

INVITED COMMENTARY

Is living donor liver transplantation really equivalent to deceased donor liver transplantation?*

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Conflicts of interest

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Living donor liver transplantation (LDLT) has developed as an alternative to deceased donor liver transplantation (DDLT) in order to overcome the critical shortage of deceased organ donations. Particularly in regions with low deceased donation rates, like Asian, LDLT for end stage liver disease significantly reduces the risk of death or drop off the wait list without compromising post-transplant survival. A preference for LDLT to DDLT may depend on the original disease representing the indication for liver transplantation (LT). LDLT offers a timely alternative to DDLT for patients with hepatocellular carcinoma (HCC). However, the higher recurrence rate of HCC after LDLT and the indication criteria remain controversial. One of the recent quantitative meta-analyses revealed the comparable patient survival rates and no significant differences in the recurrence rates between LDLT and DDLT recipients [1]. Another meta-analysis provided evidence of lower disease-free survival (DFS) after LDLT compared with DDLT for HCC [2]. Hence, LDLT likely represents an acceptable option that

does not compromise patient survival or increase HCC recurrence in comparison with DDLT at this moment.

Early data suggested that patients with Hepatitis C virus (HCV) that received a LDLT had worse outcomes, including increased rates of cholestatic HCV than did recipients of DDLT [3,4]. This is currently thought to be because of an increased rate of biliary complications or other problems seen during the learning curve of early LDLT experience. More recent data demonstrated that there is no difference in recurrent HCV between recipients of DDLT and LDLT [5,6]. The latest meta-analysis demonstrated that LDLT was equivalent to DDLT in terms of long-term patient or graft survival, HCV recurrence, and acute rejection with a potential lower short-term graft survival [7].

There are limited convincing data comparing outcomes of LDLT and DDLT for autoimmune hepatitis (AIH) and cholestatic liver diseases. It has been previously reported that the overall survival outcomes of LDLT were similar to DDLT in patients with AIH and primary biliary cirrhosis

[8]. In contrast, patients with primary sclerosing cholangitis undergoing LDLT, especially with biologically related donors, are thought to have a higher risk to develop recurrent disease compared with the DDLT setting, probably because of sharing antigens targeted by autoimmunity between recipients and the related donors [9]. Further prospective studies at transplant centers performing both LDLT and DDLT might be needed to confirm these issues.

Regardless of such original disease, LDLT offers several advantages over DDLT, which include the reduction in waiting time mortality, the reduction in cold ischemic time (CIT) and the feasibility of various preoperative interventions, such as nutritional treatment for both the donor and recipient [10]. However, it remains unclear whether those advantages offset disadvantages peculiar to LDLT, such as the smaller graft volume than DDLT and the highly technical procedure, which may be associated with higher complication rates. This seems to be caused by a fact that direct comparison of the results between LDLT and DDLT inevitably involves various biases in nature.

Reichman *et al.* [11] have performed a retrospective matched-cohort study to compare postoperative complication rate and patient survival in the two groups of patients submitted to LDLT and to DDLT. Six clinical variables for recipients: age, Meld, date of transplant, gender, primary diagnosis, and recipient surgeon were matched in each group ($n = 145$ in each group). They found that the overall complication rate was similar between two groups. In further detail, biliary complications were higher in LDLT although the complications that occurred in the DDLT were strongly associated with graft loss. Graft and patient survival outcomes for LDLT versus DDLT were similar. From those findings, they concluded that LDLT offers an excellent alternative to DDLT in areas of deceased donor organ shortages. This study defined surgical complications that are more frequent in LDLT, *i.e.*, biliary complications (34% and 17% in LDLT and DDLT cohorts, respectively). Despite a higher rate of complications among LDLT recipients, complications leading to death were not significantly higher in LDLT in the experienced center. These findings, in concert with the current common consent that the incidence of complications, even biliary complications, can decline with center experience to levels comparable with DDLT [12], underscore the impact of the learning curve on this highly technical procedure. Potential recipients need to hear about both the rates of complications after LDLT and DDLT, and this study with control for recipient variables will help to define those rates. As pointed out by the authors, this study left control for donor variables out of consideration, despite a well known fact that donor age/gender and donor-recipient human leukocyte antigen matching correlate with either the incidence of certain complications or the severity of original disease recurrence.

Nevertheless, this case control comparison of the outcome of LDLT and DDLT convincingly reported that these procedures had different complication profiles but the overall outcomes were similar with expert management, suggesting that the biological advantage in LDLT could compensate for a higher rate of surgical complications caused by greater technical complexity.

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