



Living Donor Liver Transplantation: Benefits and Risks

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Abstract

Living donor liver transplantation (LDLT) has become a prominent option for patients with end-stage liver disease, offering significant advantages in terms of reducing waiting times and improving patient survival. This procedure involves the donation of a portion of a healthy individual's liver, which regenerates post-transplant. While LDLT offers a life-saving alternative to deceased donor liver transplantation, it also carries inherent risks for both donors and recipients. This article provides a comprehensive overview of the benefits and risks associated with LDLT, examining medical, ethical, and psychological considerations. The discussion also includes an exploration of recent advancements and future directions in LDLT, with a focus on improving safety and outcomes for all parties involved.

Keywords: Living donor liver transplantation; Liver disease; Organ donation; Transplantation risks; Regenerative medicine; Ethical issues; Donor safety; Patient survival; Liver transplantation outcomes

Introduction

Liver transplantation is often the only viable treatment for patients with end-stage liver disease, including conditions such as cirrhosis, hepatocellular carcinoma, and acute liver failure. Traditionally, deceased donor liver transplantation (DDLT) has been the primary approach to address this need. However, the global demand for liver transplants far exceeds the available supply of organs from deceased donors, resulting in long waiting times and a higher risk of mortality for patients on the transplant list. To address this issue, living donor liver transplantation (LDLT) has emerged as a viable solution, with the first successful procedure performed in 1989 [1].

In LDLT, a portion of the donor's healthy liver is removed and transplanted into the recipient. The donor's liver regenerates over time, allowing both the donor and recipient to regain normal liver function. LDLT offers the advantage of reducing waiting times for liver transplant recipients and has the potential to improve long-term survival outcomes. However, despite its life-saving potential, LDLT is not without risks. Both the donor and the recipient face possible complications, and the procedure raises important ethical, medical, and psychological concerns. This article examines the benefits and risks associated with LDLT, highlighting recent advancements in the field and considering future directions for improving outcomes.

Description

Benefits of living donor liver transplantation

One of the most significant benefits of LDLT is the reduction in waiting times for recipients. With the increasing prevalence of liver disease and the limited availability of organs from deceased donors, patients often face long waits on the transplant list, during which their health may deteriorate further. LDLT allows for the timely transplantation of a liver, potentially saving the lives of patients who would otherwise have had to wait months or even years for a deceased donor organ [2].

Additionally, LDLT has been shown to offer improved outcomes in terms of graft survival and patient survival. Studies suggest that recipients of LDLT tend to have better short-term outcomes compared to those who receive organs from deceased donors, as the liver is typically healthier when transplanted from a living donor [3]. Moreover, the ability to match the donor's liver to the recipient based on factors such

as size and blood type enhances the chances of a successful transplant.

For the donor, the liver's regenerative ability is a major advantage. After the partial hepatectomy, the donor's liver regenerates rapidly, typically regaining normal size and function within a few months. This regenerative capacity reduces the long-term health risks for the donor and makes the procedure less invasive compared to other organ transplants [4]. Furthermore, donors often report a sense of fulfillment and psychological satisfaction from having helped save a life, which can improve their emotional well-being post-surgery.

Risks associated with living donor liver transplantation

Despite the advantages, LDLT carries several risks. For the donor, the primary concern is the potential for serious surgical complications, including bleeding, infection, bile leakage, and liver failure. The risk of mortality for the donor, while low, is not negligible, with estimates ranging from 0.1% to 0.5% in some series [5]. The donor's liver regenerates, but there may be long-term health risks, particularly for individuals with pre-existing health conditions or those undergoing multiple surgeries. Additionally, the psychological impact on the donor must be carefully considered, as the decision to donate a portion of one's liver may cause emotional and psychological stress.

For the recipient, while LDLT offers a reduced waiting time, the risks of complications such as organ rejection, infection, and graft failure remain significant. Immunosuppressive therapy is required to prevent rejection, which increases the risk of infections and other complications [6]. The graft survival rates in LDLT are generally favorable, but they may still be lower than those associated with deceased donor transplants, particularly in cases of ischemic damage to the liver during the procurement and transplantation process.

The availability of living donors is also a concern. Although LDLT

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offers the advantage of reducing waiting times, the limited pool of eligible living donors—typically close family members or friends—restricts the accessibility of this option. Ethical concerns also arise regarding potential coercion or exploitation of donors, particularly in cases where financial incentives or familial pressure play a role in the decision to donate.

Discussion

The decision to undergo living donor liver transplantation involves complex ethical considerations. While it is generally understood that the donor's choice should be voluntary, issues of coercion and exploitation may arise. In some cases, donors may feel pressured by family members or societal expectations to donate. This is particularly concerning in cultures where family ties are strong, and the pressure to sacrifice for a loved one can be intense. Ensuring that donors are fully informed and giving their consent without coercion is essential to maintaining the ethical integrity of LDLT [7].

Psychological factors also play a significant role in both the donor and recipient's decision-making process. Donors may experience feelings of guilt, anxiety, or depression following the donation, particularly if complications arise or if the outcome is not as expected. Similarly, recipients may face psychological challenges in coping with the sense of indebtedness to their donor, which can affect their emotional well-being post-transplant [8]. Comprehensive psychological support for both parties is critical to addressing these concerns and ensuring positive outcomes for all involved.

Advancements in living donor liver transplantation

Recent advancements in medical technology and surgical techniques have improved the safety and efficacy of LDLT. Minimally invasive surgery, such as laparoscopic and robotic-assisted approaches, has reduced recovery time and minimized surgical risks for the donor [9]. Additionally, the development of more sophisticated immunosuppressive therapies has improved graft survival and reduced the likelihood of organ rejection.

Furthermore, research into liver regeneration and the potential use of stem cells and tissue engineering holds promise for enhancing the safety of LDLT. These innovations may lead to methods for growing livers or liver tissues in the laboratory, which could eventually reduce the need for living donors altogether [10]. However, these technologies are still in the experimental stage and require further development before they can be widely applied.

Looking ahead, the focus of LDLT research should be on improving donor safety and minimizing the risks associated with the procedure. Advances in imaging techniques, such as enhanced liver function tests and 3D liver modeling, could help surgeons better assess the donor's liver health and determine the optimal amount of liver to remove. Additionally, the development of more refined techniques for graft preservation and transplantation may further reduce the risk of complications for both the donor and the recipient.

Ethical considerations also remain a key area of focus. Efforts to

ensure that living donations are voluntary, free from coercion, and properly informed must continue. Guidelines and support systems should be developed to protect the rights and mental health of both donors and recipients. Global cooperation in creating ethical standards for LDLT will be essential to addressing the ethical challenges posed by organ donation.

Conclusion

Living donor liver transplantation offers significant benefits in terms of reducing waiting times and improving patient survival, but it also carries inherent risks for both donors and recipients. Advances in surgical techniques, immunosuppressive therapies, and liver regeneration hold promise for improving the safety and efficacy of LDLT, but careful consideration of ethical and psychological factors remains crucial. As the field continues to evolve, the focus should be on maximizing safety, equity, and the well-being of both the donor and the recipient, while exploring innovative solutions to address organ shortages globally.

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Conflict of Interest

None

References

1. Khosravi N, Pishavar E, Baradaran B, Oroojalian F, Mokhtarzadeh A, et al. (2022) Stem cell membrane, stem cell-derived exosomes and hybrid stem cell camouflaged nanoparticles: A promising biomimetic nanoplatforms for cancer theranostics. *J Control Release* 348:706-722.
2. Wu HH, Zhou Y, Tabata Y, Gao JQ (2019) Mesenchymal stem cell-based drug delivery strategy: from cells to biomimetic. *J Control Release* 28: 102-113.
3. Yan K, Zhang J, Yin W, Harding JN, Ma F et al. (2022) Transcriptomic heterogeneity of cultured ADSCs corresponds to embolic risk in the host. *IScience* 4: 104822.
4. Zhang W, Huang X (2022) Stem cell membrane-camouflaged targeted delivery system in tumor. *Mater Today Bio* 1: 100377.
5. Li Y, Wu H, Jiang X, Dong Y, Zheng J, et al. (2022) New idea to promote the clinical applications of stem cells or their extracellular vesicles in central nervous system disorders: Combining with intranasal delivery. *Acta Pharm Sin B* 12: 3215-3232.
6. Ji B, Cai H, Yang Y, Peng F, Song M, et al. (2020) Hybrid membrane camouflaged copper sulfide nanoparticles for photothermal-chemotherapy of hepatocellular carcinoma. *Acta Biomater* 111: 363-372.
7. Wang M, Xin Y, Cao H, Li W, Hua Y, et al. (2021) Recent advances in mesenchymal stem cell membrane-coated nanoparticles for enhanced drug delivery. *Biomater Sci* 9:1088-1103.
8. Xia Q, Zhang Y, Li Z, Hou X, Feng N, et al. (2019) Red blood cell membrane-camouflaged nanoparticles: a novel drug delivery system for antitumor application. *Acta Pharm Sin B* 9: 675-689.
9. Shin MJ, Park JY, Lee DH, Khang D (2021) Stem Cell Mimicking Nanoencapsulation for Targeting Arthritis. *Int J Nanomedicine* 16: 8485-8507.
10. Vasanthan V, Hassanabad AF, Fedak PWM (2021) Commentary: Cell therapy for spinal regeneration-implications for recovery after complex aortic surgery. *JTCVS Open* 24: 45-46.