

Open Necrosectomy for Necrotizing Pancreatitis: An Institutional Experience

Dharma Reddy¹, Vivaan Dutt², Gururaj Gundad³, Sahana N⁴

¹Associate Professor, Department of Surgical Gastroenterology, Vijayanagar Institute of Medical Sciences, Bellary

^{2,3,4}Postgraduate, Department of General Surgery, Vijayanagar Institute of Medical Sciences, Bellary

Received: 30-03-2023 / Revised: 26-04-2023 / Accepted: 29-05-2023

Corresponding author: Dr N Sahana

Conflict of interest: Nil

Abstract

Background: The natural history of necrotizing pancreatitis is variable. Infected pancreatic necrosis is an indication for intervention, and requires intensive monitoring and surgical care in a well-equipped setup.

Aim: We described our institutional experience in the management of 25 patients with infected pancreatic necrosis using open approaches.

Methods: 25 patients who presented to our institution between 2014 and 2018 were enrolled into this study retrospectively. Once assessed to have severe AP, they were shifted to the ICU and resuscitation was done. Necrosectomy with percutaneous drainage was the surgical technique adopted, with gastrostomy where feasible. Patient outcomes were measured in terms of mortality, complications and length of post-operative stay.

Results: Patients underwent the procedure at a mean timing of 23.52 ± 3.14 days. The most common etiology was chronic alcohol consumption, followed by biliary stone. The average duration of surgery was 122.8 ± 23.37 minutes. 6 patients (24%) developed complications post operatively. Mortality in the post-operative period was 4 patients (16%)

Conclusion: Increasingly a step-up approach is advocated in the surgical management. Our study indicates that in a tertiary care center, open debridement is often the optimal approach. It also provides a valuable contemporary comparison group to minimally-invasive approaches.

Keywords: Pancreatitis, Acute Necrotizing, Debridement, Tertiary Care Centers.

This is an Open Access article that uses a funding 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 has a reported annual incidence of 13–45 cases per 100,000 persons [1] It may be a mild, self-limiting episode in the majority of patients, but around 15-20% of patients develop complications, termed severe acute pancreatitis. Necrotizing pancreatitis is necrosis involving the pancreatic, and/or surrounding peri-pancreatic tissues. [2]

The revised Atlanta classification [3] defines clinical entities associated with pancreatic necrosis. Initially poorly demarcated necrotic tissue is called an acute necrotic collection, which progressively demarcates and after 4 weeks is called a walled off necrosis.

The natural history of necrotizing pancreatitis is variable as it may remain solid or liquefy, remain sterile or become

infected over time. Risk of infection of the necrosis correlates with the size of the necrotic tissue, and increases with time. [2]

Patients with necrosis usually present with features of systemic inflammation in association with multiorgan dysfunction syndrome (MODS), and gradually may develop signs of infection such as tachycardia, fever and hemodynamic instability.

The current standard of care in treating AP has been outlined by the International Acute Pancreatitis (IAP) guidelines where debridement and drainage is advised for infected pancreatic necrosis (IPN). Surgery is also advised for symptomatic organized necrosis and sterile necrosis with clinical deterioration. [4]

Infected pancreatic necrosis is an indication for intervention. Available methods for intervention include the open approach, the minimally invasive approaches with percutaneous catheter placement, laparoscopic and retroperitoneoscopic approach, and endoscopic approach. [5]

Increasingly a step-up approach is advocated in the surgical management. However, in resource limited centers, open debridement is often the optimal approach.

We describe our institutional experience in the management of 25 patients with infected pancreatic necrosis using open approaches.

Materials and Methods

We conducted a retrospective study involving 25 patients who had presented to our institution between 2014 and 2018, were enrolled into our study and all case details were accessed. Necessary institutional ethics committee approval was taken prior to commencing the study. 9 patients were clinically stable with complaints of abdominal pain and fever; with the rest presenting to the ER and requiring initial stabilization. Once assessed to have severe AP, they were

shifted to the ICU and resuscitation was done. Diagnosis of infected necrotizing pancreatitis was made using clinical and CECT abdomen & pelvis findings. Workup included routine blood investigations and ultrasound abdomen in addition to CECT abdomen and pelvis. Ryle's tube was inserted for all patients and urinary catheterization done. Antibiotic Imipenem was started in all cases once diagnosis was confirmed.

Technique of Surgery

Under general anesthesia, midline vertical or rooftop subcostal laparotomy incisions were taken. Lesser sac was opened and pancreas visualized. Open necrosectomy with percutaneous drainage was the procedure done, where all necrotic collection and debris was drained and loosely attached necrotic tissue was debrided. Thorough saline wash given, and two drains placed within the lesser sac on opposite sides. Lesser sac closed to form a closed cavity for drainage. Where applicable, a cysto-gastrostomy was performed between the posterior wall of stomach and pancreatic collection. Distal pancreatectomy was done in selected case using standard procedure. Cases extubated immediately post operation where feasible.

Postoperatively, patients were shifted to the SICU, and shifted out to the wards once stable. Ryle's tube was maintained post operatively until feeds were allowed orally. Drain output was strictly monitored, as were clinical parameters. Lavage for closed drainage given 2-3 times post-operatively depending on output.

Drains were removed after 2 weeks, once output was clear fluid and <25cc for 3 consecutive days. Fortnightly review was advised at discharge, with regular surgical site care and alternate day dressing. Long term 6 monthly follow up was advised.

Results

The demography and clinical profile of the 25 patients were compared. Majority of the

patients were < 40 years old, with mean age of 38 ± 13.78 years. Twenty-four patients were males. (Table 1)

The most common etiology was chronic alcohol consumption, followed by biliary stone. Operative procedure followed was necrosectomy with percutaneous drainage for 13 patients and in 11 cases where feasible, gastrostomy was done. One patient required distal pancreatectomy due to extensive necrosis of pancreatic tail region.

Majority of patients underwent the procedure beyond 3 weeks of onset, with a mean timing of 23.52 ± 3.14 days.

The average duration of surgery was 122.8 ± 23.37 minutes. (Table 2)

Patient outcomes were measured in terms of mortality, complications and length of post-operative stay. 4 patients died in the post-operative period. All deaths were as a result of septicemic shock, and in 3 cases this was secondary to abdominal abscess.

6 patients (24%) developed complications post operatively. 3 developed intra-abdominal abscess collections, while one patient had adynamic obstruction, managed conservatively. One patient required repeat necrosectomy. One patient developed a chronic percutaneous fistula, with active discharge. Treated surgically by pancreaticojejunostomy.

Average post-op hospital stay was 12.58 ± 5.51 days. (Table 3)

Table 1: Age and sex wise distribution of the patients with pancreatitis (n=25)

Variable		Frequency	Percentage
Age group			
	21 - 30 yrs	9	36
	31 - 40 yrs	8	32
	> 40 yrs	8	32
	Mean \pm SD	38 ± 13.78 yrs	
Sex			
	Female	1	4
	Male	24	96

Table 2: Clinical Profile of the patients with pancreatitis (n=25)

Variable		Frequency	%
Etiology			
	Alcohol	14	56
	Alcohol, smoking	1	4
	Biliary stone	5	20
	Idiopathic	5	20
Type of necrosis			
	Acute necrotic collection	13	52
	Walled off necrosis	12	48
Indication for surgery			
	Clinical deterioration	14	56
	Infected necrosis	11	44
Operative procedure			
	Necrosectomy with percutaneous drainage	13	52
	Necrosectomy with gastrostomy	11	44
	Necrosectomy with distal pancreatectomy	1	4
Timing of necrosectomy			
	15th day	3	12
	16 - 20 days	3	12

	21 - 25 days	10	40
	> 25 days	9	36
	Mean \pm SD	23.52 \pm 3.14 days	
Duration of surgery			
	Mean \pm SD	122.8 \pm 23.37 minutes	

Table 3: Outcome among patients with pancreatitis (n=25)

Variable		Frequency	%
Complications			
	Abdominal abscess	3	12
	Intestinal obstruction	1	4
	Percutaneous fistula	1	4
	Repeat necrosectomy	1	4
	No complications	19	76
Mortality			
	Survived	21	84
	Death	4	16
Post op stay			
	Mean \pm SD	12.58 \pm 5.51 days	

Discussion

Severe acute pancreatitis represents a small but significant subset of patients requiring emergent and intensive care. Necrotizing pancreatitis accounts for 5%–10% of cases of acute pancreatitis [6]

Pancreatic necrosis is a potentially lethal condition and mortality rates of up to 40% have been reported from this condition [7]

Bacterial translocation mainly from the gut is the most widely accepted mechanism in the pathogenesis of infected pancreatic necrosis.[8]

The current revised Atlanta Classification includes new definitions that more accurately describe the various types of collections encountered: APFC, pseudocyst, ANC, and WON. The important distinctions for classifying collections correctly are the time course (\leq 4 weeks or $>$ 4 weeks from onset of pain) and the presence or absence of necrosis at imaging [9]

Contrast-enhanced computed tomography (CE-CT) is currently the diagnostic method of choice in detection of pancreatic

necrosis, and the Balthazar index has a strong predictive value in correlating with patient morbidity and mortality [10]

Surgical necrosectomy was the mainstay of NP treatment a decade ago. However, at present the management of NP has undergone a paradigm shift toward minimally invasive techniques. minimally invasive approaches include a step-up approach that incorporates percutaneous catheter or endoscopic transluminal drainage followed by video-assisted retroperitoneal or endoscopic debridement. [11]

The PANTER trial established a step-up approach or open necrosectomy for necrotizing pancreatitis. [12] However open necrosectomy continues to retain a role in management, in the case of infected necrosis, as well as in patients showing a clinical deterioration despite optimal ICU care. [2]

Among the series with open necrosectomy described in the recent past after advent of minimally invasive techniques, Babu et al. [13] studied 1535 patients admitted with acute pancreatitis. Twenty-eight (1.8%) of

all admissions underwent open surgical necrosectomy. The median APACHE II score on admission was 10.5 (5–26) total of 6 (22%) episode-related deaths. The median delay between admission to our unit and necrosectomy was 34 (5–149) days. Postoperative pancreatic fistula developed in 4 patients.

Another case series was reported by Fernandez-del Castillo. [14] 64 patients with necrotizing pancreatitis were treated with necrosectomy followed by closed packing of the cavity. Patients underwent surgery a median of 31 days after diagnosis. The mortality rate was 6.2%.

In a series by Rodriguez et al. [15] 6.8% (167 of 2449 admissions) required open necrosectomy with an overall operative mortality of 11.4%

In Ashley et al. [16] there were 99 (9%) patients with necrotizing pancreatitis treated, with 7 deaths (14%). 31 patients (86%) underwent debridement and closure over drains. Nineteen (34%) of these patients developed major complications. Most common were persistent pancreatic or enteric fistulas (9% each) and endocrine or exocrine insufficiency (15%). Eight (23%) required re-exploration.

Thus, the overall outcomes are comparable in terms of morbidity, complications and mortality although the numbers studied are fewer in our study. Open necrosectomy is a well-documented procedure at present, with well-studied complications and our study shows that it allows acceptable outcomes when performed by trained hands. It continues to play an important role in tertiary care centers with large patient load, late patient presentation and limitation in availability of advanced equipment, especially in semi-rural centers like ours.

Our study also holds significance in that it provides a valuable contemporary comparison group to the many case series'

studying minimally invasive approaches. [13]

References

1. D. Yadav, A.B. Lowenfels. The epidemiology of pancreatitis and pancreatic cancer *Gastroenterology*, 2013;144: 1252-1261
2. Maingot, Rodney, Michael Zinner, Stanley W. Ashley, and O J. Hines. *Maingot's Abdominal Operations.*, 2019. Internet resource.
3. Besselink M, Van Santvoort H, Freeman M, et al. IAP/APA evidence-based guidelines for the management of acute pancreatitis. *Pancreatology*. 2013; 13: E1–E15.
4. Mathew MJ, Parmar AK, Sahu D, Reddy PK. Laparoscopic necrosectomy in acute necrotizing pancreatitis: Our experience. *J Minim Access Surg*. 2014;10(3):126-131.
5. Kokosis G, Perez A, Pappas TN. Surgical management of necrotizing pancreatitis: an overview. *World J Gastroenterol*. 2014;20(43):16106-16112.
6. Banks PA, Bollen TL, Dervenis C et al. Classification of acute pancreatitis 2012: revision of the Atlanta classification and definitions by international consensus. *Gut*. 2013; 62(1):102–111.
7. Beattie GC, Mason J, Swan D, et al. Outcome of necrosectomy in acute pancreatitis: the case for continued vigilance. *Scand J Gastroenterol*. 2002; 37:1449–1453.
8. Medich D.S., Lee T.K., Melhem M.F., Rowe M.I., Schraut W.H., Lee K.K. Pathogenesis of pancreatic sepsis. *Am. J. Surg.*, 1993; 165: 46-52.
9. Foster BR, Jensen KK, Bakis G, Shaaban AM, Coakley FV. Revised Atlanta classification for acute pancreatitis: a pictorial essay. *Radio Graphics*. 2016;36(3):675–687.
10. Balthazar, E.J. Acute pancreatitis: assessment of severity with clinical

- and CT evaluation. *Radiology*, 2002; 223: 603-613.
11. Chang YC. Is necrosectomy obsolete for infected necrotizing pancreatitis? Is a paradigm shift needed? *World J Gastroenterol.* 2014;20(45):16925-16934.
 12. van Santvoort HC, Besselink MG, et al., Dutch Pancreatitis Study Group. *N Engl J Med.* 2010 Apr 22; 362(16): 1491-502.
 13. Babu, Benoy I, Sheen, Aali J et al.; Open Pancreatic Necrosectomy in the Multidisciplinary Management of Post inflammatory Necrosis, *Annals of Surgery*: May 2010; 251(5):783-786.
 14. Rodriguez JR, Razo AO, Targarona J, et al. Debridement and closed packing for sterile or infected necrotizing pancreatitis: insights into indications and outcomes in 167 patients. *Ann Surg.* 2008;247(2):294-299.
 15. Fernández-del Castillo C, Rattner DW, Makary MA, Mostafavi A, McGrath D, Warshaw AL. Debridement and closed packing for the treatment of necrotizing pancreatitis. *Ann Surg.* 1998;228(5):676-684.
 16. Ashley SW, Perez A, Pierce EA, et al. Necrotizing pancreatitis: contemporary analysis of 99 consecutive cases. *Ann Surg.* 2001;234(4):572-580.