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Commentary

Current Indications for Liver Transplantation

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Abstract

A liver transplant is an operation that replaces a patient's diseased liver with a whole or partial healthy liver from another person. This article explains the current indications for liver transplantation, types of donor livers, the operation itself, and the immunosuppression that is required after transplantation.

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Liver Anatomy and Function

The liver is a vital organ, meaning that one cannot live without it. The liver serves many critical functions including metabolism of drugs and toxins, removing degradation products of normal body metabolism (for example clearance of ammonia and bilirubin from the blood), and synthesis of many important proteins and enzymes (such as factors necessary for blood to clot).

Blood enters the liver from two channels, the hepatic artery and the portal vein, bringing nutrients and oxygen to liver cells, also known as hepatocytes, and bile ducts. Blood leaves the liver via the hepatic veins which drain into the inferior vena cava which immediately enters the heart. The liver makes bile, a liquid that helps dissolve fat and eliminate metabolic waste and toxins via the intestine. Each hepatocyte creates bile and excretes it into microscopic channels that join to form bile ducts. Like tributaries joining to form a river, the bile ducts join to form a single "hepatic duct" that brings bile into the intestine.

Acute Liver Failure

Acute liver failure, also known as fulminant hepatic failure, occurs when a previously healthy liver suffers massive injury resulting in clinical signs and symptoms of liver insufficiency. Any number of things can lead to acute liver failure but the most common causes are acetaminophen (Tylenol®) overdose, viral infections (known or yet unknown virus), ingestion of a toxin such as poisonous mushrooms, or an idiosyncratic drug reaction.

The hallmark of this condition is the development of confusion (encephalopathy) within eight weeks after the onset of yellowing of the skin (jaundice). Confusion occurs because toxins typically metabolized by the liver accumulate. Unlike patients with chronic liver disease, who can survive weeks to months to years while awaiting liver transplantation, patients with acute liver failure may die within days if not transplanted. These patients are listed at highest priority (Status I), placing them at the top of local, regional and national waiting lists for a donor liver.

Chronic Liver Failure

The liver has a remarkable ability to repair itself in response to injury. Nevertheless, repeated injury and repair, typically over many years and even decades, scars the liver permanently. The end stage of scarring is termed cirrhosis and corresponds to the point where the liver can no longer repair itself. Once a person has cirrhosis, he or she may begin to show signs of inadequate liver function. This is termed "decompensated liver disease." Although medications can decrease the symptoms caused by the liver failure, liver transplantation represents the only permanent cure.

Gastrointestinal Bleeding

As the liver becomes increasingly scarred, the resistance to portal blood flow increases leading to increased pressure in the portal venous system. This portal hypertension necessitates alternative routes for blood to return to the heart. Small veins throughout the abdomen, but outside of the liver, then become enlarged and thin-walled due to the abnormally high amount of blood flowing through them under increased pressure. These fragile veins, called varices, often line portions of the gastrointestinal tract, especially the esophagus and the stomach, and are prone to

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rupture and bleeding. When bleeding occurs into the intestinal tract, it can be life-threatening.

Fluid retention

One function of the liver is to synthesize many of the proteins circulating in the bloodstream, including albumin. Albumin and other proteins in the blood stream retain fluid in the vascular space by exerting what is known as an oncotic (or osmotic) pressure. In liver failure, low albumin levels force fluid out of the bloodstream, which cannot be re-absorbed. Fluid therefore accumulates in tissues and body cavities, most commonly, in the abdominal cavity, which is termed "ascites."

Jaundice

One of the main functions of the liver is to eliminate the degradation products of hemoglobin, the molecule that carries oxygen in our blood. Bilirubin is one of those degradation products processed and excreted by the liver. In liver failure, bilirubin is not cleared from the body and bilirubin levels increase in the blood. The skin and all tissues of the body will then assume a yellow color.

Conclusion

Overall, outcomes for liver transplantation are very good, but vary significantly depending on the indication for liver transplant as well as factors associated with the donor. Currently, the overall patient survival one year after liver transplant is 88%. Patient survival five years after liver transplant is 73%.As mentioned above, these results vary significantly based on the indication for liver transplantation. For example, patients who underwent transplantation for hepatocellular carcinoma had a one-year survival of only 86% whereas patients who underwent transplantation for biliary atresia liver disease had a one-year survival of 94%. The encouraging trend is that over the past 20 years short and long term patient survival has continued to improve. With advances in surgical technique, organ preservation, peri-operative care, and immunosuppression, survival will hopefully continue to improve in the future.