Results of Liver Transplantation From Old Donors

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ABSTRACT

Introduction. Faced with a shortage of organs for liver transplantation, the use of grafts from older donors is justified. However, there remains little consensus on how this use impacts the graft and patient outcomes after transplantation from these older donors. The aim of the present analysis was to assess the graft and patient outcomes after liver transplantation from deceased donors >60 years of age.

Methods. From January 2007 to January 2011, 505 subjects were identified as liver graft donors after brain death, of which 7.35% were ≥60. To determine the effect of donor age on graft and patient outcomes, we analyzed donor age, recipient age, the Model for End-State Liver Disease (MELD) score of recipients at the time of transplantation, early posttransplant complications, and mortality.

Results. The posttransplant follow-up was 29 ± 25.5 months, and 3-year patient mortality from donors, grouped according to age, was 7.92% with donors <30; 15.78% with donors 30−50, 10.68% with donors 50−60, and 12.50% with donors >60. After analysis of patient and graft survival based on donor graft age, 3-year patient survival according donor age was 89.29% with donors <30, 83.85% with donors 30−50, 89.89% with donors 50−60, and 87.50% with donors >60. Analysis showed overall patient and graft survival rates from older donors were not worse than those from younger donors ($P > .1$). Among the cases, 3-year patient survival according to MELD score was 91.19% with a MELD of I, 85.37% with a MELD of II, and 67.67% with a MELD of III; differences in graft and patient survival when comparing low MELD I and high MELD III were significantly different ($P < .01$).

Conclusions. A more advanced age of a donor should not be a contraindication for liver transplantation. The present analysis shows that liver grafts from donors >60 can be used safely in older recipients who presented with relatively low MELD scores. Analyses also indicate that high MELD obtained before transplantation may be an important prognostic factor for graft and patient survival.

OVER the last decade, a growing number of advanced-age recipients and organ shortages have caused a steady increase in liver transplantation from older donors. A shortage of deceased donors remains among the main factors that significantly limits the increasing number of liver harvesting taking place in Eastern Europe. In Poland from 1999 to 2005, older donors were considered to be worse candidates than younger donors, and they were excluded from organ harvesting or regarded as "marginal donors." Since 2006, we have changed our policies and older donors have become an alternative to overcome the shortage of organs. Based on our experience, transplant patients who have received "marginal organs" from older donors had similar initial graft function parameters as patients who received organs from younger donors; therefore, we have accepted older donors in routine procedures. The Model for End-Stage Liver Disease (MELD) was introduced in Poland in 2005. Since then, it has remained the main selection

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criterion for patients waiting for liver transplantation in our department. The aim of present analysis is to assess the graft and patient outcomes after liver transplantation from deceased donors >60 years old in relation to MELD score.

MATERIAL AND METHODS

From January 2007 to January 2011, 505 subjects were identified as whole liver graft donors after brain death, of which 435 were included in the analysis. Among them 23.21% were <30 years, 39.30% were between 30 and 50 years, 30.11% were between 50 and 60 years, and 7.35% were >60 years old.

Liver transplantations were performed using the piggyback technique without venovenous bypass. The 3-year patient survival was the primary endpoint for this study, and was calculated according to the date of transplantation, patient death, retransplantation, or last investigation.

Retransplantations were excluded from the analysis of patient survival. Patients were divided according to donor age and MELD. The characteristics of patients and donors are shown in Table 1. The donor and recipient breakdown according to gender and body mass index is shown in Table 2, with no differences between groups ($P > .05$) using analysis of variance. MELD classification of donors is shown in Table 3. The standard MELD estimation was calculated as follows:

$$MELD = (3.8 \times \ln[\text{serum bilirubin (mg/dL)}]) \\ + (11.2 \times \ln[\text{INR}]) \\ + (9.6 \times \ln[\text{serum creatinine (mg/dL)}]).$$

The Kaplan-Meier method was used to illustrate survival within groups. To obtain patient and graft survival estimators, Kaplan-Maier table analysis was performed using STATISTICA version 9.1. The graft and patient survival were calculated within a 1- to 48-month period. We included the following factors in our analysis: Donor age, recipient age, MELD of recipients at the time of transplantation, earlier complications, and mortality. In our statistical analysis, we specifically compared the following age groups: <30 versus 30–50 years, <30 versus 50–60 years, and <30 versus >60 years using a log-rank test (threshold of P value <.05).

RESULTS

The median time posttransplant follow-up was 29 ± 25.5 months, and 3-year patient mortality from donors grouped according to age was 7.92% with a donor <30, 15.78% with a donor 30–50, 10.68% with a donor 50–60, and 12.50% with a donor >60 years old. After analysis of patient and graft survival by donor graft age, the 3-year patient survival according donor age was: 89.29% with a donor <30, 83.85% with a donor 30–50, 89.89% with a donor 50–60, and 87.50% with a donor >60 years old (Fig 1B). Statistical analyses showed overall patient and graft survival rates from older donors were not significantly worse than those from younger donors ($P > .1$). Among the cases, 3-year patient survival according to MELD was the following: 91.19% for MELD I, 85.37% for MELD II, and 67.67% MELD III (Fig 2B); differences in graft and patient survival when comparing low MELD I and high MELD III were significant ($P < .01$; Fig 2).

DISCUSSION

At present, liver transplantation from older donors is the only strategy available to increase the number of transplanted organs and thus shorten the waiting time for transplant recipients. The discussion regarding the risk of this type of organ transplantation has been pursued for many years, both at the biochemical and histopathologic levels, as well as through the long-term experiences of patients. Many factors directly influence the results of transplantation, and one of the most important is the quality of

Table 2. Comparison and Matching of Donor and Recipient by Age Groups

Characteristic	Age Group (y)			
	<30	30–50	51–60	>60
Age				
Mean donor age (y)	22.24	40.9	54.97	64.06
Mean recipient age (y)	43.6	44.42	47.46	49.41
P	.15	.18	.28	.12
Gender				
Donor gender (men/women)	58/43	79/92	52/79	13/19
Recipient gender (men/women)	45/56	83/88	62/69	18/16
P	.14	.32	.98	.41
BMI				
Mean donor BMI	22.24	27.08	28.31	26.31
Mean recipient BMI	25.66	28.52	29.46	25.98
P	.21	.45	.34	.18

Abbreviation: BMI, body mass index.

Table 1. Characteristics of the Donor and Recipient of 435 Complete Liver Transplantations After Brain Death of Donor

Characteristic	Donor Age (y)				Total
	<30	30–50	51–60	>60	
Patients, n (%)	101 (23.21)	171 (39.30)	131 (30.11)	32 (7.35)	435 (100)
Recipients age (y)	43.6 ± 14.37	44.42 ± 12.72	47.46 ± 10.86	49.41 ± 9.19	44.71 ± 13.06
Donor age (y)	22.24 ± 4.5	40.9 ± 6.28	54.97 ± 2.71	64.06 ± 2.73	41.52 ± 14.1
Cold ischemia time (min)	527 ± 110	538 ± 115	529 ± 117	581 ± 110	535 ± 114
MELD score	15.6 ± 8.3	18.2 ± 11.2	17.5 ± 11.4	19.6 ± 11.78	—
Deaths, n (%)	9 (8.91)	26 (15.20)	15 (11.45)	4 (12.5)	54 (12.41)
Retransplantation, n (%)	3 (2.97)	3 (1.75)	7 (5.34)	3 (9.37)	16 (3.67)

Abbreviation: MELD, Model for End-Stage Liver Disease.
Values are given as mean values ± standard deviation unless otherwise noted.