

Liver Transplant FAQs

ADULT-TO-ADULT LIVING DONOR LIVER TRANSPLANTATION

In some countries in the 1990's such as Japan, Korea, Taiwan and Hong Kong, the concept of brain death, which makes organ donation easier, was not legally accepted. Therefore liver transplantation, which normally takes the whole liver from the deceased donor, was almost impossible. Surgeons in those countries, however, had extensive backgrounds in liver surgery, which made it possible to attempt to transplant a portion of the liver instead of the whole organ. These initial attempts posed an ethical question about the safety of the donor. Additionally, this particular procedure was not widely used in the western world, where the shortage of donor organs was still not desperate. However, in the United States and Canada, the organ shortage became dramatically worse in the late 1990's and the transplant community in this region started using this new technology in an increasing number of patients.

UIC is one of the first transplant programs that have implemented this new surgical procedure in the United States.

How is ALDLT possible?

To begin, a completely healthy individual usually exhibits a liver volume five times higher than the minimum requirement. In theory, almost 80 % of the liver volume can be removed. The remaining piece of liver would then actively regenerate and grow to the original size in approximately two months.

Secondly, although the human liver looks like a single chunk of flesh, it has anatomical segmentation inside. Surgeons have developed a technique to divide the liver into pieces without causing too much bleeding or collateral damage. (Figure 1)

The size of the liver is usually proportional to the size of the body. The recipients would not require 100 % of their estimated liver size. A donor liver, at a size of 40% or greater in relation to the recipient's estimated size usually suffices and supports the need of the recipient. Provided that the donor and the recipient are about the same size, donation of 60% of the liver becomes safe for both individuals.

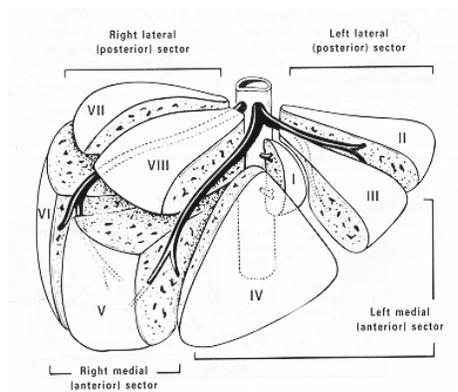


Figure1. Anatomical segmentation of the liver

Why is adult-to-adult living donor transplantation (AldLT) necessary?

Although liver transplantation is the best treatment for patients with end-stage liver disease, there are currently only enough organs from deceased donors available for approximately one-third of the 17,000 plus individuals on the national United Network for Organ Sharing (UNOS) liver transplant waiting list. Sadly, about 20% of patients die each year while waiting for a suitable liver. This scarcity of donors has imposed a need for medical professionals to explore, what would otherwise be considered extreme solutions to terminal cases of liver failure, living donor liver transplantation (LDLT).

Timing in liver transplantation is of extremely high importance. Once a patient progresses into a terminal stage of liver disease, the patient not only gets higher chances to easily recover after liver transplantation once the donor organ becomes available. (Figure 3)

Therefore, the importance of a timely evaluation and preparation for liver transplantation cannot be overemphasized. Nevertheless, performing a liver transplantation in a timely fashion often becomes impossible for two reasons. Firstly, the availability of donor livers is completely unpredictable as they are to be recovered from deceased donors. The patient may become unsuitable for transplantation due to illness by the time the donor liver becomes available. Secondly, due to the worsening shortage of donor livers, the average MELD score for transplant recipients continues to increase. In other words, patients are getting sicker while they wait for transplantation, and when they finally receive their liver transplantation, they carry higher chances of complicated and prolonged recovery, or even death.



Figure 3. Progression of liver disease and timing of liver transplantation

What are the benefits of LDLT?

Because LDLT is an elective procedure performed when the recipient is in the “best possible” condition, he or she avoids the continued physical deterioration that inevitably occurs while waiting for a suitable liver replacement.

By avoiding the use of a cadaveric liver, LDLT helps to shorten the UNOS waiting list and allow another patient on that list to benefit from transplantation.

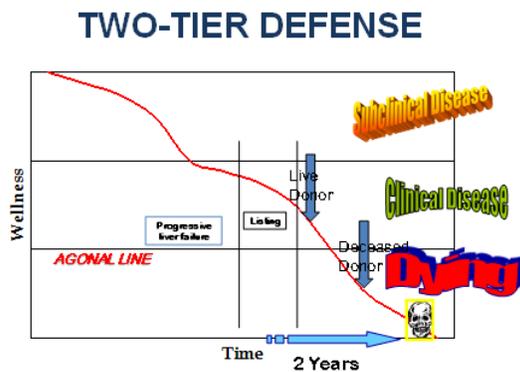


Figure 4. One of the benefits of LDLT, offering one more chance to receive liver transplantation with more ideal timing.

LDLT IN ADULTS AND CHILDREN

LDLT is an outgrowth of a series of surgical innovations in segmental liver transplantation, driven initially by the need for pediatric cadaveric livers. The unique segmental anatomy of the liver allows it to be separated into independent anatomic units that are able to retain normal function. Since 1989, several thousand LDLT operations have been performed globally, most commonly between an adult donor and a pediatric recipient. These procedures have significantly reduced the number of pediatric patients dying on the waiting list.

Similarly, living donor adult liver transplantation (ALDLT) poses exciting, new surgical possibilities for adult patients with end-stage liver disease. In fact, it has gained widespread acceptance as a lifesaving surgical innovation.

UIC Liver transplant program began offering ALDLT in 1999, and performed the first such procedure in the Midwest. Now, our ALDLT program is among the oldest in the United States, having saved more than 50 additional lives to date using this procedure.

Major concerns when performing ALDLT include ensuring the donor's safety and having an adequately sized liver graft for the recipient. Advances in surgical techniques, however, have helped improve safety, minimize risks and allow ALDLT to be widely offered throughout the United States.

In these highly technical operations, the right lobe of the donor's liver (about 60 percent of the total liver) is implanted into the recipient. Following surgery, there is a rapid regeneration of liver tissue, which allows both the donor and recipient's livers to regenerate to nearly full size. Amazingly, it typically takes the recipient less than one month to regenerate fully.

Who can be a donor?

An individual must first volunteer to donate a portion of his or her liver to a family member or someone with whom he or she shares strong emotional ties. Not all volunteers, however, are deemed suitable.

- The donor's blood type must be compatible with the recipient's
- His or her liver must be large enough relative to the recipient's body size.
- In addition, careful screening tests must be performed to evaluate the health and suitability of the donor.
- Psychiatric evaluations are also conducted to ensure that the donor does not feel unduly pressured by other family members and is truly willing to undergo the procedure, even if it should fail.
- Age between 18 years old and 60 years old
- The absence of life limiting disease in other organ systems such as heart, lung, or central nervous system
- The absence of active infection
- Absence of drug or alcohol addictions. Patient must have documentation of successfully completing a recovery program or obtain clearance by psychological evaluation

Qualifying for Live Donor Liver Transplant

The most important aspect of living donor organ transplantation is the safety of the donor. In a circumstance where the donor candidate has any less than ideal health, then the continuation of the evaluation process and further consideration for donation must be stopped.

Only the “perfectly healthy” person with reasonable size can become a donor.

- This step-by-step evaluation process starts with the simplest and least invasive tests.
- Blood test: Blood type, serologic tests for infectious diseases, liver function test, complete blood count etc.
- Liver biopsy for candidates with BMI greater than 25 or history of significant alcohol consumption to rule out having too much fat in the liver
- Abdominal CT and MRI for evaluation of size and anatomy of the liver
- Psychosocial interview with the donor advocate
- Echocardiogram and pulmonary function test

What is the risk of the donor operation?

Donation of approximately 60 % of the whole liver is clearly a major operation which may carry the risk of serious complication or even death. Since 1996, it is estimated that approximately 7000 cases of ALDLT have been performed worldwide. Among these, there have been 13 cases of reported donor mortality. None of these occurred during the surgical procedure. Instead, they were all related to non-surgical complications.

Observed mortality of the donor of the right lobe of the liver (60-65% of the whole liver) over the past 15 years is 0.4%. Fortunately, a clear trend of decrease in complications after donation operation has been observed in recent years, as surgical teams are accumulating more experience.

After completion of the whole evaluation process, the donor will see one of transplant surgeons again to discuss details of the planned procedure.

What if the donor candidate turns out to be unsuitable for donation?

The recipient will still stay on the waiting list for deceased donor (conventional) liver transplantation. Even if the donor candidate could pass multiple steps of tests and turn out to be medically suitable, he or she always has the right to withdraw their wish to donate. Withdrawal of wish to donate a portion of the liver would not affect candidacy of the recipient for deceased donor liver transplantation.

What will happen after donation?

The donor operation usually takes 4-6 hours in the operating room. Since two teams of surgeons for the donor and recipient are utilized with two surgical procedures at the same time side by side, sometimes the operating time may take longer than the initial estimation.

After donation, the donor's hospital stay is 5-7 days provided that the recovery process is straightforward with no complication.

The donor usually receives maximum pain control with epidural anesthesia, as well as general anesthesia.

After discharge from the hospital, the donor will be seen by the transplant surgeon on a regular basis for the first two months to make sure there are no complications and a good recovery. For the first year, the transplant team will closely follow up with the donor.