

Gallstones

What are gallstones?

Gallstones are small, stone-like objects that form when the liquid in the gallbladder hardens. Presence of stones in the gallbladder is referred to as cholelithiasis (cho-le-li-thi-a-sis).

The liver normally produces bile. It drains into the first part of the small intestine to aid in digestion. It is stored in the gallbladder between meals. Bile contains water and several solids: cholesterol, fats, salts and proteins. It also contains bilirubin, a yellowish pigment. Crystals can form when the bile is stored, and as the crystals grow, they form gallstones.

The distribution of gallstone types in children differs from the adult population:

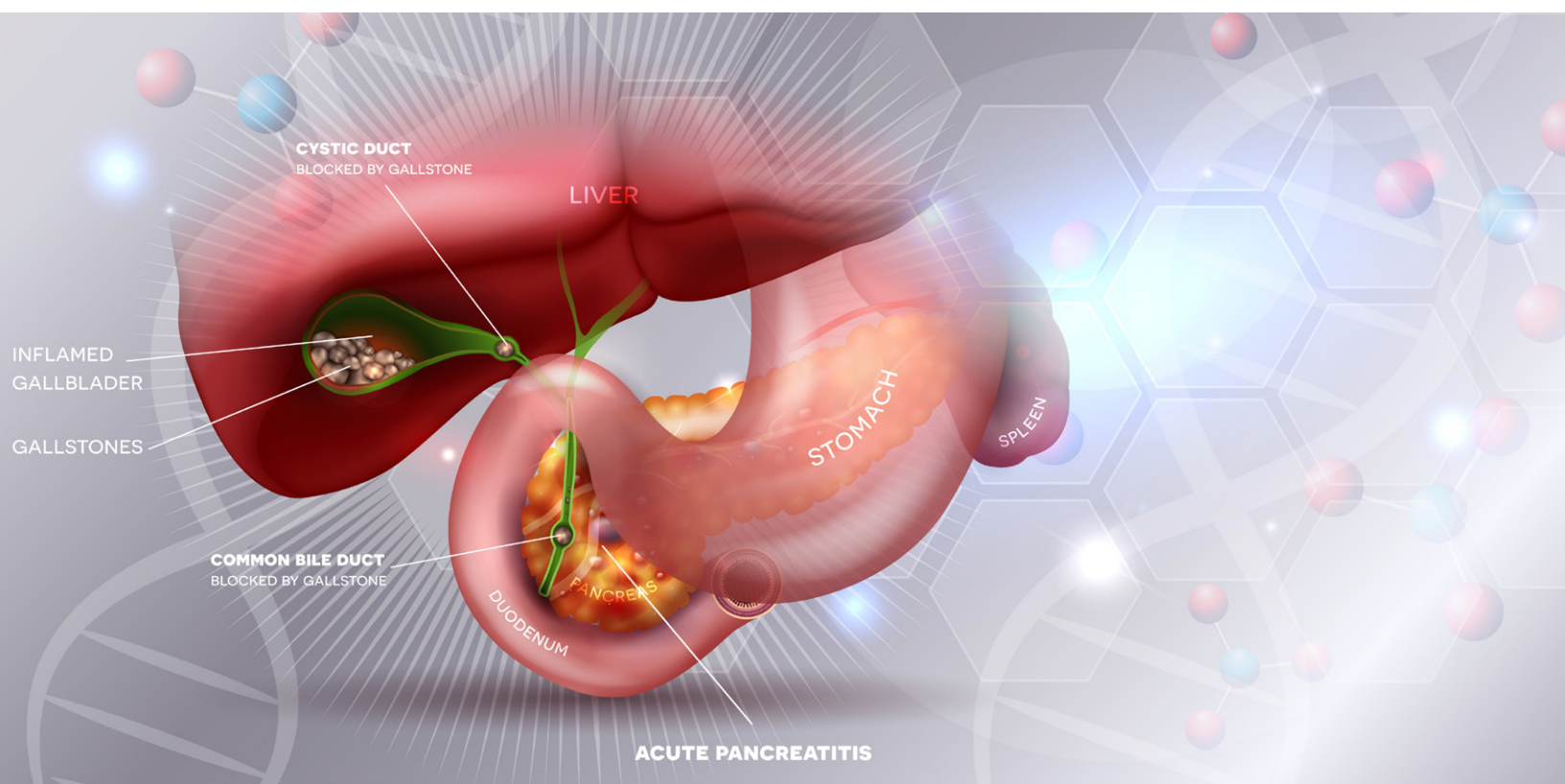
- While cholesterol stones make up around 75 % of adult stones, they account for less than 25 % in children
- Black pigment stones make up close to 50 % of gallstones in children. They are formed when

bile becomes supersaturated with calcium bilirubinate and are commonly formed in certain blood disorders

- Calcium carbonate stones, which are rare in adults, are more common in children, accounting for about 25 % of childhood gallstones
- Around 5 % of children have protein gallstones

Gallstones can migrate into the ducts of the biliary tract and can block the flow of bile.

- Choledocholithiasis (cho-led-o-cho-li-thi-a-sis) refers to gallstones present in the ducts of the biliary tract
- Cholecystitis (cho-le-cys-ti-tis) refers to inflammation and swelling of the gallbladder; cholelithiasis is the most common cause of cholecystitis
- Cholangitis (chol-an-gi-tis) is infection of the bile ducts that can occur if a gallstone lodges in a duct and blocks the flow of bile



What causes cholelithiasis and who is at risk of developing gallstones?

While the exact causes of gallstones are unknown, there are risk factors associated with their development:

- Having certain inherited red blood cells disorders, such as sickle cell disease or spherocytosis
- Being obese
- Having a family history of gallstones
- Taking certain medicines, such as contraceptives
- Pregnancy
- Prolonged parenteral (intravenous) nutrition
- Abdominal surgery
- Crohn's disease

How common are gallstones?

Gallstones are not uncommon in adults, affecting about 25 million in the United States annually. Although cholelithiasis used to be considered a rare entity in children, there has been a rise in the diagnosis of gallstones. Some studies suggest that almost 2% of children may have gallstones. This increase in children is likely due to increased detection with wide use of ultrasound technique, as well as the growing obesity epidemic.

What are the signs and symptoms of gallstones?

Sometimes gallstones form, but cause no symptoms.

The most common presenting symptom is pain in the right upper or upper middle part of the abdomen, particularly after meals. Nausea and vomiting may occur.

It is difficult for younger children to pinpoint their pain. But some older children may describe their pain as:

- Centering in the right upper or middle upper abdomen
- Spreading to the back or between the shoulder blades

- Feeling sharp, cramping or dull
- Going away, then coming back again (recurrent)
- Happening just after eating a meal
- Getting worse after eating fatty or greasy foods

If a gallstone blocks a duct, a child may also have some or all of these symptoms:

- Nausea
- Vomiting
- Fever, chills, or sweats
- Jaundice, a yellowish tint to the skin and eyes

How are gallstones diagnosed?

Gallstones may be suspected based on history of the location, frequency, severity and duration of pain with notable triggers such as high-fat meals as well as on physical exam. Ultrasound is used to confirm the diagnosis.

Sometimes other imaging techniques are used to look for gallstones or blocked ducts, or to check how well the gallbladder is working:

- An MRCP (magnetic resonance cholangiopancreatography), a type of MRI (magnetic resonance imaging) that takes detailed pictures of the bile ducts
- Cholescintigraphy (HIDA scan), which demonstrates how well a gallbladder contracts
- An ERCP (endoscopic retrograde cholangiopancreatography), a type of endoscopy which helps find and remove gallstones in the bile ducts
- Blood tests may be needed to look for signs of infection, obstruction, or other problems related to gallstones

What is the treatment for gallstones?

If a child's gallstones don't cause symptoms, and if no complications or duct blockages are detected, treatment may not be needed.

In other instances, the only treatment for a child's gallstones is removal of the gallbladder with a procedure called a cholecystectomy (co-la-sis-tec-toe-me).

- The procedure is performed under general anesthesia
- Painkillers may be prescribed to treat symptoms until the operation is performed
- In most cases, surgeons can remove the gallbladder using laparoscopic surgery, also called minimally invasive surgery. During surgery four small incisions are made on the child's abdomen. Surgeons insert a thin, lighted tube with a camera and their surgical instruments through these small incisions. Then they snip the gallbladder free and remove it through one of the openings. The advantage of laparoscopic surgery is that surgeons don't have to cut through the stomach muscles and recovery may be faster
- On rare occasions, children need to have open surgery with an incision under the ribs. This may be required if there is scarring (from previous surgeries), inflammation, bleeding or unusual anatomy of the common bile duct which prevents safe performance of the laparoscopy.
- A cholangiogram, a study of the bile ducts, may need to be performed by the surgeon during the operation. This study is not always necessary, but it helps surgeons make sure that gallstones have not fallen out of the gallbladder and into the main bile duct. If the study does show gallstones in the main bile duct, the surgeon will try to remove them.

In some cases, a child may need an ERCP (endoscopic retrograde cholangiopancreatography) to remove gallstones that have fallen out of the gallbladder or to repair injury of the bile duct that can occur as a complication of surgery. In an ERCP, the gastroenterologist passes a lighted scope through the child's mouth, past the stomach and into the upper small intestine (duodenum) to visualize the bile ducts. Small instruments can be passed through the scope and used to remove the gallstones or to place a stent

into a damaged bile duct. If a child needs an ERCP, it is usually done on a different day from the gallbladder removal surgery.

Ursodeoxycholic acid (ursodiol) is a medication that may be useful in the management of cholelithiasis in select patients. The primary disadvantage with ursodeoxycholic acid therapy is the high chance of gallstone recurrence. Therefore, this treatment is not recommended in patients with symptomatic gallstones and is usually indicated only for patients unfit to undergo surgical intervention.

What can I expect if my child has gallstones?

For children who have cholelithiasis without symptoms, periodic clinical assessment and ultrasound surveillance is appropriate. If a child starts having symptoms, or if gallstone- complications develop, surgical treatment is warranted.

The most common complication of gallstones in children is pancreatitis, or inflammation of the pancreas, reported to occur in 8% of cases. The course is usually mild and resolves spontaneously with passage of the stone.

Infection and inflammation of the gallbladder (cholecystitis) or ductal system (cholangitis) can occur which may lead to severe systemic infection.

Stones may also perforate the gallbladder, but this is a very rare complication.

If a child requires surgical removal of the gallbladder, it typically has no permanent effect on a child's quality of life, as a gallbladder is not necessary for function.

If a child doesn't have a gallbladder, the bile will simply flow from the liver directly into the intestine.

The child should be able to eat normally (without any need to change a diet) and continue with normal activities after having the gallbladder removed.

The most common mild symptom after removing the gallbladder is loose stool, especially after eating a fatty meal. Most children do not have this problem.

➔ **Locate a Pediatric Gastroenterologist**

IMPORTANT REMINDER: *This information from the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) is intended only to provide general educational information as a definitive basis for diagnosis or treatment in any particular case. It is very important that you consult your doctor about your specific condition.*



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