CONDITION

Annular pancreas

Learn how annular pancreas can narrow the small intestine, what symptoms it may cause in infants and adults, and how doctors diagnose and treat it.

WHAT IT IS
Congenital pancreatic tissue surrounding the duodenum

BODY SYSTEM
Digestive

MAIN SYMPTOMS
Vomiting, upper abdominal pain, fullness after eating, poor weight gain

WHAT CAUSES IT
Unknown developmental abnormality before birth

HOW IT IS DIAGNOSED
CT, MRI, contrast imaging, sometimes surgery

MAIN TREATMENT
Surgical bypass of the obstruction

CAN IT BE CURED?
No, ring usually cannot be removed

IS IT AN EMERGENCY?
Sometimes, green vomiting in an infant

LONG-TERM OUTLOOK
Surgery often relieves obstruction

Overview

Annular pancreas is a condition present from birth in which pancreatic tissue partly or completely surrounds the duodenum. The duodenum is the first section of the small intestine, just beyond the stomach. The pancreas is an organ that makes digestive enzymes and hormones, including insulin.

Normally, the pancreas develops from two small groups of cells that join as a fetus grows. In annular pancreas, part of this tissue forms a ring or band around the duodenum. The ring may narrow the intestine and make it difficult for food, liquid, and digestive juices to pass.

The amount of narrowing varies. Some babies have a severe blockage and develop symptoms soon after birth. Other people have a partial narrowing that does not cause problems until childhood or adulthood. Annular pancreas is sometimes found by chance during an imaging

test or operation performed for another reason.

The condition matters because a significant blockage can interfere with feeding, hydration, and growth. In adults, it may contribute to abdominal symptoms, inflammation of the pancreas, or blockage of the bile ducts. Annular pancreas itself cannot be removed safely in most cases, but surgery can create a route around a troublesome obstruction.

Symptoms

Symptoms depend on how tightly the pancreatic tissue surrounds the duodenum and whether other digestive conditions are present.

A baby with a major obstruction may develop symptoms during the first hours or days after birth. These can include:

Green vomiting in a newborn or young infant requires emergency medical evaluation. It can be a sign of an intestinal blockage, including conditions other than annular pancreas.

Children with a partial obstruction may have vomiting, abdominal discomfort, early fullness during meals, or difficulty gaining weight. Symptoms can come and go, which may delay recognition.

Some adults have no symptoms. When symptoms occur, they may include upper abdominal pain, nausea, vomiting, fullness after eating, or reduced food intake. Symptoms may become more noticeable when swelling, scarring, or another digestive problem further narrows the duodenum.

Annular pancreas can also be associated with pancreatitis, which means inflammation of the pancreas. Pancreatitis often causes steady upper abdominal pain that may spread to the back, along with nausea or vomiting. If the nearby bile duct becomes blocked, the skin or whites of the eyes may turn yellow. This is called jaundice.

Severe or worsening abdominal pain, repeated vomiting, vomiting blood, black stools, fainting, confusion, fever with jaundice, or an inability to keep down fluids should be assessed urgently. Severe dehydration, breathing difficulty, or green vomiting in an infant warrants emergency care.

- Green or yellow-green vomit, which may contain bile
- Repeated vomiting after feeding
- A swollen upper abdomen
- Trouble feeding

- Fewer wet diapers or other signs of dehydration
- Poor weight gain if the obstruction is incomplete

Causes and risk factors

Annular pancreas develops before birth. It is not caused by something a person ate, did, or was exposed to later in life.

During early fetal development, two pancreatic buds normally rotate and join together. The exact developmental process leading to annular pancreas is not fully settled. Current evidence suggests that abnormal movement, attachment, or growth of the ventral pancreatic bud can leave pancreatic tissue wrapped around the duodenum.

There are no well-established lifestyle risk factors. In most cases, parents could not have prevented the condition.

Some babies with annular pancreas also have other congenital conditions. These may include duodenal atresia, in which part of the duodenum is closed; intestinal malrotation, in which the intestines are not positioned normally; congenital heart differences; or chromosomal conditions such as Down syndrome. These associations do not mean that every baby with annular pancreas has another condition.

Annular pancreas may also occur with differences in the pancreatic ducts. These ducts are small tubes that carry pancreatic juices into the intestine. Their anatomy can affect how pancreatitis or other pancreatic problems are evaluated.

Diagnosis

Before birth, an ultrasound may show an enlarged stomach and duodenum when there is a major blockage. This pattern is sometimes called the "double-bubble" sign because the two fluid-filled areas look like bubbles. The sign suggests duodenal obstruction, but it does not identify annular pancreas by itself. Other conditions can produce the same appearance.

After birth, an abdominal X-ray may also show the double-bubble pattern. If the obstruction is incomplete, a contrast study may be used. During this test, the baby or child swallows a liquid that can be followed on X-rays. It helps show where the intestine is narrowed and whether material can pass through.

Ultrasound, computed tomography, or magnetic resonance imaging may be helpful in older children and adults. Computed tomography, usually called CT, uses X-rays to create detailed

images. Magnetic resonance imaging, or MRI, uses a magnetic field. A specialized MRI called MRCP can show the pancreatic and bile ducts without placing an instrument inside them.

Endoscopic ultrasound may be considered when more detail is needed. A clinician passes a flexible instrument through the mouth and uses ultrasound from inside the digestive tract. ERCP is another endoscopic procedure that can outline the ducts, but it is invasive and may cause complications such as pancreatitis. It is usually reserved for selected situations in which duct treatment or detailed information is needed.

A thin or mostly fibrous ring can be difficult to see on imaging. In some cases, annular pancreas is confirmed only during an operation. Doctors also assess for other causes of similar symptoms, including ulcers, tumors, gallstones, pancreatitis from another cause, or different forms of intestinal obstruction.

Treatment and management

Treatment depends on whether annular pancreas is causing symptoms or blocking the duodenum. A person whose condition was found by chance and who has no related symptoms may not need an operation. Follow-up can focus on new digestive symptoms and any other medical conditions.

A baby with suspected obstruction is stabilized before surgery. Feeding is paused, fluids are given through a vein, and a tube may be passed through the nose into the stomach to remove trapped fluid and air. The care team also checks hydration, blood salts called electrolytes, and associated congenital conditions.

When the duodenum is significantly blocked, the usual surgical approach is to create a path around the narrow area. In infants, surgeons often connect the open portions of the duodenum on either side of the obstruction. This operation is called a duodenoduodenostomy. A connection to another section of small intestine may be used when the anatomy requires a different approach.

Surgeons generally avoid cutting away the pancreatic ring itself. Pancreatic tissue can be closely attached to the duodenum and may contain important ducts. Removing it could injure the intestine or pancreas and may cause leakage of pancreatic fluid, inflammation, or abnormal connections called fistulas.

Adults with fixed obstruction may also need bypass surgery. The exact operation depends on the location of the narrowing, previous surgery, and other digestive problems. The goal is to restore the passage of food without damaging the pancreas.

Medicines cannot remove the ring of pancreatic tissue. They may still be used to treat related

problems such as pain, nausea, acid-related irritation, or pancreatitis. These treatments depend on the cause and the person's overall health rather than on annular pancreas alone.

After an operation, nutrition is restarted gradually as intestinal function returns. Some patients need temporary nutrition through a vein or feeding tube. Recovery time varies with age, the operation performed, and whether other conditions also need treatment.

Complications

The main complication is partial or complete duodenal obstruction. Ongoing obstruction can lead to vomiting, dehydration, abnormal electrolyte levels, inadequate nutrition, and poor growth. Repeated vomiting can also allow stomach contents to enter the lungs, which is called aspiration.

Pancreatitis may occur if pancreatic juices do not drain normally. Repeated inflammation can cause pain and, over time, may damage pancreatic tissue. Bile duct obstruction can cause jaundice and may increase the risk of infection within the bile ducts.

Stomach acid may contribute to irritation or ulcers near an area of narrowing. An ulcer can bleed or, less commonly, create a hole in the digestive tract.

Surgery often relieves obstruction, but all operations carry risks. Possible problems include bleeding, infection, leakage from an intestinal connection, temporary slowing of stomach emptying, scar-related narrowing, or another bowel obstruction later. The surgical team can explain which risks are most relevant to the planned procedure.

Follow up

Follow-up after diagnosis depends on symptoms and age. A person with an incidental finding may be advised to report persistent upper abdominal pain, repeated vomiting, unexplained weight loss, jaundice, or difficulty eating. Routine repeat imaging is not automatically needed for everyone; the clinician may recommend it when symptoms or duct abnormalities require monitoring.

After surgery, follow-up visits assess feeding, hydration, bowel function, weight gain, and wound healing. Infants and children may need growth and nutrition checks. If another congenital condition was identified, follow-up may involve additional specialists.

Contact the treating team promptly for increasing pain, repeated vomiting, abdominal swelling, fever, jaundice, poor feeding, or reduced urination. Seek emergency care for green vomit in an infant, severe abdominal pain, vomiting blood, black stools, fainting, breathing difficulty, or

signs of severe dehydration.

Sources

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