



Current Perspectives on LDLT

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Jean C. Emond, MD, Columbia University, New York, New York, USA, presented the Thomas E. Starzl Transplant Surgery State-of-the-Art Lecture, discussing the controversial topic of living donor liver transplantation (LDLT).

According to Dr Emond, LDLT has saved tens of thousands of lives globally and represents the only option for transplantation in many countries. Following its initial introduction in young children in 1987, improvements in surgical techniques and outcomes of LDLT occurred rapidly over the course of about 4 years. This resulted in a rapid adoption curve, and by the early 1990s, centers around the world were using LDLT and reporting 90% graft survival rates.

Dr Emond noted the high burden of liver disease in Asian countries that have a superior tradition of advanced liver surgery. LDLT has flourished in these countries, particularly because religious and cultural obstacles have served as barriers to deceased donor liver transplantation (DDLT), a situation that will likely continue.

By comparison, however, he emphasized that LDLT has not been fully embraced in the United States, where, to date, only a little more than 5000 LDLTs have been performed. These represent about 3% of total liver transplants in adult patients and about 10% of those in pediatric patients.

DONOR RISKS

Dr Emond explained that some of the key factors that have affected the adoption of LDLT in North America and Europe include:

- Real and perceived risks
- Difficulty of the technique
- Access to deceased donors as an alternative transplantation source

The associated risks to donors, in particular, represent a significant barrier to adoption of LDLT. With respect to catastrophic consequences in living donors in the United States, 4 deaths have been reported in recovering adult donors to date, all in right lobe donors, and 4 more patients have required a liver transplant. One death has also been reported in a pediatric donor.

Although this procedure does present a risk to donors, it is nevertheless very small, and Dr Emond

stressed that zero mortality should not be deemed the requirement for LDLT.

Nevertheless, he added that refining the technique such that it decreases donor risk, while preserving recipient outcomes, could only be beneficial.

For example, according to Dr Emond, there is some evidence that left lobe LDLT in particular is better for the donor, for a variety of reasons, including:

- Use of a technique that is more amenable to minimal access laparoscopic surgery
- Improved early liver function
- A shorter hospital stay
- Earlier return to work
- Less liver regeneration
- Less splenomegaly
- A suggested lower mortality risk

RECIPIENT OUTCOMES

With respect to recipient outcomes, recipient livers grow very quickly to adequate size, typically within a few weeks after transplantation. However, complications can arise, and Dr Emond discussed “small-for-size syndrome” [Dahm et al. *Am J Transplant.* 2005], a clinical condition that was initially characterized by unfavorable outcomes when transplantations involving small livers in bigger children were introduced about 20 years ago. The syndrome is associated with the transplantation of a liver mass that is too small for the recipient and is characterized by numerous clinical features, including:

- Reduced hepatic synthetic function
- Ascites
- Encephalopathy
- Persistent graft injury
- Portal hypertension
- Reduced renal function
- Impaired reticuloendothelial activity

Although this injury is devastating, it is usually reversible.

Research has also been performed to investigate methods to optimize preservation of liver grafts. Dr Emond noted that, in general, appropriate reduction in portal

flow can protect the small liver, allowing use of a graft with an approximate graft weight to recipient weight ratio of 0.5, corresponding approximately to a left lobe in most cases, and a left lateral segment in some cases [Triosi R et al. *Ann Surg.* 2003; Ben-Haim M et al. *Liver Transpl.* 2001].

Despite advances in the technique, Dr Emond described LDLT as “high stakes,” especially in North America and Europe, predominantly because of the catastrophic donor risk and demoralizing recipient risk. Although clinicians typically seek certainty, he stressed that the reality of LDLT is variance, in particular with respect to factors such as variability of donor liver shape and volume, surgical technique, and recipient condition.

He added that the only way to overcome variance and improve outcomes is by performing more LDLTs. Biological and surgical progress remains critical for this and must be accomplished utilizing evidence-based progress. For instance, data from high-volume transplant centers have demonstrated the reliability of right liver lobe transplantation, as well as minimal access hepatectomy. Collaboration within a multidisciplinary team is also an important factor in managing the risks associated with LDLT.

Considering the benefit of evidence-based progress, Dr Emond highlighted the work of the A2ALL consortium, which performed an evidence-based search for progress in LDLT from 2001 to 2014. Their research produced some valuable observations in numerous areas of LDLT, including the surgical learning curve, survival benefit of LDLT for candidates, donor and recipient short- and long-term outcomes, quality of life and psychosocial outcomes, and portal modulation.

While he emphasized the need for hepatologists to embrace LDLT, Dr Emond acknowledged the challenge in achieving this. Although the arguments in favor of LDLT are rational, opposition is prevalent among clinicians and the public, and whether biological and technical progress can overcome the resistance remains to be seen.

Overall, LDLT has not yet achieved its promise in North America and Europe, despite the fact that the technique is best for most recipients. The surgery is more difficult than DDLT and transplant teams remain reluctant to promote LDLT, in particular because of the risks involved. The organ allocation system is also problematic because it encourages DDLT. Nevertheless, LDLT will continue to play a role in liver transplantation until alternate donor sources are developed, concluded Dr Emond.



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