PRE-LIVER TRANSPLANTATION

YOUR LIVER DESERVES THE BEST

Our Accreditations

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Foundation Hospital

RESPECT FOR LIFE

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In this booklet:

LIVING WITH LIVER DISEASES

What are the signs and symptoms of liver disease? How will I know how severe is the liver damage?

It is common for patients with cirrhosis to feel normal until End Stage Liver Disease (ESLD) sets in, when patients typically develop signs and symptoms, some of which are:

- Yellowness of skin and white portions of the eyes or passing dark yellow urine (Jaundice)
- Having a swollen abdomen (fluid build-up in abdomen, called ascites)
- Excessive sleepiness, inability to sleep, becoming forgetful, drowsy or confused encephalopathy), due to build-up of ammonia
- Throwing up blood (blood vomiting), bleeding in intestines can occur when there is resistance to its flow through the liver
- Passing tarry black stools or fresh or dark red bleeding in stools
- Passing light or clay colored stools
- Easy or excessive bruising or bleeding even from simple wounds
- Constant severe excessive itching (pruritus)
- Feeling tired or weak
- Loss of appetite
- Unintentional weight loss
- Loss of muscle mass
- Swelling (edema) of hands and feet

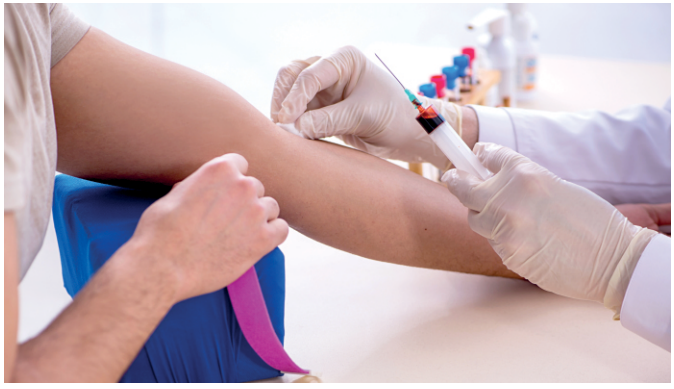
Patients with mild liver damage might not have any symptoms. Occurrence of above symptoms generally indicates - poor or inadequate liver function, poor quality of life, short life expectancy, or failure of medical therapy.

It is common that, by the time patients undergo tests and are diagnosed with liver problem, they already have decompensation (worsening) of advanced chronic liver disease.

Medical and endoscopic therapy is generally used for controlling symptoms and treating complications. Some symptoms are more serious than others, but fever, blood vomiting and confusion should alert immediate medical attention.

At this stage, liver transplant might be the only way to treat the problem and have a normal life.

How is severity of liver disease assessed?



Signs and symptoms of liver disease and results of some blood tests are commonly used to determine severity of liver disease, which in turn determines the treatment required. Some of the common findings on initial tests done in patients with liver cirrhosis are high bilirubin, low albumin level, high prothrombin time (INR), low platelet count.

Some formulae and scoring systems universally used for severity assessment are the Child-Pugh-Turcotte (CTP) score, CTP Class (A, B or C) and Model for End Stage Liver Disease (MELD) score.

Patients with early liver disease have minimal symptoms, low scores and may not require a transplant. Patients with advanced disease have severe symptoms, high scores and need an early transplant. Some patients may have secondary effects of liver disease on other organ systems, such as kidneys (hepato-renal syndrome), lungs (hepato-pulmonary), brain or and others and may also need an early transplant.

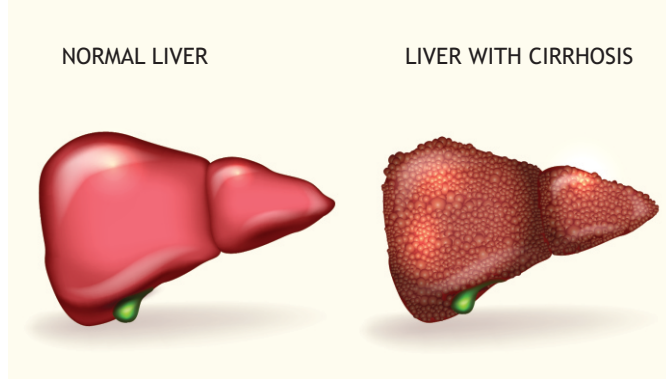
Patients with liver cancer are often diagnosed on routine screening or evaluation tests such as an ultrasound, CT scan or MRI. They might require an early transplant even without severe underlying liver disease.

Patients with acute liver failure generally have a normal (non-cirrhotic) liver and therefore have the potential for regeneration and recovery. However, beyond a certain degree of damage, recovery is unlikely. The need and urgency of transplant is almost universally determined by using the Kings College Criteria.

Sometimes, patients might have an irreversible liver disease but not enough to warrant a transplant, whereas some patients might be too sick to benefit from a transplant. This assessment can best be made by doctors who specialize in liver diseases i.e. liver transplant surgeons and hepatologists. They will transplant only if the benefits of a liver transplant outweigh its risks.

Liver transplant is not offered to patients with current alcohol abuse problems, those with uncontrolled active infections, widespread cancer or severe, untreatable diseases of the brain, heart or lung.

What is end stage liver disease or cirrhosis? What are its causes?



Some diseases destroy healthy liver cells; replace them with scar (fibrous) tissue causing loss of function. When a large part of the liver is scarred, it is called as cirrhosis. Cirrhotic liver loses its capacity to re-grow or regenerate causing loss of liver function and is often progressive and irreversible. Cirrhosis cannot be reversed with any medicines. Although cirrhosis cannot be reversed, if diagnosed at an early stage, its progression can be halted by treating its cause.

Even if 70% of liver is damaged, the remaining liver can provide adequate function for the patient. However, damage beyond that causes loss of function, organ failure and is called as chronic End Stage Liver Disease (ESLD) and for such patients liver transplant may be the only way to give them a chance of normal life span and good quality of life.

In Adults, end stage liver disease or cirrhosis, is caused by:

- Long-term infection with the Hepatitis C or Hepatitis B virus
- Drinking too much alcohol over many years
- Fatty liver secondary to obesity or high cholesterol
- Biliary Diseases (damage or blockage to bile ducts inside the liver) like Primary Biliary Cirrhosis and Primary Sclerosing Cholangitis
- Autoimmune liver diseases (immune system attack against the liver)
- Hereditary diseases such as Wilson's disease and hemochromatosis
- Liver cancer

In children, end stage liver disease or cirrhosis, is caused by:

- Biliary Atresia is the most common reason for transplant, where the bile ducts are missing, damaged or blocked by birth, thus bile accumulates in the liver and causes cirrhosis
- Metabolic diseases where some enzymes made by the liver is defective by birth

What is acute or fulminant liver failure?

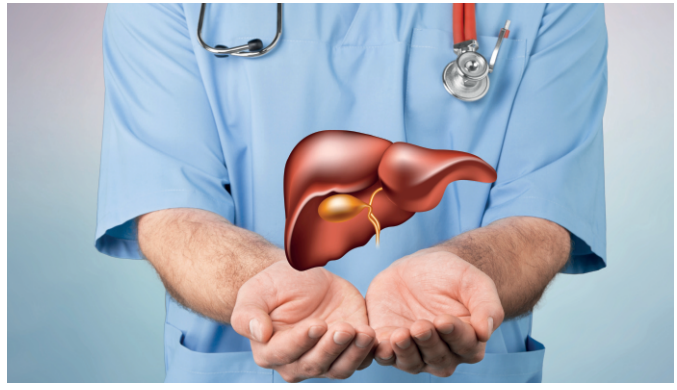
Acute liver failure (ALF) is a devastating and life-threatening condition in which there is sudden and rapidly progressive damage to the liver developing over a few days or weeks in an otherwise normal person. Its signs and symptoms typically start with jaundice and have a rapidly worsening course. Patients may become forgetful, drowsy or confused and may progress to coma over few hours to days.

ALF patients treated in a dedicated Liver ICU have a fair chance of recovering from the condition. For those who do not show signs of recovery, a liver transplant is an emergency life-saving procedure.

Some diseases causing acute liver failure are:

- Infection with Hepatitis A or E virus
- Side effects of medicines (anti-tubercular, paracetamol, ayurvedic drugs)
- Fatty liver during pregnancy

What is Liver transplantation?



Liver transplantation is the operation to replace a failing or damaged liver with a healthy well-functioning one. The most commonly used technique is Orthotopic Liver Transplantation (OLT), in which the patients' entire liver is removed and replaced by the donated liver in its location.

The donated liver can be from a living donor or a deceased (brain dead, cadaveric) donor.

TYPES OF LIVER TRANSPLANTATION

What are the types of Liver Transplantation?

There are two types of liver transplant depending on who donates the liver:

1. Deceased Donor (brain dead, cadaveric) Transplant:

Brain death is a sudden death after an accident, brain hemorrhage or stroke with irreversible brain damage.

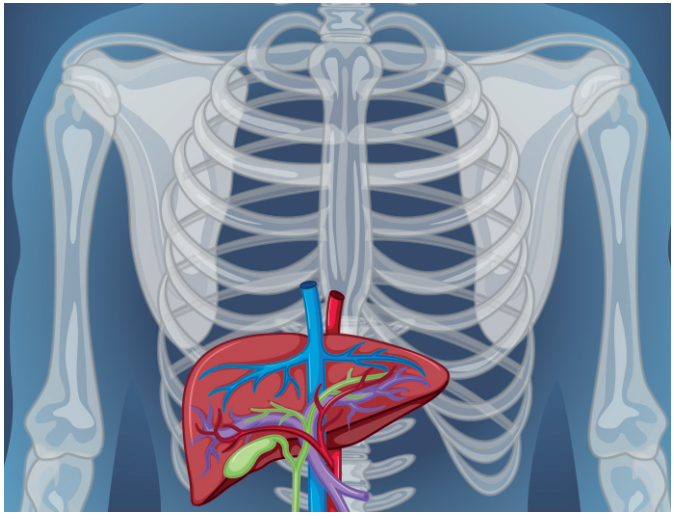
In this situation although the damage to the brain is severe and permanent, there is no damage to other organs. Brain dead patients may be artificially maintained on a ventilator and supportive medicines for a short duration and may be

able to donate their organs for transplantation if their family so desires.

Donation by a single deceased donor can allow 9 lifesaving organ transplants and numerous life-enhancing tissue replacements.

Livers from deceased donors are matched with recipient's blood group and size, offered to the first patient on the waiting list and if suitable, transplanted. Unfortunately, the number of patients in need of a transplant far outnumber the availability of such organs; therefore, not all patients might be able to undergo a deceased donor liver transplant. Patients commonly receive the whole liver, although sometimes it may be divided into two portions and offered to two patients, generally a child and an adult.

Living donor transplant



Living donors can donate one of a paired organ such as a kidney or lung or one lobe of the liver. Living donors are family members or close relatives of the patient.

1. **Reserve:** Even 30% of the liver can provide sufficient function for a person; therefore, one can easily tolerate removal of a large portion of the liver.
2. **Regeneration:** Liver has the capacity to regenerate / re-grow back to its normal size. The process starts soon after division / transplantation of the liver in both the donor and the patient and is complete within 2-3 months. Because of these properties, 50 - 70% of normal liver can be safely donated by a family member and the remaining liver provides adequate function until complete regeneration. A margin of safety is always kept for the donor when planning the operation.

Patients who suffer from cirrhosis need a liver which is 0.8 - 1% of their body weight for a successful transplant. This commonly corresponds to a right lobe for an adult patient, left lobe for an adolescent and left lateral segment for a small child.

In India, more than 80% of transplants are from living donors which is in contrast with western countries where more than 90% of transplants are from deceased donor livers.

Who can be a living liver donor?

A living donor should meet the following criteria:

- Compatible blood group with the recipient (table)

If You are of blood group*	You can donate to*
O	O, A, B or AB
A	A or AB
B	B or AB
AB	AB

(* Rh factor (+ve or -ve) is not important)

- A family member (wife, husband, mother, father, brother, sister, son, daughter, grandfather, grandmother, grandson, granddaughter or close relative of the patient). Family friends, well-wishers, staff or neighbors are not accepted as donors.
- Between 18-50 years of age
- Not overweight, because people who are overweight may have fatty liver
- The donor's liver should be large enough to provide adequate volume for the recipient (patient) after leaving behind sufficient for the donor
- Donor should be in good overall physical and mental health, should undergo a thorough medical and psychological evaluation and volunteer for donation after fully understanding the risks of the surgery

The decision to donate can be changed at any stage of the evaluation, before or after the tests are done or any time before the surgery.

EVALUATION AND PREPARATION FOR LIVER TRANSPLANTATION

What is the preparation required for the transplant?

It is important to accept transplantation with a positive attitude because it is a big step and although its preparation is cumbersome, waiting period unpredictable, operation complex and recovery prolonged, most patients do well after transplant and lead an excellent quality of life. Patients initially may deny their sickness, expect it to be very easy, feel guilty or be anxious or depressed about the process or costs involved. While patients might not believe that they need a transplant, it is important to keep the larger picture in mind, seek support from family members, not lose precious time and prepare for the transplant.

The preparation starts with recipient's evaluation. Once the patient is found suitable for transplantation, any potential donors in the family should have their blood grouping done and one who is compatible should undergo donor evaluation. If the donor is suitable, a government appointed legal authorization committee clearance is obtained and transplant scheduled. Patients planned for a living donor liver transplant can generally undergo the same in about 2 - 3 weeks.

If a suitable family donor is not available, after the recipient evaluation is found satisfactory, the patient is registered on the waiting list for a deceased donor liver transplant. This period of waiting may be stressful for patients and their families because of continued episodes of decompensation of liver disease, and uncertainty and unpredictability of the waiting period. Patients should make adequate arrangements for blood products and finances in advance before surgery.

While preparing for a transplant, we encourage you to ask any questions you may have in this regard and meet other patients and families who, have undergone the operation and willing to share their experiences.

Patients with acute liver failure are very critical, often in the ICU, sometimes on a ventilator and may have a rapidly progressive worsening disease and might need an emergency transplant. Although the preparation required is similar, all tests and arrangements have to be done in a very short duration. Recipient and donor evaluations are done emergently within few hours to days. Recipient evaluation is similar, although neurological evaluation, including a CT scan of the head may sometimes be required. Donors also simultaneously undergo a rapid evaluation, all tests being done in less than 12 - 24 hours.

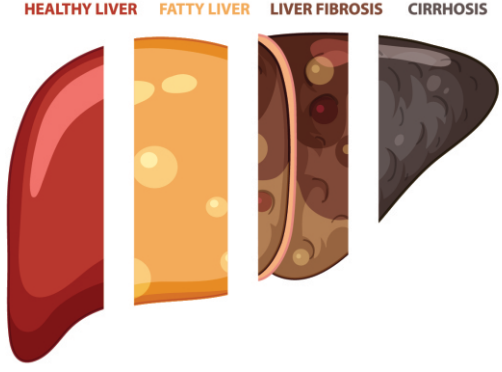
An emergency legal authorization committee meeting is called for clearance. If a suitable living donor is not available, patients are enrolled on the waiting list, where there they might be given priority. Some patients' families may be unprepared for this sudden and major change and might benefit from timely counseling.

Pre-transplant recipient (patient) evaluation

Once end-stage liver disease is diagnosed and need for a transplant is perceived, patients undergo a formal evaluation, which involves blood tests, CT and other scans and tests for heart, lungs and other organ systems and assessment by various specialists.

Evaluation generally takes about 7 - 10 days and is done on an outpatient basis. The evaluation period may be very hectic and stressful. Try to relax between tests and follow the instructions for each test carefully for accurate results. The pre-transplant coordinator is your main contact person during evaluation and will schedule any tests or procedures you will need. At every stage of evaluation, the plan for further tests may change depending on your reports; therefore it is important to visit the pre-transplant clinic routinely for review by the transplant team. Patients who are sick may be advised to undergo the evaluation in the hospital. If unexpected / incidental problems are discovered on evaluation they might have to be treated before transplant.

Evaluation goals:



- To establish the diagnosis and find the cause of cirrhosis / end stage liver disease
- To determine the severity of liver disease and its effects on other organ systems such as kidneys, lungs, etc. and thus determine urgency of transplant
- To actively look for liver tumor
- To evaluate the condition of other organ systems such as heart, lungs, kidneys, etc. and determine patient's ability to tolerate this major operation
- To evaluate technical feasibility, risk of surgery (previous abdominal infections, surgery, and thrombosis of liver blood vessels) and other difficulties, if any

Pre-transplant donor evaluation

Donor evaluation is performed in phases, with more expensive and invasive tests reserved for later phases. The tests take about 7 - 10 days and are done on an outpatient basis, commonly along with the recipient evaluation.

Phase I : Routine Blood Investigation

Phase II : Liver fat estimation

Phase III : Liver volumes

Phase IV : Anatomy of liver blood vessels

Phase V : Tests to evaluate other organ systems

Phase VI : Evaluation by specialists

Both the patient's and donor's emotional health and willingness for transplant are important for the operation and therefore they would be seeing a psychologist during evaluation.

Multi-disciplinary team (MDT) review

All cases who have completed both patient and donor evaluations are reviewed by the multi-disciplinary transplant team (MDT) weekly where their suitability for transplant is discussed and tentative date for transplant decided. When

potential donors are rejected, it can be stressful for the family, but is done for the safety of the donor and success of the transplant and an alternative donor should be identified. HLA testing and matching is performed before the authorization committee meeting.

Authorization committee clearance

All patients planned for living donor transplant need clearance by the government appointed authorization committee. Our administrative staff helps patients and their families understand and prepare various legal forms, affidavits (statements under oath) and supporting documents. Proofs of identity, residence and donor recipient relationship have to be submitted with the application to authorization committee. Donors who are not near relatives and foreign nationals have to obtain a no-objection certificate (NOC) from the state of domicile (residence) or embassy. The transplant team is independent of the authorization committee and cannot influence its decision. Falsification of documents or other efforts to provide false information / mislead the authorization committee constitutes violation of the law and carries heavy penalty. The transplant is scheduled only after clearance by the authorization committee.

Financial arrangement

Liver transplant is offered as a package at our institute. It includes operation, hospitalization and consultation charges for donor and recipient. The amount required at various phases, mode of payment, inclusions and exclusions of the package will be explained to you.

Patients with additional risk factors such as kidney or cardio-respiratory problems, those expected to undergo a complex operation, need prolonged ICU care or hospitalization might be offered the high-risk package. Patients undergoing combined liver-kidney transplant, dual lobe transplant, ABO incompatible transplant or Acute Liver Failure (ALF) or other diseases that will require use of additional expensive medicines or procedures not included in the package.

If you have insurance coverage or the cost of your care will be paid by your employer or embassy, please discuss the same with the patient financial liaison or TPA helpdesk, who will help you with any paperwork required. Some insurance companies only pay part of the package and the rest might have to be arranged by you and your family. Also, at this stage you should discuss with them about insurance coverage of post-transplant medicines. Some insurance companies also cover donor expenses for living donor transplantation; please clarify the same with them.

What is the procedure for enlisting for and undergoing a deceased donor transplant?

Once recipient evaluation is completed and patient is found medically fit for a transplant, the prescribed forms have to be completed and submitted through the hospital to the government appointed appropriate authority for listing. Patients may register at one hospital in one state for the waiting list.

After listing, patients should undergo periodic testing and review with the transplant team and also inform them of any changes in medical condition to help get appropriate priority on the waiting list.

When a potential deceased donor liver is available, patients are alerted immediately and called to the hospital. You could be called any time of day or night. The transplant team must be able to reach you when a liver is available for you 24 hours a day, 7 days a week. Please keep your contact information (at least 3 current phone numbers) up-to-date with the coordinators. If you are going out of town or country, please inform the coordinator with updated contact information.

Patients not living in the same city should pre-plan for the emergency trip well in advance. If you are in a job, you should alert your employer about sudden leave in advance. You should plan how you will get to the hospital, who will take care of your family and home in your absence and maybe make a power for attorney for your business.

Key points

- While one team prepares the patient for transplant, another team retrieves the donor liver
- Brain death or cardiac-death may cause instability in the donor and impair blood flow or oxygenation to the organs
- The liver from deceased donor is carefully checked for its suitability for transplantation
- Livers from donors may he considered high risk if they had previous Hepatitis B or Hepatitis C infection, had risk factors for HIV infection or had active infection or cancer
- The quality of liver will be discussed with you by the transplant team in detail
- After having all the information and understanding the pertinent risks you will have to decide whether to accept or reject the liver
- If the transplant team finds the liver unsuitable or the donor family withdraws their consent for organ donation, the transplant may be cancelled
- While such "false alarms" could be stressful, it is for your safety
- The waiting period is highly variable, ranging from weeks to months

What if I do not have a suitable living donor and am unable to wait for cadaveric transplant because of severe liver disease?

Patients who do not have a suitable living donor or are unlikely to get a deceased donor transplant in time for their disease severity might benefit from one of these options:

Swap Transplant: When one of patient's family members is suitable and willing for donation, but is not a good match for the patient, a paired donation or swap transplant may be considered. In this type of transplant, two families with suitable living donors exchange their donors because they are not a good match for their own patient, but are appropriate for each other's patients.

Swap transplant is commonly done for blood group mismatch, e.g. if donors and patients of one family have blood groups A and B and that of the second family B and A, respectively, these donors are not suitable for their own recipient. However, if the donors are exchanged, both patients can undergo transplantation. Both transplants are performed simultaneously after careful planning.

Dual Lobe Liver Transplant: When a potential family donor's liver volume is found inadequate for the recipient on pre-operative CT scan, they are rejected and another donor is evaluated. It is common to have two donors in one family each with low liver volumes who are otherwise suitable. If partial livers from both donors are transplanted; it is often adequate for the patient. In such a transplant, three operations (one recipient and two donors) are performed simultaneously.

ABO incompatible (ABOi) Transplant: Generally, liver transplant is performed with blood group compatible donor livers, because ABO (blood group) incompatible transplantation triggers production of antibodies against the transplanted liver causing organ rejection. However, with special immunosuppressive medicines and measures, antibody levels can be reduced before transplant and organ rejection prevented. In small children, the antibody levels are very low and ABOi transplant may be performed with less preparation and better success.

Auxiliary Transplant: In Auxiliary Partial Orthotropic Liver Transplantation (APOLT), a part of the patient's liver is removed and replaced by a part of donor liver. The patient continues to have portion of his native (own) liver. After the patient's native liver recovers, the donor liver withers in most patients and the majority of patients are able to withdraw from immunosuppressant medications. This transplant is technically more challenging and is performed in only a few centers across the world. It is performed in patients with rare disorders of liver and in select cases of Acute Liver Failure (ALF).

What precautions should I take while waiting for the transplant?

While waiting for the transplant, it is important that patients undergo regular tests, adhere to all appointments and medical advice, and comply with treatment and dietary restrictions, in order to remain healthy, prevent infections, prevent any complications, enable early identification of problems or significant change in condition and allow prompt treatment before transplant. Some simple precautions can be taken.

- Wash hands for at least 1 minute using soap and water before eating, after using the bathroom or when they are dirty. Please scrub all areas including between fingers, under the fingernail and around the nail beds
- Use anti-septic hand-rubs occasionally
- Malnourished patients may be advised few weeks of medical nutrition therapy
- It is important to do light exercises, walk and remain active (as possible)
- Get enough rest
- Take only the prescribed medicines. Do not take any new medicines, including vitamins, herbs and supplements without discussion with the transplant team
- Children are advised to undergo all vaccinations appropriate for age, because they cannot receive live vaccines after transplant
- Eat a low salt diet, as prescribed, do not use table salt in cooking or add salt to any foods you eat. This will help you in controlling ascites (fluid in the belly)
- Cut down on liquid intake, if prescribed. This will help control your ascites
- Eat smaller meals, low-fat high protein diet with enough calories will keep your muscles strong or have meals as prescribed by the dietician
- Nutritional supplements may be prescribed by the transplant team
- Please inform the transplant team about any significant change in your health or any hospitalizations
- No alcohol intake, if we have any reason to doubt your lifetime commitment to sobriety or abstinence from alcohol or illicit drugs, we might perform random screening blood or urine tests for the same and if found positive, make you inactive from the transplant waiting list
- If you smoke, you will have to stop for 4-6 weeks before transplant because it can cause problems with lung infections after surgery and recovery from ventilator after surgery
- If you have any new or unexpected change in your health such as blood vomiting or black stools, changes in mental condition, excessive sleepiness (drowsiness), confusion, nose bleeding, sudden increase in weight, swelling in abdomen or arms and feet, severe or sudden abdominal pain, fever, fainting spell, severe vomiting or loose motions, please contact the transplant team immediately

- If you feel well enough and you are medically stable, you could continue to work and even travel while you wait for a transplant. However, please update the transplant coordinator with your contact details and location, for any potential deceased donor liver offers that might come to you. Also, before you travel, you should identify a doctor who would be able to take care any urgent problems away from home
- While waiting, you might be given medicines to reduce the fluid build-up, reduce the level of ammonia in your blood and reduce itching, antibiotics and other such medicines depending on your symptoms
- You should have the phone numbers of your family members and the transplant team handy to deal with any urgent situations

Getting admitted to the hospital for transplant?

Living donor transplants are planned in advance and patients are admitted to the hospital two days prior to surgery. Donors are admitted one day before surgery for review and tests. Both donor and recipients must not eat or drink anything after midnight before the operation.

Deceased donor transplants are performed on emergency basis when a cadaveric liver is available. Patients are called to the hospital urgently; they undergo a rapid review and tests before surgery to ensure that they are healthy and ready for surgery. Patients should not eat or drink anything once they receive intimation for the transplant. Patients and the transplant team will have to wait until the condition of the donor liver is checked by the donor surgery team before transplant can be started.

After the patients are admitted, the transplant team will have a discussion about the quality of organ and transplantation process and ask you to sign the consent form after complete understanding of the same. Patients should inform the transplant team about pre-existing health problems, current medicines and known drug allergies, to prevent their accidental use and prevent drug interaction with transplant medicines. If patients develop new unexpected problems such as fever, if review tests show significant change compared to previous reports or there are any other new concerns, active problems should be first treated and the transplant might have to be postponed.

Liver Transplantation - The Operation

The timings of donor and recipient surgeries are synchronized to ensure minimal ischemia to the liver. Both donors and recipients undergo the operation under general anesthesia, where they are put to sleep, will have no consciousness, pain, awareness or recollection of the operation. While under anesthesia, they are put on a ventilator and various lines are catheters (arterial line, central line, endotracheal tube, urinary catheter, nano-gastric tube, etc) are used to accurately monitor various parameters and allow rapid administration of blood products, IV fluids and drugs. It may take upto 2 hours to prepare for the operation. During the surgery, various blood and other tests are continuously performed for monitoring.

Donor operation

The living donor operation involves removal of a portion of the liver. The liver is split into two parts as planned pre-operatively. One of these parts is removed along with the blood vessels and bile ducts going in and out of the lobe, leaving the other half in the donor with its blood vessels and bile ducts intact. The surgery lasts about 6 - 8 hours. In addition to the planned portion of the liver, the gall bladder is always removed because it is stuck to the undersurface of the liver. A drain tube is kept in

the abdomen to monitor for any bleeding and the incision line is closed using very fine absorbable sutures.

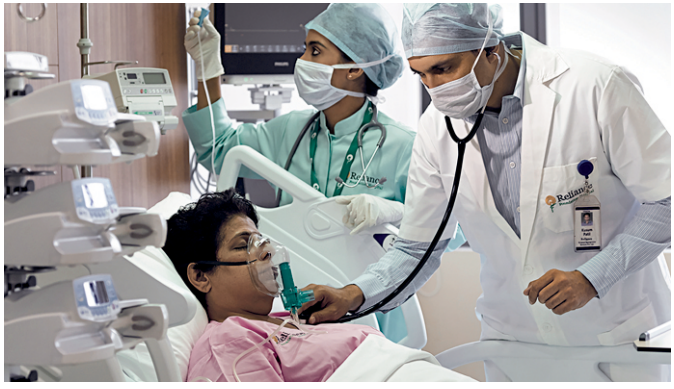
Recipient operation

The first step is to remove the entire cirrhotic liver (including gall bladder) to make space for the new liver. The cirrhotic liver is shrunken, stiff with multiple thin-walled, high pressure blood vessels around it and may be stuck to surrounding organs because of previous infection or surgery. Therefore, this part of the operation is done slowly. This is followed by transplantation of the new liver by joining (anastomoses) all blood vessels and allowing blood circulation through the liver. The liver starts working immediately. Bile ducts of the new liver may be joined with the patient's own bile duct or directly with the intestine.

A drain tube is kept in the abdomen to monitor for any bleeding and the incision line is closed using staples. The recipient surgery generally takes 8-12 hours and about 5 - 10 units of blood and blood products are used, however, in difficult cases, it may be much longer with significantly more blood products requirement.

At the end of donor surgery, the ventilator is removed while the recipient is generally shifted to the ICU on a ventilator and they are observed overnight.

Recovery after the operation



Recovery from liver transplantation depends on many factors including patients' age, overall health, and severity of liver disease, infections, other organ dysfunction or complications before or after the operation. Good understanding of the process, moral support and encouragement from family, a positive attitude and strong will power are important for faster recovery.

Donors are able to get out of the bed in 1-2 days and made to walk in 2-3 days. Various lines, catheters and drains are removed as they make progress in recovery. Generally, they can have liquid diet followed by normal diet in 2-5 days, shifted to the ward in 1-2 days and discharged in 5 7 days. While pain medicines are given, pain threshold is different for every patient, please let your nurse know if you still have pain, she will give you extra pain medicines. Some patients prefer to take pain medicine before walking or any exercise that may trigger pain or just before going to sleep for a comfortable night. On discharge, they are generally given pain killers and vitamins. Most donors will have an uneventful recovery although some might have mild problems such as fever, loss of appetite, nausea or even vomiting, because of residual effects of anesthesia and slow bowel movement after surgery, which will resolve with time.

Patients (recipients) are kept on a ventilator overnight and it is removed when they are fully awake. First 24 - 48 hours are critical and they are closely monitored for any bleeding, infection or other complications. Various lines, catheters and drains are removed as they make progress in recovery over 3-4 days. Patients are given liquid diet followed by normal diet in 2-5 days.

In patients where the bile duct has been joined directly with the intestine, the naso-gastric tube may be kept longer and diet may be delayed. Patients are helped out of the bed in 1-2 days; they participate in physiotherapy, walk in 4-5 days and gradually become more active. Few patients might need support for walking initially. Patients should actively do incentive spirometry to prevent collapse of lungs, prevent lung infections and recover faster. Patients should learn to support their incision with a pillow when coughing. Patients generally do not have a lot of abdominal pain after surgery because there is numbness of the skin around the incision, although they may experience back and shoulder pain because of lying down on the operating table for a prolonged time. Patients are given pain medicines as per their need. Some patients may be confused, agitated or have mood changes because of effect of sedatives or disturbance in sleep pattern which generally resolves in a few days. Patients are generally shifted to the ward in 4-5 days and remain in the hospital for about 10-15 days. At discharge, patients receive anti-rejection medicines, antibiotics and other medicines.

In both donors and recipients, blood tests, ultrasound and chest X-Ray are done regularly to monitor liver function and recovery as per standard protocol. Please follow the advice and guidance of the medical and nursing staff. Hospitals are busy places and priority is given to sicker patients, while it is natural for patients and families to be anxious, please do not panic and try to be calm. Please limit the number of visits to the ICU to minimize infection. Patients families are generally updated about their progress by the transplant team once a day or more often if appropriate.

Preparing for discharge

While the patient is recovering from the operation, their families should take this opportunity to learn about precautions to be taken after discharge, understand the schedule for testing and follow-up appointments, become familiar with medicines, learn about the warning signs of potential problems and understand the mechanism to contact the liver transplant team in case of urgent problem. They should also actively participate in discharge planning.

At the time of discharge, patients will get a discharge summary with detailed instructions about testing and medication schedule, which they should discuss with the transplant coordinator. They will get a copy of the investigations chart, blood sugar and blood pressure monitoring chart, which they should become familiar with and learn how to complete.

After discharge, patients are required to do tests and visit the post-transplant clinic every 5 -7 days. They should therefore stay in the vicinity of the hospital for 4-6 weeks after discharge. The house where the patient would be staying after discharge should be prepared for their arrival.

- The house should be thoroughly cleaned with disinfectants
- Arrange for smooth transportation to and from the hospital, please take into consideration stairs, etc before finalizing accommodation
- Patients are encouraged to walk and avoid using a wheel chair
- Please limit the number of visitors for a few weeks
- Avoid meeting people who are ill and report any illnesses / fever / flu / cold / persistent cough / pain in abdomen / loose motions or other transmissible infections and infectious disease such as influenza, pneumonia, chicken pox, hepatitis, etc.
- Avoid contact with animals and birds to prevent infection

FREQUENTLY ASKED QUESTIONS (FAQS)

What is the role of stem cell therapy or hepatocyte transplant in liver failure?

Stem cell therapy and hepatocyte transplantation holds promise for the future as an alternative to liver transplant. However, they are currently at an experimental stage and may be offered only as a part of clinical trial. From the research work done so far, it is clear that these therapies might be more suitable for certain groups of patients such as children with metabolic diseases and patients with acute liver failure. The protocols for such therapies have not been standardized and they are not approved for clinical use by the FDA (Food and Drug Authority).

Will my gall bladder be removed at the time of liver donation / transplant?

Yes, gall bladder is closely attached to the undersurface of the liver and it is a standard step to remove the gall bladder during any liver surgery and it will be removed during both the donor and recipient surgeries along with the liver.

The gall bladder is a storage organ for bile, temporarily stores bile which is formed by the liver. After removal of gall bladder, bile formed by the liver directly goes into the intestine for digestion directly. Removal of gall bladder does not cause any harm or influence digestion.

What kind of matching is required between the patient and donor for liver transplant? Is same blood group donor better than compatible blood group donor?

Fortunately, liver is a very sturdy organ and is relatively privileged because the immune system does not mount a strong reaction against it if the donor has compatible blood group they can be accepted for transplant. Rejection if it happens is generally mild. HLA testing and tissue cross match is not required (as is done for kidney and some other transplants), however, HLA testing may be required for establishing relationship between blood relatives.

After transplant / liver donation, when can I occasionally take alcohol?

No, patients cannot have alcohol in any form in any quantity at any time after transplant because even a small amount of

alcohol can cause significant damage to the transplanted liver. Donors may be able to drink alcohol socially, not routinely, at least after 1 2 years after transplant.

Is it more difficult to do a transplant in a child?

Yes, it is because the minute blood vessels in them are difficult to join, their postoperative care can be done only by doctors trained and experienced in pediatric critical care and transplantation and there are few of them available.

How many years will my transplanted liver last?

The new liver will last you a life-time if you take good care of it. Regular tests and follow-up with the transplant team and medicines as prescribed are the most important things to enjoy good health and normal lifestyle after transplant.

What is the law about transplant in India? What is the procedure for cadaver donation? Can the hospital arrange a living donor if I pay money?

The Transplantation of Human Organs Act, 1994 lays down the definition of 'brain-stem death' (commonly called 'cadaver'). Once brain-stem death is diagnosed by authorized doctors using specified criteria, the family may donate the organs to save lives of many patients with end stage organ failure with transplantation.

For any living donor transplantation, the donor has to be a family member of the patient and cannot be allowed to donate by paying money. Every case of living donor transplantation is reviewed by the government appointed authorization committee and approved before transplantation. The law has been a very effective positive step by the government in curbing illegal unrelated transplantation. The law has imposed very stringent penalties for any violation of the act or organ trading.