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A High Model for End-stage Liver Disease Score Should Not Be Considered a Contraindication to Living Donor Liver Transplantation

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ABSTRACT

Objective. To analyze the outcomes of patients with high Model for End-Stage Liver Disease (MELD) scores who underwent adult-to-adult live donor liver transplantation (A-A LDLT).

Materials and Methods. From September 2002 to October 2010, a total of 152 adult patients underwent A-A LDLT in our institution. Recipients were stratified into a low MELD score group (Group L; MELD score ≤30) and a high MELD score group (Group H; MELD score >30) to compare short-term and long-term outcomes.

Results. Of the 152 adult patients who underwent A-A LDLT, 9 were excluded from the analysis because they received ABO-incompatible grafts. Group H comprised 23 and Group L 120 patients. The median follow-up was 21.5 months (range, 3 to 102 m). The mean MELD score was 15.6 in Group L and 36.7 in Group H. There were no significant differences in the mean length of stay in the intensive care unit (Group L: 3.01 days vs Group H: 3.09 days, $P = .932$) or mean length of hospital stay (Group L: 17.89 days vs. Group H: 19.91 days, $P = 0.409$). There were no significant differences in 1-, 3-, or 5-year survivals between patients in Groups L versus H (91.5% vs 94.7%; 86.4% vs 94.7%; and 86.4% vs 94.7%; $P = .3476$, log rank).

Conclusion. The short-term and long-term outcomes of patients with high MELD scores who underwent A-A LDLT were similar to those of patients with low MELD scores. Therefore, we suggest that high MELD scores are not a contraindication to LDLT.

DECOMPENSATED liver cirrhosis is associated with a poor prognosis; liver transplantation provides the only curative treatment option with excellent long-term results. The Model for End-stage Liver Disease (MELD) system is a formula based on objective laboratory data. This good tool to predict short-term mortality among cirrhotic patients has also been applied to allocate liver grafts to patients on waiting lists in the United States and several other countries.[1]

Patients with United Network of Organ Sharing (UNOS) status 2A show a poor prognosis after live donor liver transplantation (LDLT).[2] In 2002, the New York State Committee on Quality Improvement in Living Liver Donation prohibited live liver donation for potential recipients with MELD scores greater than 25. Although a few studies have reported that pre-transplantation MELD scores correlate with the outcome of transplantation,[3–6] other reports have described MELD scores to not be superior to other

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0041-1345/12/$–see front matter
doi:10.1016/j.transproceed.2012.02.006

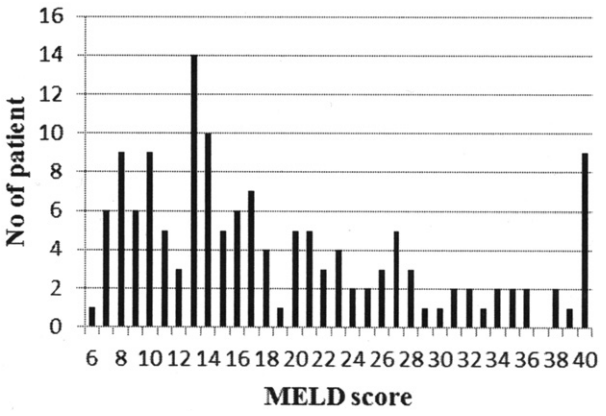

Fig 1. Distribution of MELD score among 143 recipients.

models for predicting transplant outcomes.[7–8] The relationship between pre-transplantation MELD scores and LDLT outcomes is still controversial. Because of the severe shortage of cadaveric liver grafts in Asian countries, LDLT is often the only option for patients with high MELD scores. In this study, we evaluated the morbidity rate and postoperative survival among patients with high MELD scores who underwent adult-to-adult live donor liver transplantation (A-A LDLT) at a single medical center in Taiwan.

PATIENTS AND METHODS

We retrospectively analyzed our prospective database containing all A-A LDLT procedures performed in patients with end-stage liver disease (ESLD) with or without HCC from September 2002 to October 2010. Approval from our ethics committee and informed consent was obtained from donors, recipients and their corresponding relatives.

The operative procedures were similar to those performed in other major medical centers.[9] More specifically, we routinely used the right lobe of liver with the middle hepatic vein in the donor graft. For the recipient, we employed a continuous single running suture with the parachute technique for hepatic artery reconstruction, which was performed by a cardiovascular surgeon using 4.5 × magnified surgical loupes. All recipients were sent to the surgical intensive care unit (ICU) for immediate post-transplantation care.

Pre-transplant international normalized ratios (INR), bilirubin levels, and creatinine concentrations were used to calculate the MELD scores. No additional MELD points were assigned for the presence of hepatocellular carcinoma. The recipients were stratified into one of two groups based on their MELD score: Group L (MELD score ≤30) or Group H (MELD score >30). The factors used to determine surgical outcomes included operative time, blood loss, length of hospital and ICU stays, as well as postoperative complications within three months. Long-term outcomes were assessed by patient survivals at 1-, 3-, and 5-years.

Statistical Analysis

Statistical analysis was performed with SPSS software version 18.0. Kaplan-Meier survival analysis was compared with the Log-rank test. A P value $< .05$ was considered significant.

RESULTS

During the period from September 2002 to October 2010, we performed 152 adult A-A LDLT. Nine patients were excluded from the analysis because they received ABO-incompatible grafts. Therefore, 143 patients were included in the study. A total of 23 (16%) patients had high (Group H) and 120 (84%) low MELD scores (Group L); their distribution is shown in Figure 1. Recipient characteristics are shown in Table 1 The mean recipient age was 49.7 ± 8.95 years in Group L and 54.1 ± 7.28 years in Group H ($P = .012$). The percentage of males tend to be higher than that of female patients in both groups: 78.3% Group L and 65% in Group H ($P = .186$). Patients in the high MELD score group displayed greater bilirubin levels (L = 5.35 mg/dL vs H = 26.7 mg/dL; $P < .001$), creatinine levels (L: 1.43 mg/dL vs H: 2.93 mg/dL, $P < .001$), and INR values (L: 1.16 vs H: 3.3, $P < .001$) pretransplantation.

The primary causes of liver disease were hepatitis B infections (L: 29.1% vs H: 69.5%, $P < .001$), hepatitis C infections (L: 41.6% vs H: 4.3%, $P < .001$), combined hepatitis B and hepatitis C infections (L: 9.1% vs. H: 0%, $P < .001$), alcoholism (L: 11.6% vs H: 8.7%, $P = .681$), and other causes (L: 8.3% vs H: 17.4%, $P = .183$).

The Outcomes of patients in both groups within three months of transplantation are shown in Table 2 There was no significant difference in operative duration between the two groups (L: 831.3 min vs H: 824.7 min, $P = 0.875$). The amount of blood loss was higher in Group L (L: 8023.9 mL vs. H: 5505.6 mL, $P = .044$). There was no significant difference in the length of ICU (L: 3.01 days vs H: 3.09 days, $P = .932$) or hospital stay (L: 17.89days vs H: 19.91 days, $P = .409$). In addition, there were no significant differences in the rate of postoperative bleeding (L: 5.8% vs H: 0%, $P = .238$), frequency of biliary complications (L: 12.5% vs H: 26%, $P = .179$), or the incidences of rejection episodes (L: 5.0%, H: 4.4%, $P = .895$), pneumonia (L: 0.8%, H: 0%, $P = .663$), infection (L: 13.4%, H: 13.0%, $P = .959$), or renal failure requiring postoperative dialysis.

The median follow-up duration was 21.5 months (range, 3–102). The mortality rate was 10% in Group L

Table 1. Recipient Characteristics

	Low (n = 120)	High (n = 23)	P
Recipient Age	49.7 ± 8.95	54.1 ± 7.28	.012
Recipient Male	78.3%	65%	.186
Mean MELD score	15.6 ± 6.2	36.7 ± 3.3	<.001
Mean Bilirubin	5.35 ± 7.94*	26.7 ± 9.9*	<.001
Mean Creatinine	1.43 ± 3.38*	2.93 ± 1.58*	<.001
Mean INR	1.16 ± 1.58	3.3 ± 2.97	<.001
Liver disease			
HBV	35 (29.1%)	16 (69.5%)	<.001
HCV	50 (41.6%)	1 (4.3%)	<.001
HBV+HCV	11 (9.1%)	0 (0%)	<.001
Alcoholism	14 (11.6%)	2 (8.7%)	.681
Others	10 (8.3%)	4 (17.4%)	.183

*mg/dL.

Table 2. Postoperative Characteristics of Recipients within the First 3 Months posttransplantation

	Low (n = 120)	High (n = 23)	*P*
OP duration (min)	831.3 ± 143.9	824.7 ± 190.6	.875
Blood loss (mL)	8023.9 ± 6105.9	5505.6 ± 5299.9	.044
ICU stay (d)	3.01 (1–32)	3.09 (2–5)	.932
Hospital stay (d)	17.89 (9–75)	19.91 (11–39)	.409
Complications			
Postoperative bleeding	5.8%	0%	.238
Biliary complications	12.5%	26%	.179
Rejection	5.0%	4.4%	.895
Pneumonia	0.8%	0%	.663
Infection	13.4%	13.0%	.959
Postop dialysis	0%	0%	

(12 of 120) and 4% in Group H (1 of 23). Overall 1-, 3-, and 5-year patient survival rates were 91.5%, 86.4%, 86.4% in Group L and 94.7%, 94.7%, 94.7% in Group H group, respectively (Table 3). There were no significant differences in overall survival between the two groups (P = .3476, log rank; Fig 2).

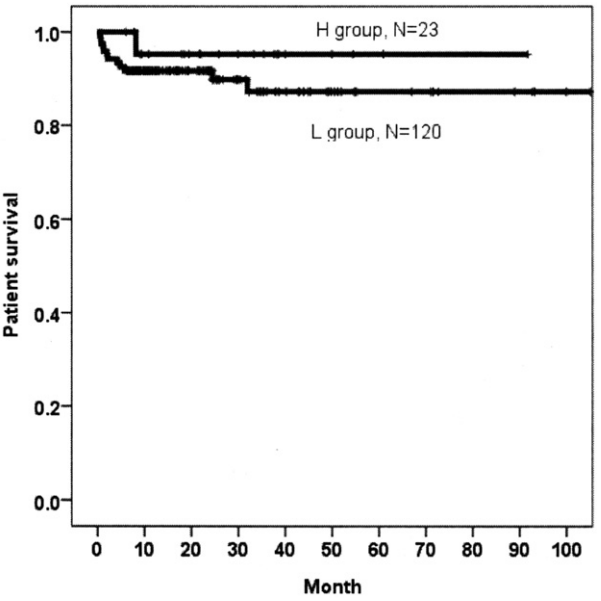

Fig 2. Cumulated survival of recipients with a MELD score ≤30 (L) or >30 (H) post A-A LDLT (P = .3476, log rank).

DISCUSSION

Since 2002, a continuous MELD severity score has been used in the USA to prioritize adult patients on the waiting list for liver transplantation.[10] However, the relationship between pre-transplantation MELD score and liver transplant outcomes is still controversial.

Among 62 adult A-A LDLT recipients. Hayashi et al[8] reported that there was no correlation between the one-year post-transplant survival and the pre-transplant MELD score. However, the number of patients with MELD scores >25 was low in that study (n = 6, 9.67%). Xia et al[11] noted that deceased donor recipients with high MELD scores showed lower baseline hematocrit and fibrinogen levels and were more likely to require ventilatory and vasopressor support before transplantation. They also described patients with high MELD scores to require more intraoperative transfusions and vasopressors than those with low scores. However, they did not analyzed the length of ICU stay. In our series, the length of ICU stay did not differ significantly between patients with high versus low MELD scores. Blood loss during the operation and postoperatively appeared to be even less among patients with high MELD scores.

Yi et al[12] stratified patients with a MELD score greater than 25 into a high score group versus those of 25 or below as a low score group. They reported that the one-year survival rate among patients without HCC who underwent LDLT to be similar between the low (90.2%) and high MELD score groups (91.7%; P = .847). The mean post-transplant hospital stay after transplantation was longer in patients with high MELD scores (P = .000), although there was no significant difference in the rate of post-transplant complications (P > .05). We observed similar lengths of hospital stay between patients with high versus low scores.

Using a score of 26 or higher to define a high MELD, Selzner et al[13] reported excellent outcomes among high MELD score recipients of live donor liver grafts, but their rate of pulmonary infection within 3 months was higher than that among MELD patients. In our study, the complication rate within three months after LDLT did not differ between patients with high versus low MELD scores.

In summary, patients with high MELD scores who underwent A-A LDLT displayed good short-term and long-term outcomes. We concluded that an high MELD score should not be considered to be a contraindication to living donor liver transplantation.

Table 3. Overall Survival of Patients Underwent A-A LDLT

MELD	Survival (%)							
	3 m	6 m	12 m	18 m	2 y	3 y	4 y	5 y
L group	94.2	91.5	91.5	91.5	91.5	86.4	86.4	86.4
H group	100	100	94.7	94.7	94.7	94.7	94.7	94.7

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