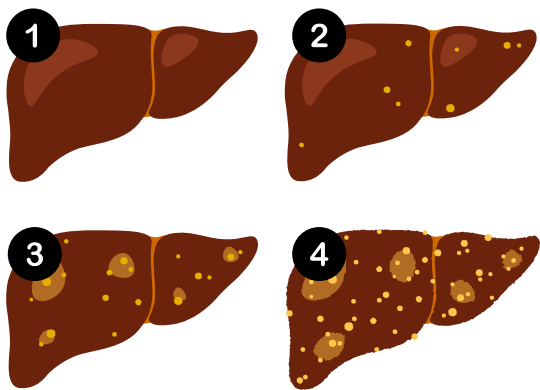


Overview

The liver is responsible for a number of important functions within the body. The liver regulates the balance of different nutrients in the bloodstream, removes a variety of toxins and waste products, produces bile to break down fats during digestion and numerous other functions. The gallbladder is a small organ that stores bile produced by the liver to later release into the small intestine to aid in fat digestion. Bile is carried from the liver and gallbladder via the bile ducts.

In individuals with IBD and ostomies, certain factors can contribute to complications of the liver. It is estimated that approximately 5% of the individuals with IBD will experience a liver condition associated with their IBD (Patel). While there are a number of different liver complications that can present in the general public, the ones most likely to impact those with IBD and/or ostomies are listed below:



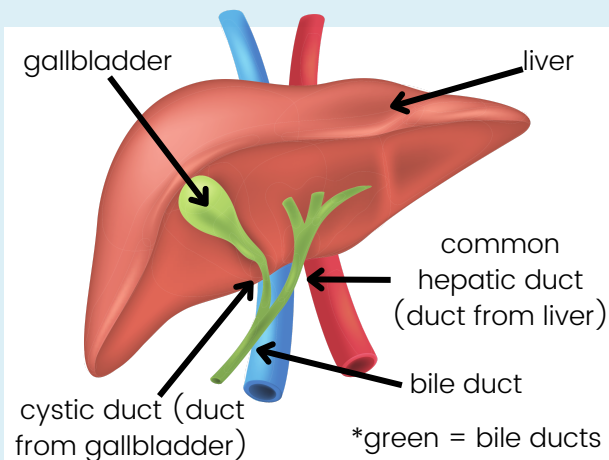
As non-alcoholic fatty liver disease progresses, it can cause scarring and irreversible damage to the liver.

- **Hepatic steatosis (non-alcoholic fatty liver disease):** As denoted by the name, fatty liver disease involves the buildup of fat in the liver. This condition can be reversible in certain cases; however, if fatty liver disease is not addressed and efforts not made towards treatment, scarring and subsequent damage to the liver can occur. Fatty liver disease is one of the most common liver manifestations associated with IBD. Exact estimates of prevalence vary due to differences in diagnostic methodology and the complex interplay between genetic and environmental factors involved in development of fatty liver disease (Spagnuolo).

- **Hepatitis:** Inflammation of the liver, termed hepatitis, can be caused by numerous factors such as viral infections (e.g. hepatitis B virus), excessive alcohol use and autoimmune conditions. In hepatitis associated with IBD, certain medications or systemic inflammation from IBD itself can lead to inflammation of the liver. If treatment is not utilized, scarring and damage of the liver can occur.



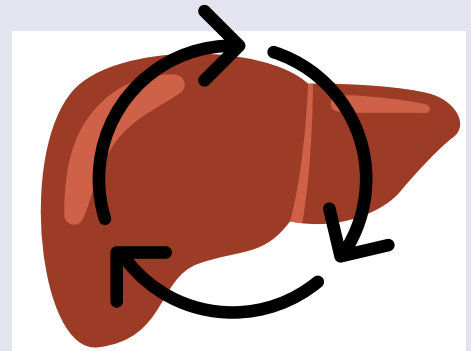
- **Cholelithiasis (gallstones):** Gallstones are hardened deposits found within the gallbladder that may or may not cause symptoms. Individuals with Crohn's are at two times the risk of developing gallstones in comparison to the general population whereas those with UC are at no elevated risk in comparison to the general public. Individuals with Crohn's in a part of the small intestine called the ileum and the colon are at heightened risk as well as those who have had a significant resection of the ileum (Fousekis).



- **Primary sclerosing cholangitis (PSC):** PSC is a condition in which the bile ducts of the liver become inflamed leading to scarring and blockage. Blockage of the bile ducts causes buildup of bile in the liver and subsequent damage to the liver. PSC is more common in UC patients at a rate of 2.9–7.6% as opposed to Crohn's patients at an estimated rate of 0.7–3.4%. PSC is more likely to affect males and typically presents between age 30 and 40 (Kummen).

Causes and Risk Factors in the General Population

- **Alcohol use:** The liver is responsible for filtering different toxins out of the body – including alcohol and medications. When the liver filters alcohol, a small amount of liver cells will die during filtration. Typically, these cells can be regenerated; however, in individuals who consume significant amounts of alcohol, these cells may not have time to regenerate. This can lead to numerous health conditions associated with the liver including hepatitis.
- **Diabetes:** Fatty liver disease is associated with both type I and type II diabetes. In particular, individuals with type II diabetes are at a considerably elevated risk of developing fatty liver disease (Bhatt).



One function of the liver is to filter different toxins out of the body – excessive alcohol consumption can damage the cells responsible for this.



Causes and Risk Factors in the General Population (continued...)

- **Elevated lipid levels:** Lipids are fatty/waxy substances that can circulate in the bloodstream. For the purpose of this fact sheet, we will specifically focus on triglycerides and cholesterol. In addition to circulation in the blood, triglycerides can also be stored in other locations in the body (mainly the liver) and released when needed for energy. Elevated triglyceride levels are a known risk factor for development of fatty liver disease. Because there is an excess of triglycerides, these can begin to accumulate in the liver leading to fat deposition on the liver. Elevated cholesterol levels can lead to high blood pressure as well as accumulation of excess cholesterol in the gallbladder. This excess buildup can present as cholesterol-based gallstones.
- **Genetics:** Many liver conditions associated with IBD may also have a genetic component. A family history of certain conditions, such as gallstones, may elevate risk in family as well; however, the mechanism behind this is complex and still under investigation.
- **Weight:** Being overweight or obese has been associated with increased prevalence of fatty liver disease (note: this is just one factor that may increase risk, and fatty liver disease is a multifactorial condition with numerous causes that need to be addressed by a healthcare provider). In fatty liver disease, the liver is unable to process and breakdown fat which causes accumulation of fat on the liver.
- **Viral Infection with the Hepatitis virus:** Virus-induced hepatitis is caused by infection with one or more strains of the hepatitis virus. The hepatitis B virus (HBV) is the most common strain. Depending upon the specific strain, there can be different routes of transmission; however, the most common route of infection is via blood and bodily fluids. Factors increasing exposure to the blood or bodily fluids of others (such as unsafe sex, sharing of needles, etc.) can increase risk. Fortunately, there is a vaccine for the hepatitis B virus which can significantly reduce risk. There is also a hepatitis A vaccine, but hepatitis A does not usually cause long-term disease. However, for people with other liver diseases, the need for a hepatitis A vaccine should be discussed with a healthcare provider.

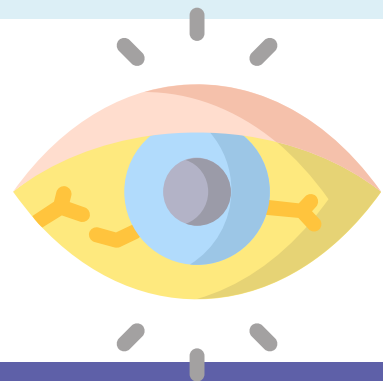
Causes and Risk Factors in IBD/Ostomy Patients

- **Active disease:** Inflammation associated with active disease can lead to exacerbation of liver complications. While mechanisms behind this are still being investigated, IBD can lead to systemic inflammation which could target the liver leading to different hepatic manifestations.



Causes and Risk Factors in IBD/Ostomy Patients (continued...)

- **Certain medications:** Particular medications used in management of IBD and ostomies may lead to inflammation and/or damage of the liver. It is important to note that when medications are taken appropriately and dosing is done correctly risk of liver complications is minimized. Medications associated with liver complications include steroids, methotrexate, thiopurines and seldomly anti-TNF agents (Fousekis).



Jaundice from liver damage can lead to yellow coloration of the skin and eyes.

Signs and Symptoms

Oftentimes, individuals with liver complications may not realize underlying disease processes are occurring. In certain instances, individuals may be entirely asymptomatic (e.g. with certain gallstones). Long-term fatigue or poor energy levels may be the initial signs of liver problems followed by more distinct signs as disease progresses. More advanced stages of liver disease may be associated with pain and swelling in the upper right abdomen, dark urine color, pale stool color, easy bruising, fluid retention and jaundice (yellow coloration of the skin and eyes).

Diagnosis

If you are concerned about liver problems due to IBD, your physician will likely start with a medical history and physical exam noting areas of the abdomen that are swollen and/or tender. In addition, you will likely be recommended to get labs drawn to assess for any abnormal changes – looking at liver functions tests in particular. An abdominal ultrasound may be utilized for imaging followed by imaging techniques like MRI or CT if further information is needed. A transient elastography or magnetic resonance elastography may also be utilized to evaluate stiffness of the liver which can indicate scarring or damage. In certain cases, endoscopic procedures (in which a thin, flexible tube is entered via the mouth to allow internal imaging) and liver biopsies may be needed to narrow down a diagnosis. If there is concern over PSC, a magnetic resonance cholangiopancreatography is the most common diagnostic tool utilized to show images of the bile ducts.



Treatment

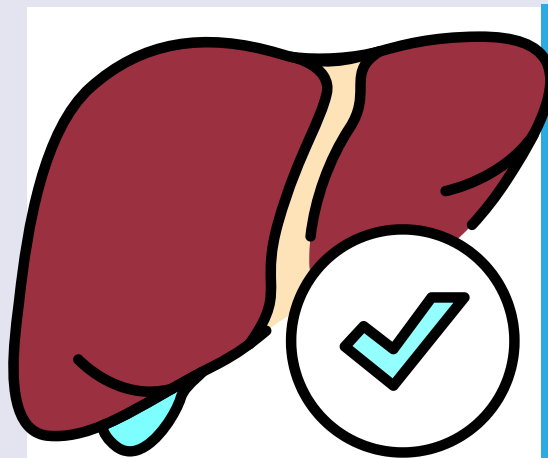
Treatment of liver complications associated with IBD and ostomies is dependent upon the specific condition. As with most extraintestinal manifestations of IBD and ostomy, management of underlying disease is crucial. By minimizing active disease and chronic inflammation, one can hope to prevent and/or minimize liver complications – this is particularly true in cases of hepatitis triggered by autoimmune disease. In cases of liver disease as a result of IBD and ostomy medications, cessation of certain medication options may lead to resolution of symptoms.

In fatty liver disease that has not yet progressed to damage of the liver, monitoring of one's diet and engagement in balanced exercise habits can actually reverse fat deposition on the liver. Individuals may be recommended to consume more fruits, veggies and whole grains, minimize alcohol consumption, lower cholesterol intake and participate in regular exercise. Treatment of gallstones typically involves utilization of medications that dissolve the gallstones or removal of the gallbladder (called a cholecystectomy).

When it comes to liver complications, prevention of damaging the liver tissue is essential. At the time, there are not great treatment options available to reverse liver scarring or damage. Individuals with advanced fatty liver disease, hepatitis or PCS will likely need a liver transplant. Fortunately, cases of autoimmune hepatitis and PCS in individuals with IBD and ostomy are rare, and for those with fatty liver disease, reversal of the condition through eating and exercise habits is possible when caught early.

Prevention

Management of active disease (whether it be IBD, ostomy-related conditions, diabetes, etc.) is essential in prevention of liver conditions. Because chronic inflammation and underlying disease processes can contribute to inflammation and damage of the liver, disease management is the first step in prevention of liver complications.



Management of active disease in addition to certain lifestyle modifications can help in prevention of liver conditions. Always speak with a trust healthcare provider if you have concerns.

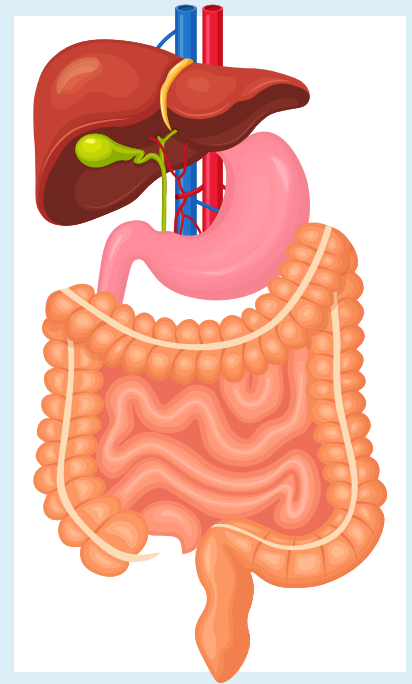


Prevention (continued...)

Additionally, certain lifestyle modifications can also reduce risk of developing liver complications as a result of IBD and/or ostomy. Focus on a balanced diet, regular exercise habits as well as minimization of excessive alcohol use can prevent damage to the liver. Certain individuals may be recommended to lose weight in order to reduce risk of liver complications – this must be done in a well-supervised and balanced manner. Restrictive dieting or excessive exercise is not the way to reach a healthy weight. Sustainable eating with a focus on fruits, veggies and whole grains is recommended with emphasis on enjoyable movement that elevates the heart rate. While weight loss may be a necessary step for certain individuals in ensuring their health, it should be done with a knowledgeable professional to avoid risk of disordered eating or exercise habits as well as sudden and/or extreme weight loss (all of which can further contribute to liver complications).

Further Resources

- Crohn's and Colitis Foundation: Liver Complications Fact Sheet (<https://www.crohnscolitisfoundation.org/sites/default/files/legacy/assets/pdfs/liver-disease.pdf>)
- Everyday Health: Is There A Link Between Crohn's and Liver Disease? (<https://www.everydayhealth.com/crohns-disease/link-between-crohns-and-liver-disease/>)
- Everyday Health: Liver Conditions Linked to Ulcerative Colitis (<https://www.everydayhealth.com/ulcerative-colitis/symptoms/liver-conditions-linked-ulcerative-colitis/>)
- Verywell Health: IBD and Liver Disease (<https://www.verywellhealth.com/cirrhosis-of-the-liver-1941713>)



Citations

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