Complications in Donors Using Right Liver Graft: Analysis of 280 Consecutive Cases

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ABSTRACT

Introduction. Living donor liver transplantation (LDLT) is performed with increasing frequency worldwide due to the shortage of donated organs. It is a life-saving procedure for the recipient, but, on the other hand, a major surgical procedure for healthy donors and it may cause morbidity and even mortality.

Patients and Methods. This research was completed at Dokuz Eylül University Faculty of Medicine Hospital General Surgery Department Liver Transplant Unit and included 280 cases (4 with simultaneous liver and kidney transplants from living donors) who underwent donor right hepatectomy for LDLT from June 2000 to June 2016. We analyzed the data of patients retrospectively.

Results. Of 280 donor right hepatectomies for LDLT, 181 were male (M; 64.6%) and 99 were female (F; 35.4%) (M/F: 1.82). Mean donor age was 31.2 ± 0.9 years (range, 18–56). Mean donor monitoring duration was 45 ± 2.4 months (range, 3–192 months). Mean body mass index (BMI) was 24.28 ± 2.96 kg/m^2 (range, 18.1–32.42 kg/m^2). In our study 72 cases (25.7%) developed postoperative complications. There were 17 Clavien grade 3A, 1 grade 3B, and 5 grade 4A complications and also 1 death due to pulmonary embolism.

Conclusion. Together with the increase in living donor surgery, the morbidity and mortality of these cases are becoming controversial. Full donor safety is only possible with appropriate donor choice requiring very detailed studies, a problem-free hepatectomy process, and close postoperative donor monitoring.

IN recent times the gold standard for treatment of liver failure is liver transplantation. However, in countries with limited organ donation, the majority of patients lose their lives while on waiting lists. The first successful living donor liver transplantation (LDLT) in 1989 has become a new source of hope for patients with liver failure in recent times.

LDLT has three superior features for recipients compared with cadaver transplantation. First, with LDLT the transplantation can occur within a short time frame, thus the morbidity and mortality that may occur during the waiting period is prevented. Second, living donor livers have better quality than cadaver donor livers because the living donors undergo broader more comprehensive medical investigations. The other advantage is that the cold ischemic duration is significantly shorter in LDLT. In theory this advantage should reduce primary graft dysfunction. Although LDLT is a potentially life-saving operation for the recipient, it is a major surgical procedure applied to healthy donors and does not provide any direct therapeutic advantage. Donor operations involve some ethical problems due to the major morbidity and mortality that may occur later [1].

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In spite of this in Asian and some European countries, like China, Japan, Korea, India, and Turkey, where cadaver organ donation is insufficient, LDLT is still important [2–4].

As a result, LDLT is only completed in situations where a reasonable result can be gained for the recipient when the donor risk is considered. The only advantage of this procedure for the donor is the psychological satisfaction of helping to save a close loved one. So, the safety of the healthy donor is the most important condition and if possible the donor hepatectomy surgery has to be completed with no mortality or minimum morbidity.

However, over time the increase in the amount of LDLTs performed has led to an increase in donor mortality and morbidity. To date, 23 donor deaths have been reported. Several donors have required liver transplantation after developing liver failure after liver donation [5].

The aim of this single-center study in Turkey was to assess the complications linked to surgical factors such as donor hepatectomy type and remaining liver percentage and to report a donor death occurring due to liver transplantation from a living donor.

MATERIALS AND METHODS

This study is a retrospective cohort study. The research was completed at Dokuz Eylül University Faculty of Medicine Hospital General Surgery Department Liver Transplant Unit and included 280 cases (4 with simultaneous liver and kidney transplants from living donors) that underwent donor right hepatectomy for LDLT from June 2000 to June 2016. Donor surgeries were all performed by the same team. The information relating to demographic characteristics, surgical procedures, and postoperative monitoring of donors was retrospectively collected. Donors were first-, second-, or third-degree relatives of recipients or individuals with suitability approved by the organ donation ethics committee. The donors' age, height, weight, body mass index (BMI), blood group suitability, additional diseases, previous hepatitis, liver volume measurements, if necessary liver biopsy results, hepatectomy percentage, surgery type, surgery duration, peroperative blood and blood unit transfusion, and peroperative cholangiography results of bile duct anatomy were investigated. On the postoperative first and seventh days aspartate aminotransferase (AST), alanin aminotransferase (ALT), total bilirubin, direct bilirubin, international normalized ratio (INR), and hemoglobin values were recorded. Complications occurring were categorized according to the Clavien classification [6] (Table 1 and Table 2).

Preoperative Assessment of Live Liver Donors

Donor candidates with diabetes mellitus, hypertension, or other serious medical disease were definitively excluded from liver donation. Donors were assessed in four stages. At each stage informed consent was obtained. Donors were informed they could refuse to continue at any time. In the first stage, donor candidates, recipients, and their families were fully informed about liver donation, liver donor hepatectomy surgery, postoperative progress, risks, complications, and monitoring. At our clinic, donors who are not related received liver donation suitability permission from the Transplantation Ethics Committee. In the second stage of donor assessment, blood group, BMI calculation, anamnesis, physical examination, psychiatric evaluation, full blood count, liver and kidney biochemical tests, coagulation profile, serological testing for human immunodeficiency virus (HIV), cytomegalovirus, hepatitis B, and C, electrocardiography, and lung graphics were assessed. Additionally, if considered necessary by the clinician investigating donor characteristics, selective tests like respiratory functions tests and cardiac stress tests were completed. For donors to continue it was necessary that the donor candidate blood group be the same as or be compatible with the recipient blood group and that the donor candidates not carry HIV and hepatitis B and C viruses. Those with BMI <30 and with no disease identified during investigations were

Table 1. Classifications of Complications According to the Clavien System

Grade 1	Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions. Allowed therapeutic regimens are drugs as antiemetics, antipyretics, analgesics, diuretics, electrolytes, and physiotherapy. This grade also includes wound infections opened at the bedside.
Grade 2	Complications requiring pharmacological treatment with drugs other than such allowed for grade 1 complications. Blood transfusions and total parenteral nutrition are also included.
Grade 3	Complications requiring surgical, endoscopic, or radiological intervention.
• Grade 3A	Intervention not under general anesthesia
• Grade 3B	Intervention under general anesthesia
Grade 4	Life-threatening complications (including central nervous system complications) requiring intensive care unit stay.
• Grade 4A	Single organ dysfunction (including dialysis)
• Grade 4B	Multiorgan dysfunction
Grade 5	Death of the patient

Table 2. Postoperative Complications According to Clavien Classification

Clavien Classification	Intraoperative Complications	Count	%
Grade 1	Fever of unknown origin	11	3.92
	Atelectasis	9	3.21
	Pleural effusion	7	2.5
	Minor bile leakage (treated conservatively)	13	4.64
Grade 2	Perioperative blood transfusion necessity	2	0.71
	Pneumonia	5	1.78
Grade 3A	Thorax tube placement (due to pleural effusion)	4	1.42
	Bile leakage treated with		
	PTC	9	3.21
	ERCP	2	0.71
	PTC + ERCP	2	0.71
Grade 3B	Incisional hernia requiring operative repair	1	0.35
	Intra-abdominal bleeding (with necessity of foreign blood unit transfusions)	2	0.71
Grade 4A	Liver failure (temporary)	5	1.78
Grade 4B		0	0
Grade 5	Death of the patient	1	0.35

Abbreviations: PTC, percutaneous transhepatic cholangiography; ERCP, endoscopic retrograde cholangiopancreatography.