Results of Surgery-Related Complications in Donors of Right Lobe Liver Graft: Analysis of 272 Cases

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ABSTRACT

Background. Living donor liver transplantation has been a new light of hope for patients with end-stage liver failure on the cadaveric waiting list. However, living donor liver transplantation still has ethical problems which cannot be overcome. Exposure of healthy donor candidates to major surgery which can be fatal is the largest of these ethical problems. In this study, we aimed to determine our rate of complications associated with surgery in donors who underwent right lobe donor hepatectomy.

Materials and Methods. Between September 2004 and December 2009, 548 liver donor candidates were examined. The right liver lobe donor hepatectomy was performed on 272 donor candidates who passed the elimination system. Demographic data as well as intraoperative findings, complication rates, and numbers were collected retrospectively. Donor complications were categorized according to the Clavien classification.

Results. Two hundred seventy-two donors who underwent right lobe donor hepatectomy were included in this study. One hundred sixteen (42.6%) of 272 donors were female, whereas 156 (57.4%) were male. There was no donor mortality. Grade 1 and grade 2 complications were observed in 105 (38%) of 272 donors. The most common complications were fever of unknown origin (20.9%) and prolonged hyperbilirubinemia (3.6%). Grade 3 complications and grade 4 complications were observed in 6 donors (2%) and 3 donors (1%), respectively. Three donors were underwent re-operation due to bleeding. The re-laparatomy rate in our series was detected as 1.10%. One donor, categorized as grade 4B according to the Clavien classification, had small bowel perforation and intra-abdominal sepsis secondary to mechanical bowel obstruction.

Conclusions. Donor mortality is a fact of living donor liver transplantation that cannot be ignored like donor morbidity. However, right liver lobe donor hepatectomy can be performed successfully with minimal complication rates with multidisciplinary and rigorous donor care in the preoperative and postoperative period.

IN 1989, the first successful living donor liver transplantation (LDLT) surgery gave a new hope to patients with end-stage liver failure who were on the cadaveric transplantation waiting list. In Asian countries, such as China, Japan, Korea, India, and Turkey, where the number of cadaveric donors is especially inadequate for religious reasons, liver transplantation is still conducted with living donors [1,2]. LDLT has distinct advantages compared to cadaveric liver transplantation, such as a directly available organ, the ability to perform surgery immediately after obtaining the liver transplant, and reduction of the occurrence of the primary organ dysfunction of short cold ischemia [3,4]. Despite all the advantages, LDLT has some ethical issues. The exposure of healthy donor candidates to

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major surgery which can be fatal is the greatest of these ethical problems. The chief concern of LDLT (described its' "Achilles' hell") is donor safety. "Primum non nocere" (first do no harm) must be the basis of all LDLT. Today, there are multiple donor hepatectomy procedures. Among donor hepatectomy procedures, right lobe donor hepatectomy has the highest complication rate. After the operation of right lobe donor hepatectomy, a mortality rate of approximately 2% has been reported [5,6]. In this article, we aim to present surgery-related complication rates in donor candidates who underwent right lobe donor hepatectomy.

MATERIALS AND METHODS

Donors and Preoperative Evaluation

Donor candidates passed a 3-step elimination system defined by James F. Trotter [7] and used in many transplantation centers. In our center, we are using a modification of Trotter's elimination system. Similarly, donor candidates must be between the ages of 18 and 60 years old and, according to hospital policy, the donor candidate must have a relationship with the recipient within the third degree of consanguinity. The potential donor candidates must be in excellent physical condition. In addition, donor candidates must be voluntary. In our center, donor candidates were evaluated by a team that included psychiatrists, psychologists, and psychiatric nurses after a detailed physical examination and medical examination. After the evaluation, in the case of detection of factors such as ambivalence, guilt, depression, substance abuse, fear of the future due to the economic concerns, family, and environmental pressure, the donor candidate is excluded from the elimination stages. Endoscopic retrograde cholangiopancreatography and hepatic angiography, which are performed as part of Trotter's elimination stages, are not applied routinely in our center. While the graft removed must be of sufficient size for the recipient, the most important feature of donor hepatectomy is that enough of the liver must remain after surgery so as to not cause liver failure in the donor. Therefore, in our center, volumetric measurements of the liver were performed preoperatively using computed tomography imaging methods [8]. The computed tomography procedure for identification of liver volumetry and hepatic vascular anatomy is as defined by Orguç et al [9]. The retro-reconstructed images were transferred to a dedicated workstation (GE Advantage Windows 2.0) for 3-D and volumetric studies. For each case, segmentation was constructed by a radiologist on the set of helical images to select liver parenchyma and suppress adjacent organs. Liver biopsy is not routinely performed in our center. Liver biopsy was only performed when the potential donor's body mass index was 28 or greater and when, in the presence of abnormal liver function test results, the recipient who was diagnosed with autoimmune hepatitis, primary sclerosing cholangitis, or primary biliary cirrhosis had a consanguine relationship with the donor [10,11]. However, the candidates who could pass all steps were accepted as living donors and underwent surgery.

Surgical Procedure

A bilateral low Kocher's incision was used with an upper midline limb up to and through the xiphisternum (Mercedes incision). Invasive monitorization including central venous catheterization, nasogastric tube, arterial line, and urethral catheterization is applied to all donors undergoing right lobe liver hepatectomy. First-generation cephalosporin (cefazolin sodium, 1 g) is used for antibiotic prophylaxis. For right lobe donor hepatectomy, after the mobilization of the right lobe, the right inferior and short hepatic veins were ligatured, starting from the caudal face toward the right hepatic vein, and dissected from the liver vena cava. With the insertion of the penrose drain from the avascular tunnel, placed between the inferior vena cava and the liver, the liver hanging maneuver known as "liver hanging" (defined by Belghiti) was performed [12]. Hilar dissection began with the dissection of the Calot triangle. After cholecystectomy, a stent, which allows the performance of intraoperative cholangiography, was placed in the cystic duct. The right portal vein and right hepatic artery were dissected and suspended. In our center, hepatic artery and the portal vein variations are not contraindications to donation. For cases in which the segment 4 artery is derived from right hepatic artery, the right hepatic artery is cut from the distal part of the distinction of the segment 4 artery to avoid ischemia [13,14]. For the determination of the transection line, the right portal vein and right hepatic artery were temporarily clamped. To minimize blood loss during transection, central venous pressure is maintained at less than 5 mm Hg. For parenchymal transection, a crush clamp technique was applied to all the donors. Donor safety is a priority, but in some situations, such as when the right hepatic vein diameter is small, the remnant liver volume is more than 30%, or separate venous drainage of segment 4 is detected, the middle hepatic vein can be included in the graft to allow lesser hepatocyte damage and obtain better early graft function [15]. After parenchymal transection, intra-operative cholangiography was performed and the location of the bile duct transection was determined. Similar to the vascular system, biliary anatomic variations other than biliary hypoplasia (Alagille syndrome) do not prevent a candidate from becoming a donor in our center [16]. Low-dose heparin (dalteparin sodium injection; Pharmacia, Canada, 60 U/kg) was systemically applied before removal of the graft. The graft was perfused through the portal vein with histidine-tryptophan-ketoglutarate solution while removed from the abdomen.

Postoperative Care

As in all major surgery, the hepatectomy donors were monitored closely during the postoperative period. A nasogastric tube inserted during the operation was removed when bowel movements became normal. Prophylactic antibiotic administration that was started during the perioperative period was usually stopped in the 24th hour of the postoperative period. The devices applying intermittent compression on the lower extremities were maintained until the donor became mobile. During the first week, when remnant liver regeneration is the fastest, liver function tests (aspartate transaminase [AST], alanine transaminase [ALT], alkaline phosphatase, gamma glutamyl transferase, total and direct bilirubin, and prothrombin time), renal function tests (urea, creatinine), blood electrolytes (sodium, potassium, calcium, chloride), and complete blood count parameters were checked on a daily basis. On the 1st and 7th days after surgery, abdominal Doppler ultrasonography was performed to determine the blood flow of the remnant liver and intra-abdominal collections. Donors come to the controls after being discharged from the hospital at the 1st, 2nd, 3rd, 6th, and 12th months of the operation. The routine controls are often finished after the first year.

Statistical Analysis

Data analysis was performed using SPSS for Windows, version 17. Categorical variables were expressed as frequencies and percentages. Continuous data were presented as mean. The differences