Endosonographic-guided therapy of pancreatic pseudocysts

Amitabh Chak, MD

Cleveland, Ohio

EUS is the latest addition to endoscopists’ armamentarium for drainage of pancreatic pseudocysts. The indications for pseudocyst drainage,1 whether performed by radiologic, endoscopic, or surgical means, remain basically unchanged. Symptomatic pseudocysts, infected pseudocysts (i.e., pancreatic abscesses), and enlarging pseudocysts unequivocally require drainage. The necessity of draining pseudocysts based strictly on size has been questioned,2,3 but most authorities recommend that pseudocysts larger than 6 cm in diameter should be drained once their wall has “matured.”

Surgery remains the standard for drainage of pseudocysts against which new methods must be compared. Surgical operations usually consist of a cystgastrostomy, a cystduodenostomy, or a Roux-en-Y-cystjejunostomy. These operative procedures carry a 10% to 30% morbidity rate, a 1% to 5% mortality rate, and a 10% to 20% rate of recurrence.4-6 Radiologic drainage7,8 and endoscopic drainage9-17 compare favorably with this surgical “standard.”

**ENDOSCOPIC DRAINAGE OF PSEUDOCYSTS**

Endoscopic methods for draining pseudocysts are extensions of ERCP techniques that rely on the use of the therapeutic duodenoscope and ERCP accessories. Publications on endoscopic drainage consist primarily of case series.9-17 This cumulative experience has led to the development of certain basic principles, which are outlined in Table 1. With all drainage techniques, it is important to allow the capsule of the pseudocyst time to “mature.” Pseudaneurysms can occur as a consequence of pancreatitis, and these should be sought.18 It is advisable to address arterial communications by angiographic means before any type of drainage procedure is attempted. Portal hypertension may accompany inflammatory pancreatitis, and identification of gastric varices will help avoid hemorrhage related to inadvertent puncture. Endoscopic drainage should be considered only if the wall of the pseudocyst is in close apposition to the gastric or duodenal wall, and a bulge caused by the pseudocyst is intraluminally visible.

Pancreatography is important before any attempt at drainage is made.19 Whenever possible, anatomic abnormalities such as distal strictures, duct disruptions, or pancreatic duct stones should be addressed by endoscopic techniques to ensure long-term success. The performance of endoscopic pancreatography also permits the endoscopist to assess the feasibility of transpapillary drainage. Transpapillary drainage should be preferred to alternative methods for drainage, because it carries the least morbidity.14-17

Endoscopic cystduodenostomies or cystgastrostomies require the puncture of the gastric or duodenal wall at the site of a luminally identifiable bulge. This procedure is usually performed with electrocautery accessories. Hemorrhage may accompany this maneuver. Howell et al.20 have suggested the use of a smaller bore aspirating needle catheter to test for blood at the site of the proposed puncture as a method for minimizing the risk of hemorrhage. Hypothesizing that hemorrhage may be related to the use of electrocautery, Monkemuller et al.21 have pioneered the use of a large-bore needle for puncturing followed by a Seldinger technique for tract dilation.

The presence of necrotic debris or loculation within the pseudocyst increases the risk of infection after a drainage procedure is performed. Therefore, it is important to create as large a communication as possible between the cyst cavity and the gastric or duodenal lumen. Cyst lavage using an endoscopically placed nasocystic catheter has been proposed as a method for reducing infection. In fact, nasocystic catheter lavage has been reported to be effective even in the presence of infected necrosis.22

Serious complications related to the endoscopic drainage of pseudocysts include severe hemorrhage, perforation, pancreatitis, and infection. Depending on patient selection and the route of drainage, the morbidity rate of endoscopic drainage techniques is between 5% to 24%, the mortality rate is between 0% to 2%, and the pseudocyst recurrence rate is between 6% to 23%.9-17 Thus, pseudocyst drainage carries the highest risk of any routinely performed endoscopic procedure.

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*From the Division of Gastroenterology, University Hospitals of Cleveland, Cleveland, Ohio*

*Reprint requests: Amitabh Chak, MD, Division of Gastroenterology, University Hospitals of Cleveland, 11100 Euclid Ave., Cleveland, OH 44106-5066*

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EUS BEFORE ENDOSCOPIC DRAINAGE

Endosonographic imaging complements several of the principles listed in Table 1. Different investigators have recommended the performance of EUS before endoscopic drainage of pseudocysts is performed. The rationale for this approach is outlined in Table 2. EUS can identify a site where the pseudocyst capsule is in close proximity to the gastrointestinal tract, and it can measure the distance from the gastrointestinal lumen to the pseudocyst (Fig. 1). A good rule of thumb is that endoscopic drainage should not be attempted with pseudocysts that are more than 1 cm away from the wall of the gastrointestinal tract.

One of the reasons that endoscopic drainage is a high-risk procedure relates to the fact that puncture through the gastric or duodenal wall is performed blindly with only a luminal bulge as a guide. The performance of EUS before drainage partially overcomes the blind nature of this maneuver. EUS is more sensitive than EGD for detecting gastric varices. The presence of gastric varices might contraindicate endoscopic drainage, or it might change the location selected for drainage (Fig. 2). Although not proven, EUS imaging of submucosal arterial vessels or extragastric vessels might also decrease the risk of bleeding associated with endoscopic drainage. Another advantage to performing initial EUS is that EUS is more sensitive than CT in identifying debris within the pseudocyst. The presence of a large amount of debris or complex loculations should raise a “red flag.” If endoscopic therapy is attempted in these patients, particular attention should be given to the creation of a large diameter communication between the cyst and the gastrointestinal lumen. It is advisable to place at least two 10F double-pigtail stents in the presence of debris. In addition, the placement of a nasocystic catheter for lavage should be considered. One unproven theoretical advantage to performing initial EUS is that it may be possible to identify pseudoaneurysms, which should be addressed before drainage procedures are performed. Obviously, endoscopic imaging alone is not sufficient for draining pseudocysts that do not produce a luminal bulge. The use of EUS before endoscopy enables the drainage of such pseudocysts. Moreover, occasionally “pseudocysts” that are drained turn out to be true cystic tumors of the pancreas, which should be treated with surgical resection. EUS features such as the presence of well-defined septations, the presence of echogenic mucin, or the presence of a mass lesion in association with the cyst might identify these cystic tumors and avoid inappropriate drainage therapy (Fig. 3).

EUS imaging before endoscopic drainage can be performed with either a radial or a curvilinear scanning echoendoscope. Once a suitable site for endoscopic drainage has been identified, the site can be marked with either a biopsy forceps or a needle. Although the needles available for performing EUS-guided fine-needle aspiration are capable of puncturing the pseudocyst and aspirating its contents, the needle gauge and the standard echoendoscope accessory channel diameter are not sufficient to permit therapeutic drainage procedures.

EUS-GUIDED DRAINAGE OF PSEUDOCYSTS

Extending the applications of EUS for pseudocyst drainage, investigators have developed methods for...
draining pseudocysts solely under EUS guidance.\textsuperscript{30-34} This therapeutic application of EUS requires large-channel therapeutic curvilinear array US endoscopes. These have recently become commercially available (XGF-UCT30, Olympus America Inc., Melville, N.Y., or FG-38X, Pentax-Hitachi. Pentax Precision Instruments, Orangeburg, N.Y., and Hitachi Medical Corporation of America, Tarrytown, N.Y.). The obvious advantage to a one-step EUS-guided approach is that it does not require separate endoscopies and it can be performed without the use of fluoroscopy. Puncture can be performed with either a needle-knife papillotome or a cystenterostome. Once access into the pseudocyst has been achieved, a guidewire can be passed into the pseudocyst to maintain access. Guidewires are hyperechoic and can be identified easily by EUS imaging (Fig. 4). Stents can then be placed over the guidewire using standard endoscopic techniques. The use of fluoroscopy for stent placement is helpful but not necessary. Initial reports\textsuperscript{30-34} have shown that EUS-guided pseudocyst drainage is feasible. Endosonographers have also shown that this one-step EUS-guided approach can be used to safely drain pseudocysts in patients with gastric varices.\textsuperscript{35}

One potential disadvantage to this approach is that if previous pancreatography is not performed, then pancreatic strictures or duct disruptions will not be identified. Thus, an EUS-alone approach without pancreatography will likely lead to a higher rate of pseudocyst recurrence. The accessories required to introduce prostheses into cysts using these new US endoscopes have not been perfected. Investigators have described techniques that consist of the placement of a single 7F or 8F stent into the pseudocyst.\textsuperscript{31,33,34} The creation of these relatively small-diameter cystenterostomies might lead to the development of infected pseudocysts. Most experts also prefer double-pigtail stents for pseudocyst drainage because straight stents are more likely to migrate into the pseudocyst.

Improved accessories for one-step EUS-guided pseudocyst drainage that allow the placement of large-bore double-pigtail stents will likely be developed in the near future. Studies that determine the efficacy and define the advantages of this approach are eagerly awaited.
REFERENCES


