

Early graft dysfunction and mortality rate in marginal donor liver transplantation

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Background/aim: To determine the effect of marginal donor livers on mortality and graft survival in liver transplantation (LT) recipients.

Materials and methods: Donors with any 1 of following were considered marginal donors: age ≥ 65 years, sodium level ≥ 165 mmol/L and cold ischemia time ≥ 12 h. Donors were classified according to the donor risk index (DRI) < 1.7 and ≥ 1.7 . The transplant recipients' model for end-stage liver disease (MELD) scores were considered low if < 20 and high if ≥ 20 . Early graft dysfunction (EGD) and mortality rate were evaluated.

Results: During the study period 47 patients underwent cadaveric LT. The mean age of the donors and recipients was 45 years (range: 5–72 years) and 46 years (range: 4–66 years), respectively. In all, there were 15 marginal donors and 18 donors with a DRI > 1.7 . In total, 4 LT patients that received livers from marginal donors and 5 that received livers from donors with a DRI ≥ 1.7 had EGD. Among the recipients of marginal livers, 5 died, versus 4 of the recipients of standard livers. There was no significant difference in EGD or mortality rate between the patients that received livers from marginal donors or those with a DRI ≥ 1.7 and patients that received standard donor livers.

Conclusion: Marginal and DRI ≥ 1.7 donors negatively affected LT outcomes, but not significantly.

Key words: Marginal donor, cadaveric liver transplantation, early graft dysfunction, mortality

1. Introduction

Despite efforts in Turkey in recent years to increase the number of donated organs, the goal has not been met. As such, donor criteria for liver transplantation (LT) have been expanded and marginal donors are being used with increasing frequency; however, with the use of marginal donors postoperative complications in recipients and graft survival have become problematic. The model for end-stage liver disease (MELD) score is used as a basic criterion for the distribution of organs among those with end-stage liver disease in Turkey, the US, and many European countries, which is also the most important predictor of mortality among those on liver transplant waiting lists (1).

The donor risk index (DRI) is a scoring system developed by Feng et al. (2). The index includes donor and transplantation parameters that affect LT outcomes, including donor age, height, race, cause of death, cardiac arrest status, organ localization, presence or absence of split graft, and cold ischemia time (2). The present study aimed to determine the effect of marginal donor livers on mortality and graft survival in LT recipients.

2. Materials and methods

The records of patients that underwent LT at Uludağ University between December 2007 and May 2012 were retrospectively examined. Those that received living donor organs were excluded.

Donors with any 1 of the following were considered marginal: age ≥ 65 years, sodium level ≥ 165 mmol/L, and cold ischemia time ≥ 12 h. DRI was also calculated for each donor and scores were grouped as DRI score ≥ 1.7 and < 1.7 . Recipients were grouped as low-MELD score (< 20) and high-MELD score (≥ 20). Patients that underwent LT were evaluated during the postoperative period for early graft dysfunction (EGD), graft, and recipient survival rates. EGD was defined based on ≥ 2 of the following postoperative laboratory findings: bilirubin level 10 mg/dL on postoperative day 7, INR ≥ 1.6 , and AST and ALT levels > 2000 IU/L for the first 7 postoperative days. Graft damage was defined as the need for re-transplantation within 6 months of transplantation or recipient mortality. Differences between recipient groups were analyzed using the chi square test. The level of statistical significance was set at $P < 0.05$.

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3. Results

In total, 47 patients underwent LT during the study period. Mean donor age was 45 years (range: 5–72 years). Table 1 shows donor age, sodium level, cold ischemia time, and DRI score. Among the donors, 15 were marginal and 18 had a DRI ≥ 1.7 . Among the LT recipients, 10 had EGD and 9 died. In all, 15 LT recipients received livers from marginal donors; 4 of them developed EGD and 5 died. Mortality also occurred in 2 of the 11 LT recipients that received livers from marginal donors but did not develop EGD. Among the 32 LT recipients that received livers from standard donors, 6 developed EGD and 4 died. EGD occurred in 5 of the 18 LT recipients whose donors had a DRI ≥ 1.7 and 4 of these recipients died; only 1 patient that developed EGD did not die.

There was no difference in risk of developing EGD between the LT recipients that received livers from standard and marginal donors ($P = 0.71$), or between those that received livers from donors with a DRI ≥ 1.7 and < 1.7 ($P = 0.50$). The mortality rate, however, was slightly higher in the LT recipients that received livers from marginal donors. Twenty-seven of the 47 patients who underwent LT were high-DRI low-MELD or low-MELD high-DRI

patients. Although 16 LT recipients had a low MELD score and a donor with a DRI < 1.7 , only 4 LT recipients had a high MELD score and a donor with a DRI ≥ 1.7 . EGD developed in 3 LT recipients with a low MELD score and a donor with a DRI ≥ 1.7 , and in 4 LT recipients with a low MELD score and a donor with a DRI < 1.7 . In total, 75% of the LT recipients that developed EGD and died, and 50% of those that did not develop EGD and died had a low MELD score and a donor with a DRI ≥ 1.7 (Table 2).

4. Discussion

The use of marginal donors is increasing in the US and currently accounts for nearly 24% of all transplants (3). The use of marginal donors has a negative effect on graft survival; however, Goldaracena et al. reported that early and late transplantation results are similar in both marginal and ideal donors (4). Similarly, Frühauf et al. did not observe a significant effect of DRI and marginal donors on graft survival in LT recipients, based on Cox's multiple regression analysis and exclusion of the age factor (5). Likewise in the present study there was not a difference in EGD or mortality between the LT recipients whose donors had a DRI ≥ 1.7 and < 1.7 .

Early studies have examined the effects of MELD scores and DRI on graft survival following LT. Bonney et al. observed that the graft survival rate was lower in recipients whose donors had a DRI ≥ 1.7 than in those whose donors had a DRI < 1.7 in patients who also had low < 15 or medium (15–30) MELD scores. In the present study, graft survival was similar in LT recipients with a high MELD score (> 30), regardless of donor DRI (6); however, no differing effects of DRI were seen by Maluf et al. in recipient patients who had different MELD scores (7). Another study reported that among patients with MELD scores > 20 the 1-year survival rate was higher in patients that received livers from marginal donors than in those whose donors were considered to be ideal (8). In the present study, 5 of 14 LT recipients with a low MELD score and a donor with a DRI ≥ 1.7 died, whereas only 1 of 13 LT recipients with a high MELD score and a donor with a DRI < 1.7 died. Based on evaluations of MELD scores and

Table 1. Donor data.

	n
Age (years)	
<65	40
≥ 65	7
Serum Na ⁺ level	
<165 mmol/L	43
≥ 165 mmol/L	4
DRI	
<1.7	29
≥ 1.7	18
Cold ischemia time	
<12 h	41
≥ 12 h	6

Table 2. Distribution of MELD and DRI scores, according to EGD and mortality.

	DRI ↓ MELD ↓	DRI ↑ MELD ↑	DRI ↑ MELD ↓	DRI ↓ MELD ↑
EGD (+) Mortality (+)	n: 1	n: 1	n: 3	n: 0
EGD (+) Mortality (-)	n: 3	n: 1	n: 0	n: 1
EGD (-) Mortality (+)	n: 1	n: 0	n: 2	n: 1

DRI, there was no significant difference between groups with respect to the development of EGD or mortality.

Although the mortality and EGD rates were higher in the present study's LT recipients with marginal donors, the rates did not differ significantly from those of the LT

recipients with standard donors. Our protocol for cadaveric LT is to match donors with a DRI ≥ 1.7 with recipients that have low MELD scores, which may be why in the present study there was not a difference in the development of EGD relating to recipient MELD score and donor DRI.

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