

ADVANCES IN HEPATOLOGY

Current Developments in the Treatment of Hepatitis and Hepatobiliary Disease

Section Editor: Eugene R. Schiff, MD

Pros and Cons of Living Donor Liver Transplant

Robert S. Brown, Jr., MD, MPH
Departments of Medicine and Surgery
New York-Presbyterian/Columbia Medical Center

G&H What percentage of US liver transplants are currently performed with a living donor?

RB Approximately 5% of total transplants are performed with a living donor. There are about 250 living-donor transplants performed per year, out of over 5,000 total in the United States. When compared to the rate of kidney transplantation, where the numbers of deceased- and living-donor procedures are nearly equal, it is not a significant number and it currently does not have a major impact on the donor pool.

G&H What factors are currently preventing the wider adoption of living-donor procedures?

RB Some of it has to do with the widely publicized deaths of two donors in the past several years. Some of it has to do with the fact that in many parts of the country, deceased donors are not sufficiently scarce that living donation is felt necessary. Also, in some parts of the country there are no experienced centers to perform this technically challenging procedure. Centers with less experience have a higher complication rate and worse outcomes. Currently, there are only a few high-volume centers that perform the vast majority of living-donor transplants.

G&H Can you characterize the typical successful donor candidate in these procedures?

RB Most donors are first-degree relatives of the recipient, often adult children or siblings. These relatives make up approximately 50% of living donors. Another 12–15% is made up of spouses. The remainder is made up of cousins, friends, and other groups that are less closely related.

Donors need to be healthy, with no liver disease or other significant medical illnesses. The tolerance for liver problems among donor candidates is close to zero. The tolerance for a mild medical problem, like controlled high blood pressure, is higher. There also needs to be a relative size match, meaning that the recipient cannot be much larger than the donor. Finally, the donor and recipient need to be blood group compatible, though not necessarily identical.

G&H Which recipients are the best candidates for living-donor liver transplant?

RB The sickest patients do not do well with living-donor transplant and are also the patients who receive high priority for deceased-donor livers. Patients with a reasonable chance of having complications while on the waiting list, but who are not so sick that partial liver graft is going to be inadequate, are the best candidates for living-donor transplant. This group includes patients with significant encephalopathy but who do not have a very high Model for End-stage Liver Disease (MELD) score. It also includes patients who have hepatic tumors just outside of the criteria for added MELD points on the United Network for Organ Sharing waiting list. For example, a patient with a 5.3-cm tumor, who many clinicians would recommend for transplant, may not qualify for adequate priority on the deceased-donor list, but would be a good candidate for living-donor transplant.

Overall, the best candidates are those patients with a significant chance of dying while on the waiting list and who have someone willing to make a donation. The major goal of living-donor liver transplant is to reduce waiting-list mortality.

G&H Are there other advantages for subgroups of patients receiving living-donor transplants?

RB The other advantage of living-donor transplant is that the timing can be controlled in order to optimize pretransplant treatment. This includes pretransplant cancer treatment for either hepatocellular carcinoma or cholangiocarcinoma, as well as, in selected patients, timed eradication of hepatitis C virus prior to transplantation with antiviral therapy.

G&H Does living-donor transplantation have a positive or negative effect on secondary outcomes of recovery time or hospital length of stay?

RB Secondary outcomes depend largely on the center where the procedure is performed. At the current time, in experienced programs, including our center's, the length of stay for living-donor transplant is the same or less than that for deceased donors because patients are generally healthier going into the procedure.

G&H What can be done to further promote the successful adoption of living-donor transplant procedures?

RB Most of these procedures are performed at major transplant centers, which are also the programs that train a substantial number of transplant hepatologists and surgeons. As more surgeons come through these programs and are trained in this relatively new procedure, the successful adoption of living-donor programs will proliferate and raise the number of procedures overall.

Further, surgeons and patients need to have a better understanding that living-donor liver transplant is a life-saving procedure. In the earliest days, living-donor procedures were seen as inferior operations, with the single goal of shortening waiting-list time. The recently published A2ALL study showed that living-donor procedures are at least equivalent in posttransplant outcomes and success rates to deceased-donor transplants. Posttransplant data appear to be roughly equivalent, and the waiting-list survival advantage has proven substantial.

Because patients are concerned with overall survival, not pre- versus posttransplant death, growing evidence showing an overall survival advantage with living-donor transplant will provide an impetus to perform it. I believe that this impetus will come primarily from patients, who often drive the adoption of new procedures. Surgeons and physicians tend to have substantial inertia, but when, for example, laparoscopic cholecystectomy was first developed, patients demanded it. If a center could not

perform it, patients found a surgeon who could. Eventually, it became the standard of care. The same was true with laparoscopic nephrectomy and living-donor kidney donation. I believe that eventually it will be the same for living-donor liver transplant.

G&H What are the disadvantages that need to be further investigated or weighed in the decision to undergo living-donor transplant?

RB The greatest disadvantage is the risk taken by the donor. Using the strictest definition of the term safe, there is no such thing as a perfectly safe donor procedure, since the donor is perfectly healthy. Living-donor procedures are also technically more challenging, so there are more potential complications. Finally, there is a clear learning curve for surgeons. Outcomes do not get better until the surgeon has performed 20 or 30 procedures.

It is not yet clear whether the experience necessary to improve outcomes is dependent solely on the surgeon or if it requires greater experience among the entire team, and the optimum way to impart that experience to other centers has not been codified or validated. If the lead surgeon leaves and another lead surgeon with less experience is recruited, does the team's expertise stay the same or does the learning curve start all over?

Finally, there is not as long of a track record in living-donor procedures. Therefore, to a certain extent, the long-term outcomes in both donor and recipient remain undefined. This will remain a question for some time. I currently see no reason to suspect that long-term outcomes are going to be different from those in deceased-donor procedures, and they could just as likely prove better as worse. Certainly, this is a question that is under active investigation in the National Institutes of Health A2ALL study and other long-term registry efforts.

G&H Will the documentation of long-term outcomes lay to rest ongoing controversy regarding living-donor liver transplant procedures?

RB Some surgeons would argue that there is never a benefit to the recipient that would outweigh the risk to the donor and that the risk could never be justified. However, the opposing standpoint argues that reducing a 20% waiting-list mortality rate to 10% for the recipient, in exchange for a 0.5–1% chance of death and a 20% chance of morbidity in the donor is justified and there is an ethical imperative to perform these procedures and save lives. The answer often lies in the middle. The other advantage is that for every successful living-donor procedure, there is a deceased donor that

the same patient may have accessed, who then becomes available for a patient with no potential living donor. Thus, there is a societal benefit from the practice as well. This is an ethical conundrum that will never go away entirely, regardless of how widely living-donor transplant is adopted.

Suggested Reading

Brown RS Jr. Live donors in liver transplantation. *Gastroenterology*. 2008;134:1802-1813.

Berg CL, Gillespie BW, Merion RM, Brown RS Jr, Abecassis MM, et al. Improvement in survival associated with adult-to-adult living donor liver transplantation. *Gastroenterology*. 2007;133:1806-1813.

Olthoff KM, Merion RM, Ghorbrial RM, Abecassis MM, Fair JH, et al. Outcomes of 385 adult-to-adult living donor liver transplant recipients: a report from the A2ALL Consortium. *Ann Surg*. 2005;242:314-323, discussion 323-325.

Fischler B, Johansson M, Gjertsen H, Ericzon BG, Bergquist A, et al. Living-related liver transplantation in children—a single center evaluation of the outcome of donor candidates and recipients. *Pediatr Transplant*. 2008;12:531-535.

Taner CB, Dayangac M, Akin B, Balci D, Uraz S, et al. Donor safety and remnant liver volume in living donor liver transplantation. *Liver Transpl*. 2008;14:1174-1179.

Ikegami T, Taketomi A, Ohta R, Soejima Y, Yoshizumi T, et al. Donor age in living donor liver transplantation. *Transplant Proc*. 2008;40:1471-1475.

Greif-Higer G, Wandel E, Otto G, Galle PR, Beutel ME. Psychological conflicts between relatives during the long-term course after successful living organ donation. *Transplant Proc*. 2008;40:902-906.

GASTROENTEROLOGY & HEPATOLOGY™

Call for Case Studies

We invite our readers to submit case studies for publication. Case studies are published alongside an expert commentary, which is solicited by the journal staff. Case studies should include a description of the case and a brief literature review. Inclusion of tables and/or figures is encouraged. All submissions are peer reviewed.

To submit your case study or manuscript, please send an electronic file to tr@clinicaladvances.com.

Editor, Gastro-Hep Communications, Inc., 611 Broadway, Suite 310, New York, NY 10012.

Contact telephone number: (212) 995-5569.