

Special series on platelet transfusion

Platelet transfusion is a common practice in hospitalized patients for preventing or treating hemorrhages. More than 50% of platelets are transfused to patients diagnosed of onco-hematological diseases receiving chemotherapy and/or hematopoietic stem cell transplantation (1-3). With the aim to help physicians to take the most accurate decisions on platelet transfusion, some guidelines have been developed based on the scarcely available scientific evidence (4-8). However, there are some controversial issues and available scientific evidence is still not enough to solve most of them. There is little evidence about which is the best platelet product to be transfused: random platelets or single donor apheresis platelets, and plasma-suspended or additive solution-suspended platelets. The pathogen reduction technologies PRTs have been implemented in some countries order to reduce the infectious complications related to blood component transfusion. However, the effects of PRT on the in vivo transfused platelet effects are not clearly established. The clinical use of cryopreserved platelets is not well defined since the effect of cryopreservation on platelet function is debated. Platelet transfusion refractoriness (PTR) is a challenging complication raised from multiple platelet transfusions. The detection and management of this complication is often disappointing (9-11). In summary, although it is a widespread practice, platelet transfusion has still some controversial and unknown aspects. The objective of this supplement is to update the current evidence and provide information on some specific platelet transfusion issues.

In the first chapter, Ren and colleagues (12) review and update the leading causes of immunologic PTR in patients with acute leukemia. PTR is an important problem in clinical practice for patients with hematological malignancies with high platelet transfusion requirements. This condition produces inefficiency of platelet transfusions, and significantly increases the risk of life-threatening bleeding. The development of alloantibodies against human leukocyte antigen (HLA) and less frequently against human platelet antigens produces immune destruction of transfused platelets. Alloantibodies against CD36 (platelet glycoprotein 4), developed in type I CD36-deficient patients have been reported to cause immune platelet destruction. Authors explain the different approaches to prevent and overcome immune PTR.

In the following chapter Dr. Jiménez-Marco (13) explains The Balearic Islands Blood Bank (BIBB) experience on use of PRTs. BIBB implemented the pathogen reduction technology in 2008 and is one of the few blood establishments worldwide with more than 10 years of routine use of two different PRT systems currently available for platelet concentrates: Intercept and Mirasol. Dr. Jimenez Marco discuss the main advantages but also the limitations of different PRT. Some advantages are the reduction/elimination of septic reactions and the extension of platelet shelf-life to 7 days, without a significant impact on platelet functionality. On the contrary, the costs of procedure and the resistance of some virus to the inactivation are the main limitations. In addition, PRT has the potential to reasonable guarantee blood safety in situations of epidemics and pandemics.

In the third chapter, Dr. Ness and colleague (14) discuss the potential advantages of single donor platelets (SDP) as compared to Whole blood derived platelets (WDP). Most of the potential advantages of SDP have remained unproven with time. The reduction of septic platelet transfusion reactions has been considered the most important advantage. Since the bacterial testing or pathogen inactivation techniques have been implemented for platelet products, this advantage has become less relevant. In general, SDP are preferred for hematologic patients and for those who develop immune PTR, and need cross matched or HLA matched platelets that can only be obtained from SPD. A combined inventory of SPD and WDP appeared to be the best approach.

Next, Dr. Lozano and colleague (15) summarize the role of cryopreserved platelets in transfusion therapy and review the effects of cryopreservation on structure and function of thawed platelets. Different methods for platelet cryopreservation have been described over the time. Dr. Lozano has collected information from the literature and from his own experience about impact of freezing and thawing on platelet function. An increase in platelet procoagulant activity has been associated to the platelet freezing and thawing. Possibly for these reasons among others, in the real life use of cryopreserved platelets is limited to specific clinical scenarios where conventional platelets are not available as for patients with HLA/human platelet antigen (HPA) alloimmunization and military operations.

In the following chapter, Dr. Hagino (16) focuses on the major causes of non-immune PTR that is two times more frequent than immune PTR. Several conditions as fever/sepsis, splenomegaly, bleeding, hematopoietic stem cell transplantation and drugs can produce a shortening in platelet survival. Authors consider that appropriate management of this adverse condition

consists of different steps that include an accurate indication of platelet transfusion, an investigation of causes, consideration of the coexistence of immune and non-immune PTR and a selection of treatment adapted to each specific cause.

In the last chapter (17), Dr. Sato and colleagues provide interesting data about platelet transfusion practice in Japan. In fact, the situation of platelet transfusion in Japan is quite different to other developed countries, since all platelets transfused are single-donor apheresis (SDP). Because of PRTs are not implemented, the platelet shelf-life is limited to three days in order to mitigate the transfusion-transmitted bacterial infection risk. Data available in Japan regarding the adverse effects of transfusion are provided by two different hemovigilance systems: the Japanese Red Cross Society and National institute of Infectious Diseases of Japan together with the Hemovigilance Committee of the Japan Society of Transfusion Medicine and Cell Therapy. Despite evident differences, adverse effects recorded are similar to those reported by other hemovigilance systems outside Japan. Allergic reactions were the most frequent adverse effect and occurred in 35.86 per 100,000 platelet bags followed by non-hemolytic fever reactions. Authors also provide useful information about management of different adverse effects.

In summary, the series on platelet transfusion provides sensible information about critical aspects of platelet transfusion. We believe that the content of this series will be useful in clinical practice for management of patients with platelet transfusion requirements.

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References

1. Solves Alcaina P. Platelet Transfusion: And Update on Challenges and Outcomes. *J Blood Med* 2020;11:19-26.
2. Humbrecht C, Kientz D, Gachet C. Platelet transfusion: Current challenges. *Transfus Clin Biol* 2018;25:151-64.
3. McCullough J. Overview of platelet transfusion. *Semin Hematol* 2010;47:235-42.
4. Kaufman RM, Djulbegovic B, Gernsheimer T, et al. Platelet transfusion: a clinical practice guideline from the AABB. *Ann Intern Med* 2015;162:205-13.
5. Nahirniak S, Slichter SJ, Tanael S, et al. Guidance on platelet transfusion for patients with hypoproliferative thrombocytopenia. *Transfus Med Rev* 2015;29:3-13.

6. Slichter SJ. Evidence-based platelet transfusion guidelines. Hematology Am Soc Hematol Educ Program 2007;172-8.
7. Estcourt LJ, Birchall J, Allard S, et al. Guidelines for the use of platelet transfusions. Br J Haematol 2017;176:365-94.
8. Schiffer CA, Bohlke K, Delaney M, et al. Platelet Transfusion for Patients With Cancer: American Society of Clinical Oncology Clinical Practice Guideline Update. J Clin Oncol 2018;36:283-99.
9. Prodger CF, Rampotas A, Estcourt LJ, et al. Platelet transfusion: Alloimmunization and refractoriness. Semin Hematol 2020;57:92-9.
10. Moncharmont P. Adverse transfusion reactions in transfused children. Transfus Clin Biol 2019;26:329-35.
11. Levy JH, Neal MD, Herman JH. Bacterial contamination of platelets for transfusion: strategies for prevention. Crit Care 2018;22:271.
12. Ren J, Li J, Liu Y, et al. Research progress on the immunological platelet transfusion refractoriness in patients with acute leukemia: a narrative review. Ann Blood 2021;6:27.
13. Jiménez-Marco T. Pathogen reduction of platelets: experience of a single blood bank. Ann Blood 2021;6:13.
14. Ness PM, Daou L. Single donor platelets versus whole blood derived platelets: are they the same?. Ann Blood 2021;5:32.
15. Lozano M, Cid J. Cryopreserved platelets: a narrative review of its current role in transfusion therapy. Ann Blood 2021.
16. Hagino T, Sato T, Hirokazu Tsuno N, et al. Incidence and management of non-immune platelet transfusion refractoriness. A narrative review. Ann Blood 2021;6:28.
17. Sato T, Hirokazu Tsuno N, Goto N, et al. Incidence and severity of adverse effects related to platelet transfusion: a narrative review of the literature and the recent hemovigilance data of Japan. Ann Blood 2021;6:24.



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