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Original Research Article

Adverse donor reaction during and after plateletpheresis in a tertiary care centre

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ABSTRACT

Background: Plateletpheresis is the process of collecting platelets, a component of blood involved in blood clotting. The term specifically refers to the method of collecting the platelets, which is performed by a device used in blood donation that separate the platelets and return other portion of blood to the donor. Platelet transfusion can be a life-saving procedure in preventing and treating serious complications from bleeding and haemorrhage in patients having disorders manifesting as thrombocytopenia like in dengue patients, ITP, aplastic anemia, and patients undergoing chemotherapy for leukaemia. In this study, our goal was to retrospectively analyse the adverse reactions occurred during and immediately after plateletpheresis donations.
Methods: From January 2015 to October 2016, a total of 66 plateletpheresis procedures were performed in department of transfusion medicine, GMC Jammu, Jammu and Kashmir, India which is a tertiary care hospital.
Results: Total 66 procedures were performed during our study period from which, four (6.06%) adverse events were recorded. Out of these four, two (50%) donors suffered from tingling sensation, one (25%) suffered from nausea and vomiting and One (25%) from haematoma formation.
Conclusions: In Conclusion, the result of our 22-month study survey document that apheresis procedures performed on cell separators are safe procedures with the low incidence of adverse reactions.

Keywords: Adverse events, Plateletpheresis, Thrombocytopenia

INTRODUCTION

It is possible to collect the therapeutic unit required for transfusion in an adult patient from a single donor using plateletpheresis. This reduces the risk of immediate transfusion reactions and disease transmission by blood transfusion.[1] The increase in medical and surgical indications for platelet transfusion along with the new technologies available, promoted and increased the use of plateletpheresis.[2] Plateletpheresis should be performed in a specific area and under the guidance and supervision of a physician.[3] Apheresis procedures are usually well tolerated. Adverse events (AEs) of variable severity may occur during or after the procedure. AEs that occur in donors can be divided into local reactions and systemic reactions.[4]

Local reactions are usually hematomas due to extravasation from the veins, caused by incorrect placement of needle during venipuncture. Pain, hyperemia and swelling may develop at the site of extravasation.[4,5] Systemic reactions are mainly vasovagal reactions that can be triggered by the pain of venipuncture or by the anxiety and state of tension of undergoing the donation etc. These are characterized by the pallor, sweating, dizziness, nausea, hypotension and syncope. Citrate toxicity may also occur because of the use of acid- citrate-dextrose in apheresis.[5]

METHODS

This is a retrospective, cross-sectional study of all adverse reactions related to platelet apheresis donation made b/w Jan 2015 to oct 2016 at a tertiary care hospital GMC Jammu, Jammu and Kashmir, India. A total of 66 procedures were performed during our study period on Fresenius Kabi cell separator. Fresenius Kabi is single needle intermittent flow type of cell separator. All donations were collected using 16 gauze needle inserted into a vein in the antecubital fossa, with all aseptic precautions. Donors were selected as per the set criteria for single donor platelet preparation according to DGHS guidelines:

- Weight 60 kg or more
- Age between 18 to 50 years
- Hb 12.5 g/dl
- Donors who have taken aspirin containing medication within 36 hours are usually deferred
- Interval between procedures should be at least 48 hours. A donor shall not undergo the procedure more than 2 times in a week or 24 times in a year.
- Platelet count >1.5lakh.
- Absence of any illness.
- Negative test for HIV, hep. B, HCV, syphilis, malaria

RESULTS

Overall, 66 plateletpheresis procedures were performed during our study period. Out of these 66, 4 adverse reactions were reported, for an overall adverse event rate of 6.06% occur.

Types of adverse events occur during plateletpheresis:

- Vasovagal reactions: includes nausea, vomiting, syncope, sweating, pallor, dizziness, weakness, hypotension.
- Vascular injuries: like hematoma formation or bruising at venipuncture site.
- Citrate toxicity:

a) mild type: tingling sensation starting from perioral area.
b) severe type: loss of consciousness, convulsion, tetany and incontinence.

Four adverse events were reported, Out of which:

- Two (3.03%) of them had tingling sensation in perioral area.
- One (1.51%) of them had nausea and vomiting i.e. vasovagal reaction of mild intensity.
- One (1.51%) had hematoma formation.

All adverse events reported during the study period was of mild intensity and no severe reaction was reported in this procedure. Total 4 reactions were reported during the study period; out of these four donors, 3 (75%) of them were first time donors and one (25%) was third time repeat donor.

Table 1: Age distribution in donors.

	Age in years	No of donors
1 B/W	20 – 30	28
2 B/W	31- 40	26
3 B/W	41 -50	12

DISCUSSION

Modern blood transfusion advocates use of every blood donation by way of blood component preparation. The development of plastic blood collection bags, integral tubing, high speed refrigerates and centrifuge, deep freezer and cell separator machines have made blood component easier and practical.[6]

While plateletpheresis shares many reactions and injuries with whole blood donation because of the differences, unique complications exist. Overall, evidence in the literature suggests that the frequency of reactions to apheresis donation is less than that seen in whole blood donation.[7,8] The adverse events during the process of plateletpheresis have been broadly divided into:[5,6,8]

- Venipuncture related
- Syncope/sweating/faintness
- Citrate reactions

Pain at the site of venipuncture was noted to be more common because the same vein in one arm is used for inflow and return, resulting in trauma and hematoma to the vein. Citrate is used as primary anticoagulant in donor apheresis procedures.[9,10] The anticoagulant effect of citrate results from its ability to chelate calcium ions resulting in the calcium ion being unavailable to participate in biological reactions such as the coagulation cascade.

The non-availability of calcium ion hinders the coagulation cascade. The result of such a decrease in ionized calcium is that excitability of nerve membrane increase to the point where spontaneous depolarization can occur.[11] This produces signs and symptoms of citrate toxicity including perioral paresthesia, shivering, light headedness, twitching and tremors. In addition, some patients also experience nausea and vomiting. As the ionized calcium level falls, further, these symptoms may progress to carpopedal spasm, tetany and seizures.[12]

It is therefore important to elicit the presence of early symptoms from the donor so that intervention can occur prior to the more severe symptoms. In our study calcium supplement was given to the donors when they complained about paresthesia/tingling or numbness sensations. All these reactions were mild. There was no severe form of reactions noted in our study. The

treatment of citrate reaction is relatively simple, when the reactions are identified early. The treatment includes: slowing the reinfusion rate to allow for dilution and metabolism of the citrate, increasing donor blood to citrate ratio to decrease the amount of citrate infused, giving oral calcium supplement and if required giving I/V calcium.[9,13] The administration of oral calcium carbonate and its effect on citrate toxicity have examined by Bolan et al.[11]

In our study the vasovagal reaction occurred in the form of sweating, syncope and faintness. This can be attributed to apprehension. Tomita et al noted that hypocalcemia may be involved in the onset of vasovagal reactions in apheresis donors.[6] Hypovolemia and vasovagal reactions are treated similarly. The procedure should be temporarily paused and fluid infusion should be started. If the reaction is due to hypovolemia the blood pressure should increase and the pulse rate should decrease in response to intervention.

The overall rate of acute adverse reactions among healthy donors undergoing plateletpheresis procedure in our study was 6.06% (4/66). Frequency of VI, CR & PS/S in plateletpheresis was 1.5%, 3.03%, 1.5% resp. Frequency of these adverse events studied by other authors are almost equal to results seen in our study.

Recent evidence suggests, however, that repeated apheresis donations may produce adverse long term effects such as Bone demineralization and cataract formation.[7,14] Additional researches are needed to ascertain the risk of long term apheresis donations.

CONCLUSION

Overall apheresis donations performed on cell separator are safe and have acute reaction rates less than that seen in whole blood donation. The adverse events of apheresis donations are relatively mild and easily treated.

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