

Original Research Article

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Profile and outcomes of symptomatic pancreatic fluid collections at a tertiary care hospital

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ABSTRACT

Background: Pancreatic fluid collections (PFCs) are seen in about 50% cases of pancreatitis. Most PFCs are usually asymptomatic and resolve spontaneously not requiring intervention. However, symptomatic and complicated PFCs require intervention. In this study we aimed at estimating clinical characteristics, demographics, modalities of treatment and their success rates.

Methods: 40 patients with symptomatic PFCs were included in this study. Clinical characteristics, type and location of PFC, indication for treatment, type of intervention, their success and complication rates were recorded.

Results: Among 40 patients, 29 were male and 11 females with mean age of 40.2 ± 7.5 years. The most common PFC was pseudocyst (62.5%) followed by walled off necrosis (WON) (25%). The most common indication for intervention was abdominal pain (50%) followed by gastric outlet obstruction (25%), obstructive jaundice (15%) and sepsis (10%). The success rate of EUS guided transmural drainage was 95.6% for pseudocyst and 77.7% for WON. The rate of adverse events was 32% in pseudocysts and 40% in WON. DEN (direct endoscopic necrosectomy) was done in 3 cases of infected WON.

Conclusions: The most common PFC seen in practice is pseudocyst followed by WON. Endoscopic (EUS guided) transmural drainage has emerged as the first line intervention for symptomatic PFCs. The rate of complications and associated morbidity is much lesser with endoscopic procedures compared to surgery. The success rate of endoscopic intervention is higher in cases of pseudocyst but complications are higher in necrotic collections.

Keywords: Direct endoscopic necrosectomy, Pancreatic fluid collection, Pseudocyst, Transmural drainage, Walled off necrosis

INTRODUCTION

Pancreatic fluid collections (PFCs) in and around the pancreas are seen in about 50% cases of pancreatitis.¹ It can be seen in a variety of conditions like acute pancreatitis, chronic pancreatitis, malignancy, trauma and post operatively.² Most PFCs are usually asymptomatic and resolve spontaneously, hence do not require intervention.³ However PFCs that are persistently symptomatic and those causing complications require intervention.⁴ With major advances in cross sectional imaging and endoscopic interventions over the last few decades our understanding and management of fluid collections has evolved tremendously. The Atlanta

Symposium on Acute Pancreatitis in 1992 defined fluid collections using terms such as acute fluid collections, acute pseudocyst, pancreatic necrosis, and pancreatic abscess.⁵ Due to inconsistencies in the nomenclature of these entities the revised Atlanta classification in 2012 categorised PFC's into 4 types- acute pancreatic fluid collections (APFC), acute necrotic collections (ANC), pseudocysts and walled off necrosis (WON). The differentiation of these collections is mainly based on the duration (< or > 4 weeks) and nature of collections (necrotic or non-necrotic).⁶

APFC is an extra-pancreatic fluid collection which develops after interstitial edematous pancreatitis (IEP)

within 4 weeks without associated peripancreatic necrosis. Most symptoms of APFC are due to the acute pancreatitis itself and 50% of APFCs resolve spontaneously and those that persist evolve into pseudocyst after 4 weeks. APFCs rarely become infected but most resolve spontaneously.⁷ ANC develops after acute necrotizing pancreatitis within 4 weeks and contains both liquid and necrotic material in different proportions.⁸ It does not have a definable wall and maybe intra or extra pancreatic in location. The distinction between ANC and APFC becomes apparent only after 1 week. ANCs gradually resolve or once mature may develop a wall and subsequently transform into WON after 4 weeks.

Pancreatic pseudocysts are homogenous fluid collections usually located outside the pancreas with a non-epithelialized wall and amylase rich fluid as content and is devoid of significant solid debris.⁵

WON is an encapsulated collection with liquid and necrotic contents like in ANC. The collection consists of pancreatic and/or peripancreatic necrotic tissue. Distinction between pseudocyst and WON is extremely important as it determines further management. Necrotic collections are at an increased risk of infection

Acute collections (APFC and ANC) usually don't require intervention as they improve with conservative management. However, pseudocysts and WON usually present with abdominal pain, gastric outlet obstruction or jaundice and require intervention. Previously surgical cystogastrostomy was considered the mainstay for these cases but extensive research over decades has made surgical approach almost obsolete, limited to only a few cases. The various modalities used now include percutaneous drainage (PCD), endoscopic drainage (conventional/endoscopic ultrasound guided; transmural and trans papillary drainage with or without necrosectomy) and surgical drainage (open necrosectomy/minimally invasive surgery).

The objectives of this study were to determine the type of PFC, etiology, mode of presentation, type of treatment modality offered, procedural success, clinical response, complication and recurrence rates of various modalities among cases of PFCs admitted in the department of gastroenterology.

METHODS

All patients with symptomatic PFCs admitted in the department of gastroenterology, Gandhi medical college, Hyderabad, India from August 2021 to January 2023 were included in this study. PFCs were classified according to 2012 revised Atlanta classification.

Study was conducted after taking ethical committee clearance and consent from patients and family.

Study design

This study was a non-randomized interventional study. 40 patients with symptomatic PFCs were included in this study and they were subjected to good cross-sectional imaging including CECT abdomen and MRCP along

with upper GI endoscopy and routine biochemistries. Patients with cystic neoplasia and pancreatic adenocarcinoma were excluded from this study by means of clinical history, imaging and tumour markers.

Patients were managed by various modalities described below based on individual clinical and imaging characteristics

Endoscopic drainage

Guidelines quote this approach as the preferred option, hence this modality was offered to all patients wherever indicated. EUS guided transmural drainage is the preferred technique used. The prerequisites for transmural drainage in our study were: presence of a mature wall of fluid collection, clear impression of the collection on gastric wall, less than 1 cm distance between pseudocyst and stomach wall on imaging, absence of varices and pseudoaneurysm. In patients with recurrence of fluid collection and evidence of partial pancreatic duct disruption, ERCP and transpapillary stenting was done.

Percutaneous drainage

This modality was used in patients with acute fluid collections with evidence of infection and organ compression, in patients with WON extending to the paracolic gutters or as part of a step-up approach in infected necrotic collections.

Surgical drainage

Patients with multiple collections not amenable to endoscopic drainage, presence of serious complications like hemorrhage, bowel perforation and cases with failure of endoscopic therapy were subjected to surgery.

Conservative management

Stable patients with minimal symptoms and acute fluid collections with absence of a mature wall were managed conservatively with nasojejunal tube insertion and symptomatic therapy.

Statistical analysis

Data was collected using a structured proforma. Statistical analysis was done using the statistical software SPSS 24. Continuous variables were represented as mean (with standard deviation) and categorical variables were represented as frequency (percentage).

RESULTS

Patient profile

A total of 40 patients were included in our study of which 29 were males and 11 were females. The mean age of the patients was 40.2 years. The most common etiology was alcohol (62.5%) followed by idiopathic (20%), biliary (7.5%), hereditary (5%) and traumatic (5%).

Clinical presentation

In this study, most common type of PFC was pseudocyst (62.5%) followed by WON (25%), ANC (7.5%) and APFC (5%). The most common presentation in our study was abdominal pain seen in 20 cases (50%) followed by gastric outlet obstruction in 10 cases (25%), obstructive jaundice in 6 cases (15%) and sepsis in 4 cases (10%). Among our 40 patients, 11 cases had multiple collections and the rest had a single collection. 80% of our cases had features of chronic pancreatitis.

Table 1: Clinical characteristics of 40 patients with PFCs.

Characteristic	
Age mean±SD in years	40.2±7.2
Gender	N (%)
Male	29 (72.5)
Female	11 (27.5)
Etiology	
Alcohol	25 (62.5)
Gallstone disease	3 (7.5)
Idiopathic	8 (5)
Trauma	2 (5)
Hereditary	2 (5)
Type of PFC	
Pseudocyst	25 (62.5)
WON	10 (25)
APFC	2 (5)
ANC	3 (7.5)
Number of collections	
Single	29 (72.5)
Multiple	11 (27.5)
Indication for treatment	
Abdominal pain	20 (50)
Gastric outlet obstruction	10 (25)
Obstructive jaundice	6 (15)
Infected collection	4 (10)

10 cases (25%) had evidence of communication between collection and the pancreatic duct (PD) at presentation but only 5 cases had this communication at 4 weeks on follow-up. 8 (20%) cases had evidence of pancreatic ascites. 22 patients had a normal or dilated pancreatic duct on MRCP at the time of admission while 9 patients had a pancreatic ductal stricture, 7 patients had a partially disrupted pancreatic duct and 2 patients had disconnected

pancreatic duct syndrome. Clinical and imaging characteristics are summarized in Table 1 and 2 respectively.

Table 2: Imaging features of PFCs in this study.

Characteristics	N (%)
Location of PFC	
Lesser sac	24 (60)
Intraparenchymal	13 (32.5)
Paracolic gutter	8 (20)
Subhepatic	3 (7.5)
Pelvic	1 (2.5)
Acute versus chronic pancreatitis	
Acute	8 (20)
Chronic	32 (80)
Pancreatic duct (PD) anatomy at presentation	
Normal/dilated	22 (55)
PD stricture	9 (22.5)
Partial duct disruption	7 (17.5)
Disconnected pancreatic duct syndrome (DPDS)	2 (5)
pancreatic duct anatomy on followup at 4 weeks after intervention	
Normal/dilated	25 (62.5)
PD stricture	9 (22.5)
Partial duct disruption	4 (10)
Disconnected pancreatic duct syndrome (DPDS)	2 (5)
Communication between collection and PD	
At presentation	10 (25)
At 4 weeks after presentation	5 (12.5)
Evidence of pancreatic ascites	8 (20)

Treatment modality

Based on the above-mentioned criteria, among the 25 cases of pseudocyst, 23 were subjected to EUS guided transmural drainage among which multiple plastic stents were placed in 22 cases and in 1 case lumen apposing stent with cautery enhanced tip (Hot Axios-Boston Scientific) was used. 2 cases of pseudocyst were managed conservatively

Among 10 cases of WON, 7 cases were managed by EUS guided transmural drainage alone, 2 cases were managed by a combined approach (EUS guided transmural drainage plus Percutaneous drainage). Among them multiple plastic stents were placed in 2 cases and metal stents were placed in 7 cases (biflanged metal stent-BFMS 2 cases; lumen apposing metal stent-LAMS 4 cases; LAMS with cautery enhanced tip 1 case). 2 cases of WON were managed surgically among which 1 case was due to failure of endoscopic therapy and other case due to multiple collections which were not amenable to endoscopic drainage and one of the collections ruptured into the wall of the transverse colon.

Among 3 cases of ANC, 2 cases were managed by percutaneous drainage in view of evidence of infection and 1 case was managed conservatively. 2 cases of APFC were included in our study. Both were managed conservatively.

Table 3: Details of mode of treatment, success and complication rates.

Type of PFC and intervention in 40 cases	Success rate	Complications
Pseudocyst	25	32%
EUS guided drainage	23	95.6%
Conservative	2	50%
WON	10	40%
EUS guided drainage	7	77.7%
DEN (direct endoscopic necrosectomy)	3	100%
Combined (EUS and percutaneous)	2	100%
Surgical	2	100%
ANC	3	33%
Percutaneous drainage	2	50%
Conservative	1	100%
APFC	2	-
Conservative	2	100%

In this study, 4 weeks after intervention CT, MRCP were repeated and patients with non-resolving collection or symptomatic recurrent collection with evidence of partial disruption of the pancreatic duct were subjected to trans papillary drainage (ERCP with PD cannulation and stenting). 4 cases had evidence of partial disruption of pancreatic duct on follow-up and were subjected to ERCP with PD stenting. 2 cases which had evidence of disconnected pancreatic duct syndrome (DPDS) were subjected to long term placement of transmural plastic stents.

Complications

The most common complication in this study was bleeding which was seen in 10 cases (6 pseudocyst and 4 WON cases) but all cases resolved without further intervention. 4 cases had evidence of infection post procedure with persisting fever spikes and leucocytosis (Other causes of fever were ruled out by clinical and lab evaluation). 1 case was managed conservatively with broad spectrum antibiotics and 3 cases were subjected to DEN (direct endoscopic necrosectomy). 1 case had evidence of stent migration (pancreatic tail) and was subjected to surgical intervention later. 1 case had stent dislodgement within 2 days of procedure but required no further intervention. Among the 4 cases subjected to percutaneous drainage, 1 developed cutaneous fistula (case of ANC).

Clinical and technical success

Among the 6 cases managed conservatively, 5 cases improved and 1 case (pseudocyst) required endoscopic intervention in the form of EUS guided transmural drainage which subsequently improved.

Among the 31 cases managed by endoscopic (EUS guided) drainage, 2 cases (both WON) required additional intervention in the form of percutaneous drainage (combined approach), 3 cases required second intervention (2 cases were subjected to repeat endoscopic intervention and 1 case required surgical intervention).

The 2 cases which were managed surgically in our study had improved with an insignificant postoperative period but required a longer hospital stay.

Details of mode of treatment, success and complication rates are summarized in Table 3. Details of cases not responding to initial mode of treatment and the subsequent intervention are summarized in Table 4.

Table 4: Details of cases not responding and type of reintervention.

Type of PFC	Number of cases not responding to primary intervention	Type of reintervention
Pseudocyst	2	Repeat EUS guided drainage for both cases
WON	2	1 case- Repeat EUS guided drainage 1 case- Surgery
ANC	1	EUS guided drainage
APFC	-	-

DISCUSSION

Pancreatic fluid collections are a common scenario we face in more than 50% cases of pancreatitis. This study was undertaken to know the frequency of each type of fluid collection, demographics, mode of presentation and success of various interventions.

In this study the most common etiology was alcohol (n=25; 62.5 %) followed by idiopathic (n=8; 20%). According to literature 80% pancreatitis cases are due to alcohol and gall stones and together they cause most PFCs⁹. In a retrospective study of 357 patients with pseudocysts, 70% were due to alcohol, 8% biliary, 5% due to blunt abdominal trauma and 16% idiopathic.¹⁰

In this study the most common PFC encountered was pseudocyst (n=25; 62.5%) followed by WON (n=10; 25%). This may be due to the fact that most acute fluid collections are asymptomatic

The commonest mode of presentation in this study (i.e., indication for intervention) was abdominal pain (n=20; 50%) followed by gastric outlet obstruction (n=10; 25%), obstructive jaundice (n=6; 15%) and infected collection (n=4; 10%). There are no studies with exact frequency of each symptom in PFCs as a whole, but the most frequent symptoms in a case of pseudocyst are abdominal pain (76-94%), nausea and vomiting (GOO) (50%) and weight loss (20-51%) while jaundice, fever or sepsis occur occasionally.^{11,12} WON cases are symptomatic in 50% cases and present with persistent abdominal pain, anorexia, malaise, feeding intolerance, weight loss and in severe cases may fistulize to adjacent anatomic structures and compress or erode vessels or the bile duct.¹³

In this study there was evidence of ascites in 8 cases (20%). Rupture of PFC into peritoneum can result in ascites, peritonitis or haemorrhagic shock which has a high mortality of 40%. Pancreatic ascites is secondary to leakage from pseudocyst in 70% cases and is more common in chronic pancreatitis. Diagnosis of pancreatic ascites is made by serum ascites albumin gradient (SAAG) of less than 1.1, protein content of greater than 3 mg/dl and amylase content of more than 1000 units.¹⁴

At the time of presentation, 7 cases had partial disruption of pancreatic duct and 2 cases had disconnected pancreatic duct syndrome but on follow up at 4 weeks only 4 cases had partial pancreatic disruption and 2 cases had disconnected pancreatic duct syndrome (DPDS). 10 cases (25%) had evidence of communication between collection and the pancreatic duct (PD) at presentation but only 5 cases had communication between collection and PD at 4 weeks after intervention. Several observations in the past support the statement that PFCs (pseudocysts in particular) at least at some point in their life have communication with the pancreatic duct.¹² However, this communication may not persist, since the inflammatory process may occlude the fistula or it may close spontaneously with decrease in size. Hence this might be an explanation for the varying rates of cyst-duct communication ranging from 6 to 20% and as high as 60% in some studies.¹ In this study cases with non-resolving or recurrent PFC with evidence of partial duct disruption at 4 weeks after intervention, were subjected to ERCP with transpapillary stenting. In a large multicentre retrospective study comparing transmural drainage alone with combined transmural plus transpapillary drainage showed similar rates of PFC resolution.¹⁵ In another study benefit of combined approach was limited to cases of partial PD disruption, with no benefit in complete duct disruptions (DPDS).¹⁶ Hence in patients with partial disruption of the main pancreatic duct, ERCP and placement of a transpapillary stent with bridging of the disruption is considered. Pancreatic duct stenting has no role in complete disruption of pancreatic duct.¹⁷

In this study, there were 2 cases of APFCs and both were managed conservatively. There was no evidence of infection in these cases and symptoms were probably due

to the underlying acute pancreatitis itself. In majority of the cases APFCs are sterile and should be managed conservatively since most regress spontaneously.¹⁸ The only indication for drainage in APFCs is infected collection with systemic signs of sepsis. In such infected cases CT or EUS guided aspiration for gram staining and culture is required.^{1,9} Among the 3 cases of ANC, 2 cases were managed by percutaneous drainage and 1 case was mildly symptomatic and not amenable for percutaneous drainage so was managed conservatively. The PANTER trial published by the Dutch pancreatitis group suggested the step up approach (minimally invasive techniques like percutaneous or endoscopic transgastric drainage with escalation to retroperitoneal necrosectomy if no clinical improvement) for infected PFCs over open necrosectomy.¹⁹

Among the 25 cases of pseudocyst, 23 cases were managed by EUS guided transmural drainage and 2 cases managed conservatively. Among those managed by endoscopic drainage 1 case required reintervention (2nd sitting of endoscopic drainage) to which there was a good response. 1 case managed conservatively did not improve hence was subjected later to EUS guided drainage. Multiple plastic stents were used in all cases except 1 case where lumen apposing stent with cautery enhanced tip was used to utilise its advantage of shorter procedure time (shorter sedation time was required in view of multiple comorbid conditions in the patient). In a large multicentre trial, plastic stents were compared to LAMS in pseudocyst drainage and found no difference in technical success, recurrence rate or post procedure hospital stay.²⁰ Hence it seems logical to use plastic stents in cases of pseudocysts in view of its obvious advantages in cost and availability. In this study there was no difference in response with the number of stents used and in the 1 case which did not respond in the first attempt actually had more than 2 stents placed compared to most cases where 2 stents were placed. The stent size and number were not predictors of the number of interventions required for treatment success based on multiple logistics regression analysis.¹⁷

Among the 10 cases of WON in this study, 7 cases were subjected to EUS guided drainage alone, 2 cases were subjected to combined percutaneous and EUS guided drainage. Among these cases multiple plastic stents were used in 2 cases and metal stents in 7 cases (2 BFMS; 4 LAMS; 1 LAMS with cautery enhanced tip). A large multicentre international trial including 189 patients demonstrated the superiority of LAMS over plastic stents²¹. In our study among the cases of WON managed endoscopically, 2 cases had no improvement, 1 was subjected to repeat endoscopic intervention and another was subjected to surgery. 1 case of WON was subjected directly to surgery as the 1st intervention in view of multiple WONs and rapid deterioration.

A meta-analysis showed that endoscopic drainage of PFCs has higher clinical success, lower reintervention

rate and a shorter hospital stay in comparison to percutaneous drainage.²² Two different trials have shown that endoscopic drainage is favourable to surgical drainage in terms of complication rate and healthcare resource utilisation.²³ Varadarajulu et al compared EUS guided transmural drainage (EUS-TD) to conventional endoscopic transmural drainage (CTD) in 30 patients and reported clinical success rate of 100% in EUS-TD compared to 33% in CTD.²⁴ Park et al found that EUS-TD had fewer complications and higher success rate in non-bulging collections.²⁵ Hence in most cases EUS guided drainage should be the first line management for symptomatic PFCs.

The success rate in this study with EUS guided drainage for pseudocyst was 95.6% and for WON it was 77.7%. The need for reintervention was seen in 4.3% in cases of pseudocyst and 55.5% in WON cases. The rate of adverse events was 32% in pseudocysts and 40% in WON cases.

In our study DEN (direct endoscopic necrosectomy) with hydrogen peroxide irrigation and snare forceps was done in 3 cases of WON with infected collection. According to the multicentre GEPARD trial in which 93 WON patients were subjected to DEN, showed 80% clinical success rate and lower probability for requirement of surgical necrosectomy.²⁶

There are some limitations of the study. Long term follow-up of patients beyond 4 weeks to assess the duration of stenting required after intervention was not done. There was no head-to-head comparison between various types of stents. The number of patients managed by surgical intervention were underrepresented in this study. The sample size in this study also was a limitation.

CONCLUSION

PFCs are a common complication of pancreatitis. Majority of these collections spontaneously regress. The most common PFC seen in practice is pseudocyst followed by WON. Only symptomatic PFCs require intervention. Endoscopic (EUS guided) drainage has emerged as the first line intervention for symptomatic PFCs. The rate of complications and associated morbidity is much lesser with endoscopic procedures compared to surgery. Evidence of communication between PFC and PD is seen in only 6 to 20% cases. The most common cause of recurrent PFC is DPDS. Transpapillary PD stenting has no role in DPDS but can be considered in cases of partial disruption. DEN is a novel endoscopic procedure for management of infected WONs and is associated with lower requirement of surgical intervention.

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