

Hospital-Based Retrospective Assessment Study Indications and Outcome of Surgical Management of Local Complications of Acute Pancreatitis

Md. Sarfraz Alam¹, Shahid Ahmed²

¹Senior Resident, Department of General Surgery, Jagannath Gupta institute of medical sciences and Hospital, Budge Budge, Kolkata, West Bengal, India

²Assistant professor, Department of General Surgery, Jagannath Gupta institute of medical sciences and Hospital, Budge Budge, Kolkata, West Bengal, India.

Received: 11-03-2022 / Revised: 19-03-2022 / Accepted: 09-04-2022

Corresponding author: Dr. Shahid Ahmed

Conflict of interest: Nil

Abstract

Aim: To evaluate the indication and outcome of different surgical management modalities in local complications of acute pancreatitis.

Methodology: A hospital-based retrospective study was conducted in the department of surgery Jagannath Gupta institute of medical sciences and Hospital, Budge Budge, Kolkata, West Bengal, India after approval from the institutional ethical committee. A purposive sampling method was utilized to recruit the patients. Patients who underwent laparoscopic, retroperitoneal or open surgical procedures for the management of local complications of acute pancreatitis for 10 months were included. 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 by the surgical team experienced in pancreatic surgery.

Results: 500 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. 24 patients required surgical intervention due to failure of endoscopic or radiological intervention or positions of lesions being inaccessible to these techniques. Among the 24 patients in the study, 4 patients had PPC, all of whom were managed with external drainage due to persistent symptoms. 6 patients who had ANC were initially subjected to conservative management. In addition, WON was noted in 4 patients and 10 patients had pseudo cyst. Due to clinical deterioration and high suspicion of infected necrosis in patients with WON, FNAC was performed in all patients, revealing growth in culture.

Conclusion: Management of patients with local complications of pancreatitis is most effective at a specialized tertiary care centre with pancreatic surgeons. 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.

Keywords: Pancreatitis, necrosis, pseudocyst, endoscope.

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

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 [1]. It 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 [2].

Acute pancreatitis is one of the most common gastrointestinal disorders requiring acute hospitalization worldwide, with a reported annual incidence of 13 to 45 cases per 100000 persons [3]. In the United States, it is the third most common gastrointestinal disorder requiring acute hospitalization [4]. In the United States alone, acute pancreatitis leads to 270000 hospital admissions annually and in-patient costs exceeding 2.5 billion dollars [5]. 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 [6]. Although most patients with acute pancreatitis recover without sequelae, between 10% to 20% will have a more complicated clinical course with higher risks of morbidity and mortality [7]. Severe acute pancreatitis (SAP) requires prolonged hospitalization, frequently including a stay in the intensive care unit (ICU) because of organ dysfunction [8].

Severe pancreatitis is associated with a mortality of 15% to 30%, whereas mortality

from mild pancreatitis is only 0% to 1%, and organ failure is the most important determinant of mortality in acute pancreatitis. However, in approximately 30% of patients with necrotizing pancreatitis, a secondary necrotic infection occurs, mostly 3 to 4 week after the onset of necrotizing pancreatitis[9].

Acute pancreatitis has local and systemic complications. Terminologies used for local complications of acute pancreatitis are based on the revised Atlanta classification 2012 [10]. Acute pancreatitis has two phases, early and late. During the early phase (<4 weeks), the local complications are categorized as Acute peri-pancreatic collection (PPC) and acute necrotic collection (ANC). During the late phase (>4 weeks), walled-off necrosis (WON) and pseudocyst are observed [10,11]. Vascular complications are encountered in both the early and late phases [12]. If the fluid collection is infected within four weeks or remains symptomatic beyond four weeks of onset, intervention is indicated [13].

Timing and modality of intervention for these local complications strongly impact the morbidity and mortality of acute pancreatitis [14]. Less invasive options such as percutaneous drainage or endoscopic drainage techniques will be adequate for managing most cases of local complications. However, minimally invasive (video-assisted or laparoscopic) or open surgical drainage is indicated when these modalities are unavailable or fail to drain the collection adequately [13-15]. 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 Jagannath Gupta institute of medical sciences and Hospital, Budge Budge, Kolkata, West Bengal, India after approval from the institutional ethical committee. A purposive sampling method was utilized to recruit the patients.

Inclusion criteria:

Patients who underwent laparoscopic, retroperitoneal or open surgical procedures for the management of local complications of acute pancreatitis for 10 months

Exclusion criteria:

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 by the surgical team experienced in pancreatic surgery. The local complications of acute pancreatitis were based on the revised Atlanta classification 2012 [10]. All complications were graded according to the Clavien-Dindo classification [16].

Results:

500 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. 24 patients required surgical intervention due to failure of endoscopic or radiological intervention or positions of lesions being inaccessible to these techniques.

Table1: The demographic and clinical characteristics of patients

Variables	N	%
Total number (n)	24	100
Male patients	13	54.17
Female	11	45.83
Median age (years)	47.5+12.42	
Clinical characteristics		
Etiology		
Biliary	10	41.67
Ethanol	13	54.17
Others	1	4.16
Category of pancreatic fluid collection (PFC)/complications		
PPC	4	16.67
ANC	6	25.00
WON	4	16.67
Pseudocyst	10	41.66
Location of the cavity		
Head	9	37.50
Body or tail	15	62.50

Among the 24 patients in the study, 4 patients had PPC, all of whom were managed with external drainage due to persistent symptoms. 6 patients who had ANC were initially subjected to conservative management. However, due to persistent fever and clinical deterioration, contrast-enhanced CT was repeated, revealing features of infected necrosis. Based on CECT findings, 4 patients were treated with VARD, and 1 patient was treated with open necrosectomy and closed

drainage between days 15 to day 21 following the onset of the disease. Due to incomplete drainage in 1 patient who underwent VARD, laparoscopic transgastric necrosectomy was performed on day 21 as CECT revealed a matured wall. In addition, WON was noted in 4 patients. Due to clinical deterioration and high suspicion of infected necrosis in patients with WON, FNAC was performed in all patients, revealing growth in culture.

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

Variables	N	%
Grade 0	3	12.5
Grade 1	6	25.0
Grade 2	9	37.5
Grade 3	1	4.2
Grade 4	5	20.8

All patients underwent laparoscopic or open cystogastrostomy. Among the 10 patients with a pseudocyst, all patients had the size of the cyst more than 6 cm and were symptomatic. 2 patients underwent laparoscopic internal drainage, while 8 others underwent open cystoenterostomy. There was no mortality in this series; 4 patients developed hospital-acquired pneumonia requiring external continuous positive airway pressure ventilation, and 3 patients developed surgical site infections. 1 patient who underwent open necrosectomy had to be re-explored on postoperative day 2 for bleeding. Blood transfusion was required in 9 patients. The mean hospital stay was 14.5 days.

Discussion:

Surgery and its timing are the focus of contention when treating SAP. Decades ago, some experts used laparotomy in the early phase of SAP to debride and drain the retroperitoneal infected necrosis [17]. However, studies have shown that “early” surgery is often accompanied by higher mortality [18], and several studies also have shown that there is success with some SAP patients with retroperitoneal infected necrosis, conservatively managed without high-risk

surgical intervention; therefore, many experts advocated delayed surgery [18, 19]. In recent decades, higher mortality rates during early surgery resulted from those SAP cases that underwent traditional laparotomy (which may cause severe trauma) to debride and drain the retroperitoneal infected necrosis [20].

Faced with high morbidity and mortality rates of operative necrosectomy, minimally invasive strategies are being increasingly explored by gastrointestinal surgeons, radiologists, and gastroenterologists [21]. As technical ability and endoscopic tools have gradually become more precise, the mortality rates of patients with severe pancreatitis have improved, and there are fewer complications compared to those having open debridement treatment [22]. Percutaneous catheter drainage (PCD), endoscopic trans gastric procedures, and a minimally invasive approaches all have been proposed as alternatives to open necrosectomy [23]. When minimal invasive management is unsuccessful or necrosis has spread to locations not accessible by endoscopy, open abdominal surgery is recommended [22].

In this study, ANC and pseudocyst were the commonest peripancreatic fluid collection

requiring surgical intervention. WON and pseudocyst were managed using minimally invasive techniques in more than 80% of the cases. While most cases of ANC were managed using VARD, patients with PPC were managed by laparoscopic and open external drainage techniques. The etiology of the majority of the cases in this study was either biliary or ethanol. In addition, one patient had developed pancreatitis secondary to hypertriglyceridemia. In our study, biliary pancreatitis was common among females, whereas alcoholic pancreatitis was more common among males, as noted with global trends [24].

The primary goal of treatment for acute necrotic collection is to drain the content and remove all infected pancreatic tissues [25]. The available treatment options include open and laparoscopic transperitoneal drainage, image-guided retroperitoneal drainage, and endoscopic transgastric approaches [26]. 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 [27]. In 2010 the results of the trial demonstrated several benefits from the step-up approach over laparotomy [27]. In our series, the “step-up” approach was the primary modality of treatment in ANC.

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 [28,29]. However, if the WON is infected, intervention is warranted in the form of endoscopic drainage or open necrosectomy [26].

Conclusion:

Management of patients with local complications of pancreatitis is most effective at a specialized tertiary care centre with pancreatic surgeons. 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 (2019) Pancreatitis: TIGAR-O version 2 risk/etiology checklist with topic reviews, updates, and use primers. *ClinTranslGastroenterol* 10(6):e00027.
2. Cruz-Santamaría DM, Taxonera C, Giner M. Update on pathogenesis and clinical management of acute pancreatitis. *World J GastrointestPathophysiol.* 2012;**3**:60–70.
3. Yadav D, Lowenfels AB. The epidemiology of pancreatitis and pancreatic cancer. *Gastroenterology.* 2013;**144**:1252–1261.
4. Gooszen HG, Besselink MG, van Santvoort HC, Bollen TL. Surgical treatment of acute pancreatitis. *Langenbecks Arch Surg.* 2013;**398**:799–806.
5. Peery AF, Dellon ES, Lund J, Crockett SD, McGowan CE, Bulsiewicz WJ, Gangarosa LM, Thiny MT, Stizenberg K, Morgan DR, et al. Burden of gastrointestinal disease in the United States: 2012 update. *Gastroenterology* . 2012;**143**:1179–1187.e1-3.
6. Yadav D, Lowenfels AB (2013) The epidemiology of pancreatitis and pancreatic cancer. *Gastroenterology.* 144(6):1252–1261.
7. Wu BU, Johannes RS, Sun X, Tabak Y, Conwell DL, Banks PA. The early prediction of mortality in acute pancreatitis: a large population-based study. *Gut.* 2008;**57**:1698–1703.
8. Beger HG, Rau BM. Severe acute pancreatitis: Clinical course and

- management. *World J Gastroenterol.* 2007;**13**:5043–5051.
9. Besselink MG, van Santvoort HC, Boermeester MA, Nieuwenhuijs VB, van Goor H, Dejong CH, Schaapherder AF, Gooszen HG. Timing and impact of infections in acute pancreatitis. *Br J Surg.* 2009;**96**:267–273.
 10. Banks PA, Bollen TL, Dervenis C. Classification of acute pancreatitis - 2012: Revision of the Atlanta classification and definitions by international consensus. *Gut.* 2013;**62**(1):102-11.
 11. Colvin SD, Smith EN, Morgan DE, Porter KK. Acute pancreatitis: an update on the revised Atlanta classification. *AbdomRadiol (NY).* 2020;**45**(5):1222-31.
 12. Głuszek S, Nawacki Ł, Matykiewicz J, Kot M, Kuchinka J. Severe vascular complications of acute pancreatitis. *Pol PrzChir Polish J Surg.* 2015;**87**(10):485-90.
 13. IAP/APA evidence-based guidelines for the management of acute pancreatitis. *Pancreatology.* 2013;**13**(2):48-53.
 14. Lancaster A, Zwijacz M. Acute pancreatitis and fluid-filled collections: etiology and endoscopic management. *GastroenterolNurs.* 2019;**42**(5):417-9.
 15. Baron TH, DiMaio CJ, Wang AY, Morgan KA. American gastroenterological association clinical practice update: Management of Pancreatic Necrosis. *Gastroenterol.* 2020;**158**(1):67-75.
 16. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg.* 2004;**240**(2):205-13.
 17. Autio V, Juusela E, Lauslahti K, Markkula H, Pessi T. Resection of the pancreas for acute hemorrhagic and necrotizing pancreatitis. *World J Surg.* 1979;**3**:631–639.
 18. Mier J, León EL, Castillo A, Robledo F, Blanco R. Early versus late necrosectomy in severe necrotizing pancreatitis. *Am J Surg.* 1997;**173**:71–75.
 19. Rawee , D. R. Y. A.-., Abdulghani , . M. M. F. ., Alsabea, D. W. M. B. Y., Daoud, D. M. A. ., Tawfeeq, D. B. A.-G. ., & Saeed, D. F. K. . (2021). Attitudes and Intention towards COVID-19 Vaccines among the Public Population in Mosul city. *Journal of Medical Research and Health Sciences,* 4(9), 1438–1445. <https://doi.org/10.52845/JMRHS/2021-4-9-1>
 20. Sarr MG, Nagorney DM, Mucha P, Farnell MB, Johnson CD. Acute necrotizing pancreatitis: management by planned, staged pancreatic necrosectomy/debridement and delayed primary wound closure over drains. *Br J Surg.* 1991;**78**:576–581.
 21. 22. Tu Y, Jiao H, Tan X, Sun L, Zhang W. Laparotomy versus retroperitoneal laparoscopy in debridement and drainage of retroperitoneal infected necrosis in severe acute pancreatitis. *SurgEndosc.* 2013;**27**:4217–4223.
 22. Werner J, Feuerbach S, Uhl W, Büchler MW. Management of acute pancreatitis: from surgery to interventional intensive care. *Gut.* 2005;**54**:426–436.
 23. Chen J, Fukami N, Li Z. Endoscopic approach to pancreatic pseudocyst, abscess and necrosis: review on recent progress. *Dig Endosc.* 2012;**24**:299–308.
 24. Babu RY, Gupta R, Kang M, Bhasin DK, Rana SS, Singh R. Predictors of surgery in patients with severe acute pancreatitis managed by the step-up approach. *Ann Surg.* 2013;**257**:737–750.
 25. Lankisch PG, Apte M, Banks PA. Acute pancreatitis. *Lancet.* 2015;**386**:85-96.
 26. Lancaster A, Zwijacz M. Acute pancreatitis and fluid-filled collections: etiology and endoscopic management. *GastroenterolNurs.* 2019;**42**(5):417-9.
 27. Baron TH, DiMaio CJ, Wang AY, Morgan KA. American gastroenterological association clinical

- practice update: Management of Pancreatic Necrosis. *Gastroenterol.* 2020;158(1):67-75.
28. 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.
29. Dalsania R, Willingham FF. Treatment of walled-off pancreatic necrosis. *Curr Opin Gastroenterol.* 2019;35(5):478-82.