

# Liver Transplant

The liver is the largest organ in the body. It is found high in the right upper abdomen, behind the ribs. It is a very complex organ and has many functions. They include:

- Storing energy in the form of sugar (glucose)
- Storing vitamins, iron, and other minerals
- Making proteins, including blood clotting factors, to keep the body healthy and help it grow
- Processing worn out red blood cells
- Making bile which is needed for food digestion
- Metabolizing or breaking down many medications and alcohol
- Killing germs that enter the body through the intestine

The liver also has a remarkable power to regenerate itself. However, there are illnesses that can cause permanent and irreversible damage to the liver. Liver transplantation has become a standard treatment for a patient whose liver no longer functions well enough to maintain life. This revolutionary treatment has moved from research and the first actual transplant in the 1960s, to a standard form of therapy in the 1990s. There are two main reasons why liver transplants have become so successful. There have been major advances in surgical techniques, and new drugs are now available to prevent rejection of the new liver.

## **Reasons for Liver Transplantation**

Medical treatment for liver diseases and liver damage is always the first choice of therapy. The only reason to perform a liver transplant is that all other forms of treatment have been unsuccessful, and the patient's liver can no longer support life. This is called end stage liver disease. There have been over 60 different liver diseases treated with liver transplantation. However, there are several conditions that are more commonly treated with this procedure. They are frequently conditions that cause chronic or continuing liver inflammation. As the inflammation heals, fibrous tissue forms, much like a scar forms when a cut in the skin heals. Severe and advanced scarring of the liver is called cirrhosis. Cirrhosis is not reversible and leads to end stage liver disease. The following conditions are the most common causes of end stage liver disease:

- Chronic viral hepatitis B and C
- Alcohol related liver disease
- Autoimmune hepatitis
- Primary sclerosing cholangitis
- Primary biliary cirrhosis
- Steatohepatitis
- Liver disorders inherited or present at birth
- Drug induced liver damage

In children, the most common cause of liver failure is biliary atresia. This is a condition in which the bile ducts fail to develop. These ducts carry bile from the liver to the intestine. If there are no ducts, the bile backs up in the liver and causes damage. Biliary atresia is usually present at birth.

### **Special Considerations**

Alcoholism is a common cause of end stage liver disease. Although these patients are not denied a liver transplant, all transplant centers will insist on a thorough psychological evaluation beforehand. They also require treatment of the alcoholism, proven abstinence for at least six months, and good prospects that the patient will continue to abstain from alcohol. A transplanted liver will become severely damaged by alcohol just like the old one.

Most patients infected with hepatitis B and some with Hepatitis C recover completely with no further liver damage. However, some will develop chronic hepatitis leading to cirrhosis and end stage liver disease. This is more common with Hepatitis C. A liver transplant under these circumstances is difficult to manage because the new liver almost always becomes infected with these viruses. Ongoing treatment is usually necessary to keep the new liver healthy.

Most cancers of the liver develop in other parts of the body and spread to the liver. These patients are never transplanted because their cancer is not curable. Occasionally, cancer develops first in the liver. This is called a primary cancer or hepatoma. When a primary liver cancer is identified early, a liver transplant will be performed. However, long-term survival is less common in this case than with transplants for other conditions.

### **Transplant Centers**

Transplant centers are very specialized facilities that are usually located at university teaching hospitals or large medical centers. They require a large staff of surgeons and other professionals to evaluate and select patients, and perform surgery and follow-up care. In addition, they must maintain close communications with transplant candidates and the national network that rations the livers as they become available. All transplant centers have equal access to technical skills and drugs to prevent rejection, so survival rates depend a great deal on the underlying disease of the recipient. Primary cancer of the liver has the lowest long-term survival at about 50%-60%. Primary biliary cirrhosis and primary sclerosing cholangitis have survival rates of over 90%. Transplants that are performed for other diseases have survival rates ranging somewhere in between these figures.

Unfortunately, there are more patients who need a new liver than there are donors. Choosing who gets a liver can be difficult, so a fair system of allocation had to be developed. There is an organization called United Network for Organ Sharing (UNOS) in Richmond, VA. UNOS provides a distribution plan to each transplant center, based on population. Donor livers almost always come from individuals who have suffered fatal brain damage due to trauma, rather than disease. Ideally, physicians and patients should be able to plan and perform a transplant before the patient reaches end stage liver disease.

However, because of the lack of donor livers, the choice of who gets a new liver now depends on how critically ill the patient is. Other considerations, such as a patient's psychological make-up, are a part of the decision. For example, an unreformed alcoholic will have little chance for a liver transplant. The patient's family situation and support at home are also factors. Often a panel of lay people and medical personnel will help make the choice at each transplant center. Once patients are selected as candidates, they are placed on the active transplant list and given a beeper to wear at all times. This is so they can get to the transplant center at a moment's notice. If for some reason the patient selected is not suitable for the operation at the time a liver becomes available, there is always a back-up candidate for each donor liver.

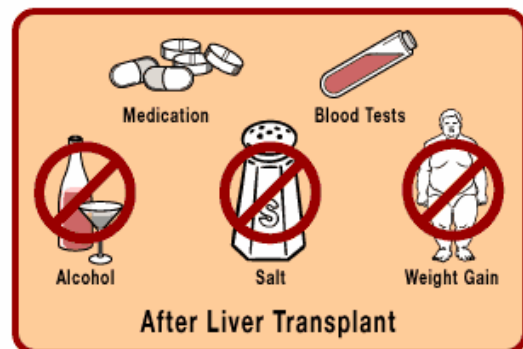
### **Surgery**

Liver transplantation is a complicated process. There are really three operations involved. The first is the removal of the liver from the donor. If the liver is donated at a different location, it must be transferred to the transplant center under sterile refrigerated conditions within 8 to 20 hours. The second operation is the removal of the diseased liver from the patient, and the third is the operation to insert and connect the new liver. The operations on the recipient are so detailed they require a long time to complete. But, the team of surgeons, nurses, and support staff are now very experienced in the technique. The new liver is attached to the various blood vessels and bile ducts. When the surgery is completed, the patient goes to the recovery area.

### **Recovery**

Recovery begins with several weeks in the hospital. Immediately after surgery, the patient is in intensive care for a time. This is so there can be continual monitoring for any infection, rejection, or poor functioning of the new liver. Rejection occurs because the transplanted liver is recognized as foreign by the body. This is the body's normal reaction to any foreign substance. The body's rejection of the transplant would cause inflammation and damage to the new liver. Because of this, medications must be given to calm the rejection reaction in the body. Long-term treatment against rejection is always necessary.

There are three main medications used to prevent rejection. One is a cortisone drug, usually prednisone (trade names: Deltasone, Orasone). It is often used in a low dose. The side effects are fluid build-up and puffiness of the face. A more serious side effect is a change in the bones. Prednisone causes a loss of calcium that can lead to osteoporosis and damage to joints such as knees, hips, and shoulders. A second drug is called Sandimmune. Sandimmune is difficult to regulate and can produce high blood pressure, kidney damage, and occasionally growth of body hair. A third drug is Prograf. This drug has been dramatic in providing successful transplants with the lowest side effects. But even here, kidney damage can occur. It is easy to see why close follow-up is needed for patients on these drugs. Frequent blood tests are required to monitor the patient's progress and reduce side effects.



As recovery progresses, the patient is released to outpatient status, but must stay close to the transplant center for daily visits and blood testing. Finally as things stabilize, the patient is sent home to the care of his/her personal physician. Usually, follow-up is maintained with the patient's physicians at the transplant center. Once patients have recovered, they can resume normal physical and sexual activities. Even vigorous exercise is possible after full recovery, but this should only be done after discussion with the physician. There are few dietary restrictions. The patient is often advised to restrict salt (sodium) intake. A well-balanced diet with adequate protein is necessary. For reasons that are not clear, obesity frequently becomes a problem with liver transplant patients. To avoid this problem, patients should take control of their calorie intake early on.

As the body becomes familiar with the transplanted liver, the amount of medicine needed to control rejection can be adjusted and usually reduced. However, most liver transplant patients will always have to take at least some medication.

### **Liver Donation**

It is very important that more livers become available for donation. All healthy people are encouraged to make arrangements to become liver donors if they are ever in a situation that would make this possible. Generally, there are no restrictions on age, sex, or race. The only matching requirements for livers are that the donor and recipient must be about the same size and have compatible blood types. Some states allow people to register to become organ donors when they apply for or renew a driver's license. Anyone wishing to become an organ donor should carry an organ donor card or an ID card with an organ donor sticker attached. It is important to discuss organ donation with family members, because they must always give consent when the circumstances take place.

### **Summary**

Liver transplantation is an important move forward in the treatment of severe liver disease. It has opened a new world for patients who otherwise were destined to die from their liver disease. The operation is a major one, and there are still problems associated with medications used to prevent rejection. But overall, patients can usually expect a good outcome with return to normal activities.