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Optimization of platelet quality and patient compliance using single donor platelets stored in Platelet Additive Solution

Dr. Ritam Chakrabarty, MD
Specialist, Transfusion Medicine, India

Introduction

- Platelet additive solution (PAS) to store pooled Buffy coat is in practice since long time
- Use of PAS increases availability of plasma for transfusion or fractionation
- Use of PAS reduces ABO incompatibility issues and plasma related adverse events in platelet (PLT) transfusions
- With the availability of PAS in India we have started its use for the storage of single donor platelet (SDP) or Apheresis platelet
- Here we share our experience of using PAS, the quality outcome of products and patient compliance

Materials and Methods

- The prospective study was conducted in 25 healthy platelet donors from November 2015 to February 2016
- All SDPs were collected using automated cell separator (Amicus, Fenwal, USA) and stored in solution containing 80% PAS (SSP+, Maco Pharma) and 20% donor plasma
- Quality analysis of each SDP unit stored in PAS was conducted on the 4th day and 7th day of storage and documented
- Donor demography and apheresis procedure details were obtained from respective screening and procedure registers
- Patient post-transfusion details were obtained from patient file and hospital information system (HIS).

Results

- **The mean age, weight and pre-donation platelet count of donors was 34 years, 63 kg and $193x10^3$ / µL respectively**
- **A mean total blood volume of 3126 ml was processed in 87 minutes using a mean anticoagulant (ACD) volume of 247 ml**
- **The mean PLT yield and leukocyte content of PLT products on 4th day storage was $3.4X10^{11}$ and 2.7×10^6 respectively.**
- **The pH of all units tested was ≥ 6.9 with all units found sterile after 5 days of incubation**

Results

- **Aliquots of all units tested on 7th day storage for mean PLT yield and leukocyte content was 3.16 X 10^{11} and 1.9 x 10^{6} respectively**
- **No patient had any transfusion reaction after PLT transfusion**
- **A 1 hour post-transfusion corrective count increment (CCI) and post-transfusion platelet recovery (PPR) in 13 aplastic anemia patients were 13260 platelet x m^2 / µL and 28.3% respectively.**

Table 1: Donor & procedure details in SDP collections (N = 25)

Donor characteristic	Values (mean ± SD)
Age (range)	34 (19 – 55)
Gender (M: F)	4:1
Weight (kg)	63 ± 10.45
BSA (m^2)	1.67 ± 1.7
Platelet count (x 10^3 /µl)	193 ± 39.2
WBC count (x 10^3/µl)	7.7 ± 0.7
Hb (gm/dl)	14.1 ± 1.7
Hct (%)	43.1 ± 2.4
Procedure details	**Values**
Procedure time (min)	87 ± 11.2
Whole blood processed (ml)	3126 ± 587
ACD (ml)	247 ± 59.3

Table 2: Quality of SDP stored in PAS (N= 25)

Parameters (mean ± SD)	Day 2	Day 4	Day 7
Volume (ml)	213.6 ± 17.6	213.6 ± 17.6	213.6 ± 17.6
pH	7.1±0.43	6.95 ± 0.46	6.91 ±0.47
PLT Yield(X 10^{11})	3. 47 ± 0.75	3.4 ± 0.81	3.16 ± 0.72
Leukocyte (X 10^{6})	2.91 ± 0.53	2.7 ± 0.71	1.9 ± 0.66
Red cell (ml/unit)	1.12 ± 0.43	1.23 ± 0.72	1.19±0.68
Hct (%)	0.4 ± 0.34	0.4 ± 0.41	0.5 ± 0.39
Swirling	Good	Good	Good

Table 3: Anti-A, Anti-B titers

Antibody titre	Number (n=25)
Neg	4
1:1	7
1:2	5
1:4	5
1:8	2
1:16	2

Discussion

- **Ex vivo storage of PLTs in PAS with a low plasma carryover offers several advantages compared with storage of PLTs in 100% plasma**
- **The latest generation of PAS, showed promising in vitro results for PLT quality in various studies**
- **Whether PLT storage in PAS is indeed equal to or even better than PLT storage in plasma still remains uncertain and under discussion**
- **Comparison of functional in vitro quality parameters between PLTs stored in 70% of PAS and PLTs stored in 100% plasma revealed still better results for the latter although result differences were smaller**

Discussion

- **Only comparative in vivo studies of PLTs stored either in 100% plasma or the latest PAS might help to find a definite answer to quality issues**
- **Each blood banker considering PLT storage in PAS has to decide individually whether the known advantages of this method might outweigh the slightly impaired in vitro quality of PAS stored PLT**
- **Improved in vitro quality of PLTs stored in latest generation PAS should at least encourage blood bankers**
- **The current study concludes that PAS is a useful storage medium of platelet concentrates that optimize the quality of platelets even after 7 days of storage with a better patient compliance. It should be available at all blood centres for its optimal uses in platelet storage**

References

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