The safety of kidd-incompatible blood transfusion in a restricted setting: a case report

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Abstract

Background: Kidd protein is red blood cell’s (RBC) major urea transporter. Albeit rare, the presence of antibodies against Kidd antigen may cause significant hemolytic transfusion reaction and hemolytic disease of the newborn. Yet, anti-Jka and anti-Jkb are rare to be discovered during antibody identification. This paper reported “bestmatched” transfusion practice in a patient with anti-Jka and anti-Jkb, where compatible PRC cannot be found, but transfusion is urgently needed.

Case Presentation: A 36 years old, G4P3A0 female, came with continuous vaginal bleeding for the past one month before admission. USG revealed hydatiform mole. She needed immediate curettage following correction of her anemia (Hb 8.3 g/dL). After antibody screening procedure followed by antibody identification, we found a positive anti-Jka and anti-Jkb in her blood sample. At least 50 blood donors were tested for compatibility and none was a match. She was then transfused with the lowest agglutination blood available (level 2 of 5 levels), with a closed monitoring to anticipate the possibility of transfusion reaction development. Fever and pruritus transpired within 24 hours post transfusion and it resolved following diphenhydramine, dexamethasone, and paracetamol injection.

Conclusion: Incompatible blood transfusion is the last option when compatible blood cannot be found. The development of transfusion reaction is inevitable, but it can be anticipated by closed monitoring. In restricted setting, blood transfusion with the lowest level of agglutination is acceptable when transfusion is imperative. In this case, the patient got optimal treatment in term of the medical surgery and transfusion response, which was shown by the significant increase of Hb level. Meanwhile, the adverse transfusion reaction was only mild, and could be treated with medicine.

Keywords: Transfusion reaction, incompatibility, Kidd blood group
Kidd (Jk) glycoprotein is the main urea transporter located on the surface of red blood cells (RBC)’s membrane. Individual with negative Jk protein demonstrates inability to concentrate urea in urine optimally. Nonetheless, often this does not manifest clinically, similar to their unaffected RBC which usually has normal lifespan and morphology. Jk-null phenotype (a-b-) is found to be extremely rare, especially in Caucasians and Black population. Consequently, the presence of anti-Jk may induce hemolytic disease of fetus and newborn (HDFN) in second pregnancy.

Greater attention should be drawn to the presence of anti-Jk cases, as acute and delayed hemolytic transfusion reactions have been reported following blood administration in those patients. Identification of Kidd antibodies is known to be quite challenging. Previous studies reported options for anti-Jk detection are somewhat limited. Studies have reported detection of anti-Jka could only be done through solid-phase technique, Erythrocytes Magnetized technology, and ID-Diamed Gel Tehnic (GT). While, anti-Jkb could be distinguished only by solid-phase technique. All of which are hardly available in centers with limited facilities. In this paper, we discuss a rare case of a “best-matched” transfusion in a patient with Kidd incompatibility, where PRC transfusion is the only option available.

CASE PRESENTATION

Female, 36 years old, presented with continuous spotting for one month before admission. She was pregnant with her fourth child, gestation age of 17 weeks, without any previous history of abortion. The patient had never received any prenatal care, even the bleeding complaint has been on-going for 1 month. No previous history of invasive procedure or blood transfusion was reported. Ultrasonography examination revealed hydatidiform mole without any sign of myometrium invasion. Laboratory examination showed anemia microcytic hypochromic (Hb 8.3 g/dL, MCV 26.1 fL, MCH 26.1 pg). The obstetrician decided to perform curettage with suction after anemia was corrected. From initial screening, blood type was B, Rhesus +, with negative direct antiglobulin test (DAT), and negative auto-control. Subsequent antibody screening displayed reactive antibody at 20°C and LISS/Coomb’s test. Further antibody identification panel showed positive Anti-Jka and Anti-Jkb through Saline 20°C and gel test.

After 50 attempts trying to find the compatible blood unit, none was found. Hence, patient’s relatives were asked to undergo screening and only one relative was considered compatible. Regardless, she was anemic and for this reason, unable to donate her blood. Since there was no other option for this patient, she eventually received blood transfusion with the lowest level of agglutination (level 2). As predicted, mild acute transfusion reactions transpired within 24 hours post transfusion. Symptoms documented were fever and pruritus. It fortunately resolved after administration of diphenhydramine, dexamethasone, and paracetamol injection. The patient was closely monitored for the following 2 weeks, and no delayed transfusion reaction occurred.

DISCUSSION

In this case, transfusion was considered life saving. The hydatidiform mole should be evacuated promptly, preceded by PRC transfusion. Transfusion was imperative to correct her anemia from the ongoing bleeding and as a precaution for the possibility of severe bleeding following evacuation procedure. Evacuation by suction curettage was preferred to reduce the risk of cells spreading to other organs, which might lead to metastatic disease. On the other hand, transfusion with Kidd-incompatible PRC might cause hemolytic transfusion reactions. So we were presented with the dilemma of transfusing incompatible blood or not to transfuse yet letting the anemia uncorrected or even worsen.

At that time, we were also concerned about the possibility of HDFN developed on the baby. This was the fourth pregnancy and hence the chance of developing HDFN due to RBC antigen-antibody interaction was high. However, in this case, HDFN did not occur despite the husband having Jk (a+b+) phenotype. A possible explanation to the latter would resolve around their inheritance pattern. Kidd antigens are inherited in codominant patterns, while Jk null phenotype is generally inherited recessively.

Evaluating the benefit and risk of going ahead with the transfusion, the patient was finally decided to be given blood transfusion with the least incompatibility which was from his brother. It is understood that having a donor from family member is actually less preferable compared to unrelated donors - as homozygosity of HLA types is more common to occur between first-degree family members, which may trigger transfusion-associated graft-versus-
host-disease (TA-GVHD).\textsuperscript{14,15} Regardless, this was the safest blood option we were able to provide concerning its kidd-incompatibility circumstances.

Following blood administration, the patient fortunately did not experience any hemolytic reaction. Other studies reported both acute (within 2.5 hours) and delayed (6 days after transfusion) hemolytic transfusion reaction due to the presence of this anti-Jk\textsubscript{a}.\textsuperscript{4,5} The contrasting outcome in our case could be attributed to early detection of Kidd antibody prior to blood administration. Meanwhile, in their cases, Kidd antibody was discovered after hemolytic reaction occurrence; hence, patients were not given blood unit with lowest antigenicity.\textsuperscript{4,5}

Ultimately, our data revealed that the lowest agglutination level (in our case +2) blood could be considered for patients with Kidd-incompatibility in a restricted setting in which other safer options are unavailable and in a life-threatening condition. However, it is imperative to monitor transfusion reaction closely for at least 7 days post transfusion and pre-transfusion sample should be stored for at least 3 weeks.

In conclusion, Kidd (Jk) glycoprotein is difficult to be detected, but incompatible transfusion with this antigen may cause hemolytic transfusion reactions, either acute or chronic. The patient with Jk-null phenotype who needs life-saving transfusion, the main priority is to find blood with negative Jk antigen. In a situation where this solution is unmet, another option is, to screen for Jk-null phenotype in all family members, especially first-degree relatives. Blood transfusion with the lowest level of agglutination could be considered as the last resort, when benefits have been carefully considered to surpass the risks. Incompatible transfusion must be accompanied by close monitoring for at least 7 days and pre-transfusion sample should be stored for at least 3 weeks.

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