Liver transplantation in Jehovah's Witness patients in Australasia

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Until recently, liver transplantation was contraindicated in Jehovah's Witness patients because of recipient-imposed restrictions on use of blood products. However, recent improvements in surgical and anaesthetic techniques and new procoagulant agents challenge this practice. We describe two Jehovah's Witness patients who had successful liver transplantation without blood transfusion. To our knowledge, these are the first such cases in Australasia. The techniques used to minimise blood loss and transfusion requirements could potentially benefit all patients undergoing major surgery. **(MJA 2007; 187: 188-189)**

Clinical records

Patient 1

A 48-year-old farmer with end-stage cirrhosis due to α-1 antitrypsin deficiency had evidence of moderate portal hypertension with splenomegaly and ascites (Child–Pugh score B), but no significant lung disease. He met minimum recipient suitability criteria for liver transplantation, according to the Transplantation Society of Australia and New Zealand (TSANZ) liver standing committee.[1] As a Jehovah's Witness, he would not accept transfusion of red blood cells, fresh frozen plasma or platelets.

However, he indicated that he would accept blood fractions and recirculated autologous blood and cell-saved blood. A relative, also a Jehovah's Witness with similar restrictions on use of blood products, offered to be a live liver donor, but this offer was rejected by the treating team on the basis of unacceptable donor risk. The patient was placed on the transplantation waiting list, and was treated with erythropoietin. Over 6 months, this increased the haemoglobin concentration from 112 g/L to 151 g/L (reference range [RR], 135–180 g/L). Results of other preoperative blood tests included: platelet count, 74×10^9/L (RR, $150–400 \times 10^9$/L); international normalised ratio (INR), 1.2 (RR, 0.9–1.3); serum concentration of bilirubin, 60 μmol/L (RR, < 20 μmol/L); albumin, 26 g/L (RR, 35–50 g/L); alanine aminotransferase (ALT), 102 U/L (RR, < 40 U/L); and creatinine, 143 μmol/L (60–110 μmol/L).

Liver transplantation was performed using an organ from a 54-year-old deceased donor. The piggyback implantation technique, without venovenous bypass, was used. Coagulation was monitored intraoperatively using routine coagulation tests and thromboelastography (Haemoscope, Skopie, Ill, USA). The latter technique measures the kinetics and tensile strength of clot formation. Prophylactic aprotinin was administered as a bolus followed by a constant infusion. The patient also received cryoprecipitate, albumin, haemodilution, and autotransfusion of cell-saved and recirculated blood.

On arrival in the intensive care unit, haemoglobin concentration was 118 g/L. The patient received recombinant factor VIIa to treat an INR of 3.4, and erythropoietin was continued. There was significant primary graft dysfunction, and ascites was slow to resolve. Three months after transplantation, the patient developed a pulmonary embolism and required anticoagulation. Currently, at 4 years after transplantation, the patient is well and works full time.

Patient 2

A 43-year-old woman with chronic hepatitis B infection was found to have an unresectable multifocal hepatocellular carcinoma at laparotomy. She had well compensated cirrhosis (Child–Pugh score A) with no evidence of portal hypertension, and met listing criteria for transplantation. A Jehovah's Witness, she would not accept transfusion of red blood cells, fresh frozen plasma or platelets, but determined that she would accept blood fractions and recirculated autologous blood and cell-saved blood. Pretransplant laboratory results were: haemoglobin concentration, 129 g/L; platelets, 203×10^9/L; INR, 0.9; bilirubin, 7 μmol/L; albumin, 38 g/L; ALT, 58 U/L; and creatinine, 70 μmol/L.

Liver transplantation was performed using an organ from a 42-year-old deceased donor. An inferior vena cava interposition technique was used without venovenous bypass because of the proximity of the tumour to this vessel. The central venous pressure was maintained below 5 cmH_2O to minimise blood loss. The patient received cryoprecipitate, haemodilution, autotransfusion, and cell-saved and recirculated blood. Unfortunately, she had an allergic reaction to the colloidal plasma-volume substitute, gelofusine; coagulation studies and thromboelastography showed fibrinolysis, which was treated with aprotinin and recombinant factor VIIa.

On arrival in the intensive care unit, haemoglobin concentration was 75 g/L, and INR was 1.3. Erythropoietin and iron supplements were started. Postoperative recovery was uncomplicated, and the patient remains well 3 years after the operation.

Discussion

To our knowledge, these are the first reported cases of liver transplantation in Jehovah's Witness patients in Australasia. While the two patients filled accepted criteria for recipient suitability for liver transplantation,[1] the likely need for blood transfusion would until recently have precluded this procedure.

Liver transplantation is a well established and successful intervention for liver failure that results in long-term survival (70% at 10 years) in individuals who otherwise have minimal 1-year survival.[2] The shortage of deceased donor livers remains the major factor limiting the number of liver transplantation operations in Australia and New Zealand. In 2000, the death rate while waiting for a donor liver in Australia and New Zealand was 40% for acute liver failure and 5%–8% for chronic liver disease.[3] This donor shortfall creates an ethical dilemma in which the potential benefit to individual patients has to be balanced against the need to maximise the benefits of this scarce resource. Following a well publicised case in Edinburgh of a death due to acute liver failure, a recommendation was made for a colloquium to address the question of patient selection for liver transplantation and the need for a uniform code of practice in the United Kingdom. The colloquium, held in 1999, recommended that liver transplantation should be performed in patients

when their expected survival is less than 12 months and the expected post-transplant survival is over 50% at 5 years.[4] These recommendations have been incorporated into the minimum recipient listing criteria used by the TSANZ liver standing committee,[1] and were met by both the reported patients.

Over the past decade, improvements in surgical and anaesthetic techniques, combined with new procoagulant agents, have resulted in a dramatic reduction in the requirement for transfusion of blood and blood products during liver transplantation. In selected patients, the need for blood transfusions can be avoided completely.[5,6] These advances have resulted in reassessment of the use of liver transplantation in Jehovah's Witness patients.

The first-ever reported liver transplantation in a Jehovah's Witness patient was in 1994.[7] Since then, transplantation has been successfully performed in selected individuals for acute and chronic liver failure without the need for blood products.[8,9] Outcomes of liver transplantation in adult Jehovah's Witness patients have been reported as 92% survival with a mean follow-up of 2.2 years (range, 0.3–5.6 years).[10]

Live-donor liver transplantation using Jehovah's Witness donor/recipient pairs has more recently been reported.[10] However, the risk to the potential live donor in the case of our first patient through refusing blood products, added to the known 0.5% mortality associated with donation of the right lobe of the liver, was thought to be excessive, and this option was rejected.[11]

As always, careful selection of the recipient is required. Two other Jehovah's Witness patients referred to us for liver transplant assessment rejected, or were rejected for, transplantation: one, after lengthy consideration, refused to accept a donor liver; while the other had multiple hepatocellular cancer tumours which fell outside the minimal listing criteria. By way of comparison, in a previously reported series, only nine of 29 Jehovah's Witness patients were found to be suitable for liver transplantation.[9]

The Jehovah's Witness church teaches that blood transfusion (whole blood, red blood cells, white blood cells, platelets and plasma) should not be accepted, but individuals themselves are to decide whether to accept organ transplantation and blood fractions. Both our patients accepted the use of cryoprecipitate, albumin, recombinant factor VIIa, recirculated autologous blood and cell-saved blood, and signed a preoperative agreement to this effect. Consent to the use of these factors and techniques were minimum listing criteria required by the treating teams to proceed with liver transplantation. In selected Jehovah's Witness patients with hypersplenism (not present in our patients), the use of partial splenic artery embolism increased platelet count, allowing transplantation to proceed.[9,10] Transjugular intrahepatic portosystemic shunt formation has been less successful in reversing hypersplenism, and should not be used for this indication.[12] Jehovah's Witness patients with severe decompensated liver disease and coagulopathy (Child–Pugh score C), severe portal hypertension and renal failure are at high risk for perioperative mortality and should not receive liver transplantation.

Preoperative use of erythropoietin to increase haemoglobin levels has a number of potential benefits. The most obvious is that the patient begins the procedure with a higher blood haemoglobin level. This also enables use of haemodilution to minimise red cell loss during the explant procedure, and autotransfusion to raise the haematocrit after haemostasis is secure. Maintaining a low central venous pressure also decreases blood transfusion requirements during liver transplantation.[13] Although recombinant factor VIIa is expensive (average $6000 per patient), it reduces coagulopathy and transfusion requirements.[14] Overall, use of these blood conservation techniques may result in a cost benefit, compared with use of large volumes of blood product.[7,10]

Successful liver transplantation is possible in selected Jehovah's Witness patients, but early referral before the development of severe, decompensated liver disease is mandatory. Also, we believe that techniques that minimise blood loss and transfusion requirements for liver transplantation should be more widely practised to benefit all those undergoing major surgery.

Competing interests

None identified.

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(Received 16 Jan 2007, accepted 29 Apr 2007) ❑