

Pancreatic pseudocysts and aneurysms

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Abstract

A number of methods are available for the drainage of pancreatic pseudocysts, including percutaneous, endoscopic and open approaches. The author reviewed the most recent reports, and summarized the latest advances in the pancreatic pseudocysts.

Keywords: Pseudocysts, pancreas, percutaneous, gastropseudocystostomy, duodenopseudocystostomy, cyst, fungal, aneurysms, Crohn's disease, pancreatitis.

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Introduction

A pancreatic pseudocyst is a collection of fluid around the pancreas. The fluid in the cyst is usually pancreatic juice that has leaked out of a damaged pancreatic duct. It mostly arises after acute or chronic pancreatitis [1]. The common symptoms are pain in the abdomen, the feeling of bloating or poor digestion of food, a deep ache in the abdomen or complications related to the pseudocyst such as infection of the pseudocyst with a pancreatic abscess, bleeding into the pseudocyst or blockage of parts of the intestine by the pseudocyst [1].

In many cases, the patients with pseudocysts will get better and resolve. If a pseudocyst is persistent or causing symptoms then treatment of the cyst is required.

A number of different types of treatments are available for the pseudocysts. The review article summarizes the latest advances in the pancreatic pseudocysts.

Pseudocysts

A number of methods are available for the drainage of pancreatic pseudocysts, including percutaneous, endoscopic and open approaches. It was developed a combined radiological and endoscopic technique (predating the use of endoscopic/ultrasound) to allow drainage of pancreatic pseudocysts into the stomach. The

aim of the study was to evaluate the long-term results of this approach. It was a retrospective study of patients undergoing combined endoscopic/ultrasound-guided percutaneous stenting between 1994 and 2007. Data were extracted from case records and the computerized radiology database. Thirty-seven combined endoscopic/ultrasound guided procedures were undertaken. Median patient age was 52 years (range 26-84 years). Nineteen pseudocysts were secondary to acute pancreatitis and 18 were in patients with chronic pancreatitis. The diameter of pseudocysts on pre-procedure imaging ranged from 4 to 21 cm (median 11 cm). Median duration of hospital stay was 7 days (range 1-44 days) and 30-day mortality was 0 percent. Stents were inserted in 70 percent of patients (n=26). Of those patients stented during the combined procedure, three developed infection of the pseudocyst, necessitating open cystgastrostomy within the first month. During a mean follow-up period of 41 months, two patients developed recurrent pseudocysts which were successfully drained with a further combined procedure (16 and 43 months). Repeat imaging in the remainder of patients failed to show any evidence of a persistent or recurrent pseudocyst beyond 2 months. It was concluded that combined radiological and endoscopic drainage is safe, cost-effective and highly efficient in preventing recurrent pseudocyst formation [2].

A 40-year-old man was admitted to the hospital because of epigastralgia and vomiting. His condition was diagnosed as

acute pancreatitis with a pancreatic pseudocyst, obstructive jaundice, and duodenal stenosis. Because he had fever, abdominal pain, and elevated levels of C-reactive protein (CRP), endoscopic ultrasound-guided transmural cyst drainage (EUS-CD) was performed with a nasocystic tube on the 6th day. After the cyst was reduced and the patient recovered from the obstructive jaundice and duodenal stenosis, the nasal drainage tube was replaced with a plastic stent. Because a short extent of stenosis in the main pancreatic duct in the pancreatic head was found by endoscopic retrograde cholangiopancreatography (ERCP), a 5Fr pancreatic stent was placed to prevent pancreatitis. No recurrence of pancreatitis and the cyst occurred after removal of both stents 5 days later [3].

Gastropseudocystostomy

With the emergence of minimally invasive techniques, percutaneous drainage has been applied to the management of symptomatic pancreatic pseudocysts in lieu of conventional surgical or endoscopic therapy. Percutaneous insertion of internalized drainage catheters represents an attractive method for pseudocyst drainage, but has been limited by the usual need for cross-sectional imaging or endoscopic guidance. It was describe the use of a simple fluoroscopically guided technique for percutaneous transgastric cystgastrostomy with internalized drainage catheter placement in two cases [4].

Duodenopseudocystostomy

Pancreatic pseudocysts adjacent to the jejunum are typically managed by surgery or percutaneous drainage. Whereas numerous studies have evaluated the role of endoscopic ultrasound (EUS)-guided drainage of pancreatic pseudocysts via the stomach and the duodenum, there are no prior reports on EUS-guided cystojejunostomy. A 45-year-old black male patient with long-standing history of alcohol abuse was admitted to our institution with severe abdominal pain, nausea, and vomiting of 72 hours' duration. Physical examination was significant for epigastric tenderness. Laboratory investigations revealed a white blood cell count of $21.6 \times 10^3/\mu\text{L}$ and a serum albumin of 1 mg/dL. A computed tomogram of the abdomen revealed peripancreatic inflammation and a large pancreatic pseudocyst measuring 18×12 cm compressing the proximal jejunum and causing intestinal obstruction. As the location of the pseudocyst made it not amenable for surgical cystogastrostomy and because of the high risk for fistula formation with percutaneous drainage techniques, an EUS-guided drainage was attempted. In addition, his poor nutritional status made him a high-risk candidate for surgical cystojejunostomy that involves mobilization of a Roux-en-Y limb. After decompressing the stomach using nasogastric suction, an EUS examination was undertaken using a therapeutic echoendoscope. The proximal jejunum was intubated under fluoroscopic guidance by continuous aspiration of air, manual compression of the abdomen, and utilizing clockwise torque and withdrawal movements of the echoendoscope to avoid looping. Although the lumen of the proximal jejunum was compressed, it was difficult to

appreciate an area of focal prominence. Under EUS guidance, the pseudocyst was identified and accessed using a 19-gauge needle. Care was taken to ensure that the tip of the echoendoscope was straight and not deflected so as to facilitate easy puncture of the pseudocyst with the fine-needle aspiration biopsy needle. After coiling a 0.035-in guide wire within the pseudocyst and dilating the transmural tract to 6 mm, a 7F 4-cm double-pigtail plastic stent was deployed. Approximately 500 mL of clear cyst contents were aspirated after transmural stenting. After the procedure, the patient reported being asymptomatic at 24 hours and was able to tolerate oral intake. A follow-up computed tomogram of the abdomen at 1 week revealed near-complete resolution of the pseudocyst and resolved intestinal obstruction. At 6-month follow-up, the patient was doing well without any symptom recurrence, and the transjejunal stent was retrieved by enteroscopy [5].

The natural orifice transluminal endoscopic surgery

It was presented a case report of a novel hybrid natural orifice transluminal endoscopic surgery (NOTES). The operation performed was a transgastric cystgastrostomy with endoscopic guidance for a pancreatic pseudocyst. This operation was completed entirely through an existing gastrostomy site with no incisions, thus avoiding the peritoneal cavity. This was a case of a 7-year-old boy with neurologic impairment from congenital herpes simplex virus encephalitis who is tube fed. He had acute pancreatitis and developed a 9 cm pancreatic pseudocyst. The pseudocyst failed to resolve after 6 weeks and developed a mature wall. Due to a history of multiple abdominal surgeries and known abdominal adhesions, a minimally invasive approach that would avoid entering the peritoneal cavity was the desired approach. The technique involved a trans-oral endoscope for visualization and the use of the gastrostomy as access to the gastric lumen and pseudocyst. The pancreatic pseudocyst was stabilized with two T-fasteners and confirmed with needle aspiration under endoscopic visualization. The pseudocyst was then opened with the LigaSure (Valleylab, Boulder, CO). The cystgastrostomy anastomosis was completed with an Endopath ETS-Flex Articulating Linear Stapler/Cutter (Ethicon Endo-Surgery, Inc, Cincinnati, OH). The operation took less than 2 hours and was completed without an incision. The patient did well postoperatively and had a dramatic reduction in size of the pancreatic pseudocyst to 3.5 cm by 2 weeks [6].

Proteases in cyst fluids

Biomarker detection in pancreatic cyst fluids is of importance to improve the diagnosis of mucinous cystadenoma, a precancerous lesion. However, assay protocols are generally established for serum testing. Immunoradiometric assay of gastric M1/MUC5AC mucin was performed on pancreatic cyst fluids with well-characterized monoclonal antibodies. Among 1466 pancreatic cyst fluids tested, about 10 to 15 percent of

samples presented abnormal behaviors: (i) radioactivity measured after immunoradiometric assay much lower than the blank of the assay and (ii) increasing dilution of the fluids leading to apparent increase of M1/MUC5AC concentration. In contrast, none of the 109 hepatic cyst fluids tested presented interference. It was thus demonstrated that some (n=54) interfering fluids cause mucin degradation as well as antibody degradation. Western blot analysis showed that the C-terminal part of the M1/MUC5AC apomucin is most sensitive to degradation. It was concluded that the presence of proteases that degrade antibodies as well as mucin may explain the pitfalls observed in 4 percent of the samples. To detect this interference, each fluid has to be systematically tested at 1:100 dilution in the presence of a saturating concentration of M1/MUC5AC mucin standard and in the absence of antiprotease reagents. Detection of interference could prevent false results caused by mucin degradation *in situ* [7].

Fungal infection

It was reported the attainment of micafungin concentrations from brain tissue and pancreatic pseudocyst fluid from two patients with invasive candidiasis. Micafungin was present in low levels at both body sites, indicating limited penetration into central nervous system (CNS) tissue and pancreatic fluid. Further studies are needed to fully characterize its pharmacokinetics at these locations, as micafungin may potentially serve as an alternative antifungal therapy for CNS or pancreatic candidal infections for which the currently recommended first-line therapy fails [8].

Crohn's disease

Pancreatitis has been described occasionally in association with Crohn's disease in adults before, but it is uncommon in children. It may be caused by multiple etiologies, and there exist a few reports of pancreatitis in pediatric patients with inflammatory bowel disease because of biliary obstruction or drug induced. It was reported a rare case of a 14-year-old girl with Crohn's disease and hypoparathyroidism who suffered from hemorrhagic necrotizing pancreatitis with development of huge pseudocysts, a life-threatening complication that required surgical treatment [9].

Intrahepatic pseudocyst

Intrahepatic pancreatic pseudocyst extension is a rare, but complex clinical entity requiring multimodality approach for management. There is no consensus regarding the optimal strategy for the treatment of intrahepatic pancreatic pseudocyst and the literature is limited to a few case reports. Most of the published cases were managed by surgical or percutaneous drainage. It was now reported a case of intrahepatic pancreatic pseudocyst extension which failed to resolve by percutaneous drainage. Endoscopic transpapillary drainage was utilized which led to complete resolution of the intrahepatic pancreatic pseudocyst [10].

Aneurysms

It was presented a case of a male patient diagnosed with a large inferior pancreaticoduodenal artery (IPDA) aneurysm, associated with a fresh thrombotic occlusion of the celiac trunk. Given the risk of splanchnic ischemia, radiologic embolisation of the aneurysm combined with celiac axis stenting was deemed unsafe. Management was therefore modified to elective revascularisation of the celiac axis prior to surgical resection of the aneurysm. A retropancreatic aorto-gastrooduodenal artery bypass graft was performed prior to exposing and resecting the pancreaticoduodenal artery aneurysm. This ensured near uninterrupted retrograde supply to the celiac axis during the procedure. This is an effective, efficient and expeditious patient pathway for these rare and complex aneurysms complicated by celiac trunk involvement [11].

Most inferior pancreaticoduodenal artery (IPDA) aneurysms are ruptured at presentation causing a high mortality risk. Minimally invasive treatment approaches may improve overall outcomes in such patients. Between 1996 and 2007, seven patients (5 Males; mean age 55 years) with symptomatic IPDA aneurysms and severe degree (>75 %) celiac artery stenosis were treated with percutaneous transcatheter arterial embolization (TAE). The medical and imaging records were reviewed for demographics, clinical presentation, treatment, complications and follow-up. Patients presented with epigastric pain (7/7), hemodynamic shock (2/7) and rectal bleeding (2/7). Selective catheter angiography was performed in all patients with the intent to embolize the aneurysms. A total of nine aneurysms were seen in seven patients. Two patients had two aneurysms each. The aneurysms ranged in size from 0.5 to 4.0 cm (mean 1.9 cm). Trans-catheter coil embolization was successful in 8/9 aneurysms in 6 patients. Following unsuccessful TAE of one aneurysm in one of the patient, the aneurysm was treated successfully with direct CT-guided percutaneous transabdominal injection of N-butyl-2-cyanoacrylate. There were no complications on follow up. Angioplasty and stenting of the celiac artery were performed in one patient for complete occlusion. None of the patients developed clinical or imaging evidence of visceral ischemia following embolization. None had recurrent symptoms during clinical follow-up (median 3 years, range 0.5-13.5 years). Follow-up CT (median 7 months, range 4 days-12 years) in all patients showed no recurrence of the aneurysm. It was concluded that IPDA aneurysms associated with celiac axis stenosis can be successfully treated with percutaneous embolization with minimal recurrence [12].

References

1. Pancreatic pseudocysts (Accessed November 10, 2010, at http://www.surgery.usc.edu/divisions/tumor/pancreas_diseases/web%20pages/PANCREATITIS/pancreatic%20pseudocyst1.html).
2. Thomasset SC, Berry DP, Garcea G, Ong SL, Hall T, Rees Y, Sutton CD, Dennison AR. A simple, safe

- technique for the drainage of pancreatic pseudocysts. *ANZ J Surg* 2010; 80: 609-614.
3. Honda H, Miyatani H, Ikeya T, Yamanaka K, Ikeda M, Ushimaru S, Takamatsu T, Iwaki T, Sagihara N, Yoshida Y. Endoscopic ultrasound-guided transmural cyst drainage (EUS-CD) was effective in a case of pancreatic pseudocyst with obstructive jaundice and duodenal stenosis. *Nippon Shokakibyō Gakkai Zasshi* 2010; 107: 1497-1504.
 4. Gaba RC, Mun SJ, Ryu RK, Lewandowski RJ, Martin JA, Salem R. A simple fluoroscopic approach to percutaneous transgastric cystgastrostomy with internalized drainage catheter for treatment of pancreatic pseudocysts: report of two cases. *Dig Dis Sci* 2010; 55: 523-528.
 5. Trevino JM, Varadarajulu S. Endoscopic ultrasound-guided transjejunal drainage of pancreatic pseudocyst. *Pancreas* 2010; 39: 419-420.
 6. Rossini CJ, Moriarty KP, Angelides AG. Hybrid notes: incisionless intragastric stapled cystgastrostomy of a pancreatic pseudocyst. *J Pediatr Surg* 2010; 45: 80-83.
 7. Forgue-Lafitte ME, Arambam R, Bara J. Proteases present in some pancreatic cyst fluids may affect mucin immunoassay by degrading antibodies and antigens. *Pancreas* 2010; 39: 1070-1076.
 8. Lat A, Thompson GR 3rd, Rinaldi MG, Dorsey SA, Pennick G, Lewis JS 2nd. Micafungin concentrations from brain tissue and pancreatic pseudocyst fluid. *Antimicrob Agents Chemother* 2010; 54: 943-944.
 9. Briem-Richter A, Grabhorn E, Wenke K, Ganschow R. Hemorrhagic necrotizing pancreatitis with a huge pseudocyst in a child with Crohn's disease. *Eur J Gastroenterol Hepatol* 2010; 22: 234-236.
 10. Kibria R, Akram S, Ali SA. Successful endoscopic transpapillary management of intrahepatic pancreatic pseudocyst. *JOP* 2010; 11: 41-44.
 11. Ritter JC, Johnston M, Caruana MF, Laws PE. Aorto-gastroduodenal bypass grafting for an inferior pancreaticoduodenal aneurysm and celiac trunk thrombosis. *Interact Cardiovasc Thorac Surg* 2010; 10: 125-127.
 12. Dave B, Sharma A, Kwolek C, Demoya M, Wicky S, Kalva S. Percutaneous transcatheter arterial embolization of inferior pancreaticoduodenal artery aneurysms associated with celiac artery stenosis or occlusion. *Catheter Cardiovasc Interv* 2010; 75: 663-672.