Warm Autoimmune Hemolytic Anemia Case Study

A 36 year old woman was brought to the ER after she passed out at the finish line of a 26.2 mile charity marathon. A CBC revealed her hemoglobin to be 4 g/dL. A Type and Screen was ordered with a reflex to antibody identification if indicated. She has been pregnant three times but has never been transfused and has no other relevant medical history.

Sample EDU-01 Patient Red Blood Cells
Sample EDU-02 Patient Serum

Expected Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>ABO / Rh</th>
<th>Antigen Type</th>
<th>DAT</th>
<th>Auto Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU-01</td>
<td>O POS</td>
<td>N/A</td>
<td>POS-IgG</td>
<td>POS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>ABO</th>
<th>Antibody Screen</th>
<th>Antibody ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU-02</td>
<td>O</td>
<td>POS</td>
<td>Panagglutinin with no apparent specificity</td>
</tr>
</tbody>
</table>

Discussion

Background
Autoimmune Hemolytic Anemia (AIHA) is caused by antibodies directed against the individual’s own red cells which results in shortened red cell survival. It is estimated to occur in approximately 1 in 80,000 patients annually. The optimal reactivity of the autoantibody can assist in categorizing the type of AIHA. About 70% of AIHA cases are caused by antibodies that react at warm temperatures (30-37°C) while cold-reactive (4-30°C) autoagglutinins account for 18%. The remainder of AIHA cases are drug induced. Nearly 50% of AIHA cases arise without any identifiable cause. The patient’s clinical and serological profile is consistent with a diagnosis of Warm Autoimmune Hemolytic Anemia (WAIHA). In WAIHA, red cell destruction is primarily extravascular. Red cells coated with IgG and/or C3 are sequestered and destroyed by the reticuloendothelial system (RES) cells of the liver and spleen.

Laboratory Findings
Since warm reactive autoantibodies are typically IgG antibodies, they react best in indirect antiglobulin tests and typically do not affect ABO grouping. False positive test results can occur in Rh typing when the red cells that are heavily coated with IgG spontaneously agglutinate, so an appropriate negative control should be tested as necessary. Additionally, weak D test results cannot be considered valid when the red blood cells being tested produce positive results in a direct antiglobulin test.
Warm Autoimmune Hemolytic Case Study (cont.)

DAT: The DAT is expected to be positive in patients with WAIHA as the autoantibody the patient is producing absorbs onto the patient’s own red cells. The red cells may be coated with IgG alone (20%), IgG and complement (67%), or complement alone (13%).

Antigen Typing: Since the red cells are DAT positive, monoclonal anti-sera which does not require an antiglobulin phase of testing must be used for antigen typing purposes. Alternatively, the red cells may be treated with chloroquine diphosphate or EGA (EDTA glycine acid) to remove the coating IgG antibodies.

Antibody Screen/Identification Panel: Generally, all reagent red cells tested at AHG are positive, necessitating further testing to detect and identify potentially underlying alloantibodies.

1. Autoadsorption – If the patient has not been transfused in the last 3 months, the patient’s red cells may treated with ZZAP (a combination of ficin and DTT) to remove coating IgG and then subsequently used for autoadsorption purposes.

2. Allogeneic Adsorption – If the patient has been recently transfused, autoadsorption is not possible and an allogeneic adsorption is performed. This procedure uses three red cell samples known to lack common red cell antigen and of complimentary Rh types; typically, the phenotype of the cells is R1R1, R2R2 and rr. The absorbing cells may be treated with enzymes to enhance antibody uptake. It is important to be mindful when performing an allogeneic adsorption that an antibody to a high frequency antigen could be absorbed as well as autoantibody.

Regardless of whether the red cells used for the adsorption are autologous or allogeneic in nature, the red cells and patient serum are incubated at 37°C, allowing the autoantibody to attach to antigen sites on the prepared cells leaving unabsorbed alloantibodies in the serum. Depending on the strength of the autoantibody, several adsorption cycles may be required. The addition of polyethylene glycol enhances the uptake of autoantibody and can be used with treated and untreated cells in either adsorption procedure.

Selection of Blood for Transfusion: Transfusion therapy in WAIHA should occur only when the patient is exhibiting life-threatening symptoms of anemia as the transfusion may exacerbate the hemolysis. All donor units crossmatched with unabsorbed serum will be incompatible; therefore, the primary concern is to ensure compatibility with any alloantibodies identified in the adsorption procedure. If no alloantibodies are present, random units that are ABO compatible may be selected for transfusion. It is debatable whether units found to be “least incompatible” in vitro survive any better in vivo.
Warm Autoimmune Hemolytic Case Study (cont.)

Treatment
Conventional treatments include immune suppression with corticosteroids, and, in some cases, splenectomy. In recent years, the number of clinical studies with monoclonal antibodies and immunosuppressants in the treatment of WAIHA has increased.

References

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