Platelet Transfusion

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Platelets play a critical role in hemostasis and thrombosis. For patients with thrombocytopenia or impaired platelet function, platelet transfusion is of significant value in preventing or treating hemorrhage. The existence of platelets and their possible contribution to hemostasis was described in the 1870s, but it was not until 1910 that transfused platelets were shown to reverse the risk of bleeding in thrombocytopenic patients. Because of the many obstacles that prevented the ready availability of platelets for transfusion, many years elapsed before platelet transfusions became routine practice in the treatment of thrombocytopenic patients. It was not until approximately the 1970s that the routine availability of platelet transfusions became a reality. This became possible when Drs. Scott Murphy and Frank Gardner (in 1969) provided evidence that platelets could be stored at 22 ± 2°C, for up to 3 days and still maintain their hemostatic function. Subsequent improvements, including the availability of improved storage containers, enabled the provision of platelets for transfusion after 5 or even 7 days of storage.

The decision to transfuse platelets should be based on the judgment of the attending physician after careful review of the patient’s condition and clinical situation. The cause of thrombocytopenia must be established prior to platelet transfusion. This is very important as platelet transfusions are not indicated in all cases and may be contraindicated for certain conditions, such as heparin-induced thrombocytopenia and thrombotic thrombocytopenic purpura/hemolytic uremic syndrome. Once the cause of thrombocytopenia has been established, the decision to transfuse platelets should not be based solely on the patient’s platelet count but it should be supported by clinical judgment.

Platelet transfusion should be given only after the risks associated with transfusion have been considered and only when the benefits outweigh the risks.

Several prospective and retrospective studies have confirmed that a transfusion trigger of 10,000 platelets/µl (and may be reduced to 5000/µl without clinical bleeding) is now recommended and widely adopted in clinical practice. Apart from platelet count patients should be monitored clinically for the early detection of signs and symptoms of increased risk of bleeding and when required increasing the transfusion threshold. However, transfusion triggers differ for some clinical conditions. Unnecessary transfusion of platelets can be reduced by determining the cause of thrombocytopenia, lowering platelet threshold (depending upon case), strictly following polices of platelet use and local audit of platelet use.

Platelets are stored at 22°C with continuous agitation with shelf life of 5 days Platelet concentrate given should be group specific. ABO-Non identical platelet transfusions are used only in emergency situations, when platelet concentrates are in short supply or when HLA matched platelets are required and best match is not ABO compatible.

Different platelet products exist, of which the most commonly used are: 1. Random-donor platelets in which platelet unit is derived from a different donor and contains at least 55 x 10⁹ platelets suspended in 40-70 ml of plasma. The dose is 10 ml/kg to a maximum of five random-donor platelet units. An important disadvantage with such type of preparation is higher donor exposure. 2. Single-donor apheresis platelets are derived from a single donor and each apheresis platelet unit contains at least 300 x 10⁹ platelets
suspended in 200-400 ml of plasma and. Apheresis platelet units are preferred when a patient becomes refractory to random-donor platelet unit. 3. CMV- Seronegative Platelets: CMV- seronegative (leukocyte depleted) blood is indicated for CMV- seronegative pregnant women, intrauterine transfusion and seronegative stem cell or solid organ transplant recipient. 4. Gamma Irradiated Platelets: Platelet concentrates can be irradiated at any stage and are used immunodeficient (e.g. transplant) patients. 5. Platelets for Intrauterine transfusion: These are hyper-concentrated platelets (>2000X10⁹/l), and are prepared from apheresis. Screening for infections (Hepatitis B, C HIV) is mandatory for all components.

It has been proved that one unit of random-donor platelets should increase the platelet count in a 70 kg adult by 5 x 10⁹/l. Response to platelet transfusions should be assessed by obtaining a platelet count 15 minutes-1-hour post transfusion and thus in order to determine the response to platelet transfusion 1-hour Corrected Count Increment (CCI) is calculated. By different studies it was found that there is direct and linear correlation between higher platelet increments, longer transfusion intervals and higher platelet dose. Moreover, the transfusion of apheresis products leads to higher increments and longer transfusion intervals. Platelet refractoriness is defined as post-transfusion increment less than expected, If the 1-hour CCI is less than 5-10x10⁹ it is suggestive of refractoriness. Refractoriness to platelet transfusion is most likely to be due to non-immune factors, and include clinical conditions such as splenomegaly, sepsis, DIC and drugs, although immune factors can sometimes be present. Platelet transfusion is contraindicated in Thrombotic thrombocytopenic purpura and Heparin induced thrombocytopenia (as acute arterial thrombosis may occur). Platelet transfusion should also be avoided in immune thrombocytopenia unless there is risk of bleeding into vital organs. Thus platelet transfusions are very effective in ameliorating the risk of thrombocytopenic bleeding; however, importance of their optimal use need to be emphasized. Various awareness talks and seminars for clinicians on their rational use, and importance of corrected count increment, platelet refractoriness will considerably improve the safety of platelets transfusion.

**Bibliography**