Case report

Endoscopic drainage of pancreatic pseudocysts

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SUMMARY

Pancreatic pseudocysts (PPs) are a common complication of chronic as well as acute pancreatitis that is unrelated to the underlying etiology. Advances in radiological techniques have in part led to an increase in the diagnosis of pseudocyst and better characterization of associated complications. The introduction of new treatment modalities has also increased the options for non-surgical management. Thus, with better knowledge of the disease and with technical advances, the indications, timing and methods to treat PPs have undergone a marked evolutionary change. We describe two cases (the first cases described in Greek literature) with acute giant PPs, treated with successful endoscopic transmural drainage. This article describes also our preferable, standard approach to the technique.

Key words: pancreatic pseudocysts, endoscopic drainage, percutaneous drainage, surgical drainage

INTRODUCTION

Pancreatic pseudocysts (PPs) are well-known complications of acute and chronic pancreatitis. A pseudocyst is present as a cystic cavity bound to the pancreas by inflammatory tissue. Typically, the wall of a pancreatic pseudocyst lacks an epithelial lining, and the cyst contains pancreatic juice or amylase-rich fluid. This is the histopathological definition of a pancreatic pseudocyst[1]. The factors involved in the outcome of PPs vary, and the ideal procedure of drainage and the appropriate timing for performing it are debatable. Drainage of PPs can be performed using several approaches. Among the most common approaches are percutaneous external drainage, endoscopic drainage to the stomach or duodenum, and surgical drainage.[2] For mature symptomatic cysts, internal drainage has demonstrated the best results. It can be done to the stomach, duodenum, or jejunum depending on the relation of the pseudocyst to these structures, with endoscopic visualization of the most prominent point of buging into the gastric or duodenal lumen, or by the use of endoscopic ultrasound (EUS) to identify the site of puncture and to avoid occasional puncture of vessels.[3] The first successfully completed transmural drainage procedures were described by Khawaja and Goldman in 1983 and then 1 year later in 4 patients by Kozarek et al.[4] Initially there was a rather low success rate and a relatively high morbidity, but with increased experience and development of the endoscopic techniques there are now good results reported in two thirds or more of the patients with a low mortality and relatively few complications.[3]

The aim of this study is to describe our initial experience of the endoscopic technique used in our institution for the treatment of giant PPs.

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CASE REPORTS

Patient 1

A 54-year-old male was referred to our endoscopic unit in October 2004, for further management and treatment of a sizeable pancreatic pseudocyst. He suffered from recurrent acute, moderate to severe gallstone pancreatitis and, the last attack was omplicated by the pseudocyst 6 months ago. The patient underwent further investigation by abdominal ultrasound and computed tomography (CT) scan. Repeated CT scan confirmed the presence of an acute pseudocyst, 11.5x10 cm in size, causing severe duodenal-gastric compression (Fig 1a).

At the time he was referred, the patient was symptomatic, with abdominal pain, nausea, vomiting, and weight

loss but apyrexial, and had a tender epigastric mass on abdominal palpation. The serial CT scans were reviewed with attention to certain findings that could affect the success and safety of endoscopic pseudocyst drainage.

The patient underwent ERCP and a complete pancreatogram (Fig 1c) was obtained, while additional conventional ES and common bile duct clearance were performed. In the same session, successful transmural cystogastrostomy and continuous drainage (pancreatic juice amylase-rich fluid was examined by cytology studies) of the cyst using a 10F endoprosthesis (stent) (Amsterdam type) was performed. The patient was thereafter able to eat well without symptoms and he was discharged 4 days later.

He was readmitted 6 weeks after the procedure and at follow-up CT scan complete resolution (Fig 1b) had occurred and the stent was removed by grasping the intraluminal end with a polypectomy snare. The patient underwent uncomplicated Laparoscopic Cholecystectomy (LC)in the same hospitalization.

Patient 2

A 62-year-old male with severe mental disturbances had a past history of acute gallstone pancreatitis. He was referred in December 2004 to our department, after 7 weeks of conservative treatment and observation, for further management of a giant pancreatic pseudocyst. The patient was still complaining of abdominal pain, nausea and vomiting, and had a tender epigastric mass on abdominal palpation. The liver function tests were abnormal. The last CT scan performed before admission to our unit, revealed two enlarged PPs (11 and 13cm in diameter), with a deficient diaphragm between them, a lack of clearness of the pancreatic parenchyma, and the PPs caused severe duodenal-gastric compression (Fig 2a). It also revealed minor dilatation of the extrahepatic bile ducts due to compression of the hepatoduodenal ligament. Magnetic resonance cholangiopancreatography (MRCP), particularly in T2-weighted images, which provided the pancreatic ductal images were obscured by the overlying cyst cavity.

The patient underwent concomitant ERCP [and additional Endoscopic Sphincterotomy (ES) and common bile duct (CBD) clearance] and a successful transmural cystogastrostomy was achieved for continuous drainage of the big cyst using a 10F endoprosthesis, placed and left in situ for 4 weeks. The procedure was well tolerated by the patient and there were no complications. The patient was discharged in 5 days time.

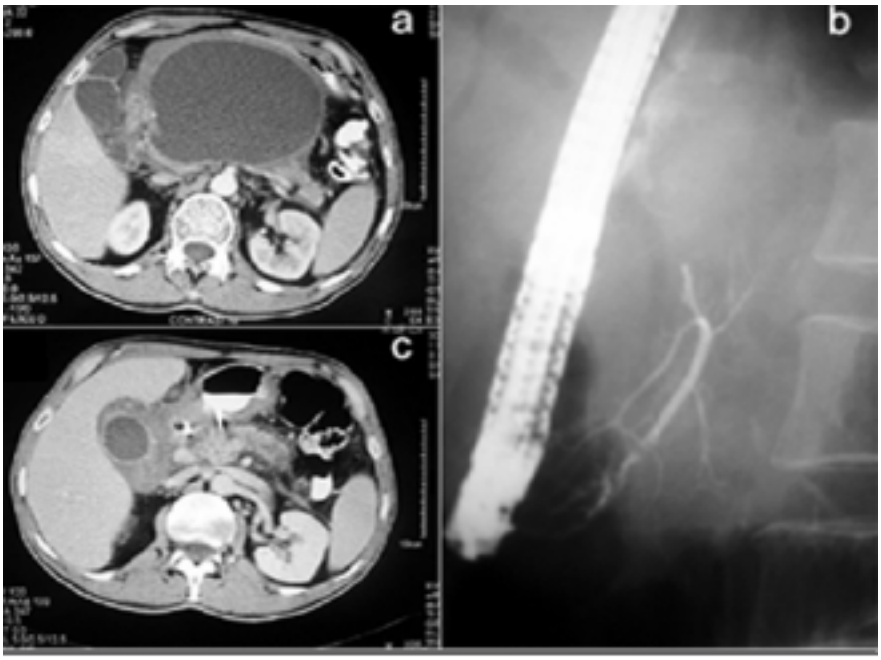

Figure 1. **a)** CT scan: shows an 11.5x10cm, well circumscribed cystic lesion arising from the head of the pancreas. The features are consistent with a pancreatic pseudocyst. **b)** CT scan 6 weeks after the procedure, complete resolution had occurred. The Amsterdam type stent 10 Fr/10 cm (after endoscopic cystogastrostomy) in place. **c)** ERCP: Pancreatogram in the same patient revealing a complete duct cut-off in the head.

At follow-up CT-scan 4 weeks after the procedure, almost complete resolution had occurred for the large pseudocyst (Fig 2b). The small one had largely resolved (remainder PP 2x3cm), and underwent spontaneous resolution 3 weeks later. The stent was removed in a second endoscopic session, by grasping the intraluminal end with a polypectomy snare. LC was recommended on elective basis.

Endoscopic technique

During the procedure, sedation and analgesia was achieved with intravenous midazolam and fentanyl titrated to suit age and tolerance. Bowel relaxation was achieved with intravenous hyoscine butylbromide. Patients were given nasal oxygen continuously and their hemoglobin saturation and pulse rate was monitored with a pulse oximetry. All the procedures were performed by the same operator using the same technique and contrast media (iopromide 37% iodine, diluted with sterile water), which is a low-osmolarity non-ionic one. Selective cannulation of the CBD was attempted in both patients. Initial cannulation was obtained by a standard double lumen sphincterotomy. We tried to obtain a complete pancreatogram at the intex ERCP and to access ES - clearance Unipolar diathermy was used and set to the lowest effective blended current.

The actual technique for performing endoscopic pseudocyst drainage was relatively straightforward[5]. Endoscopic inspection was first performed to get a "lay of the land". The stomach was fully distended and carefully examined for a clear and well-defined bulge (Fig 4a). The location of the bulge was ascertained by careful review of a high quality CT scan. The CT scan was reviewed with attention to certain findings that could affect successful and safe endoscopic pseudocyst drainage. First, there was a well-developed wall around the cyst cavity. Additionally, the cyst wall was adjacent and opposed at some point to the posterior wall of the stomach. The internal architecture of the cyst cavity was also carefully reviewed. Thick septations dividing the cavity into several distinct sections served as a warning sign to the endoscopist that the cyst could not be fully drained with a single puncture. The presence of obvious necrotic debris within the cyst cavity represents some contraindication.

After achieving adequate distention, the bulge was located and its apex was identified. Then the pseudocyst was punctured using the Cystotome system (Wilson-Cook®, Salem USA)[6] with the aspiration needle (Fig 3). After fluid aspiration (the sample was examined for cytology studies), the needle knife was loaded with contrast and pressed firmly against the gastric wall using the pure current. After the needle knife was in position, contrast was slowly injected and a clear streaming of contrast entered the pseudocyst (Fig 4b).

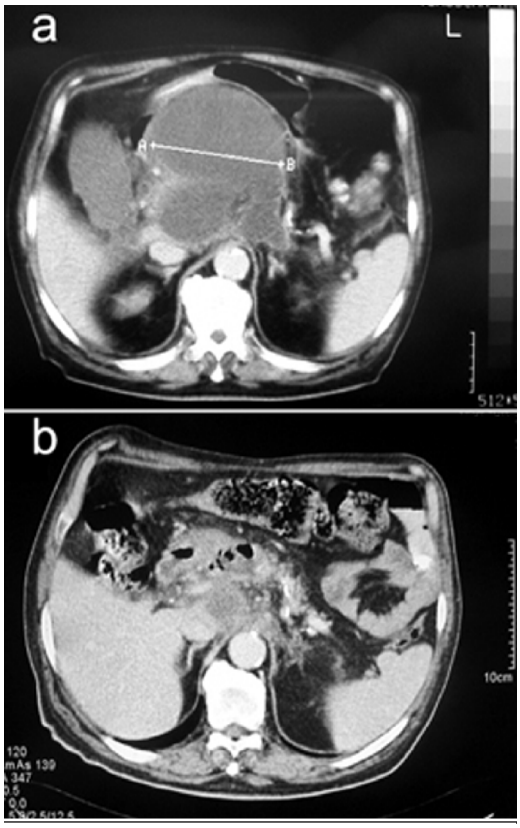

Figure 2. CT scan revealed (case 2): **a)**Two communicating enlarged PPs (11 and 13 cm in diameter), with a refined diaphragm between them. **b)** Four weeks after the procedure.

Figure 3. Cystotome device system used (Wilson-Cook®)

The system was advanced perpendicularly to the gastric wall and pushed directly into the pseudocyst cavity without any lateral displacement of the needle track. In other words, this procedure resulted in a puncture rather than an incision into the cyst cavity. Once the pseudocyst cavity had been entered, the guidewire was advanced until several coils of the wire were formed within the pseudocyst lumen (Fig 4d). After the definition of the location for puncture, a diathermic ring-like instrument, preloaded with a guide-wire, was used to drill a hole through the gastric wall and into the pseudocyst cavity, using thermocoagulation (Fig 4c). The needle-knife was then withdrawn, and a dilation system (10-Fr electrocautery sleeve) was passed over the guidewire. Following system dilation, we used one stent (Amsterdam type, 10-Fr). The above approach represents for us a relatively standard technique. The CT scan was used to confirm resolution of the cyst before endoscopic removal of the stents.

DISCUSSION

Management of PPs has been controversial. A PP associated with chronic pancreatitis represents an aspect of a complex disease process with multiple clinical presentations. There are widely differing degrees of morbidity that range from simple asymptomatic pseudocyst that can resolve without treatment, to multiple pseudocysts associated with biliary and pancreatic duct obstruction that necessitate surgery.[1,3] The management of pseudocysts that complicate acute pancreatitis is quite different from the one that affects chronic pancreatitis. In this, once the attack has been resolved, the background pathology essentially returns to normal, that is to say a normal pancreatic parenchyma with little or no associated damage to adjacent viscera or vessels.[3] Thus the distinction between acute and chronic pseudocysts is paramount for a successful treatment strategy.

Three treatment modalities are available to drain PPs: (1) endoscopic (transmural or transpapillary), (2) percutaneous, and (3) surgical. Percutaneous catheter drainage under CT scan guidance has been used for symptomatic PPs without evidence of pancreatic duct obstruction or dilatation.[7] Drawbacks of this procedure include external pancreatic fistula, infection, and incomplete drainage due to the catheter becoming plugged by debris. Subsequent operative correction may be required in some patients. Surgical has been the cornerstone of the management of symptomatic PPs.[8] The most common surgical procedure is internal drainage to the stomach, duodenum or jejunum. Internal drainage of PPs leads to abliteration of the cystic cavity in a few weeks. Laparoscopic surgery has also been used to treat PPs.[9]

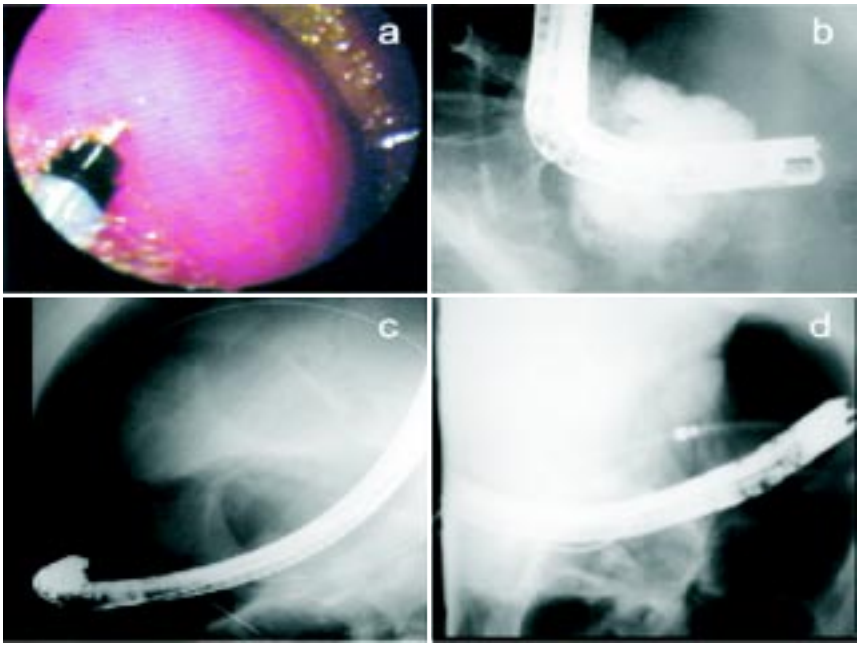

Figure 4. a) A clear and well-defined bulge in the posterior wall of the stomach. **b)** Streaming of contrast as it enters the pseudocyst. **c)**A diathermic ring-like instrument, preloaded with a guide-wire. **d)** The guidewire advanced until several coils of the wire were formed within the pseudocyst lumen, into the pseudocyst cavity.

There are few studies about laparoscopic management with a limited number of patients. The results of these studies confirm that laparoscopic techniques for PP drainage are feasible and practical.

Endoscopic and surgical treatment of PPs has a high success rate in expert hands, although there are still surprisingly few studies that can be directly compared. A number of essential requirements are necessary before endoscopic drainage is undertaken that may vary according to the endoscopic technique adopted.[3,5,6] Transmural drainage through the stomach or the duodenum requires the following conditions: (1) the stomach or duodenum wall must share a common wall with the pseudocyst; (2) the distance between the pseudocyst and the gastric wall must be <1 cm on preoperative investigations; (3) there must be a clear impression of the wall of the stomach or duodenum at the endoscopy; (4) the absence of varices; (5) it is imperative that the cyst structure is not a neoplasm or a pseudoaneurysm by aspiration of the cystic content. Many endoscopists now also use EUS to identify the site of puncture and to avoid occasional puncture of vessels or to perform one-step EUS-guided pseudocyst drainage.[10]

The results for endoscopic drainage are generally good, with a technical success rate between 80 and 90% for transmural pseudocystogastrostomy and pseudocystoduodenostomy. The long-term resolution rate is of the order of 65-75% with a recurrence rate of up to 30% of patients and stent migration. These complications occur in up to 30% of patients and may require emergency surgery. The main disadvantages are related to the difficulty in controlling major bleeding and the risk of free abdominal perforation; thus an experienced surgical team and an expert interventional radiologist should always be available at short notice when these techniques are being undertaken.

The published mortality rate is now less than 1% but appears to be biased in favour of experienced endoscopists and highly selected cases.[3,11,12,13]

If the needle penetrates into the pseudocyst lumen, one will see clear streaming of contrast as it enters the pseudocyst. If one has failed to enter the pseudocyst, a submucosal injection will result. By using thermocoagulation with the cystotome system, we prevent gastric wall bleeding.

Furthermore, we favor the use of a 10-Fr electrocautery sleeve, as we believe that patency of the fistula is best assured by cautery necrosis rather than balloon dilation.

Most endoscopists, as we do, use one stent (Amsterdam type, usually 10-Fr) and some try to place two stents and/or endoscopic nasocystic catheter side by side. The purpose of the stents is to maintain the endoscopically formed fistula opening. In general, the stents are left in place for 4 to 6 weeks. The clear, ''watery'' fluid of an uncomplicated pseudocyst was easily drained by this technique.

Transpapillary drainage a priori requires communication between the pseudocyst and the pancreatic duct, which occurs in as many as 63% of cases.[14]

We tried to obtain a complete pancreatogram because, if there is a significant communication between the pancreatic ductal system and the cyst, a transpapillary stent is placed either into the cyst cavity itself or across the area of duct disruption. It is recommended that the transpapillary approach can only be used in those patients with a significant communication between the ductal system and the cyst, and in cases that the cyst contains pure fluid with necrotic debris, in which the endoscopist can be completely confident.

Several approaches have been suggested for the performance of endoscopic pseudocystoenterostomy; however, because of the relatively small number of procedures performed, no approach has become the standard[3, 5]. Several technical issues exist, each of which has dealt with localization of the puncture site, maintaining access to the cyst cavity, enlarging the enterostomy, maintaining patency, and managing complex or infected pseudocysts.

Examining the literature to determine whether surgical, endoscopic, or percutaneous drainage is superior, is difficult. A meta-analysis of surgical intervention quoted an overall mortality rate of 9% and a complication rate of 11%. Recurrence rate after surgical internal drainage was 5%.[15] The collective data on the endoscopic experience seem to indicate that it is associated with slightly higher complication and recurrence rate but a low mortality rate.

One retrospective study has compared percutaneously treated patients with endoscopically treated patients[16]. The recurrence rate of patients undergoing percutaneous drainage was nearly twofold than that of endoscopically treated patients. Percutaneous catheter drainage had an initial success rate of 90% and a recurrence rate of 20%. The morbidity rate has been reported to be as high as 68%, with drain tract infection occurring in as many as 50% of patients. Comparing all three modalities the risk of mortality is minimal with all procedures

but is greater with the most invasive procedure, that is, open surgery. More pancreatic fistulas occur after external drainage. Pancreatic fistulas that develop after percutaneous obstruction are avoided by endoscopic internal drainage.[3]

Preliminary results in our study are excellent. Endoscopic cystogastrostomy was carried out in PPs with visible endoluminal bulging, with a well-established maturation of the wall. Both cases were giant PPs (equal to or greater than 10 cm). Technical success rate was 100%. No recurrent pseudocyst was observed during the follow-up period. No post-procedure morbidity and mortality were recorded. The endoscopic procedure also required only a short hospital stay in both patients of 4 and 5 days respectively.

In conclusion, our initial results suggest that endoscopic drainage of PPs is feasible, safe and effective. The key requirements for successful endoscopic management of PPs involve careful selection of patients and having the procedure performed by an appropriately prepared endoscopist.

REFERENCES

1. Sandberg AA, Dervenis C. Pancreatic pseudocysts in the 21st century. Part I: classification, pathophysiology, anatomic considerations and treatment. J Pancreas (Online) 2004; 5: 8-24.
2. Pitchumoni CS, Agarwal N. Pancreatic pseudocysts. When and how should drainage be performed? Gastroenter Clin of North Am 1999; 28: 615-639.
3. Rosso E, Alexakis N, Ghaneh P, et al. Pancreatic pseudocyst in chronic pancreatitis: endoscopic and surgical treatment. Dig Surg 2003; 20: 397-406.
4. Kozarek RA, Brayko CM, Harlan J, et al. Endoscopic drainage of pancreatic pseudocyst. Gastrointest Endosc. 1985; 31: 322-327.
5. Hawes RH. Endoscopic management of pseudocysts. Technique Review. Rev Gastroenter Disorders. 2003; 3: 135-141.
6. Cremer M, Deviere J, Baize M. New device for endoscopic cystoenterostomy. Endoscopy 1990; 22: 76-77.
7. Neff R. Pancreatic pseudocysts and fluid collections. Percutaneous approaches. Surg Clin North Am 2001; 81: 399-403.
8. Froeschle G, Meyer-Pannwitt U, Brueckner M. A comparison between surgical, endoscopic and percutaneous management of pancreatic pseudocysts-long term results. Acta Belg Chir 1993; 93: 102-106.
9. Hauters P, Weerts J, Navez B, et al. Laparoscopic treatment of pancreatic pseudocysts. Surg Endosc 2004; 18: 1645-1648.
10. Chak A. Endosonographic-guided therapy of pancreatic pseudocysts. Gastrointest Endosc 2000; 52: 23-27.
11. Beckingham IJ, Krige JEJ, Bornman PC, et al. Endoscopic management of pancreatic pseudocysts. Br J Surg 1997; 84: 1638-1645.
12. Sharma SS, Bhargawa N, Govil A. Endoscopic management of pancreatic pseudocyst: A long-term follow-up. Endoscopy 2002; 34: 203-207.
13. Cahen D, Rauros E, Fockeus P, et al. Endoscopic drainage of pancreatic pseudocysts: long-term outcome and procedural factors associated with safe and successful treatment. Endoscopy 2005; 37: 977-983.
14. Baron TH, Harewood GC, Morgan DE, et al. Outcome differences after endoscopic drainage of pancreatic necrosis, acute pancreatic pseudocyst, and chronic pancreatic pseudocysts. Gastrointest Endosc 2002; 56: 7-17.
15. Gumaste UV, Deve PB. Pancreatic pseudocyst drainage: The needle or scalpel? J Clin Gastroenterol 1991; 13: 500-505.
16. Barthet M, Bugallo M, Moria LS, et al. Management of cysts and pseudocysts complicating chronic pancreatitis: A retrospective study of 143 patients. Gastroenterol Clin Biol 1993; 17: 270-276.