

## ORIGINAL RESEARCH

# Early Percutaneous Drainage of Fluid Collection in Acute Pancreatitis- A Prospective Study

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## INTRODUCTION

Fluid collection in acute pancreatitis can range from simple fluid collection which resolves spontaneously to necrotic collection. Necrotic collections have a different spectrum of outcomes of varying morbidity and mortality. The fluid collections are classified based on presence of necrosis and timing of presentation as per Atlanta Classification [1]. Fluid collection with no necrosis in the first four weeks is acute fluid collection and the presence of necrosis is called acute necrotic collection. Collection after four weeks is called Walled of pancreatic necrosis and pseudocyst by presence or absence of necrosis.

The management of these fluid collections follow a step up approach with initial conservative management, followed by image guided percutaneous drainage, endoscopic drainage, Video assisted retroperitoneal drainage and surgical drainage [2]. Surgical drainage can be either minimally invasive or open necrosectomy. The timing of intervention is again highly debated.

Percutaneous drainage of collection is an initial therapeutic option and sometimes the only option required. The percutaneous approach is a feasible, minimally invasive and cost effective option. The successful outcome, defined as resolution of collection without additional intervention, was 55.7 percent in a meta- analysis [3]. Most of the early collections are managed by conservative management.

Intervention in the first four weeks is usually not required except in certain situations. In this study we have analysed the outcomes of percutaneous drainage for acute fluid collections, both acute fluid collection and acute necrotic collection which were less than 4 weeks duration.

## MATERIAL AND METHODS

The study was conducted in a tertiary care centre in the department of Gastroenterology for a period of two years. It was a prospective observational study. All patients admitted with fluid collection following acute pancreatitis were included in the study. The patients were initially managed with fluid resuscitation and supportive care. Indications for intervention were new onset or persistent organ failure, persistent unwellness, abdominal compartment syndrome, gastric outlet/ intestinal or biliary obstruction and suspected or proven infection. Patients suspected to have haemorrhage or other vascular complications were managed initially by interventional radiological procedures and excluded from the study. Other exclusion criteria were patients presenting after 4 weeks of onset of symptoms. Patients with chronic pancreatitis, pancreatic malignancies or pancreatic ascites were not included in the study.

The diagnosis of acute pancreatitis is made by clinical features, laboratory investigations and imaging studies. All our patients have undergone CECT of abdomen and pelvis except those with GFR <30ml/ hr.

Patients were treated by image guide percutaneous drainage. Ultrasonography was used for imaging. If the patient fails to improve, then endoscopic management is done. Upper GI endoscopy and EUS guided transgastric drainage were done. Endoscopic intervention was only attempted where the fluid collection was in close proximity to the stomach or duodenum. Minimally invasive procedures were the procedure preferred in

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other scenarios. Endoscopic and surgical drainage were deferred to at least 4 weeks after onset of pain.

All the data was collected using Microsoft excel office 2019 software and analysed with SPSS version 26. The Chi square test was used to test the significance.

**RESULTS**

All the patients admitted with acute pancreatitis between January 2021 to February 2023 were screened. 670 patients with acute pancreatitis were screened for fluid collection. 237 patients had acute simple fluid collection and 102 patients had acute necrotic collection. All the patients were enrolled in the study. Twenty-three patients with acute simple fluid collection and fifty-seven patients with acute necrotic collection required early intervention and were taken as study patients and their data was analysed. The demographic parameters analysed are in [Table 1 & 2].

The mean age of patients with simple fluid collection is 41.2 years and acute necrotic collection is 39.47 years. The mean duration of symptoms is 7.5 days. The mean CTSI score in simple fluid collection is 5.04 and necrotic

collection is 8.56. Mean PCD placements are 1.26 and 2.7 in simple fluid and necrotic collection. The mean days of requirement of PCD are 21 and 25.6 days. All these patients underwent a mean of 6.54 times repeated imaging studies.

Percutaneous drainage was successful in 73.69 percent of the patients. PCD was more successful in acute Simple fluid collection with three patients needing additional treatment. PCD was the only treatment required in 68.5% of patients with acute necrotic collection. The difference in outcome between acute simple fluid collection and acute necrotic collection is summarised in [Table 3].

Fifteen patients required additional procedures. Of these, five patients were referred for endoscopic management. Six patients underwent retroperitoneal minimally invasive drainage. One was managed by VARD. Two patients required open necrosectomy as we were not able to reach the necrosium through retroperitoneal route. One patient underwent ileostomy for colonic perforation.

PCD related complications were seen in 26% of the patients. The complications were peritubal leak, peritubal pain, tube blockage, tube dislodgement and bleeding.

**Table 1.** Acute necrotic collection.

		=/< PCD	>PCD	P value
Sex	Male -	42	12	0.067
	Female-	2	1	
Aetiology	Alcohol	42	12	0.067
	Cholelithiasis	2	1	
CTSI	6	2	1	0.079
	8	27	8	
	10	15	4	
Duration	upto 7 days	24	5	0.311
	> 7 days	20	8	
Underlying chronic pancreatitis	Yes	4	1	0.955
	No	30	12	
Time of intervention	Upto 7 days	18	5	0.944
	>7 days	26	8	

**Table 2.** Acute fluid collection.

		=/< PCD	>PCD	P value
Sex	Male -	20	1	0.752
	Female	2	0	
Aetiology	Alcohol	19	1	0.925
	Cholelithiasis	2	0	
CTSI	6	11	0	0.467
	8	10	1	
	10	1	0	
Duration	upto 7 days	13	0	0.003
	> 7 days	9	0	
Underlying chronic pancreatitis	Yes	6	0	0.544
	No	16	1	
Time of intervention	Upto 7 days	16	0	0.122
	> 7 days	6	1	

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**Table 3.** Comparison between acute fluid collection and acute necrotic collection.

Parameters studied	Acute peripancreatic fluid collection	Acute necrotic collection
Mean age	41.2 years	39.74years
Mean duration of symptoms	6.1 days	8.9 days
Mean CTSI score	5.04	8.56
Mean no. Of PCDs required	1.3	2.7
Mean days of PCD	21	25.6
Mean no. of imaging required	6.08	6.84
Additional intervention needed	13.6 %	31.4 %
Mean hospital stay	11.34 days	14.77 days
Mean ICU stay	2.43 days	5.59 days
Transient organ failure	27 %	87.03 %
Persistent organ failure	9.09 %	51 %
Overall mortality	9.09%	18.51 %

Tube blockage and dislodgement were common. Five patients developed DVT. Four patients had bleeding. One patient developed gastric fistula. One patient had colonic perforation.

Overall mortality was 15.78%. Two patients with acute simple fluid collection died and the mortality rate in acute necrotic collection was 18.51%. The mean ICU stay was 2.43 days and 5.59 days for simple fluid and acute necrotic collections respectively. In patients with acute simple fluid collection, transient organ failure was seen in 27% and the organ failure persisted in 9.09%. The transient organ failure was seen in 87.03%, persistent organ failure in 51% of the patients with acute necrotic collection.

**DISCUSSION**

Percutaneous catheter drainage was first used by Freeny et al. in 1998 with 47% necrosectomy-free survival rate in necrotising pancreatitis [4]. The incidence of pancreatic fluid collection after acute pancreatitis was 40-50% [5].

PCD insertion reduces pressure within the collection, drains infected collection and aids in controlling sepsis. Along with these advantages, insertion of PCD could also give time for the collection to get encapsulated and facilitate delayed necrosectomy. It also acts as a guide and defines the route to direct necrosectomy.

The aetiological factors for acute pancreatitis include ethanol abuse, gall stones, trauma, hypertriglyceridemia, viral infection and medications. Any of these causes could predispose to fluid collection. Aetiological factors do not influence the occurrence of fluid collection. Ethanol abuse is the most common cause of acute pancreatitis and the most common cause for fluid collection [5]. These collections are common in men and in fourth and fifth decades of life [6].

The most common site of pancreatic fluid collection is lesser sac, anterior and posterior pararenal spaces, perisplenic and perihepatic spaces. Each collection should be managed on based on aetiological factor, location

of collection, and hemodynamic status of the patient, symptoms, availability of resources and technical support and financial aspects. Effective management of these conditions needs multidisciplinary teams [7].

Well circumscribed homogenous fluid collection without necrosis which may or may not communicate with pancreatic duct. In up to 70% of patients these collections resolve spontaneously [8]. The factors causing persistence of collection are location in the tail, associated stricture, multiple cysts and increasing size. Fluid collection with abdominal pain or back pain not responding to medications, gastric or duodenal outlet obstruction, early satiety, anorexia, and abdominal compartment syndromes, persistent vomiting or reflux with intolerance to oral feeds and biliary obstruction. The commonest indication to treat this fluid collection is pain [8, 9].

The presence of necrosis in the collection of any amount is called acute necrotic collection. 30% of all these collections get infected. Another third needs intervention due to pressure effects, fistula formation or pain [10]. Again these collection need coordination with multiple specialties for either percutaneous, endoscopic or minimally invasive intervention. In a systematic review with 384 patient, percutaneous drainage alone was only definitive treatment in 56% of the patients [3].

In a study by Hollemans RA et al the success of PCD was correlating with the grade of necrosis. The outcome was statistically significant with CTSI score, heterogeneity of collection and left sided collection [11]. The severity of the disease is best detected by contrast enhanced CT scan after 72-96 hours after onset of pain. The severity is graded on CTSI score based on fluid collection, necrosis and local complications. The mean CTSI score in acute fluid collection and acute necrotic collection is 5.04 and 8.56. In a study by Anupam et al [12], CTSI score more than 7 was associated with failure of PCD drainage.

The duration of presentation and duration between onset of symptoms and drainage of collection was not statistically significant in both simple fluid collection and necrotic collection. In a study by (Hollemans), it was

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**Table 4.** Comparison between success rate of percutaneous drainage in previous studies.

Author	Year	Study type	No. Of patients	Success rate (%)
Robbert A. Hollemans	2015	Prospective	113	35 %
Huazhi li (16)	2018	Retrospective	76	98.6
Lichi Ke(17)	2016	Systematic analysis	557	55.3
Zerem et al(18)	2011	Prospective	69	84
Mahendra K Mittal (19)	2020	Prospective and retrospective	60	60
Nam-Hun Jong	2019	Prospective	44	64
M. C. van Baal	2011	Systematic analysis	384	55.7
Varun Mehta (20)	2019	Prospective	20	55
Marek Wronski (21)	2013	Prospective	18	33

shown that early or late presentation, intervention before 4 weeks or after 4 weeks did not alter the outcome [11]. In a study by Sugimoto, the day for first PCD insertion was 23 days and in PANTER trial it was 30 days [13, 2]. In our study it was much earlier, at 19 day.

The mean number of pigtailed per patient was 1.3 and the total duration of pigtail was 13.5 days in a study by Manish et al [14]. We did keep the PCDs patent by regular flushing the catheters upto 3 weeks.

In a study comparing the number of imaging needed percutaneous drainage group to standard medical treatment is 8.9 days to 14.3 days with p =0.002 [15]. The average number of imaging required was 6.5 in our study. Mean hospital stay were 13 days and mean ICU stay for patients with acute pancreatic necrosis was 5.59.

In our study, the successful outcome of percutaneous drainage was seen in 87% of patients with acute simple pancreatic collection and 68.4% of the patients with acute necrotic collection. The successful outcome seen in other studies is tabulated in [Table 4]. Multi organ failure was seen in 26.7% of the patients according to outcome analysis studied by Manish Kumar et al [16]. In patients with simple fluid collection transient organ failure was seen in 27% of patients and persistent organ failure in 9% of patients. In the presence of necrosis transient organ failure was seen in 87% of patients and persistent organ failure in 51% patients. MODS were seen in 30.2% of these patients. Mortality was seen in 18% of patients with acute necrotic collection and all these patients had multi organ failure. Our study demonstrated the presence of necrosis was associated with poor outcome as seen in previous other studies. However early intervention has reduced mortality rate with no difference in organ failure rate compared to other studies.

## CONCLUSION

Fluid collection in acute pancreatitis needs multidisciplinary management and has high morbidity

and mortality. The traditional approach of wait and watch should be reserved for operative intervention. Early percutaneous intervention can counter inflammatory response and may improve the outcomes in these patients.

## CONFLICT OF INTEREST

The authors have no potential conflicts of interest.

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