Anti-Cw Hemolytic Disease of the Newborn

A 12 hour old infant has developed jaundice. The neonatologist has ordered an ABO/Rh and DAT with elution studies, if indicated, on the baby's red blood cell sample. A type and screen has been ordered on the mother.

**Sample EDU-03** Mother Red Blood Cells

**Sample EDU-04** Mother Serum

**Sample EDU-05** Infant Red Blood Cells

**Expected Results**

<table>
<thead>
<tr>
<th>Sample</th>
<th>ABO / Rh</th>
<th>Antigen Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU-03 (mother)</td>
<td>A1 Rh Negative</td>
<td>Cw Neg, E Neg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>Antibody Screen</th>
<th>Antibody ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU-04 (mother)</td>
<td>Positive</td>
<td>Anti-Cw, Anti-E</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>ABO / Rh</th>
<th>Antigen Type</th>
<th>DAT</th>
<th>Eluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU-05 (baby)</td>
<td>A1 Rh Positive</td>
<td>Cw Pos, E Neg</td>
<td>Positive-IgG</td>
<td>Anti-Cw</td>
</tr>
</tbody>
</table>

**Discussion**

**Background**

Hemolytic disease of the fetus and newborn (HDFN) occurs when maternal IgG antibodies cross the placenta to the fetal circulation during gestation, causing RBC destruction and complications before birth, after birth, or both. The first recorded description of HDFN was in 1609 by a French midwife who delivered twins that both died shortly after birth. Many additional cases were described in the following centuries; however, it was not until the 1950s that the underlying cause of HDFN was clarified.

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.

**Pathophysiology of HDFN**

The exposure of an antigen negative mother to antigen positive cells can occur through transfusion or, as in this case, through asymptomatic fetomaternal hemorrhage from previous pregnancies. It is estimated that some degree of fetomaternal hemorrhage occurs in 75% of pregnancies. Since transplacental
Anti-Cw Hemolytic Disease of the Newborn (cont.)

hemorrhage is less than 0.1 mL in most pregnancies, most women are sensitized as a result of a small, undetectable fetomaternal bleed.

Maternal antibodies cross the placenta into fetal circulation and attach to corresponding antigens on fetal RBCs. The antibody coated cells are removed by macrophages in the reticuloendothelial system, especially those in the spleen. The rate of red cell destruction is determined by the antibody titer and the number of antigen sites on the fetal red cells. If the fetal bone marrow fails to produce sufficient red cells to compensate for the rate of red cell destruction, fetal erythropoiesis outside the bone marrow is increased in the hematopoietic tissues of the liver and spleen. These organs become enlarged, resulting in portal hypertension and hepatocellular damage.

Destruction of RBCs releases hemoglobin that is converted to unconjugated bilirubin. Hyperbilirubinemia becomes apparent only in the delivered newborn because the placenta effectively metabolizes bilirubin. The newborn liver is unable to conjugate bilirubin effectively, especially in a premature infant.

The diagnosis and management of HDFN requires collaboration between the patient, obstetrician and the blood bank. When a clinically significant antibody is identified in maternal serum, the fetus is typically monitored with a combination of antibody titers and ultrasounds. Further decisions on how and when to treat an affected fetus are based on the degree of fetal anemia and gestational age.

Conclusion

Anti-Cw was identified in the mother’s serum and the eluate prepared from the baby’s red cells. Anti-Cw has been implicated in mild to moderate HDFN; however, because of the low prevalence of the Cw antigen, 2% in whites and very rare in blacks, it is an uncommon occurrence.

References


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