Pancreatic Cyst-Gastrostomy

Paula Marincola Smith and Richard Davis

Introduction:

Pancreatic pseudocysts are round or oval-shaped collections of amylase- and lipase-rich pancreatic fluid, within the pancreatic tissue or immediately surrounding the pancreas. Pseudocysts are filled with simple pancreatic fluid without any solid components and are lined with a thick, fibrinous capsule. Importantly, the wall of the pseudocyst does not contain epithelial tissue, distinguishing it from a true cyst.

Pancreatic pseudocysts occur due to disruption of the pancreatic duct, resulting in leakage and accumulation of pancreatic juice. There is often associated hemorrhagic fat necrosis. As a result of the intense inflammation that occurs when pancreatic enzymes encounter intraabdominal structures, pancreatic pseudocysts are lined by a thick capsule of fibrosed granulation tissue.

Pancreatic pseudocysts often occur as the consequence of acute pancreatitis, but can also occur after chronic pancreatitis, because of iatrogenic injury (after instrumentation or surgery,) or after pancreatic trauma. In the early phase (first 4 weeks) after duct disruption, the acute peripancreatic fluid collection lacks a well-defined capsule. About 1 in 3 acute peripancreatic fluid collections will spontaneously resolve while the remaining 2/3 organize into a pseudocyst within 4-6 weeks. While most pseudocysts are located in the lesser sac between the stomach and the pancreas, they can originate anywhere along the trajectory of the pancreatic duct. Pancreatic pseudocysts can also extend anywhere in the abdominal cavity, including the paracolic gutters and pelvis, and can be multiple.

Abdominal CT scan with intravenous contrast is the imaging modality of choice to evaluate pancreatic pseudocysts. On CT scan, they appear as well-circumscribed round or oval peripancreatic fluid collections. The fluid is noted to be homogenous with low attenuation, and the cyst is often surrounded by a well-defined wall which enhances with intravenous contrast. The presence of non-liquified components within the cyst cavity should lead you to consider alternate diagnoses.

While asymptomatic or incidentally-discovered pseudocysts do not require intervention, patients frequently present with symptoms of mass effect including pain, early satiety, gastric outlet obstruction, or biliary obstruction. In the setting of such symptoms that fail to resolve with conservative management, or in the case of secondary infection or cyst recurrence, intervention is indicated.

It is important to remember that intervention should be avoided if possible until at least 6 weeks following an episode of acute pancreatitis for two main reasons. First, up to one third of acute pancreatic fluid collections will resolve spontaneously with only supportive care and symptomatic management, thus eliminating the need for further intervention. Second, all interventions for pancreatic pseudocyst rely on the presence of a thick, fibrinous wall. Intervention before this wall is mature leads to a higher chance of post-procedural leakage or other complications.

Treatment options include open or laparoscopic internal drainage (cyst-gastrostomy or cyst-jejunostomy,) endoscopic drainage, or percutaneous drainage. Endoscopic drainage (often an endoscopic cyst-gastrostomy or cyst-duodenostomy) may be difficult to access in a low-resource setting due to lack of equipment and expertise. Percutaneous drainage should generally be avoided for pancreatic pseudocysts: persistent leakage from the pancreatic duct leaves the possibility of pancreatico-cutaneous fistula formation. Of note, it has been suggested that pancreatic pseudocysts that do not communicate with the main duct are at low risk of recurrence or fistula development after percutaneous drainage. Nonetheless, percutaneous management remains controversial, and we discourage a percutaneous approach in the absence of high-quality pre-operative imaging (MRI/MRCP) to fully examine the integrity of the pancreatic duct. Remember, the pseudocyst was caused by leakage from the duct in the first place: if that leakage starts up again once the cyst is externally drained, the result is a pancreatico-cutaneous fistula.

Regarding open internal drainage procedures, the decision to proceed with cyst-gastrostomy versus cyst-jejunostomy is entirely anatomic. When the pancreatic pseudocyst is in the lesser sac directly

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behind the stomach (the most common location,) a cyst-gastrostomy is a technically straightforward procedure. We describe this procedure here. When the pancreatic pseudocyst is located outside of the lesser sac (for instance, in case of a pseudocyst which arises from the head of the pancreas in the right hemiabdomen), a cyst-jejunostomy may be more technically feasible. This procedure is described elsewhere in the Manual. The general goal of both operations is similar: to marsupialize the cyst and create an anastomosis between the cyst wall and a hollow viscus (stomach or jejunum) in order to allow continual drainage of pancreatic fluid into the intestinal tract. This chapter will focus specifically on the cyst-gastrostomy, as this is the most common procedure performed.

Consider also the etiology of the episode of pancreatitis. If it was gallstones, perform cholecystectomy at the same time as this procedure if it was not done before. Standard practice is to remove the gallbladder during the same hospitalization as the pancreatitis episode. If this was not done, it is appropriate to do it at this time.

It is important to remember that the presence of a pancreatic cyst should lead you to consider alternative diagnoses including cystic lesions of the pancreas:

- Serous cystadenoma
- Mucinous cystic neoplasm
- Side branch intraductal papillary mucinous neoplasm [IPMN]
- Solid pseudopapillary neoplasm
- Choledochal cyst
- Mesenteric duplication cysts
- Gastric duplication cysts.

These alternate diagnoses have entirely different treatment algorithms which are not discussed here.

To summarize, pancreatic pseudocysts have features that will allow you to differentiate them from these alternate diagnoses:

- A regular/rounded appearance
- Lack of any internal solid components,
- High amylase and lipase levels (these require fluid sampling- body fluid amylase assays are often not available in resource-limited settings.)
- History of pancreatitis or episode of severe abdominal pain suggestive of pancreatitis

Pancreatic cyst-gastrostomy proceeds in the following steps:

- Abdominal exploration
- Anterior gastrotomy and aspiration of the pseudocyst through the posterior gastric wall to confirm pseudocyst position
- Generous excision of a portion of the common wall of the posterior stomach and anterior pseudocyst
- Suture placement along the circumference of the common wall
- Placement of nasogastric tube
- Closure of the anterior gastrotomy in two layers

Steps:

1. General anesthesia is induced.
2. Upper midline laparotomy is performed.
3. Abdominal exploration. Rule out signs of malignancy. Inspect the liver, omentum, and peritoneal surfaces both visually and by palpation. If peritoneal masses or nodules are detected, the diagnosis is much more likely to be malignancy (pancreatic, gastric, or colonic) with peritoneal metastasis. Explore the entire abdomen carefully, take adequate biopsies, and close.

   If, on the other hand, you find only enlarged lymph nodes without other unexpected findings, recall that often intraperitoneal lymph nodes are enlarged even without any pathology. If inspection does not reveal any unexpected pathology, proceed as planned.

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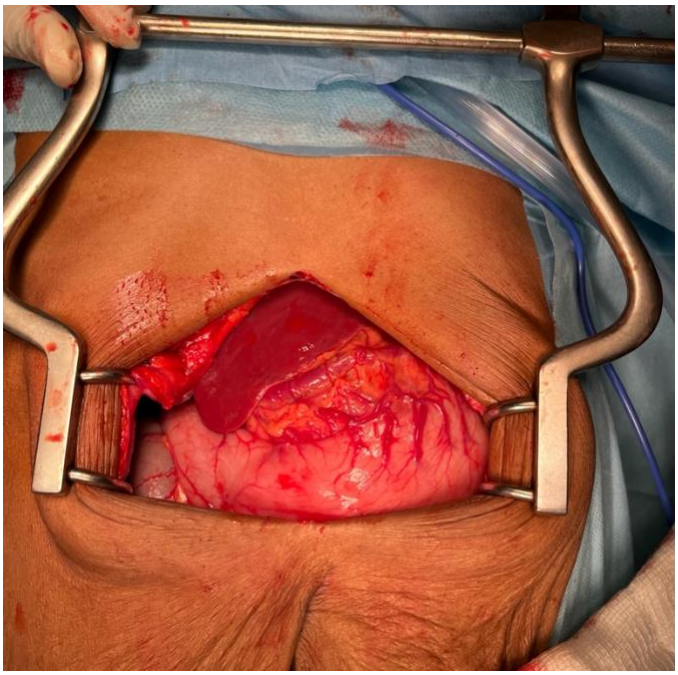
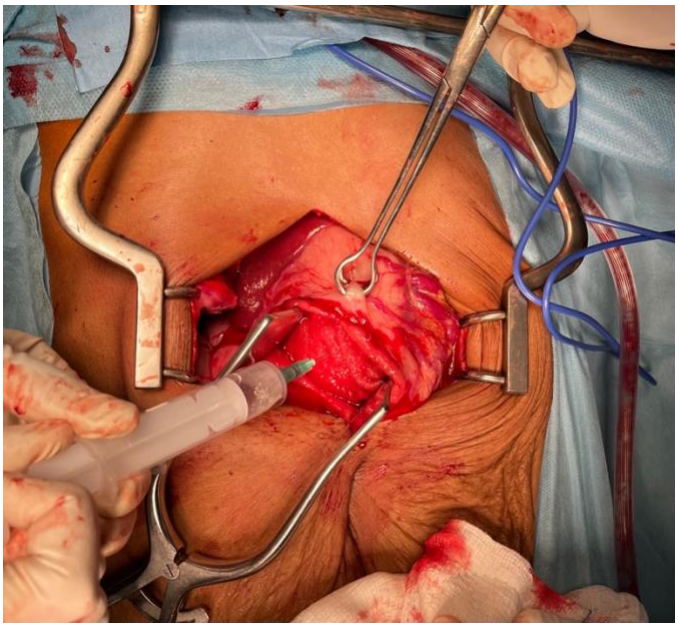


Begin with an upper midline incision, exposing the anterior wall of the stomach. Prior to proceeding with additional dissection, take this opportunity to survey the abdomen for signs of malignancy including metastatic spread. The liver, omentum, and the peritoneum should be visually inspected and palpated for signs of metastatic disease. If masses or nodules concerning for malignancy are identified, they should be biopsied prior to proceeding further.

4. Palpate for the pseudocyst through the stomach in order to plan your gastrostomy.
5. Make a generous longitudinal gastrotomy in the anterior wall over the palpable cystic mass. This incision should ideally be in the mid-body of stomach, taking care to avoid injury to blood vessels on the greater curve. Next use a self-retaining (Weitlaner or similar) retractor to hold open the edges of the anterior stomach wall.
6. Using a sterile finder needle and syringe, aspirate the pseudocyst through the posterior wall of stomach to confirm position once again. Fluid should return as thin, dark pancreatic fluid. Return of thick fluid or mucous should lead you to reconsider your working diagnosis and operative approach.



Following anterior longitudinal gastrotomy, a self retraining retractor holds the gastric wall aside. A sterile finder needle and syringe are used to aspirate the cyst through the posterior wall of the stomach. You should easily aspirate thin, dark pancreatic fluid. Return of thick fluid or mucous should lead you to reconsider your working diagnosis.

7. Use diathermy to make a circular incision through the common posterior stomach and anterior pseudocyst wall. Make sure to have a functioning suction device on hand to allow swift decompression of the cyst cavity and to avoid gross spillage of pancreatic fluid and enzymes into the abdominal cavity.

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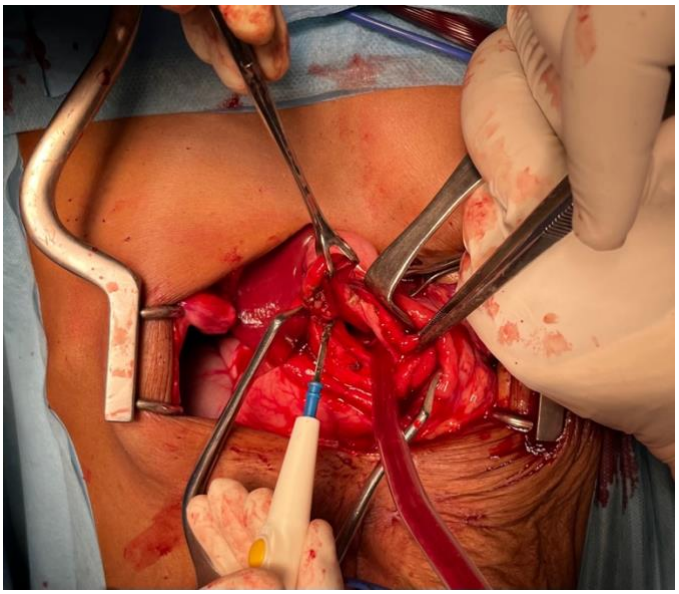
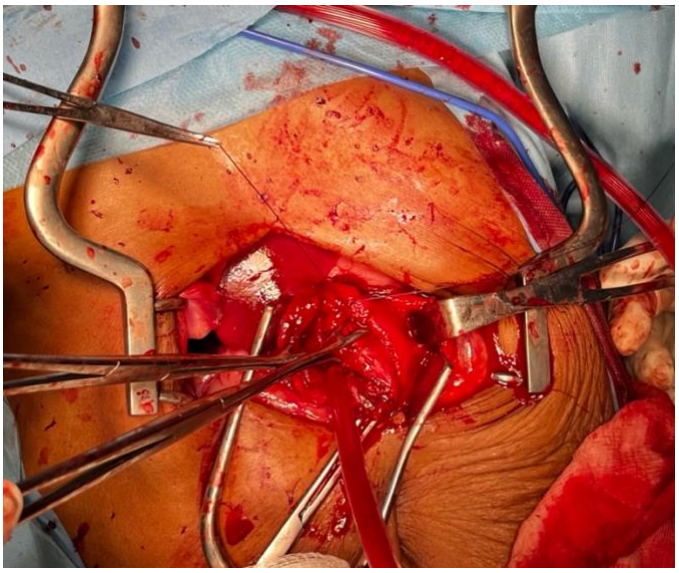


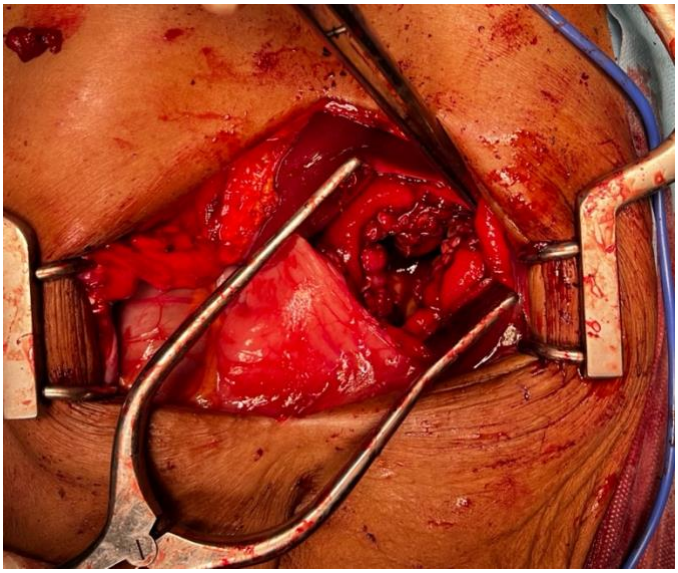
Use diathermy to open the common posterior gastric/anterior cyst wall. An assistant can insert a retractor into the cyst with one hand while operating the suction with the other, to keep the opening visible to the surgeon.

8. Following decompression, excise a circular portion of this common wall to create a common window, no less than 3cm in diameter. Larger windows are preferable if possible. You should be able to see the inside of the cyst cavity easily through this defect. Submit the common wall for pathology.



Excise a circular portion of the common wall (posterior stomach/anterior cyst), at least 3cm in diameter, to create a common window between the stomach and pseudocyst cavity. Use diathermy and go slowly, the inflammatory tissue of the pseudocyst wall will bleed copiously.

9. Suture the wall of the posterior gastrotomy to the cyst wall circumferentially with a running locking absorbable suture (2-0 Vicryl or PDS) for hemostasis and to avoid possible leakage. Take care to make full-thickness bites on both layers, ensuring large bites of serosa and small bites of mucosa with each bite of stomach.



For hemostasis and to secure the stomach to the pseudocyst, suture the wall of the posterior gastrostomy to the anterior cyst wall circumferentially in a locking manner to promote hemostasis. Absorbable suture such as 2-0 Vicryl or PDS should be used.

10. Close the anterior gastrotomy in 2 layers, taking care not to narrow the pre-pyloric area or injure the greater curve vessels. Absorbable suture should be used on the inner layer (Vicryl or PDS.) Take full-thickness bites with large bites of serosa and small bites of mucosa, to avoid bulging of mucosa. The outer layer can be closed in either an interrupted or running fashion, taking care to fully "bury" and cover the primary suture line with seromuscular bites. Either absorbable or non-absorbable (silk) suture can be used for the second layer.

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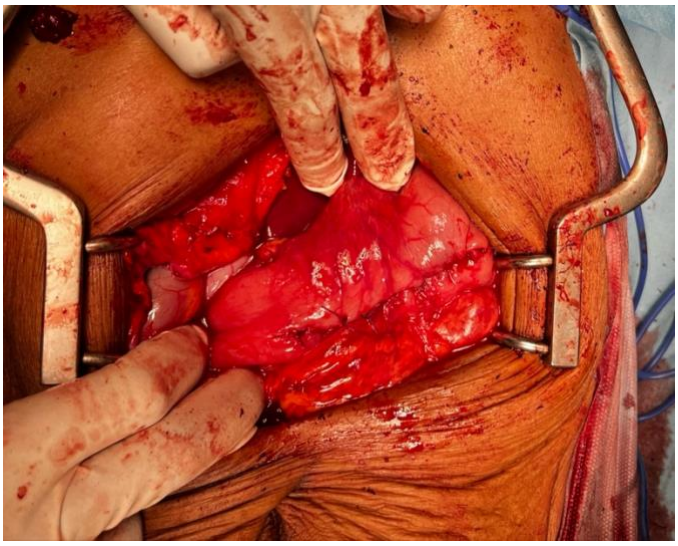

The anterior gastrotomy should be closed in two layers, taking care to avoid narrowing the pre-pyloric area or creating an iatrogenic injury to the greater curve vessels.

11. Place a nasogastric tube intraoperatively and manually confirm placement in the stomach prior to closing the abdomen. Leave the nasogastric tube in situ overnight to avoid gastric distention. Start clear liquids by mouth on the morning of post-operative day one.

Pitfalls

- Recurrence of the cyst: excised portion of common wall was too small, limiting the capacity of the cyst fluid to adequately drain into the gastrointestinal tract.
- Bleeding from common wall: Make sure to carefully inspect the cyst cavity. The excised portion of common wall should be large enough to allow adequate visual inspection for hemostasis. A running locking suture is typically utilized to promote hemostasis as this area is typically very well-vascularized. Additional sutures may need to be used to achieve hemostasis.
- Undiagnosed malignancy: review for signs of possible malignancy on preoperative history and physical exam as well as imaging, and visually inspect/manually palpate for signs of malignancy or metastatic spread upon abdominal entry. If the cyst is found to contain mucinous or gelatinous debris during surgery, convert to subtotal gastrectomy and distal pancreatectomy, if possible. Try to preserve the fundus of stomach as a reservoir. The short gastric arteries are the primary blood supply to the fundus of the stomach, so they should be preserved during subtotal gastrectomy.
- Malnutrition/poor wound healing: many patients with symptomatic pancreatic pseudocysts are malnourished at the time of their operation for a combination of reasons (mass effect from the pseudocyst itself, history of acute or chronic pancreatitis, concurrent alcohol or substance abuse.) Consider early feeding, nutritional supplementation, and monitoring for re-feeding syndrome, when appropriate. See Nutrition in the Surgical Patient.

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