

A holistic approach to liver transplantation

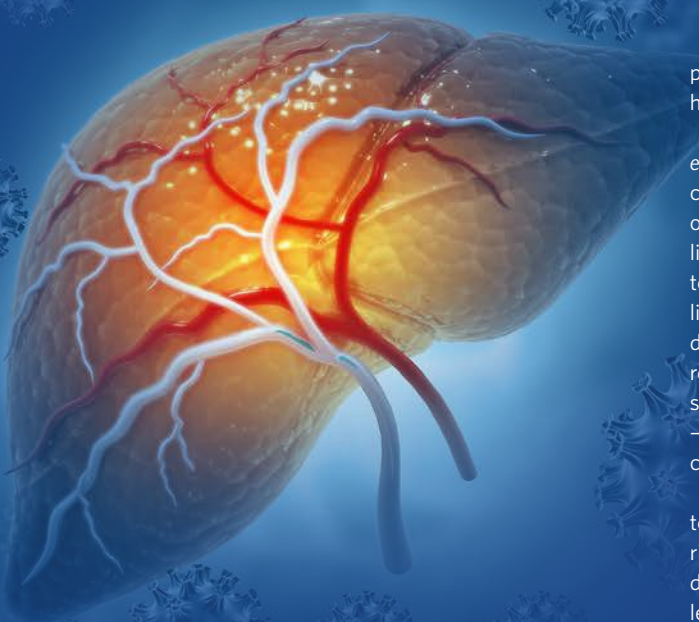
Minimally invasive surgery and other novel techniques are improving living donor liver transplants.

Transplantation is one of the most successful treatments for severe liver disease. However, there is a huge shortage of living donors, and these donors face a high risk of physical and psychological trauma during surgery. A well-developed approach is needed to ensure safety for both donors and recipients.

Since its first liver-transplant surgery in the late 1970s, West China Hospital has completed more than 2,000 such procedures. It was also the first hospital in China to use minimally invasive techniques in a living donor's surgery in 2015, when a team performed the first laparoscopic donor hepatectomy — a surgical operation to remove part of liver through the inside of the abdomen via small incisions.

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Since then, the hospital has successfully completed a further 70 minimally invasive liver transplants, says Hong Wu, a professor at the Transplant Centre and vice president of the hospital. Today it is one of



the world's top five centres for minimally invasive living donor liver transplantation.

Wu, along with his colleagues Jiayin Yang and Yonggang Wei, has championed many novel technologies, such as 3D visualization for preoperative evaluation of the liver's anatomical structure; intraoperative fluorescence navigation; imaging of the bile ducts; and resection of liver without cutting off its blood flow.

They also performed China's first high-precision, robot-assisted liver resection and the first laparoscopic, right-liver hepatectomy on living donors¹. Both approaches reduce the likelihood of severe complications and blood loss, and result in faster recovery for donors, reducing trepidation

about the procedure, and attracting more possible sources of organs for transplant.

Novel strategies

As the proportion of overweight donors is increasing every year, a strategy was needed to overcome the problem of graft size mismatch to prevent 'post-transplant large-for-size syndrome' (LFSS). This is usually caused by the implantation of an excessively large liver graft into a small recipient cavity.

Wu, along with Yang and their colleague at the centre Li Jiang, has developed the first *ex vivo* right posterior sectionectomy (eRPS)² to reduce the size of the liver graft. This technique, performed outside the body, preserves the right hepatic vein in a liver tissue graft, while

preventing LFSS. This procedure has been named HuaXi-eRPS.

The team has also developed *ex vivo* splicing technique, contributing to the completion of the hospital's first dual-graft liver transplantation. This technique is applicable when the liver graft from the adult living donor is not large enough for the recipient, which could lead to small-for-size syndrome (SFSS) — a potentially life-threatening complication.

The researchers were first to splice a segment from the right of the liver of a living donor with a segment from the left of the liver of a deceased donor. "This reduces our need for living donors. As only part of the patient's liver is used, the remaining graft can be used for another transplant," says Yang.

The splicing procedure is performed outside the body, so that the most complex parts of the surgery — including vascular reconstruction and grafts splicing — can be undertaken more easily and in shorter periods.

Going forward, it's crucial that standard guidelines are developed to direct donor transplantation, Wu says, covering preoperative evaluation, surgery, postoperative care and data management. ■

References

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2. Pu X., He D., *et al. Transpl Int* **35**:10177(2022). *Cardiology* 2022