Introduction

Pancreatic fluid collections (PFCs) are common complications of acute or chronic pancreatitis, surgery, or trauma. Several distinct entities fall into pancreatic fluid collections which include acute fluid collection, pseudocyst, necrosis and abscess. Whereas majority of PFCs resolve spontaneously but number of cases with pseudocysts, organized walled necrosis and abscess require interventions. Surgery and/or imaging-guided percutaneous drainage have been traditional therapeutic procedures for their treatment. However, percutaneous drainage is associated with discomfort and infection, whereas surgery is associated with significant morbidity and mortality. During last decade, endoscopic transmural drainage, a minimally invasive alternative to surgical drainage in selected patients, has emerged as an established safe and effective alternative treatment modality for such cases. The technique includes creation of a fistulous tract between the PFCs and gastric lumen (cystogastrostomy) or the transpapillary pancreatic drainage.
duodenal lumen (cystoduodenostomy) with placement of a plastic stent into the collection to facilitate drainage. Alternatively, if a communication exists between collection and the main pancreatic duct, transpapillary drainage which involves placement of a stent or a nasopancreatic catheter across the pancreatic duct and, if possible, into the collection itself, can be performed to achieve drainage. The present report reviews our experience in terms of safety, feasibility and efficacy in 24 cases with PFCs with various endoscopic procedures or combined endoscopic and percutaneous procedures.

Material and Methods

A total of 107 patients with PFCs were admitted over a 7-year period between 2001 and 2008. Of them, 24 who had endoscopically visible bulge or extrinsic compression were selected for endoscopic drainage. Of the other 83 patients, 74 had spontaneous resolution over a 8-week period and nine required surgery because their collections were located in the tail region of the pancreas or had no visible bulge in the stomach. The mean age of the study group was 41.4 years (range 8-53 years) with male to female ratio of 7:1. The main indications for the procedure included one or more of the following: abdominal pain, fever, infection, symptomatic compression of the stomach, duodenum or biliary tree. Informed written consent was obtained for the endoscopic treatment after explaining the risks, benefits and alternatives to this technique. A side-viewing endoscope (TJF-100), Olympus Japan was used for ERCP. Antibiotics were given empirically the day of the procedure and for 5 days afterward.

Technique of endoscopic-guided drainage procedure

All endoscopic-guided procedures were performed from the stomach or proximal duodenum. All patients underwent a contrast-enhanced CT scan abdomen and pelvis before the procedure. All patients underwent ERCP with a side-viewing endoscope (TJF-100, Olympus Japan) in a standard manner. In patients with gallstone-induced pancreatitis, biliary sphincterotomy was performed for removal of bile duct stones. Pancreatogram was attempted in all patients to look for the communication between pancreatic duct and the PFC. If pancreatic duct leak was identified, pancreatic sepostomy was performed; also an attempt was made to bridge the leak with placement of pancreatic duct stent.

After ERCP, an attempt was made to locate the site of extraluminal bulge in the stomach or proximal duodenum. If a clearcut visible luminal compression was seen, the most prominent point was punctured with a needle-knife catheter (Boston Scientific) to access the PFC to create the fistula between the cyst and the enteric lumen. After successful puncture, a sample of cyst contents was obtained for bacterio-
logic, biochemical and cytologic analysis. Thereafter, stylet was removed from needle knife and a 0.035-inch guidewire was inserted for stability. The entry site was dilated with balloon dilator. After the balloon dilatation, two 7-French double-pigtail plastic stents were placed across the cyst and enteric lumen to facilitate the drainage. The stents were removed after 6 weeks. For infected pancreatic necrosis, endoscopic necrosectomy was done using Dormia basket(Olympus FG 22Q). Percutaneous drainage, when required, was done using 10 F pigtail drainage.

The procedures carried out in patients were-cystogastrostomy, cystogastrostomy with transpapillary drainage, cystoduodenostomy, percutaneous drainage, percutaneous drainage with transpapillary drainage and endoscopic necrosectomy.

Requirement for reprocedure, mean duration of antibiotic use and mean duration of I.C.U stay were also calculated.

Definitions

(a) Acute fluid collection - a collection of enzyme rich pancreatic juice occurring within 48 hours in the course of acute pancreatitis, located in or near the pancreas and always lacking a well defined wall of granulation tissue or fibrous tissue.

(b) Pseudocyst - a collection of pancreatic juice enclosed by a wall of non epithelialised granulation tissue, which arises as a consequence of acute or chronic pancreatitis, requires at least 4 weeks to form and is devoid of significant solid debris.

(c) Early pancreatic necrosis - a diffuse or focal area of non viable pancreatic parenchyma of > 30 %of the gland on contrast enhanced CT scan, which is typically associated with peripancreatic fat necrosis.

(d) Organized walled off pancreatic necrosis - evolution of acute necrosis to a partially encapsulated, well defined collection of pancreatic juice and necrotic debris.

(e) Pancreatic abscess - a circumscribed intra-abdominal collection of pus, usually in proximity to pancreas, containing little or no pancreatic necrosis, which arises as a result of acute pancreatitis or trauma. It was suspected if signs of infection (fever, abdominal pain and tenderness, leukocytosis, positive blood culture) were evident 4 to 6 weeks after the onset of acute pancreatitis, and other nonpancreatic origins of infection were excluded.

(f) Technical success - Ability to access and drain the PFC by placement of plastic stent between cyst and enteric lumen.

(g) Treatment success - Complete disappearance of clinical symptoms with complete resolution of PFC or decrease in size of the PFC to less than 2 cm on CT scan performed at 6 weeks after the drainage procedure.
Treatment failure - Persistence of symptoms, clinical deterioration, increase in cyst size or persistence of cyst > 2 cm on follow-up, or the need for an alternative technique to completely drain the collection.

Significant bleeding - Any bleeding event which resulted in termination of the procedure, need of endotherapy or immediate surgery, or transfusion requirement.

Results

The endoscopic drainage procedure was successfully completed in all 24 patients (Figure). Eighteen patients had pseudocyst, four had infected pancreatic necrosis and 2 had pancreatic abscesses. Table 1 shows type of endoscopic procedures performed. Cystogastrostomy alone was done in a total of seven patients (six pseudocysts and one abscess), of them two underwent cystogastrostomy twice. In another eight patients cystogastrostomy was combined with transpapillary drainage. Transpapillary drainage alone was performed in three cases of pseudocysts and one case of abscess. All four cases with infected cysts needed endoscopic necrosectomy for adequate drainage and one case formed a spontaneous cystoduodenal fistula. The mean number of sessions required for patients with infected necrosis was 3.25 (range, 2–4).

Table 1: Type of endoscopic procedures performed in 24 patients

<table>
<thead>
<tr>
<th>Type of procedure</th>
<th>Type of pancreatic fluid collections</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pseudocyst</td>
<td>Infected pancreatic necrosis</td>
</tr>
<tr>
<td>Cystogastrostomy</td>
<td>6*</td>
<td>-</td>
</tr>
<tr>
<td>Cystogastrostomy and Transpapillary drainage</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Transpapillary drainage</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Cystoduodenostomy</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Percutaneous drainage</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Percutaneous drainage and transpapillary drainage</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Endoscopic necrosectomy</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Spontaneous cystoduodenal fistula</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

*2 patients underwent cystogastrostomy twice.

The duration of post procedure antibiotic use, requirement of ICU care, mean ICU stay and mean hospital stay was much longer in patients with pancreatic abscess as compared to patients with infected pancreatic necrosis and pseudocyst (Table 2). Patients were given either a combination of ciprofloxacin / metronidazole or third generation cephalosporin or imipenem–cilastin.

Table 2: Duration of post-procedure antibiotic use, ICU stay and hospital stay

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pseudo-pancreatic necrosis</th>
<th>Infected abscess</th>
<th>Pancreatic abscess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of post procedure antibiotic use in days</td>
<td>08</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Patients requiring ICU care</td>
<td>02</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td>Mean ICU stay in days</td>
<td>10</td>
<td>08</td>
<td>14</td>
</tr>
<tr>
<td>Mean hospital stay in days</td>
<td>12</td>
<td>16.6</td>
<td>31</td>
</tr>
</tbody>
</table>
The complications occurred in three patients: bleeding (2 cases), and perforation (1 case). All complications resolved with symptomatic treatment; there were no deaths. All patients were followed up for a median period of 11 months and were asymptomatic. None of the patients had recurrence or required surgery.

Discussion

Based on retrospective review of our patients, we found that endoscopic drainage procedures are feasible, safe and effective for the management of bulging pancreatic pseudocyst, infected necrosis and abscess. Our results are in agreement with a number of previous reports which have established endoscopic drainage as an effective alternative to surgery.24,25 Endoscopic therapy can be performed by a transpapillary or a transmural approach, the latter through the gastric or duodenal wall, depending on location to the stomach or duodenum, respectively.

Transmural drainage involves puncturing the GI wall to perform a cystogastrostomy or cystoduodenostomy. The endoscopic method depends on the anatomy of the main pancreatic duct, and the nature of collection. Nevertheless, the prerequisite for conventional transmural drainage is the endoscopic visualization of an extrinsic compression or the presence of distinct bulge in the wall of the stomach or duodenum with intervening distance between the wall and collection of 10 mm or less.23 The non-visualization of bulge at endoscopy precludes transmural drainage. Transpapillary drainage is an option when a nonbulging collection communicates with collection. Furthermore, endoultrasound has recently been used to guide the puncture in a nonbulging collection.26

Transmural drainage is most popular and most effective technique for pancreatic collections. In a review of published trials, the success rate for transmural drainage was calculated at 70% with a morbidity of 19% and recurrence rate of 16%.7 Hooley et al reported endoscopic drainage in 116 patients. The patterns of collections were acute fluid collection (5), necrosis (8), acute pseudocyst (30), abscess (9) and chronic pseudocyst (64). Transpapillary drainage was done in 15 cases, transmural drainage in 60 cases and both in 41 cases. The authors reported the successful resolution in 87.9% cases. Whereas randomized trials comparing endoscopic drainage with surgical drainage are lacking, historic comparisons between two techniques reported equal efficacy.9

Transpapillary drainage may be an alternative to transmural drainage in some patients with communicating pancreatic collections, especially when collection is relatively small or nonbulging. This approach, however, is not always feasible, and success depends on experience with manipulation of a guidewire through the pancreatic duct and into the collection with subsequent placement of a stent.10,11 Long-term placement of stent in the pancreatic duct has the disadvantages of the stent occlusion with thick pus or debris which mandates additional endoscopic procedures. The need for stent replacement, or placement of a nasopancreatic drains for irrigation can increase the duration of hospitalization and thereby increase costs. The risk of potential pancreatic damage associated with prolonged stent placement is another concern. Transpapillary drainage is not feasible for collections containing thick secretions or debris for fear of clogging of the stent. Therefore, transmural drainage is generally simpler, more effective, and less costly than the transpapillary route. However, the final choice depends on the presence or absence of a stricture in the main pancreatic duct and a bulge in the gastrointestinal tract produced by the collection.

Recently, endoscopic ultrasound (EUS) has been employed to improve the feasibility, safety and efficacy of endoscopic drainage especially when collection produces no extrinsic compression in the stomach or duodenum, and/or distance between the collection and GI wall exceeded 1 cm.12,13 EUS is used to diagnose the nature of the pancreatic collection and location of the puncture followed by conventional transmural drainage using upper GI endoscopy or ERCP scope. Alternatively, pseudocyst drainage has been performed under EUS-guidance as a one-step procedure.11 Non-availability of EUS should not preclude performance of conventional endoscopic drainage under suitable circumstances. Chahal et al16 reported successful non-EUS-guided drainage in 91 of 94 patients (97%) in collections as small as 3 cm; collections were located in body/tail regions in 68 patients. No patient required surgery. These results indicate that non-EUS-guided drainage can be performed safely and effectively in no-bulging collections.17 A recent survey verified these observations.18 However, EUS-guided drainage becomes necessary under a few circumstances which includes unusual location or endoscopic non-visualization of bulge, evidence of portal hypertension or failed transmural drainage.

Whereas, stent placement in single sitting is adequate for the management of pseudocysts, collections containing debris (infected necrosis) or thick pus require vigorous irrigation by means of additionally placed nasopancreatic catheter for successful drainage. Seewald et al reported endoscopic drainage in pancreatic necrosis and abscesses in 13 patients. Surgery was avoided completely in nine patients. Four required surgery for either paracolic extension of abscess or development of recurrent pseudocyst. They showed favourable results with endoscopic necrostomy and surgery may be delayed or avoided.20

Our short- and long-term results were excellent. There was no deaths and all collections resolved without recurrence. The procedure-related complications occurred in three patients which settled with conservative therapy without resorting to another technique.
Conclusion

Endoscopic transmural drainage is a relatively safe and effective therapy for pancreatic collections compressing the gut lumen and is a valuable alternative to surgical or percutaneous drainage. Technical as well as treatment success was achieved in all 24 patients. Careful pretreatment evaluation of the morphologic features and content of the pancreatic collection and pancreatic ductal anatomy are essential for proper selection of the method(s) of drainage, improving success, and minimizing morbidity and mortality.

References


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