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Case Report

Anaphylaxis related with positively charged white-cell reduction filters

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ABSTRACT

Allergic reactions related to blood transfusion frequently occur and most of them are mild reactions such as urticaria, erythema, pruritus and flushing. More severe and life threatening allergic reactions such as anaphylactic shock rarely occur. Application of white cell reduction filters during transfusions may prevent alloimmunization, febrile nonhemolytic reactions and transmission of intracellular infectious agents. Despite their beneficial effects, white-cell reduction filters may cause allergic reactions. In this article we present three patients who had anaphylactic reactions during blood transfusion with positively charged leucocyte filters.

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1. Background and object

Nonhemolytic reactions are reported to be the most frequent transfusion associated reactions. This group of reactions involves acute pulmonary injury, hypervolemia, febrile reactions, allergic reactions, graft versus host disease and post transfusional purpura. In contrast to the rare occurrence of anaphylactic reactions, mild allergic reactions related to blood transfusions such as urticaria, erythema, pruritus and flushing are frequently encountered [1]. The prevalence of anaphylactic transfusion reactions varies between 1/50,000 and 1/20,000. Anaphylactic transfusion reactions may be caused by white-cell reduction filters, blood products or latex products. Use of white cell reduction filters during transfusions may prevent alloimmunization, febrile nonhemolytic reactions and transmission of intracellular infectious agents [2]. White-cell reduction filters may lead to some complications such as anaphylactic reactions [3]. In the literature there are a few case of leucocyte filter induced anaphylactic reactions. Leucocyte filters may be classified as positive or negatively

charged filters. Anaphylactic reactions are more common with negatively charged filters. Increased bradykinin is implicated as a probable cause in these cases. Similar anaphylactic reactions have been encountered with positively charged filters without any proven increase of bradykinin secretion [4,5]. Here we report three cases that developed anaphylaxis during blood transfusion with positively charged white-cell reduction filters. These cases remind us of the importance of leucocyte filters in the etiology of transfusion reactions.

2. Case presentations

Three thalassemia major patients attended Muğla Sıtkı Koçman University Education and Research Hospital, Thalassemia Department for blood transfusion at the same day. Their ages were 17 years, 19 years and 20 years and disease durations were 16, 18 and 15 years respectively. All patients were receiving blood transfusions with a frequency of 3–4 weeks. The patients did not report any previous allergic reactions due to transfusions or any history of atopic diseases. They were exposed to a known positively charged leucocyte filter (trade-mark Braun

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Medical Inc., USA) before and there had not been any allergic reactions. But when a new positively charged leucocyte filter of a different trade mark was applied, the patients exhibited severe similar symptoms and reactions. Thirty seconds after the transfusion was started they experienced chest discomfort, severe headache, sweating, peroral cyanosis, anxiety and nausea. Transfusions were ceased immediately. All patients had tachycardia (heart rates were 120, 128, 130/min respectively) and hypotension (the first patient's blood pressure decreased to 85/60 mmHg from 125/85 mmHg, the second to 95/60 mmHg from 130/80 mmHg and the third to 90/60 mmHg from 120/80 mmHg) during this reaction. A common feature for these patients was that they were exposed to a new trade-mark leucocyte filter on this day.

The cases were accepted as transfusion induced reactions and treatments of oxygen, antihistamines (difenhidramin 1 mg/kg/dose max 40 mg), prednisolone (1 mg/kg/dose max 60 mg) and intravenous fluid support were started. The patients had clinical improvement within 15–20 min of treatment. Due to systemic signs and symptoms we considered the cases as anaphylaxis. In order to exclude other transfusion reactions we did cross-matches and their results were negative. Blood transfusions were completed by apheresis and without any complication. The direct Coombs tests of all three patients were negative and only the third patient had elevated IgE levels of 225 μ U/mL. Levels of IgA, IgM, IgG, C4 were within normal limits and none had eosinophilia.

3. Discussion

Anaphylactic reactions from transfusions are rarely seen complications and they require precise and immediate decisions for treatment of patients [4]. Some of the reactions have been linked to positively or negatively charged leucocyte filters. Negatively charged filters more frequently lead to anaphylactic reactions likely due to an increase of bradykinin [6]. Similar anaphylactic reactions have been encountered with positively charged filters without any proved increase of bradykinin secretion [4,5]. The first cases of anaphylactic reactions were detected among hemodialysis patients receiving ACE inhibitors by Tielemans et al. [7]. When they further investigated similar cases, they reported that anaphylactic reactions due to negatively charged leucocyte filters occur as a result of a direct histamine release. Funato et al. reported a similar anaphylactic reaction during red blood cell

transfusion via positive charged leucocyte filters in a 7 year old child who had a brain tumor [4]. Our three cases also had anaphylactic reactions during blood transfusion with a positively charged leucocyte filter [8]. Such reactions are more prominent in case of inadequate removal of leucocytes by filters and transfusions of platelet products [8]. Our patients have had no such reactions with positive filters despite numerous previous transfusions. So we think they experienced such a reaction due to the new filter. Three patients developed anaphylaxis during blood transfusion at the same time. We had used a different trade mark filter in these cases. Similar to Funato et al.'s report we did not have any reactions with apheresed erythrocyte product transfusion later [4]. We also repeated group and subgroup cross match tests and they were negative. With normal levels of immunoglobulins and C4 in addition to lack of a former hemolysis and anaphylaxis history we excluded other transfusion reactions. Ethylene oxide and latex may have been related with anaphylaxis. But formerly used filters that also contain these materials were used without having any reaction. As a conclusion, due to the disappearance of anaphylactic reactions using apheresed erythrocyte suspensions we thought that the anaphylactic reactions were strongly associated with the leucocyte filters.

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