



LIVER LIVING DONORS Selection

Living Donor Liver Transplantation: Ethics and Safety

B. Eghtesad, A.B. Jain, and J.J. Fung

DONOR liver shortage has been the major problem confronting patients, especially adult patients, currently being listed for liver transplantation. Over the last 10 years, the number of patients awaiting liver transplantation has increased more than 15-fold: now there are more than 18,000 patients currently listed in the United States. During the same period, the number of liver transplants increased less than twofold, from 2900 in 1991 to 4900 in 2000.¹ The median waiting time has increased dramatically; increasing numbers of patients on the waiting list (approximately 10% each year) are dying while waiting for a donor liver. Many others die after removal from the list because clinical deterioration precludes successful transplantation.

Several innovative techniques have been developed to enlarge the utility of the relatively constant pool of organs and to meet the growing needs of recipients. One recently advanced procedure utilizes a part of the liver as an allograft. Splitting cadaveric livers for two recipients has benefited the pediatric population, but the adult recipient pool has not experienced the same benefit.

Another approach to enlarge the donor pool is living donor liver transplantation (LDLT), an extension of reduced-size liver transplantation. Living donation for pediatric recipients originated as a response to the disparity in adult and pediatric waiting list times, which accounted for pediatric waiting list mortality rates exceeding 25%.² Use of a portion of the liver from a living donor, which was first successfully performed in 1989, has profoundly impacted pediatric organ waiting list times and decreased waiting list mortality.^{3,4}

The success of LDLT in children, combined with the worsening shortage of organs, has provided a strong stim-

ulus to apply this technique in adults. Adult-to-adult LDLT is already practiced at more than 30 centers in the United States and in as many centers in Asia and Europe. However, the application of LDLT in adult recipients has been limited by the quantity of liver tissue provided by the donor. This requirement has persuaded the transplant surgeons to use a larger portion of the liver of the live donor right lobe to provide functional graft for an adult recipient. The key difference between the left lateral hepatectomy procedure for liver transplantation in children and the left or right hepatectomy for an adult recipient is the magnitude of surgery and the increased risks for the donor.

ETHICAL CONSIDERATIONS

Live donor liver transplantation presents unique ethical dilemmas. While pediatric and adult LDLT are both life-saving procedures, complete lobectomy carries a greater risk of morbidity. Current data suggest that major liver resections may be performed with acceptable morbidity and mortality by experienced centers. However, an acceptable outcome in a patient undergoing a liver resection for malignancy may be too high for a living donor who, by definition, does not need a liver resection. This most serious ethical concern in LDLT relates to the principle of nonma-

From the Thomas E. Starzl Transplantation Institute (B.E., A.B.J., J.J.F.), Pittsburgh, Pennsylvania; and University of Rochester Medical Center (A.B.J.), Rochester, New York.

Address reprint requests to Dr Ashokkumar B. Jain, University of Rochester Medical Center, Box SURG, 601 Elmwood Ave, Rochester, NY 14642. E-mail: Ashok_Jain@URMC.Rochester.edu

leficence, or “do no harm.” Healthy people willing to donate a segment of the liver are most likely to be harmed by the decision of a liver transplant center to perform LDLT. The potential for doing medical harm to the donor is, of course, central to the argument for not engaging in LDLT. It goes without saying that the donor incurs significant harm. Almost all donors experience significant pain and short-term disability. In addition to the 5% to 10% risk for surgical complications and about a 0.5% to 1% risk of death, the long-term risks are unknown. However, this narrow view does not estimate the potential benefit of LDLT for the donor, a factor which is indubitably significant but difficult to quantitate and therefore hard to weigh against the tangible risk for medical injury. So, why do intelligent and well-informed parents and other invested individuals want to be living organ donors? The donor and the family have much to gain by the survival and much to lose by the death of the recipient. Donor benefit by virtue of donating, in addition to the survival of the recipient, has been documented in both kidney and liver donors.^{5,6} Though hard to analyze, it may be that the donor can expect more benefit than loss from the act of donation.

Consent

Obtaining informed consent from the donor has been an item of debate. People are generally optimistic about survival and do not look squarely at the risk of death. This optimistic and the potential pressure exerted by family members or friends contribute to the argument that informed consent for LDLT is impossible to obtain especially in the more urgent situations. This issue was carefully debated at a recent consensus meeting on live organ donation. The conclusion was that the person who gives consent to be a live organ donor should be competent, willing to donate, free from coercion, medically and psychologically suitable, fully informed of the risks and benefits as a donor, and fully informed of the risks, benefits, and alternative treatments available to the recipient. Donors should not be utilized in clinically hopeless situations. The benefit to both donor and recipient must outweigh the risks associated with the donation and transplantation of the living donor organ.⁷ The disclosure process should enable the donor to have a clear understanding of all these issues.

The transplant center must ensure that the decision to donate is voluntary. Altruism has been the underpinning of live organ donation since its inception. The absence of reproducible health benefits for donor and the current legal restrictions against financial compensation are compelling reasons for the transplant team to verify that the donor is free from coercion.

Medical and Psychological Suitability

The guidelines of the American Society of Transplant Surgeons state that potential donors should be healthy adults who are carefully evaluated and approved by a

multidisciplinary team, including hepatologists and surgeons, to ensure that they can tolerate the procedure, and a psychologist with regard to their psychic, emotional, and social suitability.⁸ Selection of the potential donor must be based on an algorithm of suitability that includes radiologic, pathologic, and laboratory tests to evaluate presence or absence of abnormal findings and risk factors.

Who Can or Should Perform LDLT?

Live donor liver transplantation involves healthy voluntary donors who should undergo surgery at appropriate institutions with vastly experienced teams. This criterion is essential to ensure the success of the procedure, to avoid donor complications, as well as to prevent untoward effects on the individual institutions, the surgeons, and the entire transplant community. Institutions should be multiorgan transplant centers of medium to large size with surgical expertise in segmental liver transplantation, with vast experience in hepatobiliary surgery, with state-of-the-art operating rooms, and with support from basic and clinical science departments.

Recipient Criteria

Recipients must be medically suitable for liver transplantation by the standard criteria of the transplant center and The United Network for Organ Sharing. These candidates need to understand and accept the fact that donation puts the donor at significant risk. Situations in which the recipient has a poor chance of overall survival must be balanced against the added risk to the donor, yielding a realistic estimate of the chance for success.

CONCLUSION

With a continuous lack of adequate cadaveric organs for transplantation, the use of LDLT is likely to decrease the scarcity of organs and thus decrease waiting list mortality. Donor safety remains the dominant principle to guide decision making and drive strategies in living donor liver donation, especially for adults. Recipient outcome and public acceptance will be the regulating variables. The present lack of a large database on LDLT should encourage the development of a registry to retrieve, update, and release results on donor, as well as recipient, short- and long-term outcomes.

REFERENCES

1. UNOS: Scientific Data Registry, 2000
2. Broelsch CE, Edmond JC, Thistlethwaite R, et al: *Transplantation* 45:519, 1988
3. Strong RW, Lynch SV, Ong TH, et al: *N Engl J Med* 322:1505, 1990
4. Edmond JC, Heffron TG, Kortz EO, et al: *Transplantation* 55:835, 1993
5. Malago M, Testa G, Marcos A, et al: *Liver Transplantation* 7:921, 2001
6. Shapiro RS, Adams M: *Liver Transplantation* 6:S77, 2000
7. Consensus Statement on the Live Organ Donor. *JAMA* 284:2919, 2000
8. American Society of Transplant Surgeons: Ethics Committee: *Liver Transplant* 6:815, 2000