Lesson 246: PreAnesthetic Assessment of the Patient With a Positive Antibody Screen Requiring Blood Transfusion

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TARGET AUDIENCE
Anesthesiologists

NEEDS STATEMENT
Anesthesiologists are responsible for administering the majority of blood transfusions given today. While generally safe, transfusion reactions do occur and can be fatal. Anesthesiologists need to be aware not only of the signs of a transfusion reaction and how to appropriately handle such a situation, but also of the methods used to type and cross-match blood, how the blood bank operates, facility limitations, and methods to avoid potentially fatal transfusion reactions. The presence or absence of unexpected antibodies must be confirmed and the risks and benefits of transfusion considered. Transfusion reactions have been identified by questionnaires as topics for review.

CALL FOR CONTRIBUTIONS
If you have an idea for a CME lesson in Anesthesiology News, please e-mail Elizabeth A.M. Frost, MD, at Efrost@aol.com.

Olsner-Weber-Rendu disease, more commonly referred to as hereditary hemorrhagic telangiectasia (HHT), is a genetic disorder characterized by the presence of multiple arteriovenous malformations (AVMs). The vascular dysplasias, found throughout the body, lack capillaries between associated arteries and veins and are therefore prone to bleeding. Smaller AVMs, referred to as telangiectases, are visible on the skin and mucous membranes and frequently rupture and bleed. As a result, epistaxis is the most common clinical presentation. Larger AVMs can be found in the lung, brain, and gastrointestinal (GI) tract where bleeding may have sudden and catastrophic consequences. Many patients over 50 years of age have symptomatic GI bleeding.1 While 95% of affected patients eventually develop recurrent epistaxis (90% by age 21), only a small number require medical treatment. The patient with HHT who presents for disease-related treatment likely has a profound anemia resulting from frequent, uncontrolled bleeding, either from recurrent nose bleeds and/or from bleeding in the GI tract or elsewhere. This bleeding is often slow but persistent, and sometimes difficult to control. Patients require multiple transfusions as supportive therapy while attempts to control bleeding are made. Multisystem AVMs are common, and 25% have GI involvement, usually in the stomach and proximal small intestine.2

Preanesthetic assessment of the patient with HHT should include a detailed bleeding history, especially the need for and frequency of prior blood transfusions.3 Blood should be available and cross-matched with the patient to ensure compatibility. While the differential diagnosis of telangiectases and epistaxis includes a number of bleeding diatheses, such as von Willebrand’s disease,4 patients with previously diagnosed HHT do not necessarily have a clotting disorder and will not require factors or fresh frozen plasma (FFP) unless sufficient volume of fluid or blood product has been administered to dilute the patient’s own clotting factors.

Patients may also have pulmonary (33%), hepatic (11%), or spinal AVMs.5 Pulmonary AVMs cause significant shortness of breath and hypoxia, and neurologic sequelae have been reported in patients with near-normal oxygen tension. Depending on the size of the AVM, the lack of hypoxic vasodilator response under anesthesia may further exaggerate the shunt, and increase hypoxia. Symptoms that suggest the patient is experiencing transient ischemic attacks should make the anesthesiologist

PREANESTHETIC ASSESSMENT
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A COURSE OF STUDY FOR AMA/PRA CATEGORY 1 CREDIT
1) Read this article, reflect on the information presented, then complete the online post-test before September 30, 2006. (CME credit is bleeding requiring multiple transfusions, was admitted after a syncpe. She was found to be severely anemic (hemoglobin of 6 g/dL). On day 2 of her hospital stay, the patient began to pass bright red blood per rectum and underwent emergent colonoscopy to control her bleeding. Significant medical history included non–insulin-dependent diabetes mellitus (NIDDM)—diagnosed 20 years previously—and recently diagnosed chronic obstructive pulmonary disease (COPD). Her social history included 50 pack-years of cigarette smoking. She had received multiple transfusions previously and had been sedated for colonoscopy and bronchoscopy but had never required surgery or received general anesthesia. Medications included glyburide 5 mg, iron, iopatrompromide, and albuterol PRN. Physical exam was remarkable for obesity, with a body mass index (BMI) of 32; a Mallampati class II airway with a thyromental distance of roughly 6.5 cm; and a mouth opening >5 cm. The patient was intermittently responsive and cooperative.

LEARNING OBJECTIVES
At the end of this activity, the participant should be able to:
1. Summarize the potential problems that the patient with a positive antibody screen can present to the anesthesia provider.
2. Describe the different options for management of the patient with a positive antibody screen.
3. Discuss the potential complications associated with blood transfusion in these patients.
4. Implement appropriate preoperative evaluation and testing in the patient with hereditary hemorrhagic telangiectasia.
5. Describe the proper techniques for blood typing and cross-matching.
6. Describe techniques for reducing the risk of a clerical error during blood transfusion.
7. Understand the clinical implications of the presence of uncommon antibodies.
8. List the indications for blood transfusion.
10. Recognize the occurrence of and properly treat a transfusion reaction.

CASE HISTORY
A 64-year-old African-American woman with a history of Olsner-Weber-Rendu disease (hereditary hemorrhagic telangiectasia), characterized by repeated episodes of epistaxis and gastrointestinal bleeding requiring multiple transfusions, was admitted after a syncpe. She was found to be severely anemic (hemoglobin of 6 g/dL). On day 2 of her hospital stay, the patient began to pass bright red blood per rectum and underwent emergent colonoscopy to control her bleeding. Significant medical history included non–insulin-dependent diabetes mellitus (NIDDM)—diagnosed 20 years previously—and recently diagnosed chronic obstructive pulmonary disease (COPD). Her social history included 50 pack-years of cigarette smoking. She had received multiple transfusions previously and had been sedated for colonoscopy and bronchoscopy but had never required surgery or received general anesthesia. Medications included glyburide 5 mg, iron, iopatrompromide, and albuterol PRN. Physical exam was remarkable for obesity, with a body mass index (BMI) of 32; a Mallampati class II airway with a thyromental distance of roughly 6.5 cm; and a mouth opening >5 cm. The patient was intermittently responsive and cooperative.

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The patient had been diagnosed with HHT as a child after presenting with multiple telangiectases and episodes of epistaxis which were difficult to control. She had not required transfusions until she developed anemia after an acute episode of rectal bleeding at age 52. Since her first transfusion, she had received hospitalization and treatment 5 times over 12 years. She did not recall any difficulty with prior transfusions. Previous studies included an echocardiogram bubble study which revealed no evidence of pulmonary AVMs and an MRI of her brain which revealed no evidence of cerebral AVMs. She was obese, with a BMI of 22. She did not report any symptoms suggestive of sleep apnea, nor did her mother, with whom she lived and who was present at the time of the interview. Obesity is defined as a weight 20% to 99% above ideal body weight and morbid obesity as more than 99% above ideal body weight for a given height and sex. Such increased body mass puts undue stress on the body’s organ systems and results in increased morbidity and mortality.6 BMI is the most widely used formula for estimating relative obesity. It is a measure of weight/height2 where weight is in kilograms and height is in meters. Morbid obesity is defined as 45 kg above the ideal body weight or a BMI >35. BMI between 20 and 25 is typically considered ideal for most individuals. BMI >27 is defined as overweight, and BMI >30 is considered obese. Nevertheless, recent reports suggest that BMI of 25-29.9 does not increase the risk of death (New York Times, April 20, 2005:A22).

A number of medical disorders, including stroke, ischemic heart disease, and diabetes, are 3 to 4 times more common among obese patients.7 Obesity itself has detrimental effects on the cardiovascular, respiratory, and other organ systems. Given that our patient also had HHT, the differential diagnosis must include both the underlying disease and the complications of hypertension and stroke.

The most common cause of COPD is cigarette smoking, and our patient’s 55 pack-year history of smoking merits a further etiology for her respiratory problems. Her primary complaint was dyspnea on exertion, and she found it difficult to climb the 2 flights of stairs to her apartment without resting 2 or 3 times. Pulmonary function tests had not been done, and an arterial blood gas analysis was not available at the time of the preanesthetic interview.

Non-insulin-dependent diabetes mellitus (NIDDM), formerly known as type 2 diabetes; adult-onset, or maturity-onset diabetes, is distinguished from insulin-dependent diabetes mellitus by the absence of a need for exogenous insulin to prevent ketoadiposis. It is estimated that 90% of diabetics in this country are of the non-insulin-dependent variety and almost all of them are significantly overweight. Treatment includes diet, oral hypoglycemic agents, and occasionally exogenous insulin for glycemic control. More important, however, is the treatment of concurrent obesity, the elimination of which often reduces the need for oral hypoglycemic agents and often allows the patient to control the disease with diet alone.

Complications of NIDDM include vascular disease, and many patients have been diagnosed for a longer period of time may present with significant coronary artery disease, cerebrovascular disease, peripheral vascular disease, retinopathy, or nephropathy.7 A thorough cardiac history is warranted in patients with longstanding NIDDM and any evidence of autonomic dysfunction (e.g., orthostatic hypotension, resting tachycardia, or other cardiac dysrhythmias), or absent variation in heart rate with deep breathing. Often the initial indication of autonomic nervous system dysfunction in the male diabetic patient is impotence. Since the most common cause of peroperative morbidity is ischemic heart disease, a preoperative ECG is prudent in patients with NIDDM.7 Because of the potential for gastroparesis, any diabetic with evidence of autonomic neuropathy should be considered to be at risk for potential aspiration during induction and may develop intraoperative cardiac lability, possibly requiring vasopressor therapy.8 The current recommendations for diabetic patients with any degree of autonomic dysfunction include:

- tight glycemic control (<150 mg/dL peripherally and ≤120 mg/dL postoperatively)
- appropriate β1-blockade
- statin medication
- the use of thiazolidinediones and glucosidase inhibitors in place of sulfonylureas oral hypoglycemic drugs.9

Our patient had previously received a transfusion. After receiving a blood specimen, the blood bank informed the physician that there were difficulties with the cross-match.

Table 1. ABO Blood Group Antigens and Antibodies

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>A</th>
<th>B</th>
<th>Anti-A</th>
<th>Anti-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+</td>
<td>–</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>B</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>AB</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>O</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Donor Blood Type | Anti-A | Anti-B | A | B
---|---|---|---|---
O | – | – | + | +
AB | + | + | – | –
B | – | + | + | –

Evaluation of the Patient Presented

Table 2. Results of Blood Typing Tests by Donor Blood Type

<table>
<thead>
<tr>
<th>Red Blood Cells</th>
<th>Serum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donor Blood Type</td>
<td>Anti-A</td>
</tr>
<tr>
<td>A</td>
<td>+</td>
</tr>
<tr>
<td>B</td>
<td>+</td>
</tr>
<tr>
<td>AB</td>
<td>+</td>
</tr>
</tbody>
</table>

(+) indicates the presence of agglutination; (-) indicates no reaction is expected.

Techniques for Blood Typing and Cross-Matching of Blood for Transfusion

Determination of the ABO blood group system discovered by Karl Landsteiner in 1901 is the first step in compatibility testing. Human red blood cells have either 1, both, or neither of these antigens. Designated A and B, and the blood “type” of any individual is determined to be one of the 4 possible combinations. Also, the serum contains spontaneous antibodies to either the A or the B antigen, depending on the blood type. As shown in Table 1, antibodies to either the A or the B antigen, depending on the blood type, are against the Rh antigen and subsequent transfusions will not increase the risk of death (New York Times, April 20, 2005:A22).

Our patient had previously received a transfusion. After receiving a blood specimen, the blood bank informed the physician that there were difficulties with the cross-match.

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had been transfused with 4 units of O-negative blood, such as in a trauma case before a type and screen could be done, these patients were now considered to be blood type O negative because the volume of serum and blood cells transfused had effectively changed the blood type. Further transfusions were then only to be of the same type that had been given previously. With the advent of blood component separation techniques and improved preservation, whole blood is rarely available for transfusion, so that most transfusions now are with either packed red blood cells, which contain little serum, and hence only antigens, or FFP, which contains only antibodies. In the situation outlined above, with the trauma patient who had received 4 units of type O-negative packed red blood cells, once the type and screen has been done, further transfusions should be type-specific. Platelets contain neither the antibodies found in the serum nor the antigens found on red blood cells, and therefore do not need to be type-specific. Donor blood with A or B antigens (type A, B, or AB) should not be given to recipients without these antigens; therefore patients who are type O must only receive type O blood. Individuals who are type AB may receive cells from any of the ABO types. Rh-negative patients should receive only Rh-negative blood, but patients who are Rh positive may receive either Rh-positive or negative blood. Standards outlined by the American Association of Blood Banks place pretransfusion testing into 3 categories depending on whether they relate to donor unit testing, patient sample testing, or donor/patient compatibility testing.14

**Donor-Related Testing**

Each unit of blood collected must be tested to determine ABO and Rh type, and it must be screened for unexpected antibodies and markers for infectious diseases. To determine ABO blood group, the donor serum is tested with standard red blood cells containing either A or B antigens, and the donor blood is tested with serum containing either anti-A or anti-B antibodies. The resulting reaction is either agglutination or nonagglutination and can be interpreted electronically, allowing for an automated process. Table 2 illustrates the possible outcomes of the above test for a given donor blood type. Tests for Rh antigens are conducted using anti-D reagents that react to agglutinate donor or recipient red blood cells. The test is either positive (agglutination) or negative (no agglutination) and corresponds to the presence (positive) or absence (negative) of Rh antigens.15 Once blood has been typed for the presence of A, B, and Rh antigens and corresponding antibodies, further investigation must be undertaken to identify the presence of uncommon antibodies. There are more than 400 different blood group antigens that may be expressed on human red blood cells, but most are clinically insignificant.16 Tests focus on clinically significant antibodies that can be detected using currently available laboratory techniques. Typically a screening test is applied to donated blood and the presence of unexpected antibodies prompts further testing for antibody identification. An indirect antiglobulin test, in which donor serum is mixed with recipient blood cells of known phenotype and incubated at 37°C, is used to further identify these antibodies. Since the phenotype of the reagent cells is known, the antibodies present in the donor serum can be deduced by noting which cells were lysed.

**Patient-Related Testing**

The major cause of fatal hemolytic transfusion reaction is patient or unit misidentification.17 Therefore steps must be taken to ensure that the correct unit is given to the correct patient. This process begins with the collection of a sample for testing by the laboratory. Though it is often taken during the preoperative visit or in the holding area prior to surgery, occasionally a patient arrives in the operating room without a sample on file in the blood bank. If significant blood loss is anticipated at this time, it is the anesthesiologist’s duty to obtain or to ensure that blood is obtained for type and screening or cross-matching prior to allowing the surgery to begin, especially if the patient has been previously transfused, is an I.V. drug user, or is pregnant (because these groups have the highest incidence of a positive antibody screen). Hospital protocol must be followed because blood banks will typically not process any sample without properly completed paperwork and will often discard blood that has been labeled incorrectly, wasting time and delaying the delivery of blood and blood products. Anesthesiologists should be familiar with the policies that govern their places of work, and with the paperwork that must accompany any sample being sent to the blood bank. Patient identification is key, and the requisition form must be checked against the patient’s wristband, and, if possible, verified with the patient. This identification should be done by the individual who collects the sample, and the sample must be drawn into pre-labeled tubes which contain the same information as the patient wristband, chart, and requisition forms. Forms must contain the patient’s full name and medical record number, or a unique numerical identifier,18 and it is policy at our hospital to have the individual collecting the sample sign the requisition form as well as the sample tube label.

Blood collected for testing is then sent to the blood bank where the requisition form is completed with the sample tube label. Incorrectly labeled samples are discarded and new samples must be obtained if there is any doubt as to the correctness of the information accompanying the sample. To ensure that the sample is representative of the patient’s current immunologic state, most blood banks will not accept a sample taken more than 3 days prior to the date of transfusion. Samples used for compatibility testing should be stored for at least 1 week after a transfusion is given should they be needed for an investigation subsequent to a transfusion reaction.19

**Table 3. Steps in the Treatment of a Hemolytic Transfusion Reaction**

1. Stop the transfusion.
2. Maintain urine output above 75 mL/h by administering generous I.V. fluids with mannitol and furosemide if necessary.
3. Alkalinate the urine with 40-70 MEq of sodium bicarbonate per 70 kg body weight.
5. Determine platelet count, partial thromboplastin time, and serum fibrinogen level.
6. Return unused blood to the blood bank for repeat cross-match.
7. Send patient’s blood and urine sample to the blood bank for examination.
8. Prevent hypotension to ensure adequate renal blood flow.

**Table 4. Incidence of Bloodborne Pathogens by Type of Pathogen**

- HIV 1:1,400,000-1:2,400,000/unit
- HTLV 1:250,000-1:2,000,000/unit
- Hepatitis B 1:58,000-1:149,000/unit
- Hepatitis C 1:872,000-1:1,700,000/unit
- Composite risk of transmission of lipid-enveloped virus: 1:83,000
- Transmission of syphilis, Lyme, ticks, West Nile virus, herpes, parasites, Creutzfeldt-Jakob disease: rare

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Continuing Medical Education

Lesson 246

**Continuing Medical Education**

**Pathogen**

- **Transmission of syphilis, Lyme, ticks, West Nile virus, herpes, parasites, Creutzfeldt-Jakob disease: rare**

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number, blood unit number, ABO and Rh type, and unit expiration date. The blood must be checked against an identifier on the patient such as a wristband, not just against the label on the accompanying paperwork or as both are often printed at the same time by the blood bank.

**Clinical Implications of Acquired Antibodies**

The patient who has received multiple transfusions, such as our patient with Osler-Weber-Rendu disease, may have been exposed to donor cells expressing antigens not expressed by the recipient, and may have developed antibodies to these foreign antigens. Unlike the spontaneously occurring antibodies to the A and B antigens, unexpected antibodies are produced only after a patient is exposed to these antigens either through transfusion of blood and blood products, illicit I.V. drug use, or during the delivery of a fetus. Exposure to these antigens during subsequent transfusion could result in a life-threatening hemolytic transfusion reaction and should be avoided. In this case, a search of hospital blood bank inventory may reveal that no appropriate units of blood are available for transfusion and the search may have to be expanded to other area hospitals or regional blood centers.

Of the many protein and carbohydrate antigen systems, antibodies to which are part of the 25 currently known human blood group systems, only a few elicit the formation of potentially damaging antibodies. Some of the more common antibodies include the Kell blood group system, antibodies to which can cause a hemolytic transfusion reaction and hemolytic disease of the newborn, the Duffy blood group system, which provides resistance to a form of malaria caused by Plasmodium vivax, and the MNS blood group system, which elicits the formation of antibodies responsible for cold and warm agglutinins.73

**Adverse Reactions Associated With Blood Transfusion**

**Hemolytic Transfusion Reactions**

A hemolytic transfusion reaction occurs most commonly when donor red blood cells are transfused into a patient who has antibodies to antigens expressed on the donor cells.70 Occasionally a hemolytic reaction will occur as a result of transfusion of blood products containing antibodies to antigens expressed on the recipient’s cells, and rarely a reaction between blood products from 2 different donors may occur within the recipient.71 The patient who is awake and experiencing a transfusion reaction may display such symptoms as pain, either generalized or localized; nausea and vomiting; fever and chills; dyspnea; or even a feeling of impending doom, but in the patient under general anesthesia, hypotension, tachycardia, and hematurnia may be the only signs that a reaction is occurring.72 Donor cells are destroyed by complement and removed from circulation, resulting in a rapid rise in plasma hemoglobin and serum bilirubin levels. Some complement is invariably deposited on recipient red blood cells, resulting in their destruction, a phenomenon referred to as “bystander hemolysis.”73 Further complications of hemolytic transfusion reactions include hypotension and shock, impairment of renal function ranging from an asymptomatic rise in blood urea nitrogen levels to complete anuria, and disseminated intravascular coagulation.

Treatment for a hemolytic transfusion reaction should begin the moment the anesthesiologist suspects that a reaction has occurred or is occurring (Table 3, page 77). The blood should immediately be removed from the patient, as the severity of any reaction is increased with increased volume of incompatible blood. Fluids should be infused to support blood pressure and ensure adequate renal perfusion. If necessary, pressors and diuretics may be administered. Treatment focuses primarily on cardiovascular support, with the use of fluids and pressors as indicated by the vital signs, including urine output. Determining what precipitated the reaction is also helpful in most cases, blood is still required. Every effort must be put forth to maintain hemodynamic stability until compatible units of blood can be located. If the cause of the reaction is the accidental transfusion of incompatible blood due to a clerical or labeling error, a new, compatible unit must be ordered from the blood bank. Unfortunately, if the precipitating factor cannot be readily identified, the risks of further transfusion with potentially incompatible blood should be weighed against any available alternate means of support. Any remaining blood or blood products should be returned to the blood bank for examination along with a sample of the patient’s blood and urine to examine for hemolysis.

**Nonhemolytic Transfusion Reactions**

There are a number of possible transfusion reactions that do not result in life-threatening hemolysis. Among them, febrile nonhemolytic transfusion reactions (FNHTRs), allergic reactions, transfusion-related acute lung injury (TRALI), and anaphylactic or anaphylactoid reactions may all result from transfusion of blood or blood products.25

A patient is said to have experienced a FNHTR if an increase of 1°F C observed within 1 hour following the transfusion that is not associated with other known causes of fever, such as hemolysis or sepsis. Usually this reaction lasts no longer than 8 to 12 hours after the transfusion. It is likely that a fever that persists beyond that time period is unrelated to the transfusion process. FNHTRs usually respond to antipyretic therapy, but it should be noted that a FNHTR is a diagnosis of exclusion and any suspicion that a more severe reaction is occurring or could potentially occur should prompt the anesthesiologist to follow the steps outlined above for the treatment of a hemolytic transfusion reaction. Awake patients experiencing shaking chills can be given meperidine (25-50 mg I.V.) if there is no contraindication.26

Allergic reactions occur when the recipient of a blood transfusion has preformed antibodies to substances present in the donor plasma. Usually it is a mild type I hypersensitivity response, which presents with transient urticaria, erythema, and pruritis, but may progress to include swelling of the face and associated airway structures.27 Mild hypotension may be observed. Allergic reactions may be treated with antihistamines such as diphenhydramine (25-50 mg I.V.) if necessary. More severe allergic reactions such as anaphylaxis or anaphylactoid reactions occur within seconds to minutes of exposure to an antigen, are more systemic in nature, and frequently result in hypotension, bronchospasm, respiratory failure, and death if left untreated. An anaphylactic reaction occurs when the recipient of a blood transfusion has preexistent immunoglobulin E (IgE) directed towards an antigen present in the donor plasma. Binding of the allergen to IgE results in the release of large quantities of preformed mediators such as histamine, which causes hypotensive shock and an anaphylaxis. Preformed IgE is produced when an individual is sensitized through prior exposure to antigens, but an individual may experience an anaphylactoid reaction when an antigen elicits a clinically indistinguishable reaction through a different pathway not involving preformed IgE.

The anesthesiologist must recognize and treat this true medical emergency promptly. Blood pressure must be maintained through large-volume fluid transfusion. Epinephrine is frequently indicated.

TRALI is a form of noncardiogenic pulmonary edema that occurs within 6 hours of the transfusion of blood products containing plasma. This phenomenon was described by Popovsky in 1983 as a form of adult respiratory distress syndrome and is characterized by dyspnea and tachypnea with signs of pulmonary edema. Patients may experience fever, chills, and cough, or if intubated, frothy edema may be visible in the endotracheal tube. The chest X-ray typically shows a bilateral white fluffy infiltrate and may progress to complete opacification of both lungs.28 Even though the patient may exhibit signs of pulmonary edema suggestive of hypervolemia, the mechanism of injury is not fluid overload.
and TRALI typically presents without jugular venous distention, murmurs, or gallops typical of such pathology.32 Treatment of TRALI is generally supportive in nature, with fluids and pressures as necessary to maintain adequate cardiac output. Extended ventilatory support may be necessary, often with the use of positive expiratory pressure, which often permits use of a decreased inspiratory oxygen percentage.

Other Complications of Blood Transfusion

Complications related to large-volume and/or rapid transfusion of blood or blood products include hypothermia, electrolyte disorders, citrate toxicity, and reactions to microaggregates.32 The clotting factors present in patient serum are often diluted when the patient is transfused with packed red blood cells, which do not contain serum, and FFP should be transfused if bleeding is poorly controlled in the surgical field.

Blood transfusions are commonly given both to increase oxygen-carrying capacity and to increase intravascular volume; however, a need to increase intravascular volume is not a specific indication because this can be accomplished with crystalloids and colloids that do not transmit infection.32

When the oxygen delivery needs of the patient are being met by the red blood cells already present in the circulation, other measures may be employed to support the patient before the need to transfuse arises. Current methods for screening donated blood have reduced the number of blood transfusion-related infections considerably (Table 4, page 77). The greatest threat of contamination comes from seronegative individuals who are infected but have not yet formed the antibodies to which the screening process is sensitive. For this reason, members of groups at high risk for infection are discouraged from donating blood and blood products. Recent numbers put the aggregate risk for infection with either HIV, human T-cell lymphotrophic virus (HTLV), hepatitis C virus or hepatitis B virus at 1 in 34,000 units.32

Case Management

The present patient was brought to the operating suite after unsuccessful attempts to control her bleeding via colonoscopy. A colorectal surgeon was summoned to perform an exploratory laparotomy with colonic resection as indicated. At that time, a type and screen had been performed and our blood bank determined that no compatible units were available due to the presence of unexpected antibodies.

A regional search for compatible units had been initiated and 2 units of compatible blood had been located at another institution. These units were available prior to the start of surgery and the patient received one unit preoperatively and the second intraoperatively. Bleeding was controlled after ligature of the artery feeding a colonic AVM and partial colectomy. Postoperatively the hemoglobin increased to 9 g/dL and the patient was discharged home after 1 week without incident.

Summary

The patient who has a positive antibody screen but requires transfusion deserves careful consideration. In the case of the anemic patient who is not actively bleeding, every effort should be made to maintain the patient with supportive care and to avoid transfusion, as the exposure of this patient to even more antigens may result in further creation of unexpected antibodies. Treatment to stop bleeding or to prevent spontaneous bleeding must be foremost; but when the patient requires surgery, it is often difficult to locate compatible units of packed red blood cells. Patients identified as being at risk for the presence of unexpected antibodies and who are expected to require a blood transfusion should be typed and a cross-match performed as soon as possible. If compatible blood does not exist in the institution’s blood bank, a regional search should be initiated while supportive care continues.

References