

## **HEPATIC FAILURE**

The liver is the second largest organ in the body and performs several different functions. The liver processes everything we eat and drink, which it converts into energy and nutrients for our body to use. It filters out harmful substances, such as alcohol, from our blood, and helps our body to fight off infection. Our liver is the largest internal organ and performs several critical functions, including:

- ✓ Processing nutrients, medications and hormones
- ✓ Producing bile, which helps the body absorb fats, cholesterol and fat-soluble vitamins
- ✓ Making proteins that help the blood clot
- ✓ Removing bacteria and toxins from the blood
- ✓ Preventing infection and regulating immune responses

Exposure to viruses or harmful chemicals can harm the liver. When liver is damaged, one may develop hepatic (liver) failure. In those with liver damage, the liver may eventually stop functioning correctly.

Liver failure is a serious condition. If liver failure develops, one should receive treatment immediately.

## **TYPES OF HEPATIC FAILURE**

Liver failure can be either acute or chronic.

### **Acute liver failure**

Acute liver failure strikes fast. One may experience loss of liver function within weeks or even days. It may happen suddenly, without showing any symptoms. Acute liver failure occurs rapidly. It can be caused by a variety of things, although in some cases, the exact cause may be unknown. Some possible causes include:

- ✓ viral infections, such as hepatitis A, B, or E
- ✓ overdose of acetaminophen (Tylenol)
- ✓ reactions to prescription medications such as antibiotics, NSAIDs, or anti-epileptic drugs
- ✓ reactions to herbal supplements, such as ma huang and kava kava
- ✓ metabolic conditions, such as Wilson's disease
- ✓ autoimmune conditions, such as autoimmune hepatitis
- ✓ conditions that affect the veins of the liver, such as Budd-Chiari syndrome
- ✓ exposure to toxins, such as those found in industrial chemicals or poisonous wild mushrooms

Other common causes of acute liver failure include poisoning from mushrooms or drug overdose, which can occur from taking too much acetaminophen (Tylenol).

### **Chronic liver failure**

Chronic liver failure develops more slowly than acute liver failure. It can take months or even years before exhibiting any symptoms. Chronic liver failure is often the result of cirrhosis, which is usually caused by long-term alcohol use. Cirrhosis occurs when healthy liver tissue is replaced with scar tissue.

During chronic liver failure, liver becomes inflamed. This inflammation causes the formation of scar tissue over time. As our body replaces healthy tissue with scar tissue, liver begins to fail.

### **TYPES OF ALCOHOL-RELATED LIVER FAILURE**

1. Alcoholic fatty liver Disease-Alcoholic fatty liver disease is the result of fat cells deposited in the liver. It generally affects those who drink a lot of alcohol and those who are obese.
2. Alcoholic hepatitis- Alcoholic hepatitis is characterized by fat cells in the liver, inflammation, and scarring. According to the American Liver Foundation, up to 35 percent of people who drink heavily will develop this condition.
3. Alcoholic cirrhosis- Alcoholic cirrhosis is considered the most advanced out of the three types. The American Liver Foundation says that some form of cirrhosis affects 10 to 20 percent of people who drink heavily.

### **CAUSES OF HEPATIC FAILURE**

#### **Causes associated with acute liver failure**

1. Acute liver failure, also known as fulminant hepatic failure, can occur even if one doesn't have a pre-existing liver disease. According to the Mayo Clinic, the most common cause of acute liver failure is acetaminophen (Tylenol) overdose. Acetaminophen is an over-the-counter (OTC) drug. One should follow the recommended dosage on the label. See your doctor immediately if overdosed. Acute liver failure may also be caused by:
  - ✓ certain prescription medicines
  - ✓ some herbal supplements
  - ✓ viral infections, such as hepatitis, including hepatitis A, B, and C
  - ✓ toxins
  - ✓ certain autoimmune diseases

Acute liver failure can be genetic, passed along by an abnormal gene from one or both of parents. If one has a genetic liver disease, one more susceptible to liver failure.

### **Symptoms of acute liver failure**

Acute liver failure often occurs in people who don't have a pre-existing liver condition. It's a medical emergency, and people experiencing symptoms consistent with acute liver failure should seek medical attention immediately. The symptoms of acute liver failure can include:

- ✓ feeling unwell (malaise)
- ✓ feeling tired or sleepy
- ✓ nausea or vomiting
- ✓ abdominal pain or swelling
- ✓ yellowing of the skin and eyes (jaundice)
- ✓ feeling confused or disoriented

### **Causes associated with chronic liver failure**

Chronic liver failure is usually a result of cirrhosis or alcohol-related liver disease (ARLD). The American Liver Foundation states that alcoholism is the most common cause of cirrhosis.

Chronic liver failure occurs due to liver damage that develops slowly over time. This can lead to cirrhosis, in which the large amount of scar tissue on your liver prevents the organ from functioning properly.

Usually, our liver breaks down any alcohol that is consumed. But if one drinks too much, liver can't break down the alcohol fast enough. Also, toxic chemicals in alcohol can trigger inflammation in liver and cause liver to swell. Over time, this damage can lead to cirrhosis.

If one is having hepatitis C, they are at greater risk of developing chronic liver failure or cirrhosis. The hepatitis C virus is spread through the blood. If the blood from a person with the infection enters other body, one can catch it. Needle sharing and using dirty needles for tattoos or piercings can spread hepatitis C.

According to the American Liver Foundation, around 25 percent of people with chronic hepatitis C develop cirrhosis. It's the second leading cause of cirrhosis.

### **Symptoms of chronic liver failure**

The symptoms of chronic liver failure can be broken down into early symptoms and more advanced symptoms. The early symptoms of chronic liver failure may include:

- ✓ feeling tired or fatigued
- ✓ loss of appetite
- ✓ nausea or vomiting
- ✓ mild abdominal discomfort or pain
- ✓ Some symptoms that can indicate the advanced stages of chronic liver failure include:
- ✓ yellowing of the skin and eyes (jaundice)
- ✓ easy bruising or bleeding
- ✓ feeling confused or disoriented
- ✓ build-up of fluid in your abdomen, arms, or legs
- ✓ darkening of urine
- ✓ severe skin itching

## **SYMPTOMS OF HEPATIC FAILURE**

Symptoms of liver failure may include:

- ✓ nausea
- ✓ loss of appetite
- ✓ fatigue
- ✓ diarrhoea
- ✓ jaundice, a yellowish colour of the skin and eyes
- ✓ weight loss
- ✓ bruising or bleeding easily
- ✓ itching
- ✓ oedema, or fluid build-up in the legs
- ✓ ascites, or fluid build-up in the abdomen

These symptoms can also be attributed to other problems or disorders, which can make liver failure hard to diagnose. Some people don't show any symptoms until their liver failure has progressed to a fatal stage.

If one has alcohol-related liver disease (ARLD), one may develop jaundice. Toxins can build up in brain and cause sleeplessness, lack of concentration, and even decreased mental function. One may also experience an enlarged spleen, stomach bleeding, and kidney failure. Liver cancer can also develop.

Some examples of possible causes of cirrhosis include:

- ✓ chronic hepatitis B or C infection
- ✓ alcohol-related liver disease
- ✓ non-alcoholic fatty liver disease
- ✓ autoimmune hepatitis
- ✓ diseases that affect your bile ducts, such as cholangitis

## **STAGES OF LIVER FAILURE**

Infections, alcohol abuse, and genetics can all lead to liver disease and damage. Liver failure happens when liver can't work well enough to perform its many vital functions, such as producing bile to help digest food and clearing blood of toxic substances.

Liver failure can be a life-threatening emergency. It can be either acute or chronic. Acute liver failure comes on quickly, while chronic liver failure occurs gradually over time.

Damage to liver can accumulate through several stages. Each stage progressively affects liver's ability to function properly. Stages of liver failure are:

1. **Inflammation.** In this early stage, the liver is enlarged or inflamed.
2. **Fibrosis.** Scar tissue begins to replace healthy tissue in the inflamed liver.
3. **Cirrhosis.** Severe scarring has built up, making it difficult for the liver to function properly.
4. **End-stage liver disease (ESLD).** Liver function has deteriorated to the point where the damage can't be reversed other than with a liver transplant.

### **Liver cancer**

The development and multiplication of unhealthy cells in the liver can occur at any stage of liver failure, although people with cirrhosis are more at risk.

## **DIAGNOSING LIVER FAILURE**

To diagnose liver failure, doctor will start by taking medical history and performing a physical examination. They may then perform a variety of additional tests, including:

**Liver blood Tests-**Liver blood tests assess the levels of various proteins and enzymes in blood that can be an indicator of liver functions.

**Other blood Tests-**Doctor may also perform a complete blood count (CBC) or test for viral hepatitis or genetic conditions that can cause liver damage.

**Imaging Tests-**Imaging technology such as ultrasound, CT scan, or MRI scan can help doctor to visualize liver.

**Biopsy-**Taking a tissue sample from liver can help your doctor to see if scar tissue is present and can also aid in diagnosing what may be causing the condition.

### **Treatment for liver failure**

- ✓ Since damage to the liver leads to liver failure, treatment involves addressing what's causing liver damage to occur. For example, antiviral medications can be used to treat a viral hepatitis infection, or immune suppressing medication can be given to treat autoimmune hepatitis.
- ✓ Lifestyle changes may also be recommended as a part of your treatment. These can include things like abstaining from alcohol, losing weight, or avoiding the use of certain medications.
- ✓ According to the American Liver Foundation, damage from the inflammation and fibrosis stages of liver failure may be reversed and healed over time (if properly identified and treated). The liver damage caused by cirrhosis is often not reversible, although it can be slowed or stopped.
- ✓ In people with severe cirrhosis or ESLD, a liver transplant may be necessary. This involves removing the diseased liver and replacing it with a liver from a healthy donor.

Regardless of the type, liver failure can be a life-threatening emergency that requires prompt medical intervention. The early stages of liver failure can often heal over time with proper treatment and lifestyle changes. However, the later stages of liver failure aren't reversible and can sometimes require a liver transplant.

People who are diagnosed with liver disease are often monitored throughout their life to make sure that their condition isn't worsening or causing further liver damage.

## **LIVER TRANSPLANT**

A liver transplant is a surgical procedure that removes a liver that no longer functions properly (liver failure) and replaces it with a healthy liver from a deceased donor or a portion of a healthy liver from a living donor. Liver transplant is usually reserved as a treatment option for people who have significant complications due to end-stage chronic liver disease. Liver transplant may also be a treatment option in rare cases of sudden failure of a previously healthy liver.

Living-donor liver transplant is an alternative to waiting for a deceased-donor liver to become available. Living-donor liver transplant is possible because the human liver regenerates and returns to its normal size shortly after surgical removal of part of the organ.

Liver transplant is a treatment option for people with liver failure whose condition can't be controlled with other treatments and for some people with liver cancer. Liver failure may happen quickly or over a long period of time. Liver

failure that occurs quickly, in a matter of weeks, is called acute liver failure. Acute liver failure is an uncommon condition that is usually the result of complications from certain medications.

Although a liver transplant may treat acute liver failure, it is more often used to treat chronic liver failure. Chronic liver failure occurs slowly over months and years.

## **COMPLICATIONS OF THE PROCEDURE**

Liver transplant surgery carries a risk of significant complications. There are risks associated with the procedure itself as well as with the drugs necessary to prevent rejection of the donor liver after the transplant. Risks associated with the procedure include:

- ✓ Bile duct complications, including bile duct leaks or shrinking of the bile ducts
- ✓ Bleeding
- ✓ Blood clots
- ✓ Failure of donated liver
- ✓ Infection
- ✓ Rejection of donated liver
- ✓ Mental confusion or seizures
- ✓ Long-term complications may also include recurrence of liver disease in the transplanted liver.

## **ANTI-REJECTION MEDICATION SIDE EFFECTS**

After a liver transplant, one has to take medications for the rest of life to help prevent body from rejecting the donated liver. These anti-rejection medications can cause a variety of side effects, including:

- ✓ Bone thinning
- ✓ Diabetes
- ✓ diarrhoea
- ✓ Headaches
- ✓ High blood pressure
- ✓ High cholesterol

Because anti-rejection drugs work by suppressing the immune system, they also increase risk of infection.

## **COUNSELLING BEFORE LIVER TRANSPLANT**

Nutrition counselling with dietitians who assess our diet and make recommendations on how to plan healthy meals before and after transplant. Psychological evaluation to assess and treat any underlying issues, such as depression or anxiety, and determine to understand the risks of a liver transplant

Addiction counselling to help people who are struggling with how to quit alcohol, drug or tobacco

Financial counselling to help you understand the cost of a transplant and post-transplant care and to determine what costs are covered.

## **LIVING LIVER DONORS**

Living-donor liver transplants using a small portion of a liver from a healthy, living person account for a small percentage of liver transplants each year. Living-donor liver transplants were initially used for children needing a liver transplant because suitable deceased-donor organs are scarce. Now, it is also an option for adults who have end-stage liver disease.

Living-donor liver transplants offer an alternative to waiting for a deceased-donor liver, and allow the organ recipient to avoid possible health complications of waiting for a transplant. The first step is to identify a living donor who is healthy and able to safely undergo a major surgical procedure. The donor's age, blood type and organ size also are critical considerations in determining whether the patient and the donor are a match for living-donor liver transplant.

Most living liver donors are close family members or friends of the liver transplant candidate. If one has a family member or friend who is willing to donate part of his or her liver.

Living-donor transplants have good results, just as transplants using livers from deceased donors. But finding a living donor may be difficult. Living liver donors go through extensive evaluation to ensure they are a match with the organ recipient and to assess their physical and mental health. The surgery also carries significant risks for the donor.

## **DOMINO LIVER TRANSPLANT**

Another, less common, type of living-donor liver transplant is called a domino liver transplant. In a domino liver transplant, one may receive a liver from a living donor who has a disease called familial amyloidosis. Familial amyloidosis is a very rare disorder in which an abnormal protein accumulates and eventually damages the body's internal organs.



The donor with familial amyloidosis receives a liver transplant to treat his or her condition. Then, the donor can give his or her liver to the patient in a domino liver transplant because the liver still functions well. One may eventually develop symptoms of amyloidosis, but these symptoms usually take decades to develop.

Doctors usually select recipients who are 55 years old or older and who aren't expected to develop symptoms before the end of their natural life expectancy.

Doctors will evaluate you to determine if you may be a candidate for a domino liver transplant or if another treatment option would be more appropriate for your condition.

## **DECEASED-DONOR LIVER TRANSPLANT**

If the patient is notified that a liver from a deceased donor is available, the patient will be asked to come to the hospital immediately. Health care team will admit patient in the hospital, and the patient will undergo an exam to make sure the patient is healthy enough for the surgery.

Liver transplant surgery is done using general anaesthesia, so the patient will be sedated during the procedure.

The transplant surgeon makes a long incision across abdomen to access liver. The location and size of incision varies according to surgeon's approach and patient's anatomy.

The surgeon removes the diseased liver and places the donor liver in patient's body. Then the surgeon connects blood vessels and bile ducts to the donor liver. Surgery can take up to 12 hours, depending on the situation.

Once new liver is in place, the surgeon uses stitches and staples to close the surgical incision

If the patient is receiving a liver transplant from a living donor, surgery will be scheduled in advance.

Surgeons first operate on the donor, removing the portion of the liver for transplant. Then surgeons remove diseased liver and place the donated liver portion in the body. They then connect blood vessels and bile ducts to the new liver.

The transplanted liver portion in patient's body and the portion left behind in the donor's body regenerate rapidly, reaching normal volume within a several weeks.

After your liver transplant, one can expect to:

- ✓ Possibly stay in the intensive care unit for a few days. Doctors and nurses will monitor condition to watch for signs of complications. They'll also test liver function frequently for signs that new liver is working.
- ✓ Patient is allowed to spend 5 to 10 days in the hospital.
- ✓ Have frequent check-ups continue recovering at home.
- ✓ One has to take medications for the rest of life. One has to take a number of medications after liver transplant, many for the rest of life. Drugs called immune suppressants help keep immune system from attacking new liver. Other drugs help reduce the risk of other complications after transplant.
- ✓ Expect six months or more recovery time after your liver transplant surgery.
- ✓ One may be able to resume normal activities or go back to work a few months after surgery.

## **LIVER TRANSPLANT SURVIVAL RATES**

In general, about 75% of people who undergo liver transplant live for at least five years. That means that for every 100 people who receive a liver transplant for any reason, about 75 will live for five years and 25 will die within five years.

People who receive a liver from a living donor often have better short-term survival rates than those who receive a deceased-donor liver.

## **DIET AND NUTRITION**

- ✓ After your liver transplant, it is especially important to eat a well-balanced diet to help recover and keep liver healthy.
- ✓ Transplant team includes a nutrition specialist (dietitian) who can discuss nutrition and diet needs and answer any questions one may have after your transplant.
- ✓ In general, diet after liver transplant should be low in salt, cholesterol, fat and sugar.
- ✓ To prevent damaging new liver, it's important to avoid alcohol.
- ✓ Dietitian will also provide with several healthy food options and ideas to use in nutrition plan.

Dietitian's recommendations may include:

- Eating at least five servings of fruits and vegetables each day
- Avoiding grapefruit and grapefruit juice because of their effect on a group of immunosuppression medications
- Having enough fiber in your daily diet
- Choosing whole-grain foods over processed ones

- Drinking low-fat or fat-free dairy products, which is important to maintain optimal calcium and phosphorus levels.
- Eating lean meats, poultry and fish
- Staying hydrated by drinking adequate water and other fluids each day

## **EXERCISE**

Exercise and physical activity should be a regular part of life after a liver transplant to continue improving overall physical and mental health. Walking, bicycling, swimming, low-impact strength training and other physical activities should be the part of a healthy, active lifestyle after transplant. One has to check in with transplant team before starting or changing post-transplant exercise routine.

## **PREVENTION OF LIVER FAILURE**

One can help to prevent liver failure by making lifestyle changes that keep our liver happy and healthy. Here are some tips for improving liver health:

- ✓ Drink alcohol in moderation, and never mix medications with alcohol.
- ✓ Take medications only when needed, and carefully follow any dosing instructions.
- ✓ Don't mix medications without first consulting your doctor.
- ✓ Maintain a healthy weight — there's a connection between obesity and fatty liver disease.
- ✓ Get vaccinated against hepatitis A and B.
- ✓ Be sure to have regular physicals with your doctor during which they perform liver blood tests.