Case report: ABO discrepancy due to vancomycin complicating a transfusion reaction investigation

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Abstract: A 3-year-old patient with acute myelogenous leukemia developed fever and chills during transfusion of packed red cells. A preliminary workup suggested that a group AB donor unit had been issued to a Group A patient. However, a discrepancy between the ABO group of the original donor unit segment (A) and blood taken from the IV tubing (AB) and the patient's pre- and posttransfusion samples (A and AB, respectively) suggested another reason for the weak reactivity of some samples with anti-B. The patient's chart revealed that vancomycin, reported to be a cause of non-immune agglutination of red cells, had been injected into the IV tubing one hour prior to transfusion. Further testing confirmed that the patient's febrile response to transfusion was consistent with a nonhemolytic transfusion reaction and was unrelated to the drug-induced, pseudo ABO problem.

Several studies have shown that vancomycin, used to treat antibiotic-resistant staphylococcal infections and usually administered by intravenous (IV) infusion, causes non-immune hemagglutination, complicating serological testing in the blood bank.[1–4] In one study,[2] standard IV concentrations of vancomycin, when added to equal volumes of washed red cells, caused spontaneous agglutination of the cells. A later study[3] suggested that the drug, which has a positive charge, causes aggregation by interacting with the negative charge of the red cell surface. This case report shows how the infusion of vancomycin shortly before a red cell transfusion complicated the serologic workup for a suspected transfusion reaction.

Case history

A 3-year-old male with acute myelogenous leukemia (AML) was receiving 180 mL of packed red blood cells. During the infusion of the first 15 mL, the patient developed fever and chills. The transfusion was discontinued and a reaction investigation was initiated. The patient's medications were vancomycin, tobramycin, and ticarcillin.

Materials and methods

The protocol for investigating suspected adverse reactions to transfusion followed the testing outlined by AABB *Standards*.[5] A clerical recheck was performed and a new blood sample from the patient was obtained. The new blood sample was designated as post or the posttransfusion specimen. The blood container, administration set, and attached IV solutions were returned to the blood bank. A segment of donor blood from the distal portion of the IV tubing right above the needle was obtained and referred to as the donor unit. Finally, these samples were compared with the pretransfusion specimen, designated pre, for the following tests: visual hemolysis, icterus, ABO type, and direct antiglobulin test (DAT).

Results

The preliminary results are listed in Table 1. The patient's temperature rose to 101.6° F, but there was no visual hemolysis in the posttransfusion sample and there were no discrepancies with the clerical recheck. The patient's posttransfusion red cells had a microscopically positive DAT, and both the patient's posttransfusion red cells and those from the sample labeled donor unit reacted with both anti-A and -B. Despite the fact that the red cells from the donor unit sample also had a positive DAT, our first impression of the clinical findings and preliminary investigation results led us to believe we may have issued a group

AB donor unit to a group A recipient. Based on this evaluation, additional testing was performed; further results are listed in Table 2.

Table 1
Preliminary transfusion reaction investigation results

Clinical evaluation	temperature	blood pressure
pretransfusion	98.2	98/52
posttransfusion	101.1	160/40
Laboratory results		
Visual hemolysis		
pretransfusion sample	none	
postransfusion sample	none	
donor unit*	none	
Icterus		
pretransfusion sample	none	
posttransfusion sample	none	
donor unit*	none	
DAT†		
pretransfusion sample	negative	
posttransfusion sample	weak–microscopic	
donor unit*	4+	
ABO retest	reactions with anti-A	anti-B
pretransfusion sample	4+	0
posttransfusion sample	4+	1+
donor unit*	4+	1+

*Donor sample obtained distal to the IV tubing near needle
†Direct antiglobulin test

Table 2
Further test results on pre- and posttransfusion samples and donor red cells

Antibody screen using 22% albumin	
pretransfusion	negative
posttransfusion	negative
Antibody screen, ficin-treated	
pretransfusion	negative
posttransfusion	negative
Elutions using ELU-KIT II*	
posttransfusion sample	negative
donor unit sample†	negative
Crossmatch with original donor sample	
pretransfusion	compatible
posttransfusion	incompatible
ABO/Rh Typing	
segment used in pretransfusion testing	A positive
blood taken from inside the blood bag	A positive
donor unit sample†	AB positive

*Trade name for the acid-eluate kit by Gamma Biologicals
†Donor sample obtained distal to the IV tubing near needle

Despite the fact that all antibody screens and eluates were negative, the patient's posttransfusion serum was incompatible with the red cells from the original donor segment. Red cells from original segments from the donor unit and from inside the bag unequivocally tested as group A while red cells from the donor unit segment tested as AB positive.

Since the patient was on several medications, drug levels were run on blood samples from within the IV tubing and the patient's posttransfusion specimen. Significant levels of vancomycin were found in each specimen (8.59 and 8.01 μg/mL, respectively). The patient's chart contained documentation that vancomycin was given intravenously through the same line used for blood administration one hour prior to the start of the blood transfusion.

Conclusions

The results of the adverse transfusion reaction investigation indicated no evidence of a hemolytic transfusion reaction and were consistent with a nonhemolytic febrile reaction. The fact that vancomycin had been administered one hour prior to transfusion appeared to be unrelated to the untoward transfusion episode. However, vancomycin was thought to be a candidate for the inconsistent ABO group and positive DATs found with two blood samples (patient's posttransfusion specimen and donor unit IV tubing segment), and an incompatible crossmatch using posttransfusion serum since studies have confirmed that vancomycin can cause non-immune aggregation of red blood cells.[1–4]

References

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