ABO Incompatible Transfusion Reaction Case Study

A 36 year old male trauma patient is transported to your facility for emergency surgery. A sample is received in the blood bank for pre-transfusion testing, including type and antibody screen and crossmatch for six units of PRBCs. This testing was performed on an automated blood bank system and the crossmatched units were issued to the operating room. The patient received five units of packed RBCs during surgery. After infusion of 100mL of the sixth unit, the patient became hypotensive and the transfusion was stopped. The patient’s hypotension resolved and the surgery was completed without additional transfusions. Following surgery, he is transported to the Surgical ICU for recovery. Soon after arriving in the ICU, hemoglobinuria is observed. This along with the drop in blood pressure during infusion of the sixth unit led the attending physician to suspect a transfusion reaction.

Pre-transfusion samples, post-transfusion samples, and a segment from the sixth unit transfused are delivered to the blood bank for testing.

Participants were asked to perform ABO Group and Type testing on the pre-transfusion, post-transfusion, and donor cells. In addition, participants were asked to perform an antibody screen on both pre-transfusion and post-transfusion serum samples, as well as compatibility testing with the pre-transfusion serum sample and the donor red cells. The expected results are listed below.

Patient and Donor Test Results

Pre-transfusion Sample EDU-02 and EDU-03:
- Forward Group O
- Reverse Group O
- Rh Positive
- Antibody Screen negative
- DAT negative

Post-transfusion Sample EDU-04 and EDU-05:
- Forward Group mixed field (15% A and 85% O) or unable to determine
- Reverse Group O
- Rh positive
- Antibody Screen negative
- DAT weakly or microscopic positive

Donor Sample EDU-06:
- Forward Group A
- Rh positive
- Crossmatch with pre-transfusion serum Sample EDU-03: NOT compatible (immediate spin 3+ with AHG phase negative)
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Discussion
The patient does exhibit some of the signs of a hemolytic transfusion reaction (hemoglobinuria, hypotension). These symptoms, along with the mixed field ABO grouping noted in the post-transfusion sample indicate that one of the units transfused was likely ABO incompatible. Upon investigation, it is discovered that the sixth unit was labeled as a group O but typed as a group A. Somehow this went undetected when the blood was received into inventory. The ABO incompatibility was not detected during pre-transfusion testing because the laboratory’s automated blood bank system is only capable of performing the crossmatch at the antiglobulin phase, which may not detect incompatible IgM ABO antibodies. The patient recovered with no further complications.

This case underscores the importance of the ABO recheck of units when units are received from the blood supplier as well as the performance of an immediate spin crossmatch when crossmatch testing is performed using some automated systems.¹²

Surprisingly, the outcome of ABO-incompatible transfusions is often not fatal. Reports indicate that as little as 5.5%³ or as many as 30%⁴ of ABO-incompatible transfusions were fatal. Signs and symptoms associated with ABO-incompatible transfusions generally include fever, back pain, hemoglobinuria, hemoglobinemia, renal failure, disseminated intravascular coagulopathy (DIC), hypotension, and shock. If an ABO-incompatible transfusion is suspected, the transfusion should be discontinued immediately. Treatment may include IV fluids for hypotension and shock and diuretics to promote urine output and improved renal blood flow. Urine output and vital signs should be monitored closely if an ABO-incompatible transfusion occurs or is suspected.

Transfusing fewer ABO-incompatible RBCs may minimize the signs and symptoms and possibly prevent fatality. Therefore, close monitoring of the patient’s vital signs for the first 30 minutes of transfusion should help to identify most incompatible transfusions early.

References

This case study and antibody discussion was provided by Hemo bioscience (www.hemobioscience.com), the manufacturer of these Blood Bank proficiency samples.