

Updated Status of Deceased-Donor Liver Graft Allocation for High-Urgency Adult Patients in a Korean High-Volume Liver Transplantation Center

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ABSTRACT

Background. The number of deceased organ donors in Korea has been gradually increased to reach 8 per million population. This study intended to analyze the updated status of urgent deceased-donor liver transplantation in a Korean high-volume liver transplantation center.

Methods. A retrospective study was performed with a 4-year study period from 2010 to 2013.

Results. During the study period, 328 adult patients were enrolled at the Asan Medical Center for urgent orthotopic liver transplantation (OLT) with Korean Network for Organ Sharing status 1 in 56 (17.1%) and status 2A in 272 (82.9%). Of them, 201 (61.3%) were allocated for OLT and 195 (58.2%) actually underwent OLT after exclusion of 6 cases of spontaneous withdrawal. In KONOS status 1, liver grafts were initially allocated to 33 (58.9%), but 6 were withdrawn owing to clinical improvement, so 27 (48.2%) actually underwent OLT. In status 2A, 168 (61.8%) underwent OLT within 2 weeks of priority waiting period. According to ABO blood groups in recipients, the allocation probability was 68% (68 of 100) in group A, 60.6% (60 of 99) in group B, 64.1% (25 of 39) in group AB, and 53.3% (48 of 90) in group O. Mean waiting period for OLT was 5.7 ± 2.1 days.

Conclusions. Deceased donor incidence of ~ 8 per million population contributed to meeting $\sim 60\%$ of the demand for urgent deceased-donor liver transplantation in a Korean transplantation center, so further increasing deceased organ donor numbers is necessary to improve the current status of organ shortage.

THE NUMBER of deceased organ donors in Korea was gradually increasing to reach 8 per million population in 2012 and 2013 [1]. Despite this increase, most patients awaiting orthotopic liver transplantation (OLT) with nonurgent conditions have not benefited. In contrast, patients requiring urgent OLT have shown a much greater probability of receiving deceased-donor liver transplantation (DDLT). This has led to a significant alleviation of the need to perform urgent living-donor liver transplantation (LDLT), especially in adult patients. In fact, urgent LDLT was replaced with urgent DDLT according to the increase of deceased donors [2]. Besides the status of urgency for OLT, ABO blood group compatibility is the critical component for deceased-donor organ allocation, so ABO blood group matching between donor and recipient can be an important component to alter the possibility of

undergoing DDLT. The present study intended to analyze the updated status of urgent DDLT at a high-volume liver transplantation center in Korea.

PATIENTS AND METHODS

The institutional OLT database of the Asan Medical Center was retrospectively analyzed. The profiles of OLT volume changes were previously described [3,4]. To analyze the updated status of liver graft allocation for urgent DDLT, a retrospective review was performed with a 4-year study period from January 2010 to December 2013. The study

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protocol was approved by the Institutional Review Board of our institution.

In Korea, the urgent DDLT allocation system for adult patients is similar to the previous United Network for Organ Sharing (UNOS) system, such as status 1 including early retransplantation and status 2A [1,2]. It is called the Korean Network for Organ Sharing (KONOS) system with subclassifications of KONOS status 1 and status 2A. All patients associated with hepatitis B virus (HBV) can not be KONOS status 1 owing to nonmedical reasons after consideration of the high prevalence of HBV in Korea and difficulty to discern acute liver failure from acute-on-chronic liver failure [2]. For both status 1 and 2A requiring highly urgent OLT, 2 weeks of priority waiting period are given. If graft allocation does not happen within this 2-week waiting period, their priority allocation is cancelled with no chance of further repeated enrollment for urgent OLT. For compatibility of ABO blood group matching between donors and recipients, the identical matching of blood groups has a priority over compatible matching. Graft allocation to ABO blood group mismatching is not allowed to date, even for infant transplant candidates. Rh blood group matching is not taken into account, owing to the very low incidence (<0.3%) of Rh-negative blood in the Korean general population.

In this study, the patients who had changed to receive LDLT during the 2-week waiting period were excluded for objective estimation of organ allocation probability. The continuous variables were expressed as mean \pm SD and compared with the use of Student *t* test. The incidence variable was compared with the use of chi-square test. Survival curves were estimated with the use of the Kaplan-Meier method. A *P* value of <.05 was considered to be statistically significant. Statistical analyses were performed with the use of SPSS (version 20; IBM).

RESULTS

During the 4-year study period, 328 adult patients were enrolled for urgent DDLT as KONOS status 1 in 56 (17.1%) and status 2A in 272 (82.9%). Of them, 201 patients (61.3%) were allocated for deceased-donor liver grafts and 195 patients (58.2%) actually underwent OLT after exclusion of 6 cases of spontaneous withdrawal due to patient recovery. The selection process for liver organ allocation according to recipient blood groups and the clinical sequences of nontransplant patients are depicted in Fig 1.

In KONOS status 1, the male-to-female sex ratio and mean age were 31:25 and 46.7 ± 7.2 years, respectively. The primary diagnoses were liver graft failure requiring early retransplantation ($n = 18$), hepatitis A virus infection ($n = 8$), hepatitis E virus infection ($n = 1$), autoimmune hepatitis ($n = 1$), Wilson disease ($n = 1$), and toxic hepatitis ($n = 6$), as well as acute liver failure of unknown causes ($n = 21$). In KONOS status 2A, the male-to-female sex ratio and mean age were 192:80 and 51.2 ± 7.8 years, respectively. The primary diagnoses were HBV-associated acute liver failure and acute-on-chronic liver failure ($n = 172$), alcoholic liver disease ($n = 56$), hepatitis C virus-associated liver cirrhosis ($n = 20$), autoimmune hepatitis ($n = 4$), late retransplantation ($n = 5$), and various other causes ($n = 15$).

In 56 patients with KONOS status 1, liver grafts were initially allocated to 33 (58.9%) within 2 weeks of the priority waiting period, and 6 were withdrawn from OLT owing to

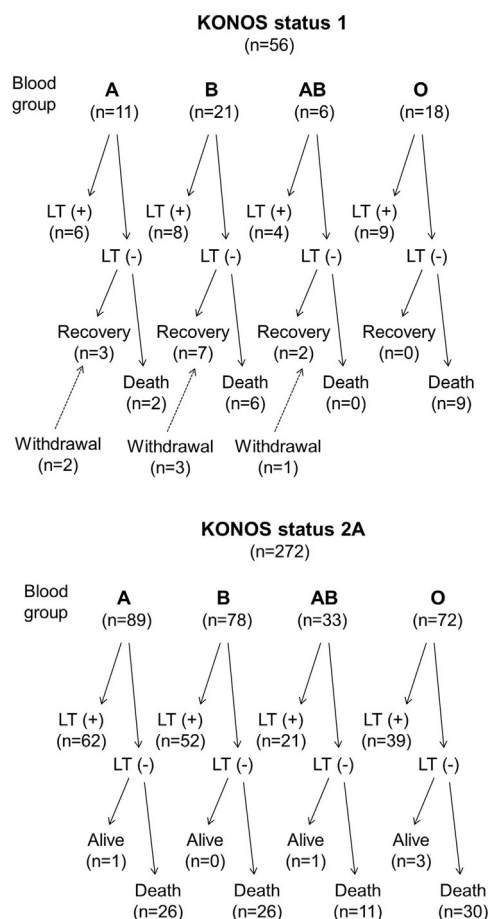


Fig 1. The selection process for liver organ allocation according to the recipient blood groups with clinical sequences of non-transplant patients. Withdrawal indicates spontaneous withdrawal of organ allocation owing to spontaneous patient recovery. Abbreviations: KONOS, Korean Network for Organ Sharing; LT, liver transplantation.

clinical improvement (4 from acute liver failure and 2 from initial graft dysfunction), so 27 (48.2%) actually underwent DDLT. Thus, the probability of graft allocation for KONOS status 1 was estimated to be 58.9% (66.7% for blood group A, 44.4% for blood group B, 80% for blood group AB, and 50% for blood group O).

In 272 patients with KONOS status 2A, 168 (61.8%) underwent DDLT within 2 weeks of the priority waiting period. Thus, the probability of graft allocation for KONOS status 2A was estimated to be 61.8% (69.7% for blood group A, 66.7% for blood group B, 63.6% for blood group AB, and 54.2% for blood group O). There was no difference in allocation probability between KONOS statuses 1 and 2A ($P = .69$).

We estimated the graft allocation probability in 328 patients according to ABO blood groups. The allocation probability was 68% (68 of 100) in group A, 60.6% (60 of 99) in group B, 64.1% (25 of 39) in group AB, and 53.3% (48 of 90) in group O. There was no difference of allocation

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