Liver Transplantation With Old Grafts: A Ten-Year Experience

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ABSTRACT

Background. The persistent scarcity of donors has prompted liver transplantation teams to find solutions for increasing graft availability. We report our experience of liver transplantations performed with grafts from older donors, specifically over 70 and 80 years old.

Patients and methods. We analyzed our prospectively maintained single-center database from January 1, 2005, to December 31, 2014, with 380 liver transplantations performed in 354 patients. Six groups were composed according to donor age: <40 (n = 84), 40 to 49 (n = 67), from 50 to 59 (n = 62), from 60 to 69 (n = 76), from 70 to 79 (n = 64), and ≥80 years (n = 27).

Results. Donors <40 years of age had a lower body mass index, died more often from trauma, and more often had cardiac arrest and high transaminase levels. In contrast, older donors (≥70 years of age) died more often from stroke. Recipients of grafts from donors <50 years of age were more frequently infected by hepatitis C virus; recipients of oldest grafts more often had hepatocellular carcinoma. Cold ischemia time was the shortest in donors >80 years of age. Patient survival was not significantly different between the groups. In multivariate analysis, factors predicting graft loss were transaminase peak, retransplantation and cold ischemia time but not donor age.

Conclusions. Older donors >70 and >80 years of age could provide excellent liver grafts.

THE persistent scarcity of organ donors resulting in longer delays on waiting lists for recipients has led liver transplantation (LT) teams to find solutions for increasing graft availability, one of which is to use grafts from extended criteria donors (ECD). However, the definition of ECD is still not clear and includes clinical and biological characteristics such as age >60 or >65 years, non–heart-beating donors, split or partial grafts, hepatitis C (HCV) or B positive serology, liver test abnormalities and liver steatosis, hypernatremia, duration of stay in the intensive care unit (ICU) of >7 days, hemodynamic instability, and cold ischemia time (CIT) of >12 hours [1–4]. The impact of donor age on graft and recipient survival has been found to be negative [5,6] or to have no impact [7]. Little is known about the age limits for being a donor and most of the studies have compared two groups: ideal donor <40 years old and older donors >65 or >70 years old, but with few other details [4–9]. Few studies have focused specifically on elderly donors. Dirican et al. [10] reported the mitigated results of 13 LT recipients with grafts from donors >80 years of age. Ghinolfi et al. [11] reported better results. The most important issue when grafts from old or much older donors are transplanted is to ensure that donors' and recipients' characteristics are taken fully into consideration [8,9].

We report our experience of LT performed from 2005 to 2014 with grafts from older donors, of which 27 from donors >80 years old, and compare early and late LT outcome with younger donors stratified by age from under <40 to >80 years old.

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PATIENTS AND METHODS

We retrospectively analyzed our single-center prospectively maintained database (CNIL declaration number 1478500 v 0) from January 1, 2005, to December 31, 2014.

Donor Selection

Criteria for determining organ suitability were clinical (age, sex, body mass index, cause of death, duration of ICU stay before organ procurement, use of vasopressors, occurrence of cardiac arrest, medical history), biological (aspartate aminotransferases [AST], alanine aminotransferase, total bilirubin, γ-glutamyl transferases, alkaline phosphatase, prothrombin time, and viral or bacterial infection) and radiologic (total body nonenhanced and enhanced computed tomography [CT]). In the beginning of our experience and until 2011, we systematically carried out a liver biopsy in donors >70 years old before graft procurement to evaluate fibrosis and steatosis. In the event of fibrosis stage >2 associated with macrovacuolar steatosis involving >30% of the hepatocytes, procurement was not performed. Since 2011, we have been particularly attentive to the liver-to-spleen attenuation ratio on CT images. We previously reported its value for evaluating liver steatosis [12]. Finally, we were highly selective when analyzing donors >70 years old.

Recipients

Age, sex, indication for LT, Model for End-stage Liver Disease (MELD) score, hemodialysis, mechanical ventilation support, ICU hospitalization before LT, total surgery duration, CIT, and intraoperative blood transfusions were evaluated. Donor Risk Index (DRI) [13] and Balance of Risk (BAR) [14] scores were calculated. Our upper limit of age to establish an indication for LT was 70 years.

LT was performed using the piggy-back technique without venovenous bypass from 2005 to 2013. Thereafter, lateral cavocaval anastomosis was performed. A liver reperfusion biopsy was systematically performed.

After transplantation, liver function was assessed by biological liver parameters (AST, alanine aminotransferase, total bilirubin, γ-glutamyl transferase, alkaline phosphatase, prothrombin time, and factor V). Hepatic ultrasound imaging was performed on day 1 posttransplantation. Enhanced hepatic CT and cholangiography by T-tube were performed on day 7 posttransplantation. Cholangiography was also controlled at month 3 posttransplantation before T-tube ablation.

The immunosuppressive regimen comprised tacrolimus, mycophenolate mofetil, and corticosteroids. Steroids were discontinued at month 3 posttransplantation except for patients transplanted for autoimmune hepatic disease. Basiliximab or lymphocyte antiglobulins were added in the event of renal dysfunction before transplantation, retransplantation or preformed donor-specific anti-HLA antibodies. Early allograft dysfunction was defined according to the criteria published by Olthoff et al [15].

Statistical Analysis

Quantitative data are presented as median (interquartile range [IQR]) and were compared with the Kruskal-Wallis test and multiple pair comparisons. Qualitative data are presented as numbers (%) and were compared with the χ^2 test or Fisher Exact Test when appropriate. Survival data were analyzed with Kaplan-Meier analysis and compared with the log-rank test. Univariate and multivariate analyses (logistic regression including factors with $P < .2$ in the univariate analysis) were performed for prediction of graft loss. All statistical tests were performed using commercially available statistical software (XLSTAT 2016, Addinsoft, Paris, France).

RESULTS

Three hundred eighty-seven LT were performed from January 1, 2005, to December 31, 2014. We excluded from the analysis 1 living donor LT and 6 patients who died one the day of LT. Therefore, 380 LT in 354 patients were analyzed.

Donors

Between 2005 and 2014, the median donor age increased from 53 (IQR, 18–75) to 59 (IQR, 21–88) years ($P < .001$). There were no donors >80 years old in 2004 and 6 of 59 (10%) in 2014. Finally, 64 of 380 donors (16.8%) were >70 years and 27 of 380 (7%) >80 years (Fig 1). Six groups were

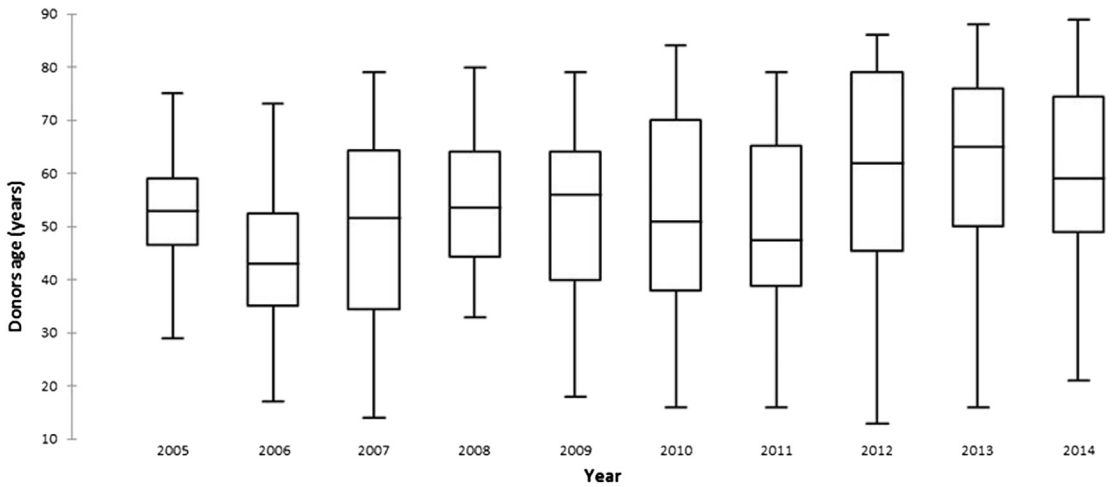

Fig 1. Evolution of donor age from 2005 to 2014 ($P < .001$). Data are shown as box plots with median represented by horizontal line with 75th percentile at top and 25th at bottom. The 10th and 90th percentiles are shown as whiskers.