Interventional radiology-assisted transgastric endoscopic drainage of peripancreatic fluid collections

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Summary

Peripancreatic fluid collections (PFCs) occur as a consequence of pancreatitis. Most PFCs resolve spontaneously, although 1%–2% persist and may require intervention. Conventional transluminal endoscopic drainage methods require the PFC to be bulging into the gastric wall; however, it is not uncommon for this to be absent. Imaging guidance for transluminal endoscopic PFC drainage allows the endoscopist to localize nonbulging pseudocysts that cannot be localized using endoscopy alone, to identify and avoid vascular structures between the cyst and the gastric lumen, and to reveal solid or necrotic components within the pseudocyst cavity. Although endoscopic ultrasound (EUS) has been used to meet this need, timely access to therapeutic EUS remains a limiting factor at many centres. We report our technique and experience performing transgastric endoscopic drainage of PFCs under computed tomography (CT) interventional radiology guidance.

Peripancreatic fluid collections (PFCs) occur as a consequence of pancreatitis. They are deemed chronic when they persist longer than 4 weeks after the pancreatitis episode. They can be categorized as pseudocysts or walled-off pancreatic necrosis (WON).[1] Most PFCs resolve spontaneously, although 1%–2% persist and may require intervention.[2]

Conventional transluminal endoscopic drainage methods require the PFC to be bulging into the gastric wall. It is not uncommon for this to be absent, necessitating imaging guidance. Although endoscopic ultrasound (EUS) has been used to meet this need, timely access to therapeutic EUS remains a limiting factor at many centres.

We report our technique and experience performing transgastric endoscopic drainage of PFCs using computed tomography (CT) interventional radiology guidance.

Technique

The procedure is completed in 2 stages. The first stage is performed by interventional radiology under CT guidance. The CT images are reviewed to identify a suitable percutaneous, transgastric window to access the PFC. An 18-gauge trocar needle is then advanced through the anterior and posterior wall of the stomach into the PFC. Following removal of the inner stylet, a stiff guidewire is advanced. The tract is dilated and an 8.5-French multipurpose catheter is placed in the PFC. Fluid from the PFC is extracted for culture, sensitivity, and cytology studies when clinically indicated. The multipurpose catheter is connected to an external drainage bag.

The second stage of the procedure is performed under fluoroscopic guidance, either in the endoscopy suite or the operating theatre. Following patient positioning in either a supine or left lateral decubitus position, conscious sedation is administered. Fluoroscopic guidance is used to advance a guidewire through the multipurpose catheter, leaving it coiled within the

PFC for stability. A side-viewing duodenoscope is used for the procedure, with a therapeutic end-viewing gastroscope available if required. With direct endoscopic visualization, the multipurpose catheter is carefully withdrawn from the PFC over the guidewire, just enough to expose the posterior gastrostomy. The guidewire is left within the pseudocyst to maintain access. The posterior gastrostomy is then cannulated using a sphincterotome, and through-the-scope guidewire access is achieved using a second guidewire. The enterocystic tract is balloon-dilated over the guidewire up to 18 mm. Following dilation, 2 10-French/4 cm double pigtail stents are deployed over the wire, leaving 1 pigtail on each stent coiled within the collection and the other within the gastric lumen. Both guidewires and the multipurpose catheter are then removed.

Outpatients have the first and second stages performed on the same day. Inpatients, who are usually admitted for infectious symptoms, have their second stages delayed until sepsis resolves.

In all cases, the first stage of the procedure was performed by the on-call interventional radiologist, and the second stage was performed by the same therapeutic endoscopist (J.E.). A video of the technique is available at https://youtu.be/-KBQ7f4qYXo.

Chart review

We performed a retrospective chart review to identify all patients who underwent IR-assisted endoscopic transgastric PFC drainage between July 2007 and July 2017. To be considered suitable, PFCs were required to be chronic, symptomatic or infected, and adjacent to the stomach. All patients were evaluated preprocedure using computed tomography (CT). The primary outcome was efficacy of the technique, defined by technical success rate (endoscopic deployment of a stent into the PFC) and resolution of the PFC (confirmed by follow-up cross-sectional imaging studies and symptom resolution).

Outcomes of the drainage procedure in the 39 patients whose charts we reviewed are summarized in Table 1; their PFC characteristics and symptoms at presentation are summarized in Appendix 1, available at canjsurg.ca/003019-a1. Only 1 patient required an operation to achieve adequate drainage. Eighteen (46.2%) patients required more than 1 drainage procedure, either endoscopic or percutaneous. This was more common in patients with WON than in those with pseudocyst (61.1% v. 38.9%). Repeat endoscopic procedures usually involved removal and replacement of nonfunctioning stents, dilation of the cystogastrostomy, and débridement of necrotic debris, as required. Further percutaneous procedures were most often to drain loculated collections away from, or not communicating with, the transgastric drains. Near/complete resolution, or significant reduction in size was seen in 33 of 34 (97%) patients; no follow-up imaging (most commonly because of transfer to home hospital) were available for the remaining 5 patients.

Complications are summarized and classified in Appendix 1. In all, 7 (17.9%) patients had complications classified as Clavien–Dindo grade IIIa or above. One (2.6%) patient with pancreatic necrosis required admission to the intensive care unit for resuscitation after a splenic artery pseudoaneurysm ruptured into the cyst; hemostasis was achieved with IR coiling. One (2.6%) patient experienced a pneumothorax during the IR transgastric drain placement after the pleural space was violated; a single pigtail chest tube was placed, resulting in complete resolution. One (2.6%) patient had abdominal pain and free air identified on plain radiograph on postoperative day 1; exploratory laparoscopy did not reveal any contamination, and the free air was suspected to be from the anterior gastrotomy after the transgastric drainage catheter was removed. The most common complication, seen in 4 (10.2%) patients, was cyst infection/sepsis, most commonly as a result of stent migration/blockage. Three patients were managed endoscopically with repeat stenting through the same gastrotomy. There was 1 death in our series. There was concern about localization from the IR drainage procedure. The patient had extensive retroperitoneal sepsis and went to the operating room for surgical drainage, but continued to deteriorate and died after a prolonged stay in the intensive care unit.

Table 1. Outcomes of 39 patients who underwent the drainage procedure with CT guidance

Outcome	Frequency, %*
Follow-up, mean ± SD (range), mo	9.32 ± 6.78 (2–29)
Additional drainage	
Total required	18 (46.2)
Endoscopy only	15 (83.3)
IR and endoscopy	2 (11.1)
OR	1 (5.6)
Subtype of PFC	
WON	11 (61.1)
Pseudocyst	7 (38.9)
Outcomes at follow up (n = 34)†	
Symptoms	
Asymptomatic	18 (53.0)
Ongoing symptoms	16 (47.0)
CT findings	
Near/complete resolution	19 (55.9)
Reduced in size	14 (41.2)
No improvement	1 (2.9)

CT = computed tomography; IR = interventional radiology; PFC = peripancreatic fluid collections; SD = standard deviation; WON = walled-off pancreatic necrosis.

*Unless indicated otherwise.

†Five patients were excluded from the subanalysis owing to missing data.

Discussion

Imaging guidance for transluminal endoscopic PFC drainage allows the endoscopist to identify and avoid vascular structures between the cyst and the gastric lumen, to localize nonbulging pseudocysts that cannot be localized using endoscopy alone, and to reveal solid or necrotic components within the pseudocyst cavity.

Endoscopic ultrasound-guided drainage has been shown to be safer and to have greater technical success rates than conventional endoscopic drainage techniques without imaging guidance, and is considered by many to be standard-of-care.[3] Its availability varies across centres and practice patterns. A lack of timely access to therapeutic EUS resources at our centre led to the development of our technique using much more readily available CT guidance.

We deployed double-pigtail plastic stents for all PFCs, regardless of whether or not necrosis was present. Patients with pseudocysts were more likely to have complete relief of symptoms after drainage than those with WON. A recent study has reported improved outcomes for the treatment of WON when using metal stents.[4]

One of the drawbacks of our technique is the need to coordinate interventional radiology and therapeutic endoscopy services, as opposed to the 1-step drainage offered with EUS. At most tertiary centres, however, interventional radiology is available on a daily basis for urgent cases. We thus were able to schedule patients as urgent on call cases or, if the patients were stable, postpone drainage until our next therapeutic endoscopy list.

The outcomes for drainage procedures in pancreatitis vary with the severity of the disease process. A contemporary study of EUS-guided drainage for uncomplicated pseudocysts describes very low complication rates.[5] However, a randomized prospective study by Bakker and colleagues comparing surgery to EUS-guided drainage for infected pancreatic necrosis showed rates of major complication or death of 20% in the endoscopic group.[6] The major complication rate in our study (17.9%) is consistent with these findings, given our mixed study population.

Conclusion

Using CT guidance to facilitate endoscopic transluminal drainage of PFCs is an effective technique with a low complication rate comparable to rates reported using EUS guidance. Although a single-step EUS-guided drainage procedure may remain ideal, the increased availability of CT guidance has the promise of enabling more patients to benefit from endoscopic transluminal management.

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