Case Report

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Autologous blood transfusion in a neurosurgical patient with multiple alloantibodies

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Abstract:

There are many challenges to obtain antigen-negative, crossmatch compatible blood for a patient with multiple alloantibodies. We present a case report of a 31-year-old female patient with a recurrent pontine cavernoma who was to undergo a neurosurgical procedure. We identified alloantibodies anti-Fy^a and anti-c in her blood sample. To meet her intraoperative blood requirement, we attempted with autologous blood transfusion using both predeposit autologous donation and acute normovolemic hemodilution. Autologous blood alone was sufficient despite anticipating surgical blood loss and a postoperative surgical site infection.

Keywords:

Alloimmunization, anti-c, anti-Fya, autologous blood transfusion

Introduction

Red blood cell (RBC) alloimmunization is an immune response against foreign RBC antigens which commonly occur following allogeneic blood transfusions and pregnancies.[1] Alloimmunization may lead to incompatible crossmatches in blood, decrease in RBC survival, and, in turn, an increased necessity for transfusion.[2]

This case report describes the blood management of a neurosurgical patient with multiple alloantibodies using the strategy of autologous blood transfusion.

Case Report

A 31-year-old female patient with B Rh (D) positive blood group having a recurrent pontine cavernoma was admitted to undergo surgery in our institute. As per the Maximum Surgical Blood Order Schedule, four RBC units were crossmatched, but all were incompatible in antihuman globulin phase by column agglutination technique.

History revealed that she underwent surgeries twice previously for the same lesion, one in 2005 and another in 2011. She received an allogeneic blood transfusion in 2005. There is no history of any pregnancy.

Suspecting the presence of atypical alloantibodies, a detailed immunohematology work-up was carried out [Table 1]. Antibody screen (three-cell panel; Surgiscreen; Tulip) demonstrated panagglutination, and antibody identification (11-cell panel, ReCell; Ortho Clinical Diagnostics) was suggestive of the presence of multiple antibodies, most likely anti-Fy^a and anti-c. Extended phenotyping was also performed for confirmation.

As none of the ABO-compatible units in our inventory was Fy^a and c negative, we searched for compatible blood among first-degree relatives by directed donation. The patient had a sibling who was Rh (C + E-c-e+), Fy^a negative. The sibling

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Table 1: Immunohematology work-up

Test	Method	Result	Remarks
Blood grouping (ABO, Rh)	CTT, IS	B Rh (D) positive	No discrepancy
Direct antiglobulin test	CAT	Negative	Polyspecific AHG used
Indirect antiglobulin test	CAT	Positive (+2)	O-pooled cells and polyspecific AHG used
Autocontrol	CTT	Negative	4°C, RT, 37°C, IAT
Enzyme treatment	CTT	Positive (+2)	Papainized O pooled cells used; 20 min incubation at 37°C
Antibody screening (three-cell panel)	CAT	Pan-reactivity	IAT
Antibody identification (eleven cell panel)	CAT	Suggestive of anti-Fy^a and anti-c	IAT
Extended phenotyping			
Rh system	CTT	D+C + E – c – e + (R_1R_1 genotype)	RT incubation, 1000 rpm×1 min
Others		S+s-, Fy (a-b+), Jk (a+b+), Le (a-b-), M+N-, K-k+	

CTT=Conventional tube technique, CAT=Column agglutination technique, IS=Immediate spin, AHG=Antihuman globulin, RT=Room temperature, IAT=Indirect antiglobulin test

donated blood, which was planned to be irradiated and given, if necessary.

As a part of patient blood management, we discussed the case with the surgeon and anesthetist, and a decision was made to collect autologous blood as significant blood loss was expected intraoperatively. Her baseline hemoglobin and hematocrit values were 14 g/dL and 43%, respectively, at the time of admission.

Predeposit autologous donation (PAD) was performed to obtain one unit of blood. The predeposited unit was separated into packed red cells and fresh frozen plasma (FFP) and stored as autologous units. She was started on oral iron (tablet ferrous sulfate 200 mg once daily) from the day of the PAD and was continued until discharge. The availability of group-compatible FFP, cryoprecipitate, and platelets was ensured. On the 9th day after PAD, she underwent surgery. As her immediate preoperative hemoglobin was 13.1 g/dL, two units of whole blood were collected as part of acute normovolemic hemodilution (ANH) in the operating room, after induction of anesthesia. Intraoperative blood loss was estimated to be around 1600 ml. Both the whole blood units collected by ANH were transfused intraoperatively. Toward the end of the surgery, her arterial blood gas analysis showed hemoglobin of 10.6 g/dL.

Postoperatively, she developed a surgical site infection and her hemoglobin level on the postoperative day 17 was 7.6 g%, for which the blood collected as predeposit was transfused. The patient did not require any further transfusions; she was discharged on the postoperative day 26 with a hemoglobin value of 10.4 g/dL and hematocrit of 31% with autologous transfusion alone. A graph showing the hemoglobin trend, and transfusion is depicted in Figure 1.

The FFP prepared was not transfused back and hence had to be discarded.

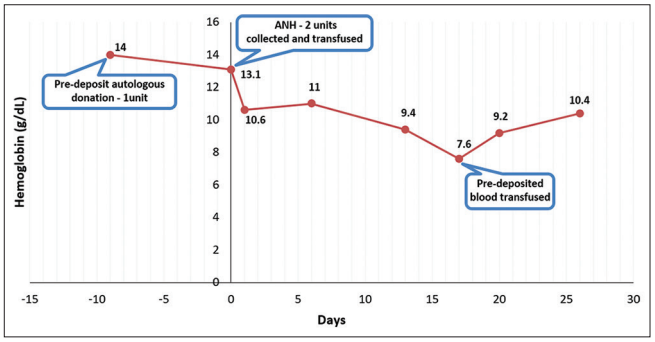

Figure 1: Hemoglobin trend of the patient from predeposit autologous donation to the day of discharge. Day 0 denotes the day of surgery. ANH = Acute normovolemic hemodilution

Discussion

The risk of alloimmunization is higher in patients who have received multiple blood transfusions.[3] RBC alloimmunization following the first transfusion occurs more frequently when there are ethnic and antigenic pattern differences between the donors and recipients.[4]

According to a meta-analysis, the overall proportion of alloimmunization rate in India was found to be 0.052%, out of which anti-D (24%) was most common, followed by anti-E (22%), anti-c (10%), anti-K (8%), and anti-M (6%).[5] In this case, we identified anti-Fy^a and anti-c. In a study from Gujarat, India, the prevalence of anti-c was 7.14% and anti-Fy^a was 2.39%.[6]

The prevalence of c antigen and Fy^a antigen in the Indian population is about 58% and 87.4%, respectively.[7] Hence, to obtain four ABO compatible units, around 80 units had to be crossmatched. It would have been a practically difficult and expensive exercise to identify and provide antigen-negative red cells for transfusion to this patient. Hence, we attempted directed donation from her sibling. Since the probability of bleeding was higher, the requirement of more blood units was anticipated. To

prevent delay in surgery, autologous blood donation was planned.

The Association for the Advancement of Blood and Biotherapies also recommends autologous transfusion in patients with multiple red cell alloantibodies, patients with antibody against a high-frequency antigen or when sufficient time after collection allows for regeneration of the collected red cell mass.[8] A study by Thompson *et al*. describes the collection of seven autologous blood units in a patient with multiple alloantibodies. Unlike in our patient, they administered recombinant human erythropoietin (EPO) also to increase hemoglobin concentration.[9]

In this case, the transfusion needs of the patient were exclusively met with autologous blood due to the joint involvement of the surgeon, anesthetist, and the transfusion medicine physician.

Autologous blood transfusion makes blood available in patients with rare blood groups,[8] eliminates the risk for transfusion-transmissible infections, and also decreases the requirement of allogeneic transfusion.[10] Its disadvantages are the increased potential for clerical error due to multifaceted logistics for the collection, storage, and transfusion of the right blood unit to the right patient,[11] and the high discard rates[12] as the unused blood cannot be added to the donor pool.[13] In our case also, the FFP unit was discarded.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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