



Case Report

Anti-D alloimmunization after platelet transfusion

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ARTICLE INFO

Article history:

Received 17-02-2021

Accepted 18-03-2021

Available online 19-05-2021

Keywords:

Platelet

Transfusion

Alloimmunization

Donor

Antibody

Antigen

ABSTRACT

Human platelets do not express any antigens of the Rhesus system. However, platelet concentrates contain the variable volume of contaminating RBCs, which may induce RhD alloimmunization when transfused in a RhD negative subject. Though low rate of anti-D alloimmunization related to platelet transfusion, the development of RhD and non-RhD antibodies cannot be ignored. Thus, transfusion practices could allow the transfusion of RhD positive platelet units to RhD negative patients, with the exception of females of childbearing age.

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1. Introduction

Dengue fever and dengue haemorrhagic fever have emerged as a global public health problem in recent decades. The South-East Asian countries such as India, Indonesia, Myanmar, and Thailand are at the highest risk of DF/DHF accounting for nearly half of the global risk. Dengue infection is usually a benign syndrome. Bleeding in dengue is one of the dreaded complications.¹ Severe bleeding is related to severe thrombocytopenia.² Platelet transfusion is given in those patients who is either bleeding or having other haemorrhagic symptoms along with thrombocytopenia. The component of choice is Platelets.

Platelets should be transfused prophylactically to reduce the risk for spontaneous bleeding. The AABB recommends transfusing hospitalized adult patients with a platelet count of 10×10^9 cells/L or less to reduce the risk for spontaneous bleeding.³

Human platelets do not express any antigens of the Rhesus system but do express antigens of ABO system. However, platelet concentrates contain the variable

volume of contaminating RBCs, which may induce RhD alloimmunization when transfused in a RhD negative subject. The incidence of anti-D alloimmunization after RhD-incompatible platelet transfusion ranges from 0% to 18.7%, which is significantly lower than the incidence of RhD alloimmunization after RBC incompatible transfusions.⁴⁻⁹

In the recent years, decrease in RBC contamination in PLT concentrates is observed due to improved blood component processing and use of apheresis technology. Contaminating RBCs volume in apheresis platelets products is 50 times less than the volume of RBCs in a whole blood-derived PLT concentrate using the PLT-rich plasma method (0.00043 ml vs. 0.036 ml).¹⁰⁻¹² It has been shown that neither the number of RhD positive pooled PLT concentrates nor the total number of PLT products had an impact on anti-D formation. Thus, cumulative RBC dose and PLT dose as well as repeated exposure to RhD antigen appear not to be related to a higher rate of anti-D alloimmunization. The protective effect of ABO-incompatibility is attributed to the destruction of RBCs (due to ABO-incompatibility) before the RhD antigen is recognized by the recipient. Immunosuppression

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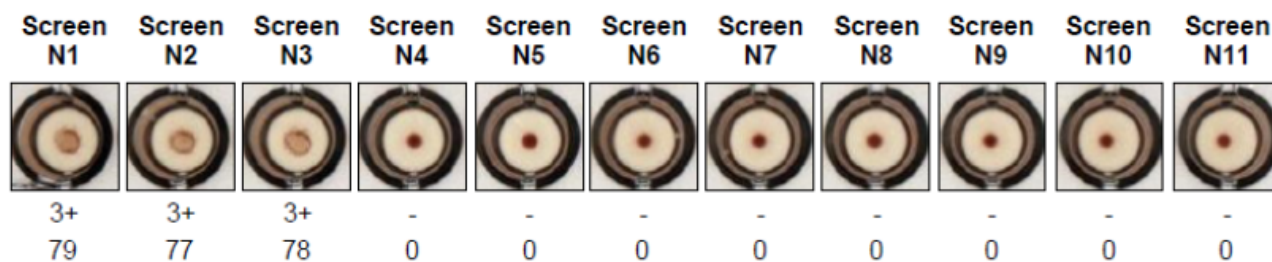


Fig. 1: Donor 1

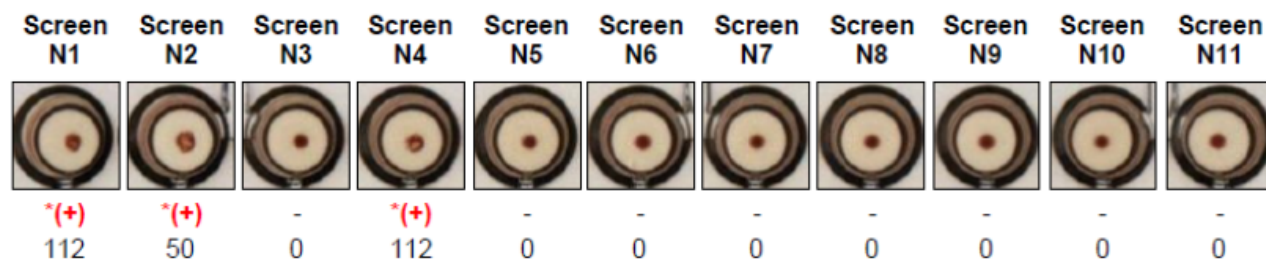


Fig. 2: Donor 2

(disease or treatment related) has also been implicated as a factor with a protective effect in alloimmunization.¹³ Leukoreduction of blood components, including platelet concentrates, may have an additional protective role in alloimmunization. Actually, alloimmunization rates have been reported to decrease after the implementation of universal leukoreduction.¹⁴

2. Case History

Two healthy and young (20 years and 21 years) voluntary male blood donors donated whole blood in Dec 2020 and Jan 2021 respectively. Blood group of both was O Negative. During routine screening for irregular antibody following blood donation, both were positive for irregular antibody (Figures 1 and 2). Further antibody screening and identification was performed on Diagast panel (Lot no 174000 and 176000). It was found complete match for Anti-D in Donor1 and Anti-D & Anti-C in donor 2. Antigen phenotype was done and confirmed the absence of corresponding antigens.

During detailed history evaluation it was noticed that both the donors had previous history of prophylactic platelet transfusion for Dengue fever. Donor 1 was transfused with 4 units of RDP (2 Rh Positive) before 7 years while Donor 2 was transfused with 16 units of RDP (10 Rh positive) before 11 years. The amount of RBC contamination is not known but mostly not visibly contaminated. At the time of platelet transfusion, both donors were not having any unexpected antibody in their plasma.

3. Discussion

Alloimmunization to the RhD antigen may occur when platelets obtained from RhD-positive donors are transfused to RhD-negative recipients. All of these compatibility considerations must be balanced against the available supply, which may be limited due to the 5- to 7-day shelf life of platelets.¹⁵

Data suggest a low rate of anti-D alloimmunization related to platelet transfusion. Thus, transfusion practices could allow the transfusion of RhD positive PLT units to RhD negative patients, with the exception of females of childbearing age.¹⁶

So far, only few publications reported about formation of non-D Rh antibodies after PC transfusion. Kitazawa and colleagues¹⁷ observed 3 patients who developed 4 alloantibodies (2 anti-E, 1 anti-C, and 1 anti-c) after platelet transfusions. In the present case, one donor has developed anti-C in addition to anti-D. So, chances of development of non-D Rh antibodies due to platelet transfusion cannot be ignored.

Direct correlation of development of antibody to number of Rh-positive platelets cannot be established with the above cases. RBC contamination of Platelet rather than number of units is important factor for the development of antibody/ies.

Although the risk is low, it could have a clinical impact on the patients especially those who are childbearing age female, when RhD alloimmunization can cause hemolytic disease of the foetus and new born (HDFN). Blood centres can manage inventories of platelets of all the blood

groups and due precautions are advocated to prevent the development of RhD and non-RhD antibodies.

4. Source of Funding

None.


5. Conflict of Interest

The author declares no conflict of interest.

References

- Shivbalan S, Anandnathan K, Balasubramanian S, Datta M, Amalraj E. Predictors of spontaneous bleeding in Dengue. *Indian J Pediatrics*. 2004;71(1):33–6. doi:10.1007/bf02725653.
- Chairulfatah A, Setiabudi D, Agoes R, Colebunder R. Thrombocytopenia and platelet transfusions in dengue Haemorrhagic Fever and Dengue Shock Syndrome. *WHO Dengue Bull*. 2003;27:141–4.
- Kaufman RM, Djulbegovic B, Gernsheimer T, Kleinman S, Tinmouth AT, Capocelli KE, et al. Platelet Transfusion: A Clinical Practice Guideline From the AABB. *Ann Intern Med*. 2015;162(3):205. doi:10.7326/m14-1589.
- Romphruk AV, Cheunta S, Pakoate L, Kumpeera P, Sripara P, Paupairoj C, et al. Preparation of single donor platelet with low antibody titers for all patients. *Transfus Apheresis Sci*. 2012;46(2):125–8. doi:10.1016/j.transci.2012.01.006.
- Yazer MH, Triulzi DJ. Detection of anti-D in D– recipients transfused with D+ red blood cells. *Transfusion*. 2007;47(12):2197–2201. doi:10.1111/j.1537-2995.2007.01446.x.
- Goldfinger D, McGinniss MH. Rh-Incompatible Platelet Transfusions - Risks and Consequences of Sensitizing Immunosuppressed Patients. *N Engl J Med*. 1971;284(17):942–4. doi:10.1056/nejm197104292841704.
- Baldwin ML, Ness PM, Scott D, Braine H, Kickler TS. Alloimmunization to D antigen and HLA in D-negative immunosuppressed oncology patients. *Transfusion*. 1988;28(4):330–3. doi:10.1046/j.1537-2995.1988.28488265260.x.
- McLeod BC, Piehl MR, Sasseti RJ. Alloimmunization to RhD by platelet transfusions in autologous bone marrow transplant recipients. *Vox Sang*. 1990;59:185–9.
- Molnar R, Johnson R, Sweat LT, Geiger TL. Absence of D alloimmunization in D– pediatric oncology patients receiving D-incompatible single-donor platelets. *Transfusion*. 2002;42(2):177–82. doi:10.1046/j.1537-2995.2002.00015.x.
- Goldfinger D, McGinniss MH. Rh-Incompatible Platelet Transfusions - Risks and Consequences of Sensitizing Immunosuppressed Patients. *N Engl J Med*. 1971;284(17):942–4. doi:10.1056/nejm197104292841704.
- Cid J, Carbassé G, Pereira A, Sanz C, Mazzara R, Escolar G, et al. Platelet transfusions from D+ donors to D– patients: a 10-year follow-up study of 1014 patients. *Transfusion*. 2011;51(6):1163–9. doi:10.1111/j.1537-2995.2010.02953.x.
- Cid J, Lozano M. Risk of Rh(D) alloimmunization after transfusion of platelets from D+ donors to D- recipients. *Transfusion*. 2005;45(3):453. doi:10.1111/j.1537-2995.2005.00440.x.
- Shaz BH, Hillyer CD. Residual risk of D alloimmunization: is it time to feel safe about platelets from D+ donors? *Transfusion*. 2011;51(6):1132–5. doi:10.1111/j.1537-2995.2011.03151.x.
- Blumberg N, Heal JM, Gettings KF. WBC reduction of RBC transfusions is associated with a decreased incidence of RBC alloimmunization. *Transfusion*. 2003;43(7):945–52. doi:10.1046/j.1537-2995.2003.00443.x.
- Dunbar NM. Does ABO and RhD matching matter for platelet transfusion? *Hematology*. 2020;2020(1):512–7. doi:10.1182/hematology.2020000135.
- Valsami S, Dimitroulis D, Gialeraki A, Chimonidou M, Politou M. Current trends in platelet transfusions practice: The role of ABO-RhD and human leukocyte antigen incompatibility. *Asian J Transfus Sci*. 2015;9(2):117–23. doi:10.4103/0973-6247.162684.
- Aster RH. Effect of Anticoagulant and ABO Incompatibility on Recovery of Transfused Human Platelets. *Blood*. 1965;26(6):732–43. doi:10.1182/blood.v26.6.732.732.

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Cite this article: Shah RJ. Anti-D alloimmunization after platelet transfusion. *Indian J Pathol Oncol* 2021;8(2):306-308.