ABO Hemolytic Disease of the Newborn

A two day old infant has developed jaundice and the pediatrician has ordered a work-up to discover the cause. The mother did not receive prenatal care so previous serological records are unavailable. A Type and Screen is ordered on the mother’s sample and a Direct Antiglobulin Test (DAT) is ordered on the infant’s sample. If the DAT is positive, an antibody identification may be performed on the RBC eluate.

Expected Results
The mother’s blood is Group O Rh positive. Her antibody screen is negative. The infant’s blood is Group A Rh positive. The Direct Antiglobulin Test is positive using anti-IgG reagent. The RBC eluate contains Anti-A and/or Anti-A, B antibodies.

Discussion
The serological results obtained from testing the mother and baby samples are consistent with ABO Hemolytic Disease of the Fetus and Newborn (HDFN). HDFN results from maternal IgG antibodies that cross the placenta to the fetal circulation during gestation causing RBC destruction and complications before birth, after birth or both. The most common symptoms of ABO HDFN are hyperbilirubinemia (increased bilirubin) and jaundice 24-48 hours after birth.

Until the introduction of Rh Immune Globulin in 1968, nearly all cases of HDFN were caused by maternal anti-D reacting with fetal Rh (D) antigens. Although instances of HDFN mitigated by anti-D still exist, other RBC incompatibilities have surpassed anti-D as the cause of HDFN with ABO HDFN being the most common.

ABO incompatibility occurs in 20-25% of pregnancies, however, laboratory evidence of HDFN occurs in only 1% of these cases, and the hemolytic disease is severe enough to require treatment in only 1 in 200 infants. The two primary reasons why ABO incompatibility is rarely serious are:

- Most anti-A and anti-B are primarily IgM in nature and therefore do not cross the placenta.
- A and B antigens are not well developed on fetal red cells.

ABO hemolytic disease occurs almost exclusively in infants of A or B type born of group O mothers. Group O individuals, in addition to possessing anti-A and anti-B, produce a third ABO isoagglutinin called anti-A, B. Anti- A, B is not a combination of anti-A and anti-B but a separate “cross-reacting” antibody – when group O plasma is absorbed with A or B cells the eluted antibody reacts with both A and B cells. Anti-A, B is usually IgG in nature and therefore transported across the placenta in the second and third trimester, continuing until birth. A titer of maternal anti-A, B is rarely performed as part of prenatal testing.
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as it does not correlate well with the extent of fetal red cell destruction. Most cases of ABO HDFN are successfully treated with phototherapy; however, close monitoring of affected neonates is necessary and exchange transfusion is occasionally required.

References

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