RED URINE IN A RECENTLY TRANSFUSED WOMAN: ANSWERS

Case Study by Jim Perkins, M.D. (© 2009)

1. What diagnosis is suggested by this sequence of events and the patient's laboratory data?

   This patient presented with red urine nine days after a transfusion. She had been multiply transfused in the past. The macroscopic urinalysis was strongly positive for "blood" (actually heme) as measured by the urine "dipstick" test, but there were few RBCs on microscopic examination, a combination that is consistent with hemoglobinuria. We don't know what the patient's hematocrit was after transfusion but on the morning after admission, after the patient had been hydrated, the hematocrit was close to her pre-transfusion baseline. Finally, the patient appears to have a strong blood group alloantibody, and a call to the previous hospital revealed that the antibody screen was negative 9 days earlier. Together these data suggest that the patient is having a delayed hemolytic transfusion reaction (DHTR).

   Other findings suggestive of a hemolytic transfusion reaction are the fever, the increased urine bilirubin on admission, and the elevated LDH level.

2. What type of antibody(ies) might be present when the patient's serum reacts with all allogeneic RBCs tested? Does the patient's ethnicity suggest any possibilities for the identity of the antibody(ies)?

   Based on the negative autocontrol the patient has one or more alloantibodies. Reactivity with all of the RBCs in the first two panels suggests that the patient has either an antibody directed against a high-frequency antigen, or multiple alloantibodies. There are multiple high frequency antigens that individuals of an African background might lack, but anti-U immediately comes to mind.

3. What antibody(ies) do you think might be present based on this new information?

   The patient's RBCs lack the S and s antigens making anti-U highly likely. U is a high-frequency antigen that is absent from the RBCs of about 1% of African-Americans, and U-negative RBCs lack S and s as well.

   Seven U-negative RBC samples were identified among the laboratory's RBC panels and inventory of frozen rare RBC samples. Two of the seven were non-reactive with the patient's serum in an indirect antiglobulin test using polyspecific anti-human globulin (AHG). Four of six U-negative cells were non-reactive after ficin treatment. The U antigen is not destroyed by ficin, so if anti-U were present ficin-treated cells would be expected to react. Taken together these results are diagnostic of anti-U.

   However, there appears to be additional blood group antibody activity present. The patient's phenotype suggests that she could make anti-C, anti-Jk^b, anti-Fy^a, and anti-N. (FY^{a-b-} individuals of African descent do not make anti-Fy^b since cells in their bodies other than RBCs do carry the Fy^b antigen.) Anti-N and anti-C are ruled out on U negative cells in the saline IAT with polyspecfic AHG. Loss of the saline-IAT reactivity after enzyme treatment is consistent with anti-FY^a, but the reactions with cells #5 and #8 remain unexplained. These reactions may represent antibody directed against low frequency antigens; the latter are not uncommon in multiply-transfused individuals with multiple alloantibodies.

4. How do the results using alloadsorbed serum help with the immunohematologic diagnosis?

   The alloadsorption was performed in an attempt to identify the alloantibodies underlying the anti-U. The adsorbing cell was s-positive, and therefore U-positive, so anti-U would be removed if the adsorption was complete. On the other hand, the adsorbing cell lacked Fy^a and Jk^b, so antibodies with these specificities would not be adsorbed and might be demonstrable in the adsorbed serum. As it turned out, all of the cells reacted with the adsorbed serum. Note, however, that the two cells that only reacted very weakly positive (microscopic agglutination) are the only two cells in the panel that lack ***both*** *the Fy^a and Jk^b antigens, suggesting that these two antibodies are present. The hospital laboratory did not have sufficient rare cells to confirm this impression, but the blood center reference lab was able to do so.*