

Liver Transplant Surgery

For liver transplant patients

Liver transplant is a usually done for people with end-stage liver disease and for people who have liver cancer. In liver transplant surgery, doctors replace a diseased liver with a healthy liver from a donor.

Most times, donated livers are given first to recipients who are sicker and who have a high Model for End-Stage Liver Disease (MELD) score.

Your wait for transplant could last days, months, or years. Sadly, up to 10% of patients on the wait list in the U.S. get worse or even die before they receive a transplant. This is why it is very important that you work with your doctor to prevent health problems that could prevent you from being transplanted.

Waiting for Your Transplant

Keep in Touch

- After you are accepted and listed by our transplant program, we need to set up a reliable way to contact you, at any time of the day or night. **You must have a reliable cell phone and other source of contact.**
- If you plan to be out of town, give your transplant coordinator the phone number(s) where we can call you. Please do not miss a life-saving opportunity because you cannot be reached!
- Whenever your contact information changes, be sure to call your transplant coordinator so that we have your updated numbers.



Talk with your doctor if you have any questions about your transplant surgery.

Know Your Transplant Travel Plan

Be sure to have your travel plan to UWMC decided ahead of time. This may include:

- Arranging for a person who can drive you to Seattle in the middle of the night
- Finding out when flights leave your nearest airport for Seattle
- Having your bag packed and ready

Be Ready

When we call you for transplant, we will try to give you enough time to get to UWMC in a timely but unhurried manner. Most patients have about 6 to 10 hours' notice. When we call you, we will give you a specific time to arrive at UWMC for check-in.

Be Flexible

Certain situations can affect when we call you for transplant, and what happens next:

- We may call you as a backup candidate for another transplant recipient.
- After you are called in for transplant, your surgery could be cancelled if we find that the donor liver is not of good quality.
- Your transplant could be cancelled after you arrive at the hospital if we determine that there are changes in your health condition that make the transplant surgery too risky. If this happens:
 - You will need to have more tests to clear you again for liver transplant. We want to make sure you are in the best condition to have a liver transplant as safely as possible.
 - You will **not** lose your place in line on the list for a new liver as long as your condition allows for a safe operation.

We realize that being called for transplant and not having the surgery happen as planned can be very stressful and may cause a financial burden. But know that even if you do not receive a transplant the first time we call you, being called means you are very close to receiving a transplant – hopefully within the next several weeks. Please be patient.

Day of Transplant

When you arrive at UWMC, check in at Admitting on the main level (3rd floor) of the hospital. After you are done with registration, you will be given the number of the room where you will stay. Most patients come to the transplant unit on 4-Southeast before their surgery.

After you are admitted:

- Nurses will draw more than 10 tubes of blood. These will be used for both testing and storage.
- A member of your Transplant Team will ask you about your medical history and give you a physical exam.
- You will be sent to the lab for a chest X-ray.
- You will take a shower with an antibacterial soap.
- You will sign a consent form that gives us permission to do your transplant surgery.

When we are sure about the timing and quality of the donor liver, you will be moved to the operating room (OR) on the 2nd floor of the hospital. Your family can come with you as you are moved. Your family will then be directed to the surgery waiting room. Family members are not allowed in the OR.

Your surgical team will include:

- Attending transplant surgeon
- Liver transplant surgery fellow
- Nurses
- Anesthesiologist
- Other medical providers as needed

Soon after you arrive in the OR, the anesthesiologist will give you medicine that will make you sleep. The anesthesiologist will then place the many lines needed to safely monitor you throughout the surgery. Some of these lines include special *intravenous tubes* (IVs) placed in your neck and arms.

The next thing you will be aware of is waking up in the intensive care unit (ICU) after your transplant.

The Liver Transplant Operation

A liver transplant operation can last 5 to 8 hours. But, you may be in the OR longer than that, depending on how complex the operation is. This includes the time it takes the anesthesiologist to prepare you for your operation and how long it takes to move you to the ICU after the operation.

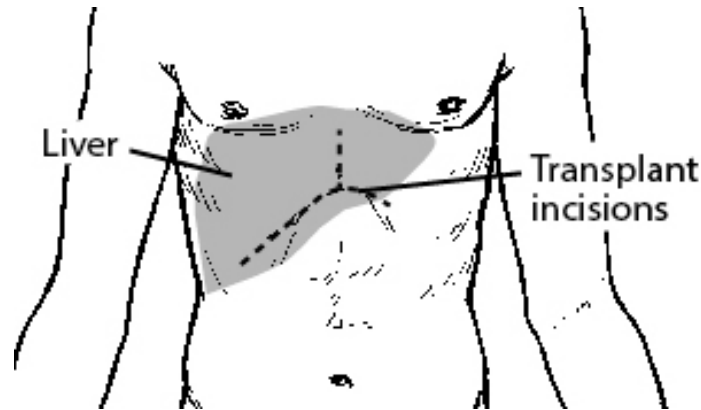
The operating room nurse will update your family as the operation proceeds. Your surgeon will also talk with your family in person when the surgery is done.

What happens during the surgery?

The liver transplant involves many steps:

Incision

The liver is in the right upper part of your abdomen, beneath your lower ribs. To do a safe transplant, we need to make a large incision beneath your ribs and up to the breastbone (see drawing).

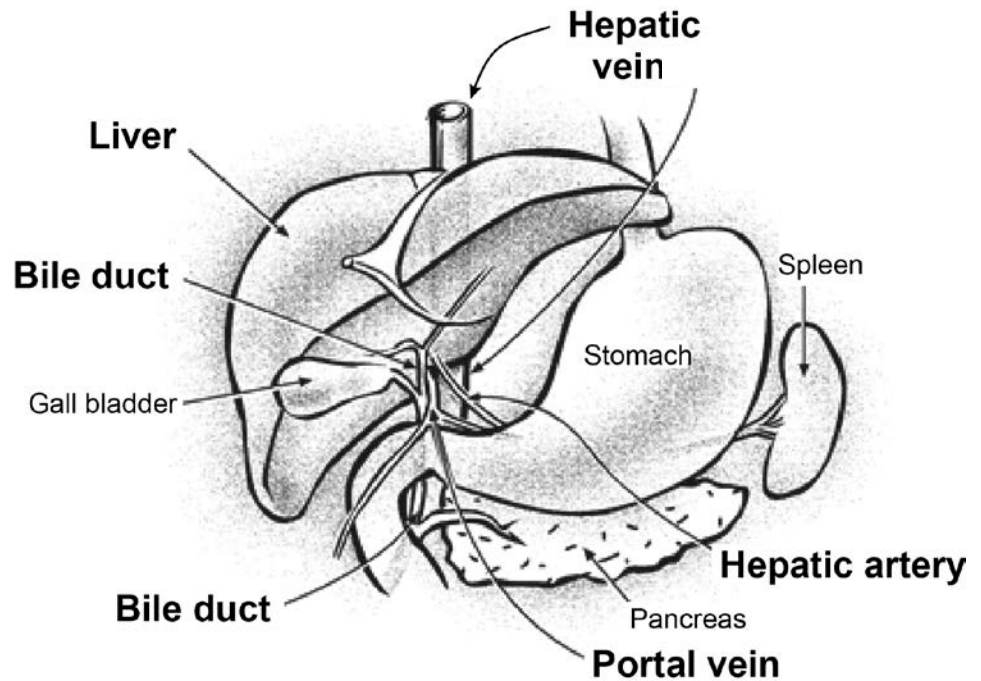


Incisions for liver transplant

Dividing the Liver

The liver has 4 connections that must be cut before it can be removed. These include:

- The **hepatic veins**, blood vessels that carry filtered blood from the liver to the *inferior (lower) vena cava*. The inferior vena cava is the large vein that carries blood to the right atrium of the heart.
- The **portal vein**, which collects blood from your bowels, pancreas, and spleen, and carries it through your liver before returning it to your heart. This is the main blood supply to your liver. It provides almost 80% of the blood supply to the liver cells.
- The **hepatic artery**, a very small vessel that supplies only 20% of the blood entering your liver. This artery is very important because it supplies blood to the bile ducts in your liver.
- The **bile duct**, which carries bile from your liver to your bowel to help absorb fat in the food you eat.



This drawing shows the connections to the liver that must be cut during transplant surgery.

Veno-Venous Bypass

A *veno-venous bypass* is used in some operations. In this procedure, we make 2 extra incisions over 2 large veins in your right or left groin and left armpit. A tube is placed in these 2 veins and connected to a pump. This bypass allows blood to flow around the site where we are working, and it returns a normal blood volume back to the heart.

Connecting the New Liver

Then we sew your new liver in. First the hepatic veins and the portal vein are reconnected, which restores blood flow to your liver. Then we reconnect the hepatic artery and, finally, the bile duct.

At the end of the operation, 1 or more tubes (drains) are placed near your liver and brought out through the sides of your abdomen. These drains remove any blood or fluid that collected in your abdominal cavity during surgery. The drains are removed a few days after surgery.

What happens after surgery?

When the transplant surgery is done:

- The surgeon and anesthesiologist will help move you to the ICU on the 5th floor of the hospital.

- For the first few hours after your operation, you will be kept asleep and on a breathing machine (*respirator*). You will wake up with a breathing tube.
- When the surgical team is satisfied that there is no bleeding problem, your new liver is working well, and you are breathing well on your own, we will take the breathing tube out and take you off the breathing machine.
- We will then remove some of the other tubes and monitors that were placed for your operation. Some will stay in place for a while during your recovery.
- You will then go back to the regular hospital floor on 4-Southeast.

Your Hospital Stay

While you are recovering in the hospital, your care will be managed by your Transplant Team of doctors, residents, and nurses. You will have daily blood tests to monitor your electrolytes, blood counts, liver function tests, and medicine levels. We also do many ultrasounds to assess how well the new liver connections are working. Most transplant patients are in the hospital for about 10-14 days. If you have any complications, your stay will likely be longer.

During your stay, we will work with you on several issues that are very important to your recovery and to the success of your transplant:

Getting Up and Moving

After a major operation, it is very important to start moving as soon as you can, and as much as you can. Moving helps your body get rid of the effects of anesthesia and return to normal more quickly. Walking helps prevent pneumonia and blood clots in your legs. It also helps your digestive system work better. Nurses and physical therapists will help you until you are comfortable walking on your own.

Your Medicines

Pain control is important for your healing. Right after transplant, your pain will be managed with pain medicine in your IV. Once you are eating well, you will start taking pain pills. Most patients are able to stop taking all pain medicine by 3 to 4 weeks after transplant.

After your transplant, you will start taking 10 to 15 new medicines. The nurses and the pharmacists will teach you to identify your medicines and will help you set up a *mediset* (a box that holds your medicines) to organize your daily doses.

Follow-up Clinic Visits

- During the first 3 months after your transplant, the Transplant Team will take care of all aspects of your medical care. If you have a health problem, you can reach us by phone 24 hours a day, 7 days a week.
- After you leave the hospital, you will return to the Transplant Clinic and have your blood drawn for blood tests at least twice a week for the 1st month.
- Between the 1st and 2nd month, you may need to come to clinic once a week and have blood drawn for lab tests 1 or 2 times a week. By the end of the 2nd month, we may need to see you only every other week.
- About 3 months after your transplant, if things are going well, we will check you out of the Transplant Clinic. Your care will then be returned to your primary care provider.

Your Long-term Care

When you have “graduated” from the Transplant Clinic, you will go back to your primary care provider for your healthcare needs. But, you may consult with us from time to time. You will also have follow-up visits with one of our hepatologists:

- 6 months after transplant
- 1 year after transplant
- Yearly after that, for the rest of your life

These follow-up visits are very important. They help us keep your transplant stable long-term.

Timeline After Surgery

The Ideal

This timeline gives the **ideal** hospital stay and clinic follow-up after transplant surgery:

- Day 0Liver transplant operation
- Day 7 to 10.....Discharge from hospital
- Day 11Clinic visits (You will have a varying number of clinic visits between Day 11 and Day 90)
- Day 90Transfer care to primary care provider
- 6 months.....Follow-up visit with UWMC hepatologist
- 1 year, then yearly.....Follow-up visit with UWMC hepatologist

The Actual

In **real life**, this is what often occurs:

- About 40% of all liver transplant recipients (40 out of 100 recipients) follow this ideal plan.
- About 10% of transplant recipients (10 out of 100 recipients) have a very difficult time.
- About 50% of all liver transplant recipients (50 out of 100 recipients) have at least 1 major complication.

The good news is that even if there is a complication, it is usually identified, treated, and resolved for most transplant recipients. Often, by 3 months after transplant, these patients have caught up to those who have had no issues at all and then continue on the same “ideal” course.

Complications from Surgery

A liver transplant operation is a complex procedure. It requires hundreds of steps, all of which are vital to the best outcome.

The list of possible complications could fill many pages but, thankfully, most are quite rare. Problems range from the most severe (dying) to more common problems such as rejection or readmission for fever.

One of the reasons you must have so many tests before your surgery is to reduce the risks of having a severe complication such as heart attack, stroke, or death. But, in spite of all of these tests, problems can happen.

For the first 24 hours after transplant, our main concerns are bleeding and the function of your new liver. Some transplants can be done with almost no blood loss, while others require 10 or more units of blood. If you have ongoing bleeding after transplant, we may need to do another surgery to stop the bleeding.

For a small number of transplant recipients (about 1% to 2%, or 1 to 2 out of 100), a liver may not work well. We call this *primary non-function*. If the liver does not work well, we will need to do another transplant. We will do everything we can to get you a new liver as quickly as possible.

Any of the 4 connections of the new liver can develop a complication. But, the most common problems occur with the bile duct and the hepatic artery:

- The **hepatic artery** supplies blood to the bile ducts. If this artery “clots off” so that no blood flows through it after surgery, bile cannot get out of the liver and the bile ducts may *atrophy* (waste away). This leads to poor liver function, infection, or even a need for re-transplant. Very soon after your transplant surgery, we will check your hepatic

artery by ultrasound to make sure the blood is flowing well. If there is a concern, we will take you back to the OR to remove the clot and repair the artery.

- The **bile duct** can “scar down,” which blocks bile flow, or “leak,” which spills bile into the abdomen. Most bile duct problems can be fixed without surgery.

Rejection

Your immune system helps fight off infection. It does this by knowing what is *self* (your own cells and proteins) and what is *non-self* (things that are foreign to your body). Your immune system will attack and destroy anything it sees as non-self, such as a virus or bacteria.

It is natural for your immune system to see a transplanted organ as non-self and attack it like it would any other invader. This is called *rejection*.

Medicines to Control Rejection

To control rejection, we must inhibit your immune system. This is done with 3 main *immunosuppressive* medicines:

- Tacrolimus (FK-506)
- Steroids or predisone
- Mycophenolate mofetil (MMF)

At the time of your transplant, your Transplant Team will decide what immunosuppressive medicines you need to take. These medicines can have major side effects that often must be controlled by taking other medicines. Your Transplant Team will constantly reassess your medical status and medicine needs.

Most transplant patients take about 10 to 15 medicines, from 1 to 4 times a day. Right after transplant, this can be a handful of pills every few hours.

Your doctors will review your medicines and taper them over time, usually at 3 months and again at 6 months after transplant.

But, you will take immunosuppressive drugs for the rest of your life. If you stop taking them, your immune system will reject your gift of life, your liver transplant.

Complications of Immunosuppression

Infection Risk

Immunosuppression helps your body accept your new liver, but it can also make it easier for you to get infections. Some types of bacteria, viruses, and fungal infections that occur in people who are immunosuppressed do not affect other people.

We cannot completely protect you from these complications. But, there are things you can do to reduce your risk of infection. You will learn more about these topics:

- Certain bacteria are carried on raw or uncooked food. Your dietitian will teach you about foods to avoid and how to safely handle and store foods.
- Certain occupations or hobbies can expose you to airborne particles that carry fungal spores. Our occupational health services will help you find ways to greatly lower this risk.
- You are more likely to get infections from animals. At discharge, your nurse coordinator will review our pet guidelines with you.
- Good hand washing is vital to prevent infections. We strongly advise that you wash your hands with warm soap and water several times during the day, for 20 seconds each time. This is the best way to reduce your exposure to germs.
- We do **not** recommend you wear a face mask, since it does not give much protection from germs.
- Be cautious when you are with friends and family who may be ill. Avoid inviting guests who are ill into your home.

Cancer Risk

The immune system also plays a role in fighting tumors. With a suppressed immune system, you will be at a greater risk of developing some types of cancers, such as skin cancer, *sarcomas*, or a blood cancer called *post-transplant lymphoproliferative disease* (PTLD).

Only 1 to 2% of transplant recipients (1 to 2 out of 100 recipients) develop one of these cancers in their lifetimes. But, because there is a risk, stay in close contact with your primary care provider and your transplant team. If you have any unusual new skin bumps or masses, your doctor will need to biopsy or remove them.

Survival After Transplant

The usual course of end-stage liver failure is deterioration over time. Without transplant, end-stage liver failure is 100% fatal.

But, your odds of survival with a good quality of life are greatly increased with a liver transplant. The Scientific Registry of Transplant Recipients (SRTR) offers the most current statistics on our liver transplant program. These statistics are updated twice a year.

In general:

- 1 year after liver transplant, 90 to 93% of transplant recipients (90 to 93 out of 100) are still alive.

- 3 years after liver transplant, 80 to 85% of transplant recipients (80 to 85 out of 100) are still alive.

When a recipient dies after transplant, it is usually because they:

- Had other diseases before the transplant, such as heart disease, that got worse
- Had complications related to immunosuppression
- Had a high risk of developing liver cancer

Many liver transplant recipients are doing well 10 or more years after their surgery. No one knows how long a transplanted liver can last, but worldwide there are a small number of patients who are still doing well 30 years after their transplant.

Communication

The relationship between you and your Transplant Team is a lot like a marriage: To be successful, clear communication is needed.

The transplant process is very complex. It is very important that you, your transplant coordinator, and your doctors can speak freely. If you or your family are becoming frustrated for any reason, tell us how you feel so that we can help.

At times, the relationship between you and your Transplant Team may feel one-sided. During the work-up, you will need to have a long series of tests or interviews. Some of these can be both physically and emotionally painful. But, remember that we do this with one important goal in mind: to lead you through this complex process and give you the best chance at achieving a higher quality of life.

