

## Management of Local Complications of Acute Pancreatitis: A Retrospective Study

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### Abstract

**Aim:** This study aims to evaluate the indication and outcome of different surgical management modalities in local complications of acute pancreatitis.

**Methods:** A hospital-based retrospective study was conducted in the department of surgery at Anugrah Narayan Magadh medical College and Hospital Gaya, Bihar, India after from March 2021 to October 2021. 50 patients required surgical intervention due to failure of endoscopic or radiological intervention or positions of lesions being inaccessible to these techniques.

**Results:** Out of 50 patients, 54% were males. 50% had ethanol etiology and 34% had pseudocyst pancreatic fluid collection. According to the location, 70% were at body or tail. According to Clavien-Dindo classification, 30% were in grade 2 followed by grade 1 (26%) and grade 4 (20%).

**Conclusion:** Although various endoscopic techniques are now available to manage the pancreatic fluid collection and pancreatic necrosis, surgery remains essential in managing the disease.

**Keywords:** Acute Pancreatitis, Local Complications, Surgical Management.

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### Introduction

Acute pancreatitis (AP) is defined as an acute inflammatory attack of the pancreas with a sudden onset of symptoms, which, in the absence of post necrotic damage to the gland, results in complete resolution of histology, physiology, and symptoms and provided the initiating cause is removed there will be no further attacks. The commonest causes for AP are gallstones (40–65%) and alcohol (25–40%), and the remainder (10–30%) are due to a variety of causes including autoimmune and genetic risk factors. [1,2] Irrespective of etiology, the trigger factors cause supraphysiological intracellular signaling resulting in trypsin activation within the zymogen granules. [3-5] The resultant acinar cell death causes a localized and systemic inflammatory response. Initially, the most prominent features are distant organ dysfunction notably the lungs and kidneys, which in most cases is of short duration (< 48 h). [6,7]

Acute pancreatitis (defined as the acute nonbacterial inflammatory condition of the pancreas) is derived from early activation of digestive enzymes inside acinar cells, with varying compromising of the gland itself, nearby tissues, and other organs. It is well known that several situations develop into acute

pancreatitis, but the mechanisms and how those mechanisms develop the disease remain unclear. If the early events that generate the inflammatory process are understood and if pro and anti-inflammatory factors that modulate the severity of the disease are known - treatment can be implemented so the process will not happen or possible associated complications will be minimized. [8]

The primary goal of treatment for acute necrotic collection is to drain the content and remove all infected pancreatic tissues. [9] The available treatment options include open and laparoscopic transperitoneal drainage, image-guided retroperitoneal drainage, and endoscopic trans gastric approaches. [10] The current recommendation for the treatment of acute necrotic collection is the “step-up” approach. The term „step-up” was coined by the Dutch PANTER trial and is used commonly across disciplines when referring to minimally invasive procedures that have the potential to be re-employed with escalation towards more invasive procedures for the drainage of infected pancreatic necrosis. In 2010 the results of the trial demonstrated several benefits from the step-

up approach over laparotomy. [11] In our series, the “step-up” approach was the primary modality of treatment in ANC.

This study aims to evaluate the indication and outcome of different surgical management modalities in local complications of acute pancreatitis.

### Materials and Methods

A hospital-based retrospective study was conducted in the department of surgery at Anugrah Narayan Magadh medical College and Hospital Gaya, Bihar, India from March 2021 to October 2021. A purposive sampling method was utilized to recruit the patients. 433 patients were admitted to the surgery department with the diagnosis of acute pancreatitis or with complications of acute pancreatitis. Among them, 80 patients had local complications due to acute pancreatitis. All patients were managed using the step-up approach, starting with conservative management and minimally invasive intervention when warranted. 50 patients required surgical intervention due to failure of endoscopic or radiological intervention or positions of lesions being inaccessible to these techniques.

### Inclusion and Exclusion Criteria

The inclusion criteria for the study were patients who underwent laparoscopic, retroperitoneal or open surgical procedures for the management of local complications of acute pancreatitis for the period of one year. Exclusion criteria for the study were patients who had associated vascular and bowel-related complications.

### Procedure

Clinical, laboratory and imaging findings including, contrast-enhanced CT scan findings of all the cases, were recorded as per the proforma. In addition, the indication of each procedure, perioperative outcome and associated complications were evaluated in all the studied cases. All minimally invasive procedures were performed under general anesthesia using Karl Storz© laparoscopic set by the surgical team experienced in pancreatic surgery. The local complications of acute pancreatitis were based on the revised Atlanta classification 2012.<sup>1</sup> All complications were graded according to the Clavien-Dindo classification.<sup>7</sup> Data were analyzed using the statistical package for the social sciences (SPSS) version 20.

### Results

**Table 1: The demographic and clinical characteristics of patients**

Variables	N	%
<b>Gender</b>		
Male	27	54
Female	23	46
<b>Clinical characteristics</b>		
<b>Etiology</b>		
Biliary	21	42
Ethanol	25	50
Others	4	8
<b>Category of pancreatic fluid collection (PFC)/complications</b>		
PPC	10	20
ANC	15	30
WON	8	16
Pseudocyst	17	34
<b>Location of the cavity</b>		
Head	15	30
Body or tail	35	70

Out of 50 patients, 54% were males. 50% had ethanol etiology and 34% had pseudocyst pancreatic fluid collection. According to the location, 70% were at body or tail.

**Table 2: Clavien-Dindo classification of the complication following surgical intervention**

Clavien-Dindo classification	N	%
Grade 0	9	18
Grade 1	13	26
Grade 2	15	30
Grade 3	3	6
Grade 4	10	20

According to Clavien-Dindo classification, 30% were in grade 2 followed by grade 1 (26%) and grade 4 (20%).

### Discussion

The majority of patients suffering from acute pancreatitis will have a mild, self-limited and uncomplicated course. Pancreatic necrosis may develop in up to 10%-20% of patients, because of insufficient perfusion of pancreatic parenchyma to support metabolic requirements, leading to a prolonged clinical course with up to 30% mortality in case of infected necrosis. [12] Local and systemic complications, mild or life-threatening, such as pancreatic and/or peripancreatic fluid collections, walled-off necrosis, infected pancreatic necrosis, disconnected pancreatic duct syndrome and vascular complications can occur. The successful management of these patients needs a multidisciplinary team composed by gastroenterologists, surgeons, interventional radiologists, and specialists in critical care medicine, infectious disease, and nutrition. Intervention is generally required for infected pancreatic necrosis and less commonly in patients with sterile necrosis who are symptomatic (gastric or duodenal outlet or biliary obstruction). [13]

Out of 50 patients, 54% were males. 50% had ethanol etiology and 34% had pseudocyst pancreatic fluid collection. According to the location, 70% were at body or tail. According to Clavien-Dindo classification, 30% were in grade 2 followed by grade 1 (26%) and grade 4 (20%). Management strategy of walled-off necrosis has evolved over the years. Some WON resolve with time and can be conservatively managed if there are no symptoms or secondary complications like infection of the walled-off necrotic collection. [14] However, if the WON is infected, intervention is warranted in the form of endoscopic drainage or open necrosectomy. [12] In our series, all patients with WON underwent open transperitoneal necrosectomy due to the positions of WON being unamenable to endoscopic approaches. Several endoscopic drainage modalities exist for managing symptomatic pancreatic pseudocysts. [15] These include trans papillary pancreatic duct stenting, transmural drainage, or a combination of both. [16,17] Trans papillary stent placement and endoscopic ultrasound (EUS)-guided transmural drainage (EUS-TM) for PPC drainage report a wide range of clinical success. [18-20] However, when these modalities are not suitable for the patient surgical management is an acceptable modality for managing pancreatic pseudocyst. [21]

There is no single surgical procedure that is appropriate for all pseudocysts. The most important factor dictating the mode of treatment is localexpertise. [22] Despite the various endoscopic

and minimally invasive options, the most effective and reliable method of draining a pseudocyst is internal drainage by an open surgical approach. [23] For the management of pancreatic pseudocyst in our series, cyst gastrostomy was the commonest internal drainage procedure performed, followed by Roux-en-Y cyst jejunostomy. This technique consists of an anterior gastrostomy followed by a posterior gastrostomy centered on the cyst, which avoids dissection through inflamed tissues. [24,25]

### Conclusion

Management of patients with local complications of pancreatitis is most effective at a specialized tertiary care center with pancreatic surgeons who have expertise in managing these cases. Although various endoscopic techniques are now available to manage the pancreatic fluid collection and pancreatic necrosis, surgery remains an essential modality in managing the disease.

### References

1. Whitcomb DC; North American Pancreatitis Study Group. Pancreatitis: TIGAR-O Version 2 Risk/Etiology Checklist with Topic Reviews, Updates, and Use Primers. *Clin Transl Gastroenterol.* 2019 Jun;10(6):e00027
2. Yadav D, Lowenfels AB. The epidemiology of pancreatitis and pancreatic cancer. *Gastroenterology.* 2013 Jun;144(6):1252-61.
3. Gryshchenko O, Gerasimenko JV, Peng S, Gerasimenko OV, Petersen OH. Calcium signaling in the acinar environment of the exocrine pancreas: physiology and pathophysiology. *J Physiol.* 2018 Jul;596(14):2663-2678.
4. Romac JM, Shahid RA, Swain SM, Vigna SR, Liddle RA. Piezo1 is a mechanically activated ion channel and mediates pressure induced pancreatitis. *Nat Commun.* 2018 Apr 30;9(1):1715.
5. Pallagi P, Madácsy T, Varga Á, Maléth J. Intracellular Ca<sup>2+</sup> signalling in the pathogenesis of acute pancreatitis: recent advances and translational perspectives. *International Journal of Molecular Sciences.* 2020 Jun 3;21(11):4005.
6. Johnson CD, Kingsnorth AN, Imrie CW, McMahon MJ, Neoptolemos JP, McKay C, Toh SK, Skaife P, Leeder PC, Wilson P, Larvin M, Curtis LD. Double blind, randomised, placebo controlled study of a platelet activating factor antagonist, lexipafant, in the treatment and prevention of organ failure in predicted severe acute pancreatitis. *Gut.* 2001 Jan;48(1):62-9.
7. Raraty MG, Connor S, Criddle DN, Sutton R, Neoptolemos JP. Acute pancreatitis and organ failure: pathophysiology, natural history, and management strategies. *Curr Gastroenterol Rep.* 2004 Apr;6(2):99-103.
8. Cruz-Santamaría DM, Taxonera C, Giner M. Update on pathogenesis and clinical

- management of acute pancreatitis. *World journal of gastrointestinal pathophysiology*. 2012 Jun 6;3 (3):60.
9. Lancaster A, Zwijacz M. Acute pancreatitis and fluid-filled collections: etiology and endoscopic management. *Gastroenterol Nurs*. 2019; 42(5):417-9.
  10. Baron TH, DiMaio CJ, Wang AY, Morgan KA. American gastroenterological association clinical practice update: Management of Pancreatic Necrosis. *Gastroenterol*. 2020;158(1): 67-75.
  11. Hollemans RA, Bakker OJ, Boermeester MA, et al. Superiority of Step-up Approach vs Open Necrosectomy in Long-term Follow-up of Patients With Necrotizing Pancreatitis. *Gastroenterology*. 2019;156(4):1016-26.
  12. Baron TH, DiMaio CJ, Wang AY, Morgan KA. American Gastroenterological Association clinical practice update: management of pancreatic necrosis. *Gastroenterology*. 2020 Jan 1;158(1):67-75.
  13. Bugiantella W, Rondelli F, Boni M, Stella P, Polistena A, Sanguinetti A, Avenia N. Necrotizing pancreatitis: A review of the interventions. *International journal of surgery*. 2016 Apr 1;28:S163-71.
  14. Dalsania R, Willingham FF. Treatment of walled-off pancreatic necrosis. *Curr Opin Gastroenterol*. 2019;35(5):478-82.
  15. Barthet M, Lamblin G, Gasmi M, Vitton V, Desjeux A, Grimaud JC. Clinical usefulness of a treatment algorithm for pancreatic pseudocysts. *Gastrointest Endosc*. 2008;67(2):245-52.
  16. Nealon WH, Walser E. Surgical management of complications associated with percutaneous and/or endoscopic management of pseudocyst of the pancreas. *Ann Surg*. 2005;241(6):948-57.
  17. Catalano MF, Geenen JE, Schmalz MJ, Johnson GK, Dean RS, Hogan WJ. Treatment of pancreatic pseudocysts with ductal communication by transpapillary pancreatic duct endoprosthesis. *Gastrointest Endosc*. 1995;42(3): 2 14-8.
  18. Lopes CV, Pesenti C, Bories E, Caillol F, Giovannini M. Endoscopic ultrasound-guided endoscopic transmural drainage of pancreatic pseudocysts. *Arq Gastroenterol*. 2008;45(1):1 7-21.
  19. Antillon MR, Shah RJ, Stiegmann G, Chen YK. Single-step EUS-guided transmural drainage of simple and complicated pancreatic pseudocysts. *Gastrointest Endosc*. 2006;63(6): 797-803.
  20. Krüger M, Schneider AS, Manns MP, Meier PN. Endoscopic management of pancreatic pseudocysts or abscesses after an EUS-guided 1-step procedure for initial access. *Gastrointest Endosc*. 2006;63(3):409-16.
  21. Matsuoka L, Alexopoulos SP. Surgical Management of Pancreatic Pseudocysts. *Gastrointest Endosc Clin N Am*. 2018;28(2):131-41.
  22. Andersson B, Andrén-Sandberg Å, Andersson R. Survey of the management of pancreatic pseudocysts in Sweden. *Scand J Gastroenterol*. 2009;44(10):1252-8.
  23. Ghimire R et al. *Int Surg J*. 2021 Nov; 8 (11): 3238-3242 *international Surgery Journal*. 202 1;8(11):3242.
  24. Yoon SB, Chang JH, Lee IS. Treatment of Pancreatic Fluid Collections. *Korean J Gastroenterol*. 2018; 72(3):97-103.
  25. Obermeyer RJ, Fisher WE, Salameh JR, Jeyapalan M, Sweeney JF, Brunicaardi FC. Laparoscopic pancreatic cystogastrostomy. *Surg Laparosc Endosc Percutan Tech*. 2003;13 (4):250-3.