
Liver Cirrhosis

Types, Causes, Symptoms, Diagnosis, and Treatments

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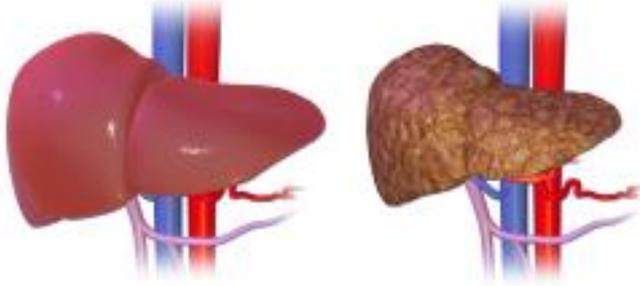
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Abstract

Liver cirrhosis is a serious condition where healthy liver tissue is replaced by scar tissue, leading to impaired liver function. This comprehensive guide aims to provide patients, their families, and the general public with an in-depth understanding of liver cirrhosis. It covers its definition, types, causes, symptoms, stages, underlying mechanisms, diagnostic methods, potential complications, treatment options, prevention strategies, prognosis, and daily living considerations.

Introduction

The liver is a vital organ responsible for numerous essential functions, including detoxification, protein synthesis, and the production of biochemicals necessary for digestion. When the liver becomes damaged over time, it attempts to repair itself, leading to the formation of scar tissue. This scarring process, known as fibrosis, can progress to cirrhosis, where extensive scar tissue replaces healthy liver tissue, severely impairing liver function (1-10).



Normal liver (left) vs. liver cirrhosis (right): Liver cirrhosis is the end result of chronic liver damage from various causes, characterized by the replacement of normal liver tissue with scar tissue. Image Credit: Modificado de BruceBlaus - Wikimedia Commons File:Liver Cirrhosis.png, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=57165562>

What is Liver Cirrhosis?

Liver cirrhosis is the end result of chronic liver damage from various causes, characterized by the replacement of normal liver tissue with scar tissue. This scarring disrupts the liver's ability to function properly, affecting processes such as detoxifying harmful substances, producing vital

proteins, and regulating blood clotting. As the disease progresses, the liver's capacity to perform these functions diminishes, leading to significant health issues.

Types of Liver Cirrhosis

Liver cirrhosis can be classified based on the underlying cause that leads to liver damage.

Alcoholic cirrhosis

One of the most common types is alcoholic cirrhosis, which results from long-term excessive alcohol consumption. Over time, alcohol causes inflammation and scarring of the liver tissue, eventually leading to irreversible damage.

Non-alcoholic steatohepatitis or NASH

Another major type is non-alcoholic steatohepatitis, or NASH, which is linked to obesity, diabetes, and metabolic syndrome. In NASH, fat builds up in the liver, causing inflammation that progresses to scarring.

Viral hepatitis-related cirrhosis

Viral hepatitis-related cirrhosis occurs when chronic infections from hepatitis B or C lead to ongoing liver inflammation and eventual fibrosis.

Biliary cirrhosis

Biliary cirrhosis is caused by damage to the bile ducts. In primary biliary cholangitis, the body's immune system mistakenly attacks the bile ducts, while secondary biliary cirrhosis is due to long-term blockage or damage to the bile ducts from other causes.

Cardiac cirrhosis

Cardiac cirrhosis, though less common, results from chronic heart failure that leads to prolonged liver

congestion and damage. Each type of cirrhosis differs in its origin but results in similar damage to liver tissue and impairment of liver function.

Causes and Risk Factors of Liver Cirrhosis

The development of liver cirrhosis is closely tied to a range of lifestyle, medical, and genetic factors.

Chronic Alcohol abuse

Chronic alcohol abuse remains one of the most significant contributors, as the liver metabolizes alcohol and sustained overuse causes inflammation and fibrosis.

Chronic viral infections

Chronic viral infections such as hepatitis B and hepatitis C are also leading causes globally. These viruses attack the liver over time, leading to scarring.

Non-alcoholic fatty liver disease

Non-alcoholic fatty liver disease is a growing cause of cirrhosis, particularly in people who are overweight or diabetic, as fat accumulation in the liver can trigger inflammation and subsequent fibrosis.

Autoimmune hepatitis

Autoimmune hepatitis, a condition where the immune system attacks the liver, can also lead to cirrhosis if not treated.

Genetic disorders

Genetic disorders like hemochromatosis, which causes iron overload, and Wilson's disease, which causes copper

accumulation, can damage liver cells and result in cirrhosis.

Prolonged bile duct obstruction

Prolonged bile duct obstruction from diseases like primary sclerosing cholangitis can block the flow of bile, causing liver damage over time.

Medications

Long-term exposure to certain medications or environmental toxins may also harm liver tissue, leading to cirrhosis. Each of these risk factors contributes to chronic liver injury, which, if unaddressed, progresses to irreversible scarring.

Symptoms of Liver Cirrhosis

In the early stages, liver cirrhosis often develops quietly without noticeable symptoms. As the disease advances, people may begin to experience general symptoms such as fatigue, weakness, and loss of appetite. Weight loss and nausea are also common, along with a sense of abdominal discomfort or bloating.

Jaundice

As liver function declines, more visible signs emerge. Jaundice, or yellowing of the skin and eyes, appears when the liver can no longer process bilirubin effectively. The skin may also become itchy due to the buildup of bile salts. People with cirrhosis may bruise or bleed more easily, as the liver loses its ability to produce clotting proteins. Swelling in the legs, ankles, and abdomen may occur due to fluid retention, with the accumulation of fluid in the abdomen referred to as ascites.

Hepatic encephalopathy

In more advanced stages, confusion or memory issues may develop, a condition known as hepatic encephalopathy, which results from toxins building up in the brain due to impaired liver detoxification. Visible blood vessels on the skin, known as spider angiomas, may also appear. These symptoms often worsen over time and indicate the liver's declining ability to perform essential tasks.

Stages of Liver Cirrhosis

Liver cirrhosis progresses through stages that reflect the degree of liver damage and loss of function.

Compensated cirrhosis

In the early stage, known as compensated cirrhosis, the liver is scarred but still manages to perform its functions. At this stage, individuals may have no symptoms or only mild ones, such as fatigue. As the disease progresses, it enters the stage of decompensated cirrhosis.

Decompensated cirrhosis

Here, the liver's ability to function is significantly reduced, and complications like jaundice, ascites, and bleeding from varices can occur. This stage marks a turning point where symptoms become more noticeable and medical intervention becomes more urgent.

End-stage liver disease

In the most advanced stage, often referred to as end-stage liver disease, the liver is severely damaged and unable to carry out vital functions, putting the patient at risk of life-threatening complications. At this point, a liver transplant may be the only treatment option. Each stage of cirrhosis signals a decline in liver function, and early detection and

treatment are crucial to slowing progression and preserving quality of life.

Pathology of Liver Cirrhosis

The development of liver cirrhosis begins with repeated injury to liver cells from chronic conditions such as alcohol use, viral infections, or metabolic disorders. In response to this injury, the liver initiates a healing process that involves the activation of specialized cells known as hepatic stellate cells. Once activated, these cells begin producing collagen and other substances that form scar tissue. This accumulation of scar tissue, also known as fibrosis, replaces healthy liver tissue and disrupts the normal architecture of the liver.

As fibrosis progresses, it leads to the formation of nodules and further distortion of the liver's structure. Blood flow through the liver becomes restricted, resulting in increased pressure in the portal vein, a condition called portal hypertension. This causes blood to be diverted to smaller vessels, which can become swollen and prone to rupture. The buildup of scar tissue also hampers the liver's ability to carry out essential functions such as detoxifying the blood, producing proteins, and regulating nutrients and hormones.

Genetic factors can influence susceptibility to liver damage, including variants in the PNPLA3 gene, which has been associated with increased risk of fibrosis and cirrhosis, especially in individuals with fatty liver disease.

Diagnosis of Liver Cirrhosis

Diagnosing liver cirrhosis involves a careful evaluation of the patient's symptoms, medical history, physical examination, and a range of diagnostic tests.

Blood Tests

The process often starts with blood tests that assess liver enzyme levels, bilirubin, albumin, and clotting factors. These tests help determine how well the liver is functioning and whether there is ongoing inflammation or damage.

Imaging studies

Imaging studies, such as ultrasound, CT scans, or MRI, can reveal changes in liver size and texture, the presence of nodules, and signs of portal hypertension or ascites. A special type of ultrasound known as elastography can measure liver stiffness, which correlates with the extent of fibrosis.

Liver biopsy

In some cases, a liver biopsy may be performed to confirm the diagnosis and determine the stage of fibrosis. A small sample of liver tissue is taken and examined under a microscope to assess the extent of damage. Although non-invasive methods are increasingly preferred, a biopsy remains the gold standard when diagnostic uncertainty exists.

Complications of Liver Cirrhosis

Liver cirrhosis can lead to multiple serious complications as the liver loses its ability to function properly.

Ascites

One of the most common complications is ascites, which is the accumulation of fluid in the abdominal cavity. This condition can cause discomfort, bloating, and difficulty breathing, and may lead to infection known as spontaneous bacterial peritonitis. Another frequent complication is hepatic encephalopathy, a condition where toxins build up

in the brain due to the liver's inability to clear them, leading to confusion, memory problems, and in severe cases, coma.

Portal hypertension

Portal hypertension, or increased pressure in the portal vein system, can result in the development of varices, which are swollen veins, especially in the esophagus or stomach. These varices can rupture and cause life-threatening bleeding. Cirrhosis also reduces the production of proteins like albumin and clotting factors, leading to edema, easy bruising, and prolonged bleeding.

Hepatorenal syndrome

Hepatorenal syndrome is another serious complication, where kidney function deteriorates as a result of advanced liver disease.

Hepatocellular carcinoma

Furthermore, people with cirrhosis are at increased risk for hepatocellular carcinoma, a primary form of liver cancer. Early detection and management of these complications are essential for improving outcomes.

Treatment and Management of Liver Cirrhosis

The treatment of liver cirrhosis focuses on halting or slowing the progression of liver damage, managing symptoms, and treating complications.

Alcohol consumption

The most important step is to address the underlying cause. For example, individuals with alcoholic cirrhosis must stop drinking alcohol entirely, as continued use accelerates liver

damage. Supportive therapies and counseling, including programs like Alcoholics Anonymous, can be crucial in maintaining abstinence.

Medications and lifestyle

For viral hepatitis, antiviral medications such as tenofovir (Viread) or entecavir (Baraclude) for hepatitis B, and direct-acting antivirals like sofosbuvir-ledipasvir (Harvoni) for hepatitis C, can suppress or eliminate the virus and reduce liver inflammation. In patients with non-alcoholic fatty liver disease, managing blood sugar levels, losing weight, and increasing physical activity are effective in reducing liver fat and preventing further damage.

Medications may also be used to manage symptoms and prevent complications. Diuretics like spironolactone (Aldactone) and furosemide (Lasix) are used to control fluid buildup. Lactulose is commonly prescribed to reduce ammonia levels and prevent hepatic encephalopathy. Non-selective beta blockers such as propranolol help prevent variceal bleeding by lowering portal pressure.

Liver transplantation

In advanced cases, particularly in those with decompensated cirrhosis or liver cancer, liver transplantation may be necessary. Transplantation offers the only definitive cure for end-stage liver disease. Patients are evaluated based on the MELD (Model for End-stage Liver Disease) score to prioritize transplant eligibility. Post-transplant, patients require lifelong immunosuppressive medications and close medical follow-up.

Prevention of Liver Cirrhosis

Preventing liver cirrhosis involves reducing exposure to factors that damage the liver and promoting overall liver health.

Avoiding alcohol

Avoiding excessive alcohol intake is one of the most effective preventive measures. Limiting alcohol to moderate levels or abstaining completely, particularly for those with underlying liver conditions, greatly reduces the risk of cirrhosis.

Vaccination and healthy habits

Vaccination against hepatitis B and practicing safe behaviors to avoid hepatitis C infection can prevent virus-related liver damage. Safe practices include avoiding sharing needles, using protection during sex, and ensuring medical or tattooing instruments are sterilized.

Diet, weight, and Lifestyle

Maintaining a healthy weight through diet and exercise reduces the risk of fatty liver disease, especially in people with diabetes or insulin resistance. A balanced diet low in processed sugars, unhealthy fats, and excessive salt supports liver function. Medications should be used only as prescribed, and over-the-counter drugs like acetaminophen must be taken cautiously, as high doses can be toxic to the liver.

Regular medical checkups and blood tests can help detect liver abnormalities early. People with risk factors should undergo routine liver function tests and imaging studies to monitor liver health. Early diagnosis and treatment of underlying causes are key to preventing progression to cirrhosis.

Prognosis of Liver Cirrhosis

The prognosis for individuals with liver cirrhosis varies widely depending on the cause, stage of disease, overall health, and how well the condition is managed. In cases of compensated cirrhosis, where the liver still performs essential functions, the outlook can be relatively good, especially if the underlying cause is treated or removed. Many individuals with early-stage cirrhosis can live for years with proper lifestyle adjustments, regular monitoring, and medical support.

However, the prognosis becomes more guarded in decompensated cirrhosis. Complications such as variceal bleeding, ascites, or hepatic encephalopathy often signify a more advanced disease with higher risks. The MELD score is often used to estimate the severity of liver disease and the likelihood of survival over time.

Liver transplantation significantly improves long-term survival in eligible patients with end-stage liver disease. Advances in medical treatment, early detection, and public awareness have improved the outcomes of cirrhosis, but timely intervention remains essential. Patients who adhere to treatment plans and make necessary lifestyle changes often experience better results and fewer complications.

Living with Liver Cirrhosis

Living with liver cirrhosis involves making long-term changes to maintain health and avoid complications. One of the most important changes is adopting a liver-friendly lifestyle. This includes a diet low in sodium to reduce fluid retention and avoid ascites. Processed foods, canned soups, and salty snacks should be limited, and home-cooked meals using fresh ingredients are encouraged.

Regular follow-up appointments with a hepatologist or liver specialist help track liver function and monitor for complications. Blood tests, imaging, and endoscopic exams may be scheduled routinely to detect changes early. People with cirrhosis should also receive vaccinations for hepatitis A, hepatitis B, and influenza to avoid infections that can worsen liver function.

Individuals should avoid all forms of alcohol and non-prescribed medications that could harm the liver. Medications such as non-steroidal anti-inflammatory drugs (NSAIDs) like ibuprofen can cause kidney issues and should be used only with medical supervision. Patients often need to take prescribed medications for managing ascites, preventing variceal bleeding, or reducing toxin levels in the blood.

Emotional and psychological support is also important. Chronic illness can affect mood and quality of life, and some patients may benefit from counseling or support groups. Staying informed about the condition and involving loved ones in care can ease the burden and help manage the disease more effectively. With the right medical care and lifestyle changes, many people with liver cirrhosis can maintain a stable condition and a good quality of life.

Conclusion

Liver cirrhosis is a chronic and potentially life-threatening condition that develops from long-term damage to the liver. Despite its seriousness, understanding the causes, symptoms, stages, and treatment options can lead to early detection and improved outcomes. Whether caused by alcohol, hepatitis, metabolic conditions, or other factors, cirrhosis requires consistent medical care and lifestyle changes to manage effectively.

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