

Gallbladder Disease: Imaging and Treatment



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Gallbladder Disease: Imaging and Treatment

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Gallbladder diseases account for numerous problems related to digestion, and the discomfort they cause affects people worldwide. This article examines various gallbladder diseases, including causes and treatment options. Understanding the gallbladder and its diseases is crucial to achieving an accurate diagnosis.

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After completing this article, readers should be able to:

- Explain the function of the gallbladder and its role in the overall digestive system.
- Identify the signs and symptoms of various gallbladder diseases.
- Evaluate the advantages and disadvantages of imaging modalities as diagnostic tools for evaluating gallbladder disease.
- Discuss the different treatment options for gallbladder disease.

The digestive tract is a complicated and highly coordinated system that provides the body with essential energy and nutrients. Common digestive complaints include heartburn, indigestion, nausea, constipation and abdominal discomfort.¹ Although these ailments often are thought to be byproducts of digestion, they also can be an indication that something more serious is wrong.¹ It is estimated that 1 out of every 3 Americans regularly encounters some kind of digestion problem, and more than \$3 billion are spent each year on over-the-counter products to help battle digestive disorders and diseases.¹

Because the gallbladder is an accessory digestive organ (ie, it helps with digestion but is not part of the digestive tract), it is logical to evaluate its function when serious digestive concerns arise. More than 20 million Americans have gallbladder disease, including inflammation, gallstones, gallbladder carcinoma and other biliary system diseases.² In addition, nearly 1 million new cases are diagnosed each year.²

Although anyone can have gallbladder disease, it predominantly affects women. For women, common risk factors include

age, weight and number of children; among women between 20 and 30 years of age, risk is 6 times greater for overweight women than for women of average weight.³ By age 60 years, almost one-third of obese women develop gallbladder disease.³

Reducing the intake of fatty foods and losing weight, if indicated, could reduce symptoms of gallbladder disease; however, prevention is not possible in most cases. Digestive problems can occur regardless of individual weight; lifestyle changes do not prevent or control all digestive problems. Establishing a dietary cause for gallbladder disease is difficult because no definitive relationship has been proven between diet and gallbladder disease; however, some researchers suggest that low-fiber and high-cholesterol diets might contribute to gallstone formation.⁴ Early action can eliminate significant discomfort and prevent a serious condition from escalating into a life-threatening one.

Anatomy and Physiology

The gallbladder is a small, green, muscular, pear-shaped sac tucked into a depressed area on the right, underside of the liver. It is 3 to 6 inches in length and 1 to 2 inches in width. Its main function is to store the digestive fluid bile, which the

liver produces continuously.^{1,3} The storage capacity of the gallbladder is about 30 mL to 75 mL of bile.⁵

Bile flows from the liver through the right and left hepatic ducts, which join to form the common hepatic duct (see Figure 1). This duct then connects to the cystic duct coming from the gallbladder to form the common bile duct.⁵ The pancreatic duct joins the common bile duct and empties into the duodenum. The gallbladder and ducts that carry bile and other digestive enzymes from the liver, gallbladder and pancreas to the small intestine are known collectively as the biliary system.

Food enters the small intestine at the duodenum, where it triggers a series of hormonal and nerve signals that cause the gallbladder to contract. The peptide hormone cholecystokinin, which is released from the duodenal mucosa following the ingestion of fats and amino acids in foods, helps control the emptying of the gallbladder.^{6,7} Cholecystokinin results in a powerful contraction of the gallbladder, decreased resistance from the sphincter of Oddi and increased hepatic function.⁵ These functions enhance the flow of biliary contents from the gallbladder into the duodenum.

Approximately half of the bile secreted between meals is diverted through the cystic duct to the gallbladder for storage. In the gallbladder, nearly 90% of the water in the bile composition is absorbed into the bloodstream, making the residual bile very concentrated (see Table).⁸ The remaining bile manufactured by the liver flows directly through the common bile duct into the small intestine at the sphincter of Oddi, which is located a few inches below the stomach. Nearly 95% of the bile salts are reabsorbed into the wall of the lower portion of the small intestine as bile continues its journey. The liver extracts this material from the blood and secretes it back into bile; this cycle occurs 10 to 12 times daily.⁷

Bile is important for many reasons. First, bile acids ease the biliary secretion of cholesterol and are mandatory for the normal absorption of dietary fats in the body. Bilirubin, the main pigment in bile, is excreted in bile as a waste product of red blood cells that have been destroyed in the body. In addition, drugs and other waste products are excreted in bile and later eliminated

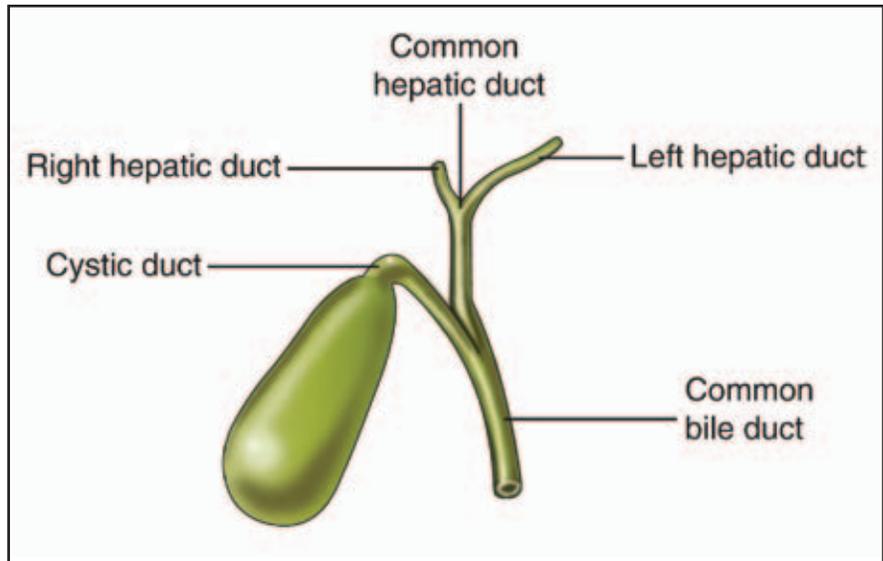


Figure 1. Drawing of the gallbladder and ducts.

from the body through waste. Last, various proteins that have important roles in bile function are secreted in bile.^{5,7} Conditions that slow or obstruct the flow of bile (eg, cholestasis) also can cause gallbladder disease.

Types of Gallbladder Disease

Several different types of gallbladder disease can cause similar symptoms (see Box 1). The most common symptom of gallbladder disease is an intermittent pain known as biliary colic.^{9,10} This begins with a rapid onset and can persist with severe intensity for up to 4 hours.⁵ Large or fatty meals can precede the steady pain that localizes in the mid-upper portion of the abdomen; this discomfort usually is accompanied by some degree of nausea. Changing body position, taking over-the-counter pain relievers and passing gas do little to relieve these symptoms, which generally disappear after several hours. Persistence of an elevated serum bilirubin level suggests common bile duct stones; fever or chills suggest an underlying complication, such as inflammation of the gallbladder (cholecystitis), pancreas (pancreatitis) or bile duct (cholangitis). The attacks of pain vary in occurrence and duration; likelihood of a second attack within a year is less than 50%.⁹

Gallstones

The formation of 1 or more biliary calculi, or gallstones, is known as cholelithiasis. Gallstone formation is a complex process that begins with an excess of cholesterol