

## **Pancreatic cysts**

Pancreatic cysts are collections (pools) of fluid within the head, body, or tail of the pancreas. Some pancreatic cysts are true cysts, that is, they are lined by a special layer of cells that are responsible for secreting fluid into the cysts. Other cysts are pseudocysts and do not contain specialized lining cells. Pancreatic cysts can range from several millimeters to several centimeters in size. Many pancreatic cysts are benign and produce no symptoms, but some cysts are cancerous or precancerous. (Precancerous cysts are benign cysts that have the potential to become cancerous.)

There are two major types of pancreatic cysts, inflammatory cysts and non-inflammatory cysts. Non-inflammatory cysts include: serous cyst adenomas, mucinous cyst adenomas, intra-ductal papillary mucinous neoplasm (IPMN), and solid pseudopapillary tumor of the pancreas. Symptoms of pancreatic cysts include abdominal pain, back pain, jaundice, fever, chills, and sepsis. Treatment depends on the type of cyst, and patient health.

Different types of cysts contain different types of fluids. For example, pseudocysts that form after an attack of acute pancreatitis contain digestive enzymes such as amylase in high concentrations. Mucinous cysts contain mucus (a proteinaceous liquid produced by the mucinous cells that form the inside lining of the cyst).

### *Symptoms*

The symptoms of pancreatic cysts depend on their size and location. Small (less than two cm) cysts usually cause no symptoms. Large pancreatic cysts can cause abdominal pain and back pain presumably by putting pressure on surrounding tissues and nerves. Large cysts in the head of the pancreas also may cause jaundice (yellowing of the skin and eyes with darkening of urine color) due to obstruction of the common duct. Obstruction causes bile to back up and forces

bilirubin (the chemical that produces jaundice) back into the bloodstream.

On rare occasions, acute pancreatitis can cause the formation of large pseudocysts that can compress the stomach or the duodenum leading to obstruction to flow within the intestines, abdominal pain and vomiting. These cysts also may become infected and lead to fever, chills, and sepsis.

### *Different causes and types of pancreatic cysts*

There are two major types of pancreatic cysts; inflammatory cysts and non-inflammatory cysts. Inflammatory cysts are benign, whereas non-inflammatory cysts can be benign, precancerous, or cancerous.

### *Inflammatory cysts*

Most of the inflammatory cysts of the pancreas are pancreatic pseudocysts. Pseudocysts of the pancreas result from pancreatitis (inflammation of the pancreas). The common causes of pancreatitis include alcoholism, gallstones, trauma, or surgery. The fluid inside the pseudocysts represents liquefied dead pancreatic tissue, cells of inflammation, and a high concentration of digestive enzymes (for example, amylase). Most pseudocysts caused by acute pancreatitis resolve spontaneously (without treatment) within several weeks. Pseudocysts that need treatment are those that persist beyond six weeks and are causing symptoms such as pain, obstruction of the stomach or duodenum, or become infected.

### *Non-inflammatory cysts*

- *Serous cyst adenomas:* These cysts are mostly benign and commonly occur in middle-aged women. They usually are located in the body or tail of the pancreas. Typically they are small and cause no symptoms. Rarely, they do cause abdominal pain.

- *Mucinous cyst adenomas:* Thirty percent of these cysts contain cancer, and those that do not contain cancer are considered precancerous. They also are more common in middle-aged women and are usually located in the body or tail of the pancreas.
- *Intra-ductal papillary mucinous neoplasm (IPMN):* These cysts have a high likelihood of being or becoming cancerous. At the time of diagnosis, there is a 40%-50% chance of already being cancerous. These cysts are more common among middle-aged men and are more commonly located in the head of the pancreas. The cysts typically produce large amounts of mucous which can be seen draining out of the ampulla of Vater at the time of endoscopic retrograde cholangio-pancreatography (ERCP), a test that visualizes the ampulla of Vater and the pancreatic duct. These cysts can cause abdominal pain, jaundice and pancreatitis.
- *Solid pseudopapillary tumor of the pancreas:* These are rare tumors found mainly in young Asian and black females. They may reach a large size, and can become malignant. Prognosis is excellent after complete surgical resection of these tumors.

### *Diagnosis*

Since the majority of pancreatic cysts are small and produce no symptoms, they often are discovered incidentally when abdominal scans (ultrasound, CT scan, or MRI) are performed to investigate unrelated symptoms. Unfortunately, ultrasound, CT, and MRI scans cannot reliably distinguish benign cysts (cysts that usually need no treatment) from precancerous and cancerous cysts (cysts that usually require surgical removal).

Endoscopic ultrasound (EUS) is becoming increasingly useful in determining whether a pancreatic cyst is benign, precancerous, or cancerous. During EUS, an endoscope with a small ultrasound transducer on its tip is inserted through the mouth, esophagus, and

stomach into the duodenum. From this location very close to the pancreas, liver, and gallbladder, accurate and detailed images can be obtained of the liver, pancreas and the gallbladder.

During EUS fluid from cysts and samples of tissue also can be obtained by passing special needles through the endoscope and into the cysts or tumors. The process of obtaining tissue or fluid with a thin needle is called fine needle aspiration (FNA).

The fluid obtained by FNA can be analyzed for cancerous cells (cytology), amylase content, and for tumor markers [tumor markers, such as CEA (carcinoembryonic antigen), are proteins produced in large quantities by tumor cells]. For example, pancreatic pseudocyst fluid will typically have high amylase levels but low CEA levels. A benign serous cyst adenoma will have low amylase and low CEA levels, whereas a precancerous or cancerous mucinous cyst adenoma will have low amylase levels but high CEA levels.

The cells obtained by fine needle aspiration can be examined under a microscope for cancer or precancerous cells.

### *Treatment*

The most important aspect of management of pancreatic cysts is the determination of whether a cyst is benign (and usually needs no treatment) or if it is cancerous and must be removed.

The second most important aspect of management is to determine whether a patient with a precancerous or cancerous pancreatic cyst is a suitable surgical candidate. In medical centers experienced in performing pancreas surgery, surgical removal of precancerous or cancerous cysts has a high rate of cure.

There are not yet standard recommendations for managing pancreatic cysts. Different medical centers have adopted different approaches to diagnosis and treatment. Management decisions must be individualized for each patient after discussions with a doctor familiar

with the patient's health status. The following is one example of how a doctor may manage pancreatic cysts.

1. Pancreatic pseudocysts need treatment if they persist beyond six weeks after acute pancreatitis, especially if they reach a large enough size and cause symptoms such as obstruction of the stomach or common duct, abdominal pain, or become infected.
2. Small pancreatic cysts (for example, cysts smaller than two cm) will have little chance (3.5%) of being cancerous and can be observed. Nevertheless, even these small cysts can grow in size and turn cancerous in the future. Thus, these patients are monitored with yearly scans (for example, yearly CT scans). These patients will be evaluated further using endoscopic ultrasound with possible fine needle aspiration if the cysts grow in size and/or cause symptoms.
3. Pancreatic cysts larger than two cm in young, healthy individuals usually are treated with surgical removal, especially if the cysts produce symptoms.
4. Pancreatic cysts larger than two cm in elderly patients can be studied with endoscopic ultrasound and fine needle aspiration. If fluid cytology and CEA measurements suggest cancerous or precancerous changes, the patients can be evaluated for pancreatic surgery.