



Pancreatic Fluid Collections Q & A

Ask the Expert features questions submitted by members with answers provided by ASGE physician experts.



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1. **Q. After a pancreatic pseudocyst has been identified for drainage, should a pancreatogram always be performed to confirm or exclude a pancreatic duct leak? If not, how do you determine which patients should undergo a pancreatogram? Is magnetic resonance cholangiopancreatography (MRCP) sufficient?**

A. There are no data to support the routine performance of a pancreatogram in all patients with a pancreatic pseudocyst undergoing transmural drainage. In a recent meta-analysis of seven studies that included 551 patients with pancreatic fluid collections (PFCs), 48.8 percent underwent transmural drainage, 22.6 percent underwent transpapillary drainage and 25.6 percent underwent combined drainage. The short-term treatment success rates for the three techniques were 79.9 percent, 80.8 percent and 87.9 percent, respectively.¹ There were also no differences in rates of clinical success, adverse events or recurrence among the cohorts. However, only three of seven studies were undertaken in the past decade when the Atlanta classification for defining PFC was more widely applied and high-quality cross-sectional imaging modalities became more commonly available.

A substantial proportion (>55 percent) of patients with walled-off necrosis (WON) have disconnected pancreatic duct syndrome (DPDS), and placing a transpapillary stent is unlikely to be beneficial. On the other hand, in a majority of patients with a pseudocyst, the pancreatic duct is intact or only partially disrupted. When a bridging stent is placed across the duct leak in these patients, in conjunction with endoscopic transmural drainage, it restores ductal integrity and facilitates faster resolution of the pseudocyst. Unfortunately, none of the studies that have examined the role of pancreatic duct stenting in transmural

drainage of PFCs was adequately powered to assess treatment efficacy. Also, the PFCs were poorly categorized (pseudocyst vs. WON), thereby precluding subgroup analysis. Only a randomized trial comparing transmural drainage with the combined (transmural drainage plus transpapillary bridging stent placement) approach is likely to yield a definitive answer.

In general, it is sufficient to treat all uncomplicated pseudocysts with transmural drainage alone. If there is suboptimal resolution of the pseudocyst on follow-up imaging or if the patient is persistently symptomatic, then evaluating the pancreatic duct for bridging stent placement is appropriate. An initial pancreatogram is only recommended for patients with concomitant pancreatic ascites or pancreatic duct stones or strictures, in whom the rate of pseudocyst recurrence is high. There is currently no evidence to support the routine placement of a pancreatic duct stent in patients with a normal pancreatogram undergoing transmural drainage of a PFC.

The morbidity associated with endoscopic retrograde cholangiopancreatography (ERCP) in the setting of acute pancreatitis is high, and the procedure is technically challenging because of duodenal edema or complete disruption of the main pancreatic duct. Magnetic resonance imaging (MRI) combining T1, T2, early and late post-gadolinium images and MRCP provides comprehensive imaging of the pancreas. At MRCP, if a discrete intrapancreatic fluid collection is observed along the expected course of the main pancreatic duct, with viable upstream parenchyma, then a diagnosis of DPDS is made. If the pseudocyst or WON is large, it can be difficult to evaluate the relationship between the pancreatic duct and the fluid collection. In such cases, a secretin-enhanced MRCP may be required for determining whether the main pancreatic duct is disrupted or disconnected. Finally, the quality of MRCP is technology-dependent and operator-specific.

2. Q. How do you manage a patient with acute pancreatitis complicated by a pseudocyst? Do you drain the pseudocyst immediately or wait? If the latter, how long do you wait?

- A. When a pancreatic pseudocyst is identified in the acute setting, it is important to pay close attention to the clinical symptoms and imaging studies. If the symptoms are improving, i.e., the patient is tolerating an oral diet or enteral nutrition and the pain is well controlled with oral analgesics or narcotics, it is appropriate to manage the patient conservatively with follow-up computed tomography (CT) or MRI in six to eight weeks. However, if the symptoms are persistent, i.e., continued need for narcotics, there is a gastric outlet or biliary obstruction or failure to thrive, then it is appropriate to perform transmural drainage of the pseudocyst, provided that the pseudocyst is well encapsulated.

Prior to performing an intervention, it is important to determine whether the PFC is a true pseudocyst or an acute necrotic collection (ANC). The imaging modality of choice for making this determination is a T2-weighted MRI, which can identify solid debris within the PFC. Also, it is critical to assess pseudocyst wall maturity to avoid peritoneal soiling as a consequence of premature instrumentation of the pseudocyst. If the pseudocyst is well defined and can be imaged adequately in a single plane, then endoscopic ultrasonography (EUS) may be an appropriate modality for assessing wall maturity. On the other hand, if the pseudocyst is large and extends to the flanks, cross-sectional imaging modalities, such as CT or MRI, may be more accurate than EUS.

3. Q. How do you manage a patient with acute pancreatitis who has pancreatic ascites and does not have a well-formed fluid collection?

- A. More than 90 percent of cases of pancreatic ascites are associated with chronic pancreatitis, with the pancreatic duct leak upstream of a stone or stricture. Other rare causes include trauma, a knife or gunshot injury or damage to the pancreatic tail during surgery with the leakage from the duct into the peritoneal cavity.

While ascites denotes the leakage of pancreatic secretions into the peritoneal cavity, the presence of a pseudocyst indicates that the leakage is walled-off. Approximately 50 percent of patients in whom pancreatic ascites develops also have a concomitant pseudocyst that is leaking. Pancreatic ascites must be managed aggressively because pancreatic enzymes can cause potentially debilitating or fatal digestion of tissues within the peritoneal cavity. Prior to the advent of pancreatic endotherapy, patients were managed conservatively with total parenteral nutrition, somatostatin analogues, diuretics, large-volume paracentesis and, if necessary, surgery that was undertaken as a salvage measure. This approach led to healing in less than 50 percent of patients, with an overall mortality rate of 10 to 15 percent and a recurrence rate of 15 to 25 percent.

The current approach is to perform an ERCP to locate the site of pancreatic duct disruption and place a transpapillary stent across the leak (Figures 1 to 3), in addition to large-volume paracentesis. Placement of a stent creates a low-pressure system that allows decompression of the pancreas into the duodenum. Several large series and meta-analyses have shown that if the site of ductal disruption can be bridged successfully, pancreatic secretions can be kept from leaking intra-abdominally and the need for urgent surgery can be avoided in the vast majority of patients, with an overall treatment success rate of more than 90 percent.^{2,3}



Figure 1: Peripancreatic fluid collection following EUS-guided FNA of a pancreatic cyst.

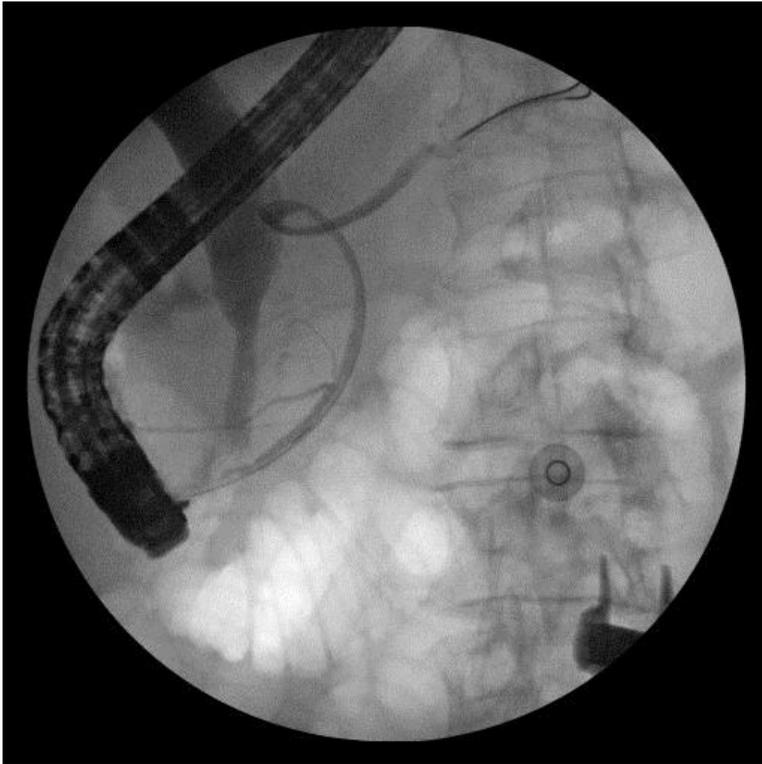


Figure 2: ERCP revealing a pancreatic duct leak in the head of the pancreas.

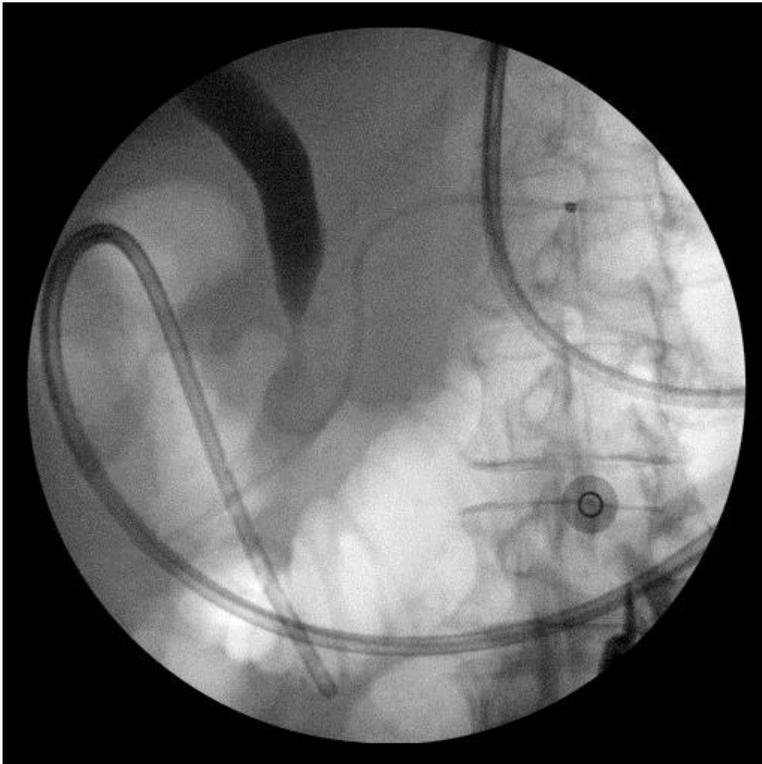


Figure 3: Successful placement of a transpapillary bridging stent bypassing the leak.

4. Q. What therapeutic options exist for a patient with persistent pancreatic ascites and pancreatic inflammation, who has undergone placement of a pancreatic stent, long-term nasojejunal feedings and long-term octreotide therapy, all of which have failed?

A. Symptomatic patients who fail all medical measures may ultimately require surgery. Indications for surgery include persistent or recurrent accumulation of ascites and/or a sudden deterioration in the patient's clinical status. The type of surgical intervention depends on the anatomy of the pancreatic duct and the site of the leakage: the pancreatic duct or a pseudocyst. When the pancreatic duct is dilated, the preferred approach is to create an anastomosis between the ruptured duct and a Roux-en-Y jejunal loop. Patients with a pseudocyst and a mature wall lining can undergo a cyst-jejunostomy. If the pancreatic duct is not dilated or if the disease is confined to the pancreatic tail, a distal pancreatectomy, followed by duct ligation, is an acceptable alternative approach.

5. Q. Are there any pseudocysts that should not be drained endoscopically out of concern that the fluid will not drain adequately because of their size?

A. Despite the lack of objective data, in my experience, the larger the size of a PFC (>12 cm in size), the more likely that it is a WON and not a pseudocyst. Ineffective instrumentation of WON is likely to predispose to infection and the need for reintervention. Therefore, it is important to delineate the two entities by performing MRCP and preferably the endoscopic transmural drainage under EUS-guidance. It is important to recognize that the different PFC subtypes have overlapping characteristics, and clear categorization can be challenging. Other factors that limit treatment success include multiple collections that may communicate with each another, multiple septations and extension of the pseudocyst to the flanks.

For practical purposes, if the PFC does not have any debris or only minimal debris (<10 percent) at EUS, after dilating the transmural tract to 8 to 15 mm, the placement of a single or multiple 7- or 10-Fr transmural stents is likely to yield treatment success in more than 90 percent of patients. In a retrospective study of 122 patients, the stent size and number were not associated with the number of interventions required for treatment success when adjusted for pseudocyst size.⁴ On the other hand, if there is a concern that the PFC is in fact WON (>20 percent debris, hyperechogenic at EUS, black or dark brown aspirate), then a multidisciplinary approach is imperative. If a decision is still made to proceed with endoscopic drainage, we recommend the creation of multiple transluminal "gateways" to facilitate better drainage of the PFC contents. In a retrospective study of 60 patients with WON, patients treated with multiple gateways had better treatment outcomes than patients treated via a single transmural tract (92 compared to 52 percent).

6. Q. Please comment on the use of metal compared to plastic stents for the drainage of pseudocysts: How do you choose which one to use? What are the disadvantages to using one or the other?

A. Despite the lack of adequate data, metal stents are being used more frequently for transmural drainage of PFC. A systematic review was recently conducted by our group to compare the rates of treatment success, adverse events and recurrence between patients undergoing metal versus plastic stent placement for endoscopic transmural drainage of a

PFC. Seventeen studies that included 881 patients met inclusion criteria. There was no difference in overall treatment success between patients treated with plastic and metal stents (81 percent [95 percent CI, 77 to 84 percent] vs. 82 percent [95 percent CI, 74 to 88 percent]) for both pseudocysts (85 percent [95 percent CI, 81 to 89 percent] vs. 83 percent [95 percent CI, 74 to 89 percent]) and WON (70 percent [95 percent CI, 62 to 76 percent] vs. 78 percent [95 percent CI, 50 to 93 percent]). Also, there was no overall difference in the rates of adverse events (16 percent [95 percent CI, 14 to 39 percent] vs. 23 percent [95 percent CI, 16 to 33 percent]) and recurrence (10 percent [95 percent CI, 8 to 13 percent] vs. 9 percent [95 percent CI, 4 to 19 percent]) between plastic and metal stents.

The bottom line is that the current evidence does not support routine placement of metal stents for transmural drainage of PFCs, particularly pseudocysts. However, there is some indirect evidence that the placement of self-expandable metal stents (SEMS) may reduce the need for reintervention in patients undergoing drainage of WON.⁷ In a retrospective study, 25 patients with WON who underwent SEMS placement were matched with 50 patients who underwent plastic stent placement, and the clinical outcomes were compared. Patients treated with SEMS required one less endoscopic necrosectomy session ($P=.03$) to achieve resolution, and the WON resolved four weeks earlier ($P=.02$) than in those who underwent plastic stent placements.

In clinical practice, I never place SEMS for transmural drainage of an uncomplicated pseudocyst. For WON, if the size of the collection is more than 12 cm, I drain it by creating multiple gateways. I prefer the placement of multiple plastic stents via each gateway, because this approach is more cost effective, albeit time consuming. If the WON is <12 cm in size, is unilocular or contains >20 to 25 percent debris and the patient appears to have a poor tolerance to nasocystic catheter placement, then I place a metal stent, because the wide lumen facilitates better drainage.

Placement of plastic stents can be time consuming, as there are no dedicated single-step devices. Unless a large-bore catheter that accommodates more than one guidewire is being used, placement of multiple plastic stents takes time and can often be technically challenging. If placement of a second plastic stent within the PFC is unsuccessful, the drainage of cyst contents can be suboptimal, leading to infection or delay in symptom resolution. On the other hand, placement of a recently developed lumen-apposing metal stent is technically easy, and the procedure can be performed in less than 10 to 15 minutes. However, metal stents are far more expensive, and one has to be familiar with the operating mechanism and the technique of deployment. While a plastic stent can be placed using both a gastroscope and echoendoscope, the lumen-apposing stent is designed exclusively for use only in conjunction with an echoendoscope.

- 7. Q. What drainage options exist for a patient who is symptomatic from a pseudocyst and has a concomitant pseudoaneurysm confirmed by CT? Would you advise interventional radiology with placement of coils in the artery feeding the pseudoaneurysm prior to endoscopic therapy, or should the patient go immediately to surgery?**
- A. The reported incidence of chronic pancreatitis complicated by pseudoaneurysm bleeding ranges from 4 to 10 percent. Pseudoaneurysms result from erosion of pancreatic or adjacent blood vessels by leaked pancreatic juice. The persistent vessel erosion leads to a permanent communication between the involved vessels and the pseudocyst, giving rise to the

formation of a pancreatic pseudoaneurysm. The splenic artery is most frequently involved, followed by the pancreaticoduodenal and hepatic arteries. Although recent improvements in endoscopic techniques have enabled the treatment of several chronic pancreatitis-associated complications, such as stones and strictures, treatment of pseudoaneurysms remains an exception. Even with rapid diagnosis and treatment, the reported mortality rate ranges from 15 to 50 percent. Dynamic contrast abdominal CT and angiography should be performed as the initial management strategies to localize the bleeding, followed by embolization of the artery feeding the pseudoaneurysm to control the bleeding. Surgical intervention should be undertaken for patients who are unable to undergo or who fail arterial embolization for pseudoaneurysm bleeding. If the pseudocyst is located in the tail of the pancreas, resection is the preferred procedure, because both the pseudoaneurysm and the pseudocyst can be managed by a single intervention that has lower morbidity and mortality. On the other hand, if the lesion is located in the head of the pancreas, a more conservative approach such as radiology-guided embolization should be attempted first.

The pseudocyst tends to “tamponade” the pseudoaneurysm by mechanical compression; rapid decompression of the pseudocyst tends to unmask the cushioning effect and may precipitate acute bleeding. Therefore, for patients undergoing an elective procedure, it is prudent to first treat the pseudoaneurysm by coil embolization and then perform endoscopic transmural drainage of the pseudocyst.

8. Q. What is the minimum weight or age of a child who can undergo EUS-guided PFC drainage using a regular therapeutic echoendoscope? What should be done if the child is below this age or weight?

A. A therapeutic echoendoscope has an outer diameter of 14 mm and has a rigid tip that limits its use in very young children. Although data are lacking to make any definitive recommendations, we generally reserve the linear-array echoendoscope for children who are at least 18 months of age. In young children, a symptomatic PFC induces luminal duodenal compression. If technical difficulty is encountered with the passage of a linear array echoendoscope, then a duodenoscope or therapeutic gastroscope can be used in conjunction with an ultrasound miniprobe to guide transluminal PFC drainage.

9. Q. If a patient has a persistent pancreatic pseudocyst after a transmural stent has been placed, do you recommend surgical cystgastrostomy or proceed with repeated endoscopic therapy?

A. The most common reason for persistence of a pseudocyst following transmural stent placement is ineffective drainage. A repeat intervention is likely to be successful in more than 60 to 75 percent of patients even if the pseudocyst is infected. There are several technical tips that help improve the outcome of reintervention: a) lavaging the pseudocyst and performing vigorous aspiration prior to deploying additional stents, b) creating an additional transmural tract, c) placing a transpapillary pancreatic duct stent, bridging the leak or d) placing metal stents for better drainage. Should the presumed pseudocyst fail to resolve following transmural drainage, one must always entertain the possibility that the PFC is in fact a WON, not a pseudocyst. This may require additional interventions such as endoscopic or percutaneous necrosectomy to achieve a successful outcome.

10. Q. How long should a PFC drainage stent remain in place in a patient with a disrupted pancreatic duct in whom a pancreatic stent could not be inserted? Is the timing the same if a metal stent was used?

- A. It is important, at some point prior to or after endoscopic transmural drainage, to perform MRCP (preferably) or ERCP to assess the status of the main pancreatic duct. If MRCP reveals a normal pancreatic duct and if the pseudocyst has resolved, the transmural stent can be safely removed. The transmural stent can generally be removed eight weeks after the intervention. On the other hand, if a leak persists, placement of a transpapillary pancreatic duct stent to bridge the leak can be considered. At repeat imaging, if the pseudocyst has resolved, the transpapillary stent may be removed at ERCP after resolution of the duct leak was confirmed. If a patient has DPDS, then the transmural stent (or stents) may be left indefinitely in situ to minimize the chances of pseudocyst recurrence. The stents act as a conduit for drainage of the disconnected gland. The long-term implication of leaving a metal stent in place indefinitely is unclear. In patients with DPDS, we exchange the metal stent for plastic stents. The follow-up interval is the same irrespective of the type of transmural stent placed.

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See pg. 9 for a list of resources.

Additional Resources

ASGE Online Learning Resource

Paradigm Shift in Endoscopic Management of Peri-pancreatic Fluid Collection

Anthony Yuen Bun Teoh, FRSCed (Gen), Charing Ching Ning Chong, FRSCed (Gen) and Lawrence Khek Yu Ho, MD, et al.

0.50 CME Credits. OLV005. 2015. Member \$35; non-member \$50. Available at www.asge.org, Online Learning Center

ASGE Report on Emerging Technology

"New devices and techniques for management of pancreatic fluid collections," *GIE: Gastrointestinal Endoscopy* 2013; 77:835–838. Available at www.giejournal.org.