

## HEMOGLOBINURIA IN THE OPERATING ROOM

### Case Study by Jim Perkins, M.D.

1. What directions should you give to the anesthesiologist at this point?

*Fever and red urine during or immediately after transfusion suggest that an immediate hemolytic transfusion reaction (IHTR) may be occurring, so the transfusion should immediately be stopped and investigated. Hemoglobinuria is sometimes the first manifestation of an IHTR in an anesthetized patient who cannot complain of some of the other symptoms of a reaction such as back or infusion site pain.*

*Immediate steps in the investigation should include checking the tag on the unit to make sure it was given to the intended patient. The blood administration set should be disconnected from the patient's intravenous line with the unit of RBCs and fluids still attached, and this entire apparatus should be sent to the blood bank. Any other units of blood issued to the patient should also be returned. A new patient blood specimen should be obtained and sent to the blood bank. Finally, a urine sample should be sent in this case, since red urine is the presenting symptom.*

2. What tests should be performed now?

*First, the blood bank should confirm that the patient received the RBCs that were intended for him. The post-transfusion specimen should be centrifuged and the plasma or serum should be compared to the plasma or serum in the pre-transfusion specimen, looking for hemoglobinemia or icterus. If both of these tests are negative, a hemolytic transfusion reaction is unlikely. Other tests performed routinely include repeat typing of the patient's pre- and post-transfusion specimens. If the DAT and inspection of the serum suggest hemolysis but there is no blood grouping error, the crossmatches should be repeated with both pre- and post-transfusion specimens. Additional testing depends on the results of the initial findings.*

*The patient's urine should be investigated in this case with a macroscopic and microscopic urinalysis. Hemoglobinuria is demonstrated when the urine "dipstick" demonstrates "blood" but few RBCs are seen microscopically.*

3. What do you think is going on here? Is there any further investigation that should be done?

*The patient has hemoglobinemia and hemoglobinuria, but the tests for incompatibility are all unrevealing including the DAT and the repeat blood typings and crossmatches. Therefore the case should be investigated for non-immune hemolysis.*

*If possible, the fluid bag attached to the unit should first be inspected to determine that it is saline and does not contain dextrose; in this case there was no attached bag of fluid returned with the unit. The blood in the unit should be investigated for hemolysis by removing an aliquot, diluting it with saline, and then centrifuging it. A red supernatant demonstrates hemolysis.*

4. What would you do now?

*To discover the cause of the non-immune hemolysis an on-site investigation is probably necessary. Inappropriate warming or freezing of the unit(s) are important causes of hemolysis in the bag itself. Transfusion with dextrose containing solutions or through a small needle under pressure may cause non-immune hemolysis, but neither would affect the untransfused RBCs within the bag.*

5. What therapy would you suggest?

*In order to preserve renal function it would be prudent to induce a diuresis with saline and furosemide.*

6. Why might the hematocrit have continued to drop?

*The post-operative hematocrit determination may have included RBCs that were circulating at that time but which had been damaged by heat to the extent that they were cleared over the course of the night. Of course hemodilution may have contributed to the drop in hematocrit, but the patient's output roughly matched the input of fluids.*