REDUCING THE INCIDENCE OF FNHTR BY USING LEUKOREDUCED BLOOD AND BLOOD PRODUCTS

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ABSTRACT

Removal of leucocytes from various blood products has been shown to minimize Febrile nonhemolytic transfusion reactions, HLA alloimmunization, platelet refractoriness in multitransfused patients and prevention of transmission of leukotropic viruses such as EBV and CMV. Rapidly growing size of hemato-oncological patients who require multiple transfusion of blood and blood components during the course of their management pose a great challenge to transfusion services for providing them red cell and platelet antigen matched products in alloimmunized subjects. Hence, removal of leucocytes below a certain threshold level of $\leq 5 \times 10^6$ in a blood component certainly helps in prevention of alloimmunization and associated risks in those patients. In this modern era, the best Leucoreduction can be achieved with the help of 3rd and 4th generation leukofilters, both in the laboratory and bed side, and state of the art apheresis devices. The present article briefly reviews the current literature for pros and cons of leucofilteration and its scope of implementation in the cost constrained settings.

HISTORY

The concept of removal of leukocytes from the blood was introduced by Fleming, as early as 1920. Fleming used a cotton wool plug in a bent glass tube with a constricted limb. Blood was placed above the cotton wool and forced through it with the help of a teat. It was later realized that this model closely resembled the structure of modern depth filters. The work on leucofilteration got a boost subsequent to the accidental observation by Swank in 1961, while working on a blood viscosity model, wherein, on microscopic examination, he found that very high pressure was required to force 2-10 days old acid-citrate-dextrose (ACD)stored blood through a microfilter, as aggregates of platelets and leukocytes clogged the filter passes. Later, in the 1980s, advancement in technology led to the development of the first generation cellulose acetate filters,

with a leukocyte removal efficiency of 98 percent. Although clinically acceptable results were achieved, they had two major limitations. First, they appeared to activate complement C3, with subsequent vasoconstriction and increased capillary permeability. Second, the efficacy of leukocyte removal was strongly dependent on the flow across the filter, so the overall filtration process was slow. The new generation filters with rapid flow and excellent leukocyte removal are discussed later in the text.

CASE REPORT

An 8-year-old female child who was diagnosed as **Pyruvate kinase deficiency** at 2months of age and her blood group is **B RH** positive. She was in need of transfusion every month after diagnosis and during the course of transfusion, she developed adverse transfusion reactions like Allergic reaction and Febrile non hemolytic transfusion reaction for which the transfusion reaction workup was done and the results were such that there is no agglutination of antigen and antibody, there is no pretransfusion error, there is no delay in transfusion and storage and there is no hemolysis also. So, the further transfusion was planned to transfuse coombs cross matched O Rh negative compatible red cells for which she developed again an episode of allergic and febrile reaction. Since, she is in need of transfusion every month for maintaining normal physiology to ameliorate anaemia, we planned for Leukoreduced red blood cell for further transfusion for which there was no allergic and febrile reaction even after subsequent transfusion. She was transfused with more than 18 leuckoreduced blood products with success.

DISCUSSION

Blood transfusion is a fundamental therapy in numerous pathological conditions. Chronic Blood transfusion dependent diseases like Pyruvate kinase Deficiency, Thalassemia, and Sickle cell Anemia are in need of regular transfusion to lead a normal life. Even though, HSCT is the final most appropriate treatment for hemato-oncological patients, Blood transfusion plays an important role in conservative treatment. Regrettably, many clinical reports describe adverse transfusion's drawbacks due to non leukoreduced red blood

cells. So, by using leuckofilter, leukoreduced blood component transfusion plays an important role in reducing transfusion reactions, morbity and unnecessary hospital stay for longer period during post transfusion.

DISEASE BACKGROUND

Pyruvate kinase deficiency (PKD) is the most common enzyme-related glycolytic defect that results in red cell hemolysis. Red blood cell (RBC) metabolism hinges on glycolysis. Pyruvate kinase (PK) enzyme is a key to this process. PK converts phosphoenolpyruvate to pyruvate. In PKD, cellular energy efficiency and longevity decrease. Young RBCs are most affected in PKD. PKD is a lifelong chronic hemolytic anaemia with a wide spectrum of symptoms and manifestations. Given the significant risk of complications that can arise over a patient's lifetime, monitoring is critical. Currently, supportive care includes transfusions, splenectomy, and chelation therapy. PK activators and gene therapy offer innovative disease-directed approaches which may transform the clinical phenotype of patients in the future. Given the potential future treatment possibilities for PKD, careful thought is needed to determine the optimal management strategies in individual patients[4]

CONCLUSION

The current generation of leukofilters could achieve 4 log reductions in leukocyte content. The availability of leukocyte removal (leukoreduction) techniques for blood components is associated with a considerable improvement in various clinical outcomes which includes a reduction in the frequency and severity of febrile transfusion reactions, reduced cytomegalovirus transfusion-transmission risk, the reduced incidence of alloimmune platelet refractoriness, will prevent HLA alloimmunization as well as reducing the overall risk of both recipient mortality and organ dysfunction. So, transfusing Leuckoreduced Blood component is ideal for patients with Chronic Blood transfusion dependent diseases and for Haemato oncological patient, who are in need of HSCT.

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