CLINICAL VIGNETTE

Assessing the Risks of Emergency Transfusion in the Operating Room

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Introduction

Crossmatching prior to the transfusion of red blood cell units is a routine, but integral component for detecting dangerous antibody to antigen reactions and ensuring appropriate recipient and donor compatibility. However, despite the laboratory process requiring only about 45 minutes, certain clinical scenarios requiring emergent, life-saving transfusion may preclude the full evaluation and selection of appropriate donor units. We report a situation of rapid hemorrhage during surgery and discuss risks in emergency transfusion of uncross-matched erythrocytes.

Case Report

A 67-year-old female was recently diagnosed with metastatic lung adenocarcinoma, after presenting with shortness of breath due to cardiac tamponade and large pleural effusion. She underwent successful pericardiocentesis and thoracentesis and was discharged. One month later, she returned to the emergency room with dyspnea and tachycardia and was found to have a large, loculated pericardial effusion on CT scan and echocardiogram. Because of evidence of tamponade on echocardiogram and physical exam, including 14 mmHg of pulsus paradoxus, surgical pericardial window was recommended over pericardiocentesis due to the degree of loculation and location of the fluid pockets.

The patient was taken emergently to the operating room. An arterial catheter was placed in the right radial artery, and specimens were sent to the laboratory for type and crossmatch. In addition to local anesthetic infiltration into the surgical field, the anesthesiologist administered intermittent boluses of intravenous midazolam and ketamine to provide sedation. Within 20 minutes, the retrosternal space was dissected, and the inferior pericardium was incised with return of copious dark bloody fluid. Following relief of tamponade, general anesthesia with endotracheal intubation was induced with more ketamine and rocuronium. During this time, a pulsatile area of bleeding was noted on the surface of the right ventricle that could not be controlled with application of pressure or pledgeted suturing. Further attempts at exposure to improve visualization revealed a densely adherent pericardium to the cardiac surface and resulted in further bleeding. At this time, crossmatched units of blood were not yet available, and the care team decided to proceed with administration of emergency uncrossmatched type O erythrocytes given the rapid hemorrhage. After several uncrossmatched units were given, crossmatched units became available. A total of 16 units of packed red cells were transfused for the case. Additional attempts attempts at hemostasis, including median sternotomy and placement of myocardial stitches were unsuccessful. The patient became hypotensive and rapidly deteriorated with cardiac arrest. After 30 minutes of surgical resuscitative efforts without return of circulation, the patient was pronounced dead.

Discussion

Blood transfusion therapy entails several risks, including febrile reactions, hemolysis, anaphylaxis, and acute lung injury among other complications. Since immediate, intravascular hemolysis resulting from ABO blood type incompatibility is life threatening, the transfusion of emergency uncrossmatched type O erythrocytes avoids this type of ABO incompatibility as type O erythrocytes are a universal donor. However, by transfusing uncrossmatched blood in an emergent situation, the normal blood bank process of screening for minor red cell antibodies (e.g. antibodies to antigens in the Kell, Kidd, Duffy, or MNS systems) and serologically mixing recipient plasma with donor erythrocytes for compatibility testing is bypassed. If these antibodies in the recipient plasma exist undetected without a screening test and match antigens in the transfused blood, there is a possibility of a less severe, indolent extravascular hemolytic reaction to occur.

Minor red cell alloantibodies develop following prior transfusions or in other exposures to foreign blood antigens, such as during pregnancy. Although these antibodies can cause hemolysis and shortened donor red cell life after an emergency transfusion, these antibodies are rarely found in studies with reported prevalence, ranging from 0.73 to 2.4%.[1-4] A retrospectitive study examining 4,144 units of uncrossmatched emergency transfusions given to 1,407 patients found that only one out of the 7 patients who received an antibody incompatible unit developed a delayed serologic transfusion reaction.[5] Similarly, another retrospective investigation of 262 recipients of 1,002 uncrossmatched group O units found that 7 of the patients with clinically significant alloantibodies received 15 antigen-incompatible units.[6] Only one hemolytic transfusion reaction occurred among these episodes.

Therefore, the evidence shows that there is minimal risk of clinically significant hemolysis after transfusing uncrossmatched group O erythrocytes in the context of an acute,

emergent hemorrhage. If a patient faces significant morbidity in the face of delays in blood provision, then uncrossmatched, emergently available blood has a favorable risk profile.

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