

Elderly Living Donor Liver Transplant Recipients Over 60 Years Old at a Japanese Single Center

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ABSTRACT

Background. Among living donor liver transplant (LDLT) recipients, the number of elderly individuals has been increasing because of longer survival due to the improvement of treatment for hepatic diseases such as hepatitis C (HCV). Here we report the outcomes of living donor recipients over the age of 60 years.

Materials and Methods. In 76 adult LDLT patients at our institution before September 2015, there were 21 recipients over 60 years old. We divided all of the recipients into 2 groups (“elderly” recipient group >60 years of age [n = 21], and a “nonelderly” recipient group <60 years [n = 55]), and we investigated outcomes in each group.

Results. The graft survival rates in the elderly group were 89.9% at 1 year, 89.9% at 3 years, 83.0% at 5 years, and 83.0% at 10 years. The graft survival rates in the nonelderly group was 91.1% at 1 year, 85.2% at 3 years, 82.8% at 5 years, and 82.9% at 10 year. There was no significant difference between the 2 age groups. In the elderly group, 3 patients died (2 patients had HCV recurrence and 1 patient had fungal infection in the brain, leading to a fatal subarachnoid hemorrhage). In the nonelderly group, 4 of 10 patients died of graft failure due to the graft size being too small.

Conclusion. Elderly patients, at the end stage of liver failure, are likely very frail and may have latent infections. Careful examination for latent infections before LDLT should be carefully performed in regard to indications for LDLT, which might reach satisfactory outcomes as in nonelderly LDLT recipients. Even if elderly patients are approved for transplantation, very careful management is needed.

RECENTLY, survival of patients with end stage liver disease (ESLD), especially with hepatitis C (HCV) cirrhosis, have been increasing, owing to the development of various antiviral therapies, and as a result, a growing number of liver transplant recipients are elderly. However, the optimal living donor liver transplantation (LDLT) indication, with regard to age, is still controversial [1,2]. LDLT has been shown to be inferior to total liver transplantation from cadaveric donor [1,2]. Insufficient immune activity of partial liver often results in critical infectious diseases that become life threatening, especially in elderly patients, who sometimes have latent infectious disease. Older transplantation candidates arguably undergo more stringent evaluation and consideration before transplantation in an effort to select those most appropriate to proceed to transplantation. The aim of this study was to evaluate the outcomes of nonelderly

and elderly LDLT recipients. In addition, we aimed to determine the significance of LDLT indication criteria that excluded patients with poor physical status and that selected the larger right lobe when the remaining left lobe would have been be more than 35% of total liver volume.

MATERIALS AND METHODS

Patients

Between September 2003 and September 2015, a total of 76 adult patients underwent primary LDLT at Kyoto Prefectural University

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of Medicine Hospital. Among all living donors, 21 were considered elderly, defined here as over 60 years of age. The recipients were classified into 2 groups: those over 60 years of age (elderly recipient group, $n = 21$) and those under 60 years (nonelderly recipient group, $n = 55$). Characteristics of the recipients are summarized in Table 1. We evaluated the outcomes of LDLT in elderly recipient group in terms of graft survival, rejection rate, and perioperative complications compared with the nonelderly recipient group (Table 2). The severity of adverse events was defined as follows: 1) mild, requiring neither hospitalization nor treatment; 2) moderate, requiring no hospitalization but treatment; and 3) severe, requiring hospitalization, life-threatening, or fatal.

Selection Criteria

Our selection criteria for performing LDLT for elderly recipients over 60 years were as follows: (1) the ability to walk (patients with abasia ambulating with a handcart were excluded from the indication of transplantation) (2) no latent infectious disease found before transplantation as determined by adequate testing; and (3) no aneurism in brain found before transplantation. Graft weight was predicted by computed tomography volumetric analysis. Our

Table 1. Baseline Demographics and Clinical Characteristics of Living Donor Liver Transplant Recipients

Variables	Nonelderly Recipient Group (n = 55)	Elderly Recipient Group (n = 21)	P Value
Recipient characteristics			
Age, y, mean \pm SD	50.2 \pm 8.8	63.9 \pm 3.8	<.001
Male sex, n (%)	27 (49.1)	9 (42.9)	NS
Primary disease, n (%)			
Liver cirrhosis with or without cancer			
Hepatitis C	37 (67.3)	14 (66.7)	NS
Hepatitis B	6 (10.9)	2 (9.5)	NS
Non-B non-C	6 (10.9)	2 (9.5)	NS
Primary biliary cirrhosis	4 (7.3)	2 (9.5)	NS
Primary sclerosing cholangitis	2 (3.6)	0 (0)	
MELD score			
MELD score >20, n (%)	13 (23.6)	3 (14.3)	.031
Diabetes mellitus, n (%)	6 (10.9)	1 (4.8)	.029
Operation time (min)	843	854	NS
Blood loss (mL)	6199	6651	NS
Donor characteristics			
Age, y, mean \pm SD	41.8 \pm 12.9	42.0 \pm 11.7	NS
Male sex, n (%)	26 (47.3)	10 (47.6)	NS
Graft (left/right)			
Right lobe, n (%)	28 (50.9)	14 (66.7)	.049
Left lobe, n (%)	27 (49.1)	8 (33.3)	.049
GW/RW ratio (%)	0.75 \pm 0.9	0.89 \pm 0.6	.048
ABO blood type			
Incompatible, n (%)	6 (10.9)	2 (9.5)	NS
Relationship to donor			
Child, n (%)	25 (45.5)	14 (66.7)	.038
Sibling, n (%)	12 (21.8)	3 (14.3)	.038
Spouse, n (%)	13 (23.6)	4 (19.0)	NS
Parents, n (%)	5 (9.1)	0 (0)	

Continuous variables are expressed as the mean \pm standard deviation (SD). Categorical variables are expressed as number (%).

Abbreviations: MELD, Model for End-Stage Liver Disease; GW/RW, graft weight/recipient weight; NS, not significant.

Table 2. Graft Survival, Adverse Events, and Causes of Death in Living Donor Liver Transplant Recipients, by Age Group

Variables	Nonelderly recipient group (n = 55)	Elderly recipient group (n = 21)	P Value
Acute cellular rejection, n (%)	13 (23.6)	5 (23.8)	NS
Cumulative graft survival rate			
1 y after transplantation	91.1	89.9	NS
3 y after transplantation	85.2	89.9	NS
5 y after transplantation	82.8	83.0	NS
10 y after transplantation	71.2	83.0	NS
Adverse event*			
Mild, n (%)	36 (65.5)	11 (52.4)	NS
Moderate, n (%)	11 (20)	7 (33.3)	NS
Severe, n (%)	3 (5.5)	1 (4.8)	NS
Cause of death			
	n = 10	n = 3	
HCC recurrence, n (%)	1 (10)	0 (0)	
HCV recurrence, n (%)	3 (30)	2 (66.7)	.022
Fungal infection	1 (10)	1 (33.3)	<.001
Graft failure	4 (40)	0 (0)	
Unknown	1 (10)	0 (0)	

Abbreviations: NS, not significant; HCC, hepatocellular carcinoma; HCV, hepatitis C virus.

*Severity of adverse events was defined as follows: 1) mild, requiring neither hospitalization nor treatment; 2) moderate, requiring no hospitalization but treatment; and 3) severe, requiring hospitalization, life-threatening, or fatal.

decision about graft type for elderly recipients was selected as follows: (1) remnant liver volume of donor would be required to be more than 35% of previous total liver volume; (2) graft weight/recipient weight (GW/RW) ratio would be required to be more than 0.7% for recipients; and (3) a larger right lobe available for selection when more than 35% of the total liver volume in the left lobe as possible.

Immunosuppressants

The immunosuppressive protocol was a tacrolimus-based regimen with corticosteroid in all cases. Tacrolimus was titrated to target trough levels of 8 to 10 ng/mL, slightly lower than usual in consideration of patient's older age. Corticosteroid use was suspended 3 to 6 months after transplantation.

Statistical Analysis

The significance of differences between the groups was determined by the χ^2 test or the unpaired Student *t* test. Survival was calculated by the Kaplan-Meier product-limited method, and the differences in survival between the groups were then compared using the log-rank test. A multivariate analysis (Cox stepwise regression) was performed to identify the risk factors associated with the survival of less than 1 year and with death more than 1 year after LDLT. Pretransplantation variables that were used for the analysis included recipient age, recipient sex, donor sex, donor age, presence of consanguinity between donor and recipient, presence of existing diabetes mellitus (DM), presence of HCV, presence of hepatocellular carcinoma (HCC), Model For End-Stage Liver Disease (MELD) score, graft type, and GW/RW. Data are reported as mean \pm standard deviation (SD). Two-tailed values of $P < .05$ were considered to indicate statistical significance. All statistical analyses were performed using SPSS version 11.0J (SPSS Inc, Chicago, IL).

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