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Case Report

Presence of atypical antibody (anti Jk^a) in a multi transfused transfusion dependent anemia patient

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ARTICLE INFO

Article history:

Received 11 March 2014

Accepted 11 December 2014

Available online 16 February 2015

Keywords:

Anti Jk^a antibody

Multi-transfused

Atypical antibody

Alloantibodies against Kidd blood group antigens are clinically important. Even though the Kidd antibodies, anti Jk^a, anti Jk^b and anti-Jk3, are suspected to be an important cause of delayed hemolytic transfusion reactions (DHTRs), making them hazardous in transfusion medicine, they are often difficult to detect, as their frequency in populations range from 1.3 to 2.5%.^{3,4} One such case of anti Jk^a antibody seen in our transfusion services is presented below.

Case report

We present a case of 26 year old female patient of A Rh D –ve blood group, who had presented with symptomatic severe anemia in her third trimester of pregnancy. She was referred to this centre from a rural medical setup, where she was being managed as a case of transfusion dependent anemia, since a complete diagnostic workup had not been done. She had history of multiple blood transfusions in the past at various institutes. Her general examination showed marked pallor, frontal bossing and mongoloid facies. Lab investigations at our institute revealed hemoglobin of 5.4 gm%, mean corpuscular volume (MCV) of 72 fl, mean corpuscular hemoglobin (MCH) of 20 pg and red cell distribution width (RDW) of 15% (Table 1). Patient's peripheral blood smear (PBS) revealed microcytic, hypochromic RBCs, anisopoikilocytosis, pencil cells, tear drop cells and polychromasia which was suggestive

Introduction

Transfusion dependent anemias due to hemoglobinopathies are among the most common genetic disorders worldwide. Lifelong regular red blood cells transfusion still remains the mainstay of treatment in these patients. One of the complications of blood transfusion is the formation of alloantibodies and autoantibodies against red blood cell antigens.¹ Studies report the frequency of alloantibodies formation, among such multi transfused patients, to be ranging from 2.37 to 37%.² Antibodies must be identified in the recipient's serum before each transfusion so that compatible blood can be provided.

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E-mail address: pragraj@yahoo.com (R.S. Mallhi).<http://dx.doi.org/10.1016/j.mjafi.2014.12.011>

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of ongoing hemolysis. White blood cell series and platelets were within normal limits. Other investigations were essentially within normal limits except abdominal sonography which showed a mild hepato-splenomegaly.

High performance liquid chromatography (HPLC) (Fig. 1) of patient at this institute revealed a HbF of 80% which was suggestive of a hemoglobinopathy. The relatively lower than expected values of HbF could be attributed to the dilution of HbF by the recent blood transfusions received by her. Molecular confirmation of the hemoglobinopathy could not be done because of institutional constraints. Parents of the patient were not available for necessary investigations. In the absence of confirmation of the diagnosis by molecular methods, a provisional diagnosis of transfusion dependent anemia due to a hemoglobinopathy was offered.

We received demand for packed red blood cells (PRBCs) at our dept. However out of 20 PRBCs bags, ABO and Rh cross-matched, only 02 were found compatible (Fig. 2). On further workup, patients' blood sample was Direct Coomb's Test (DCT) and auto-control negative, but Indirect Coomb's Test (ICT) positive, alerting us to the possibility of presence of an 'Irregular' allo-antibody. Antibody Detection Panel was run on patient's sample (Fig. 3) which showed presence of anti Jk^a. Concurrently the patient sample and the two blood bags that were found to be compatible were also tested by Antigen Profiling which confirmed the absence of Jk^a antigen on RBCs of both patient and compatible bags (Fig. 4). Final extended phenotype of patient was D⁻C⁻E⁻c⁺e⁺K⁻k⁺Kp^{a+}Kp^{b+}Jk^{a-}Jk^{b+}P₁Le^{a-}Le^{b-}Lu^{a+}Lu^{b+}.

Discussion

Sensitization to red cell antigens may result from previous transfusions, pregnancy, transplantation or injection of immunogenic material. In our case this patient is a known case of transfusion dependent anemia with history of multiple transfusions in past. During one such transfusion our patient might have developed anti Jk^a antibody.

Table 1 – Lab investigations and results.

Investigation	Results	Unit
Hemoglobin	5.4	gm%
MCV	72	fL
MCH	20	pg
RDW	15	%
TLC	3300	/cm ³
DLC	P 34 L 60 M 5 E 1	
Platelets	1,20,000	/cm ³
Urea	21	mg/dL
Creatinine	0.6	mg/dL
Bilirubin (total/unconjugated)	1.0/0.7	mg/dL
Na ⁺ /K ⁺	140/2.7	mEq/dL
AST/ALT	29/36	IU/L
PT(test/control)	13.5/12.5	Sec
aPTT(test/control)	32/28	Sec
INR	1.39	

Bold values signify the deranged parameters.

Fig. 1 – HPLC findings. Type of hemoglobin: Hb F 80.2, Hb A2 2.0, Hb A0 18.4. Interpretation: Hb F markedly increased with corresponding decrease in Hb A0 – suggestive of a hemoglobinopathy.

The Kidd blood group is an important antigenic system in human erythrocytes, and this antigen system is defined by two antithetical specificities, Jk^a and Jk^b, and a third rare recessive gene, Jk, that produces neither Jk^a nor Jk^b antigens.⁵ The prevalence of Kidd antigens in general population varies from 77% to 91% for Jk^a and 43%–73% for Jk^b.⁶

The Kidd antibodies, anti-Jk^a, anti-Jk^b & anti-Jk3, are often difficult to detect, making them hazardous in transfusion medicine, where they are suspected to be an important cause of delayed hemolytic transfusion reactions (DHTRs).⁷ Anti Jk^a can cause severe and fatal hemolytic transfusion reactions but is more commonly associated with less severe DHTRs.⁸ What makes Kidd antibodies even more dangerous is their ability to cause intravascular hemolysis despite being IgG type of immunoglobulins.⁹ It has been estimated that over one-third of DHTRs are caused by anti Jk^a.^{5,10} Still, the prevalence of Kidd antibodies induced DHTRs is likely to be under represented due to their transient nature and because of their tendency to drop to low or undetectable levels in the plasma making their in vitro detection difficult.^{8,9}

Fig. 2 – Results of cross-match.

Fig. 3 – Result of antibody detection panel. Agglutination seen in 1, 4, 5, 6, 8, 10, 11 – corresponding to Anti Jk^a. Fig. 4 – Result of antigen profile of patient and compatible donors. Absence of Jk^a antigen in patient and compatible donors.

In contrast to the hemolytic activity of Kidd antibodies in incompatible blood transfusions, anti Jk^a, anti Jk^b and anti-Jk3 are only rarely responsible for severe hemolytic disease of newborn (HDN), a fact for which there is no obvious explanation.^{11,12}

In our case, further management, after issue of compatible blood, comprised of informing the patient of the presence of anti Jk^a, with the caution that she is to be transfused with only A Rh D –ve blood typed for absence of Jk^a antigen.

We also recommend that Blood banks should perform ICT and antibody screening in all blood demands received, especially in surgical cases involving multi transfusion and those who require long term multiple transfusions as in cases of transfusion dependent anemia like thalassemia and sickle cell disease, to minimize DHTRs due to Kidd and other minor group mismatch.

Conflicts of interest

All authors have none to declare.

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