).

Due to advancements in early diagnosis and treatment of both primary and secondary causes of thrombocytosis, the role of thrombocytapheresis is, though limited but a valuable, temporizing intervention. Here, the role of thrombocytapheresis is discussed to reduce platelet count in a case of cerebral venous thrombosis where platelet reduction was urgently needed because of a reactive thrombocytosis.

## CASE REPORT

A 42-year-old female was admitted with a history of sudden loss of consciousness followed by

Sadhana Mangwana

**Affiliation:** Senior Consultant and Head, Department of Transfusion Medicine and Immunohematology, Sri Balaji Action Medical Institute, A-4, Paschim Vihar, New Delhi, India.

**Corresponding Author:** Dr. Sadhana Mangwana, G-17, Pocket-2, Naraina Vihar, New Delhi 110028, India; Email: sadhanamangwana@yahoo.co.in

Received: 25 May 2020

Accepted: 20 October 2020

Published: 24 November 2020

generalized tonic-clonic seizures (GTCS) and in a critical general condition. The patient was referred from another healthcare facility in intubated state and on manual ventilation. At the time of admission, routine investigations revealed all hematological and biochemical tests including platelet count ( $384 \times 10^9/L$ ) within normal limits, except a low hemoglobin. Non-contrast computed tomography (NCCT) revealed a large hemorrhagic venous infarct in the left frontal lobe with subarachnoid and intraventricular bleeding. Magnetic resonance angiogram (MRA) did not show any significant vascular abnormality but magnetic resonance venogram (MRV) showed venous sinus thrombosis in the superior sagittal sinus. The patient was immediately taken for surgery (left decompressive craniotomy with duraplasty). Post-operatively, the patient was put on ventilator support along with antibiotics, anti-epileptics, anti-platelet (aspirin), cerebral decongestants, diuretics, and symptomatic treatment. After a week's time, platelet count started to increase and on 15th day of admission and surgery, increased to  $1,195 \times 10^9/L$  (Figure 1) when it was decided to therapeutic platelet reduction through thrombocytapheresis. Two therapeutic platelet reduction procedures were done using Amicus blood cell separator (Fresenius-Kabi), four days apart, using dedicated closed system disposable sets, acid citrate dextrose-A (ACD-A) as an anticoagulant and physiologic saline as replacement fluid as per manufacturer's instructions. According to ASFA recommendations, 1.5–2 total blood volume (TBV) were processed using ACD-A in a 1:6–12 whole blood:anticoagulant ratio without any adverse effects (Table 1) [2]. At the end of two procedures, platelet count was reduced to  $441 \times 10^9/L$  with aggregate reduction of 63% between pre- and post-apheresis platelet count (48% and 46.7% respectively in two procedures). Procedures finished in 97 minutes and 84 minutes, respectively.

Gradually, the patient was weaned off from the ventilator, extubated, and discharged on 22nd day of admission in a satisfactory stable condition. The patient was followed up for 12 months by hospital visits and telephone follow-up with no rebound of symptoms or increased platelet count.

Table 1: Parameter details

	Procedures	
	1	2
Blood volume processed (mL)	1930	2150
ACD-A used (mL)	316	282
Procedure time (min)	97	84
Pre-procedure platelet count ( $\times 10^9/L$ )	1195	828
Post-procedure platelet count ( $\times 10^9/L$ )	770	441

## DISCUSSION

Thrombocytosis, defined as increased circulating platelet count  $>450 \times 10^9/L$ , is seen reactive more commonly to bleeding, hemolysis, infection, inflammation, asplenia, or cancer [3, 4]. Normally, increased platelet counts being functionally normal, do not predispose to thrombosis or bleeding while in myeloproliferative neoplasms (MPN), which include essential thrombocythemia (ET), polycythemia vera, etc., platelets are functionally abnormal and thrombocytosis is associated with thrombo-hemorrhagic events [2].

In low-risk patients, thromboprophylaxis is done with low-dose aspirin while in high-risk patients, hydroxyurea and interferon- $\alpha$  are given as platelet-normalizing therapy. Since this patient was unresponsive to other first-line therapies (anti-platelet) and platelet count was increasing to extreme thrombocytosis levels, urgent cell reduction was considered to avoid thrombotic/hemorrhagic complications.

In a case-based review on the role of thrombocytapheresis in the management of hyperthrombocytosis, Boddu et al. have recommended that plateletapheresis should be considered with relative urgency when platelet counts are above  $1,500 \times 10^9/L$  with increased risk of major hemorrhage and when cytoreductive agents are contraindicated or less desirable [3], whereas ASFA has recommended thrombocytapheresis in essential thrombocythemia with Grade recommendation of 2C signifying that thrombocytapheresis is accepted as second-line therapy, either as a stand-alone treatment or in conjunction with other modes of treatment, under category II for indication of symptomatic relief [2]. In this case of cerebral venous thrombosis and cerebral infarct, an acute thrombo-hemorrhagic event, the primary goal was normalization of platelet count and maintenance of a normal platelet count to help improve the patient. Few cases are reported in the literature where thrombocytapheresis has been used in different indications like myelofibrosis, post-splenectomy, essential thrombocytosis, chronic myeloid leukemia (CML) [3–7]. Thrombocytapheresis has been utilized to prevent or treat acute thromboembolism or hemorrhage in selected patients [2]. Various case reports have shown improvements of symptoms of thrombotic/hemorrhagic complications which are not responding to other first-line therapies [3].

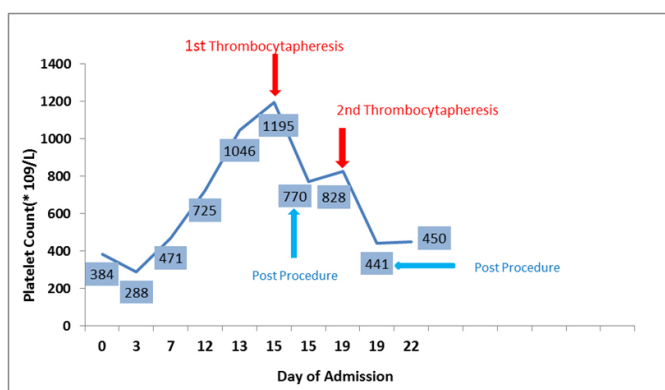


Figure 1: History of platelet count and response of thrombocytapheresis procedures.

To the best of our knowledge, there are no studies in the literature comparing various cell separators used for platelet reduction. Thrombocytapheresis procedures in this case were done on Amicus cell separator (Fresenius-Kabi) and were able to achieve 63% platelet count reduction in just two procedures while the Haemonetics MCS + cell separator used by other authors, showed 60% and 47% platelet reduction respectively indicating that Amicus cell separator has a better efficiency in platelet reduction leading to better management and quick recovery of the patient [5, 6].

## CONCLUSION

To conclude, therapeutic thrombocytapheresis is found to be a useful measure of platelet reduction in severe thrombocytosis to relieve the patient of debilitating complications in a case of cerebral venous thrombosis. Elective thrombocytapheresis should be considered for cytoreduction in patients at increased risk of major hemorrhage where rapid platelet count reduction is urgently required to avoid further deterioration in patient's condition. Thrombocytapheresis is a bridging therapy to maintain cytoreduction with anti-platelet drugs. In this case also, no rebound thrombocytosis was seen with good recovery during 12 month follow-up.

## REFERENCES

1. Rodgers GM, Means RT Jr. Thrombocytosis and essential thrombocythemia. In: Greer JP, Rodgers GM, Glader B, et al. editors. *Wintrobe's Clinical Hematology*. 14ed. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins; 2019.
2. Padmanabhan A, Connelly-Smith L, Aquilino N, et al. Guidelines on the Use of Therapeutic Apheresis in Clinical Practice — Evidence-Based Approach from the Writing Committee of the American Society for Apheresis: The Eighth Special Issue. *J Clin Apher* 2019;34(3):171–354.
3. Boddu P, Falchi L, Hosing C, Newberry K, Bose B, Verstovsek S. The role of thrombocytapheresis in the contemporary management of hyperthrombocytosis in myeloproliferative neoplasms: A case-based review. *Leuk Res* 2017;58:14–22.
4. Falchi L, Bose P, Newberry KJ, Verstovsek S. Approach to patients with essential thrombocythemia and very high platelets count: What is the evidence of treatment? *Br J Haematol* 2017;176(3):352–64.
5. Das SS, Bose S, Chatterjee S, Parida AK, Pradhan SK. Thrombocytapheresis: Managing essential

thrombocythemia in a surgical patient. *Ann Thorac Surg* 2011;92(1):e5–6.

6. Negi G, Talekar MS, Verma SK, et al. Therapeutic platelet reduction: Use in postsplenectomy thrombocytosis. *Asian J Transfus Sci* 2015;9(1):85–6.
7. Hans R, Prakash S, Sharma RR, Marwaha N. Role of therapeutic apheresis in pediatric disorders. *Pediatric Hematology Oncology Journal* 2016;1(3):63–8.

\*\*\*\*\*

## Acknowledgments

The author acknowledges contribution by Devendra Arya and Fresenius-Kabi for application support.

## Author Contributions

Sadhana Mangwana – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

## Guarantor of Submission

The corresponding author is the guarantor of submission.

## Source of Support

None.

## Consent Statement

Written informed consent was obtained from the patient for publication of this article.

## Conflict of Interest

Author declares no conflict of interest.

## Data Availability

All relevant data are within the paper and its Supporting Information files.

## Copyright

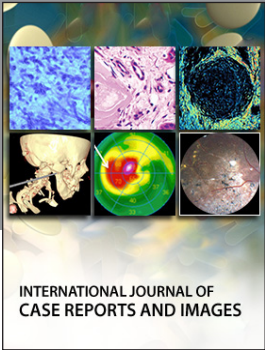
© 2020 Sadhana Mangwana. This article is distributed under the terms of Creative Commons Attribution License which permits unrestricted use, distribution and reproduction in any medium provided the original author(s) and original publisher are properly credited. Please see the copyright policy on the journal website for more information.

Access full text article on  
other devices



Access PDF of article on  
other devices





INTERNATIONAL JOURNAL OF  
CASE REPORTS AND IMAGES



VIDEO JOURNAL OF  
CLINICAL RESEARCH



VIDEO JOURNAL OF  
BIOMEDICAL SCIENCE



INTERNATIONAL JOURNAL OF  
HEPATOBIILIARY AND  
PANCREATIC DISEASES



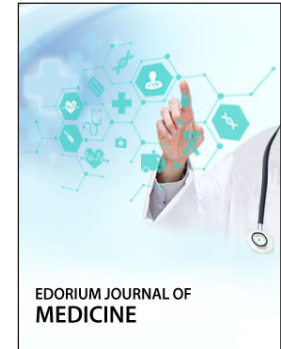
INTERNATIONAL JOURNAL OF  
BLOOD TRANSFUSION AND  
IMMUNOHEMATOLOGY



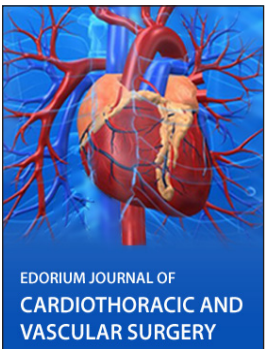
EDORIUM JOURNAL OF  
OPHTHALMOLOGY



**Submit your manuscripts at**  
[www.edoriumjournals.com](http://www.edoriumjournals.com)



EDORIUM JOURNAL OF  
MEDICINE



EDORIUM JOURNAL OF  
CARDIOTHORACIC AND  
VASCULAR SURGERY



JOURNAL OF CASE REPORTS  
AND IMAGES IN ORTHOPEDICS  
AND RHEUMATOLOGY



EDORIUM JOURNAL OF  
PSYCHOLOGY



EDORIUM JOURNAL OF  
CELL BIOLOGY



JOURNAL OF CASE REPORTS AND IMAGES IN  
DENTISTRY



EDORIUM JOURNAL OF  
CANCER



EDORIUM JOURNAL OF  
PSYCHIATRY



JOURNAL OF CASE REPORTS AND  
IMAGES IN INFECTIOUS DISEASES



EDORIUM JOURNAL OF  
ANATOMY AND EMBRYOLOGY



EDORIUM JOURNAL OF  
SURGERY



JOURNAL OF CASE REPORTS  
AND IMAGES IN PATHOLOGY



EDORIUM JOURNAL OF  
ANESTHESIA