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STUDY OF OUTCOME VARIABLES OF LAPAROSCOPIC NECROSECTOMY IN PATIENTS WITH NECROTIZING PANCREATITIS

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ABSTRACT

Introduction: Acute pancreatitis (AP) a heterogeneous disease is known to have potential to be fatal. In India, the prevalence is 8.6 per 100,000 men and 8.0 per 100,000 women, respectively. On general, 20 % of acute pancreatitis patients experience a severe course. Acute necrotizing pancreatitis is characterized by acute necrotic collections (ANCs), which can be seen on contrast-enhanced computed tomography and include fluid and varying levels of necrotic tissue (CT). In an effort to lessen the mortality and significant morbidity of open surgery for severe necrotizing pancreatitis, minimal access surgical methods have been described. Because in the majority of the patients, the area of necrosis is limited to the lesser sac, minimal access retroperitoneal technique has significant limitations for primary debridement of the necrotic sequestrum. With these objective present study was undertaken to study postoperative complications in terms of gastrointestinal fistula, hemorrhage or recurrence & outcome variables as length of hospital stay, morbidity & mortality in patients of necrotizing pancreatitis (NP) **Materials and Methods:** 18 adult patients admitted in the Department of Surgery and underwent laparoscopic necrosectomy for necrotizing pancreatitis fulfilling inclusion and exclusion criteria were enrolled. Upon enrolment, all the patients were subjected to detailed history and clinical examination and laboratory investigations. On the next day, CECT of abdomen was performed and diagnosis of NP was reached. Once clinical diagnosis was reached, patients were evaluated pre-operatively and posted for laparoscopic necrosectomy **Observations and Results:** Mean hospital stay were 20.89 ± 8.55 days. Majority of the patients had new onset infection (22 %) and new onset MOF (11 %). While, least number of the patients had intraabdominal bleeding and pancreatic fistula (each 6 %). Majority of the patients did not require recurrent intervention (89 %). While, 2 (11 %) required recurrent intervention. Majority of the patients survived and were discharged (89 %). While, only 2 (11 %) patients died. Both patients died due to sepsis induced MOF. Among 2 patients with < 30% necrosis, 1 patient each (50 %) had AP due to gall stone and alcohol. Of 11 patients with 30 – 50% necrosis, 6 (54.55 %), 3 (27.27 %), 1 (9.09 %), and 1 (9.09 %) patient had AP due to gall stone, hyperlipidemia, alcohol, and idiopathic causes, respectively. Among 5 patients with > 50 % necrosis, 4 (80 %) patients had AP due to alcohol, and 1 (20 %) had AP due to gall stone. No statistically significant correlation found between Causes of AP and Extent of necrosis **Conclusion:** To conclude, laparoscopic pancreatic necrosectomy is a safe approach in patients with PN. It is found to be associated with reduced incidence of major complications and mortality

KEYWORDS

AP, NP

INTRODUCTION

Acute pancreatitis (AP) a heterogeneous disease is known to have potential to be fatal. In India, the prevalence is 8.6 per 100,000 men and 8.0 per 100,000 women, respectively[1]. On general, 20 % of acute pancreatitis patients experience a severe course, and their fatality rate ranges from 10 % to 30 %[2,3]. In the USA, AP caused 2770 fatalities in 2017, or 0.9 per 100,000 people[4]. The 2012 revision of the Atlanta Criteria categorises AP as mild, moderately severe, and severe[5]. At its worst, acute pancreatitis (AP) progresses to septic necrotizing pancreatitis with organ failure, which has a death rate that can reach 35%[6]. Gallstone disease and excessive alcohol intake are the two main causes of pancreatitis, but a number of other factors are likely at play when determining which people may develop AP[7]. In order to improve survival and reduce anatomic and physiological sequelae, significant effort is being made to analyse the efficiency of various therapeutic approaches because infected necrotizing pancreatitis is a difficult condition to treat. The occurrence of necrosis, ARDS, AKI, and systemic consequences are among the serious risks of severe pancreatitis that could be fatal. The mortality rate for the same continues to be 15%, and in the event of infected necrosis, it may reach 30%. In specialized tertiary hospitals offering multidisciplinary care, improvements in critical care, improved imaging, early radiological intervention, and evidence-based management can lower the death rates[8,9,10]. Acute necrotizing pancreatitis is characterized by acute necrotic collections (ANCs), which can be seen on contrast-enhanced computed tomography and include fluid and varying levels of necrotic tissue (CT). In contrast-enhanced CT, walled off necrosis (WON), a clearly defined collection of necrotic tissue with an enhancing wall of reactive tissue, often develops four weeks after the commencement of necrosis. Moreover, several cases of this could be seen outside of the pancreas.

For critically ill patients with necrotizing pancreatitis, there has been a noticeable improvement in prognosis during the previous 20 years. In the 1970s, mortality rates of more than 50% were frequently recorded, but today they are less than 20%[11,12,13]. There has been a significant decrease in acute necrotizing pancreatitis mortality as a result of a number of reasons. Early mortality from hemodynamic insufficiency and systemic inflammatory response syndrome has been significantly reduced as a result of advances in critical care and the widespread availability of physicians with training in critical care. Interventional radiological methods have advanced to the point where they eliminate the necessity for or enable the timing of surgical intervention. Surgery, imaging, gastroenterology, and critical care have all worked together as a multidisciplinary team to use surgical intervention sparingly. Pancreatic necrosectomy surgery has a defined technique of removal of a sequestrum of clearly identifiable necrotic tissue that is easily separable from surrounding viable tissue during surgery. Also, it is now known that the ideal timing for surgery should take place, at the very least, 2 to 3 weeks after the onset of pancreatitis to allow a sequestrum to form, eliminating the significant morbidity and mortality associated with early pancreatic resections. Although the surgical death rate for acute necrotizing pancreatitis has decreased dramatically, there is still a large financial burden on the patient from surgical therapy as well as long- and short-term morbidity. In an effort to lessen the mortality and significant morbidity of open surgery for severe necrotizing pancreatitis, minimal access surgical methods have been described[14,15,16,17,18,19,20]. For draining infected fluid, these methods either use an endoscopic[14,20,21] or a laparoscopic[18,19] retro-peritoneal approach. Because in the majority of the patients, the area of necrosis is limited to the lesser sac, minimal access retroperitoneal technique has significant limitations for primary debridement of the necrotic sequestrum. The documented experience of primary debridement of necrotic pancreatic and peripancreatic debris during minimal access surgery utilising transperitoneal procedures comparable to those employed during open surgery is limited to anecdotal studies[15,22]. Given the aforementioned gap in the literature, the current study examined postoperative complications in patients with necrotizing pancreatitis, including gastrointestinal fistula, bleeding, and recurrence, as well as outcome variables such length of hospital stay, morbidity, and mortality (NP)

AIMS & OBJECTIVES

1. To study postoperative complications in terms of gastrointestinal fistula, haemorrhage or recurrence

2. To examine postoperative hospital, stay duration, morbidity, and death in necrotizing pancreatitis patients

MATERIAL AND METHODS

The current study was conducted from September 2022 to January 2023 in Nagpur, Maharashtra, in the surgery department of the Indira Gandhi Government Medical College & Hospital. Before beginning the current investigation, authorization from the institutional ethical committee was obtained. 18 adult patients who met the inclusion and exclusion criteria and underwent laparoscopic necrosectomy for necrotizing pancreatitis were admitted to the department of surgery. All participants in the study were informed about it, and their written informed consent was obtained.

Inclusion Criteria

1. Patients of age between 18 and 65 years of both gender
2. Patients with progressive sepsis or who were clinically stable but experienced intermittent episodes of sepsis, particularly during attempts at introducing an oral diet
3. Patients who remained persistently symptomatic after the onset of severe pancreatitis (including persistent symptoms of nausea, episodic emesis, or significant abdominal pain), and failure to tolerate an oral diet or a failure to thrive

Exclusion Criteria

1. Patients aged less than 18 or more than 65 years
2. Patients who had undergone any intervention previously
3. Patients with coagulopathy, immunocompromised state, Significant co-morbidities
4. Pregnant women
5. Patients refusing consent.

Procedure

Upon enrolment, all the patients were subjected to detailed history and clinical examination and laboratory investigations. On the next day, CECT of abdomen was performed and diagnosis of NP was reached. Once clinical diagnosis was reached, patients were evaluated pre-operatively and posted for laparoscopic necrosectomy.

Pancreatic Debridement

The patient was placed in a left lateral posture with a beanbag supporting their bodies at a 60-degree angle when the pancreatic necrosis and collection were primarily in the smaller sac or the left paracolic gutter. If the necrotic areas were predominantly in the right paracolic gutter and retro duodenal area, then the patient was placed in a right lateral position using a beanbag. For the majority of the procedures, we used 3 ports: a hand access device and two 10- to 12-mm standard laparoscopic ports (Figure 1).

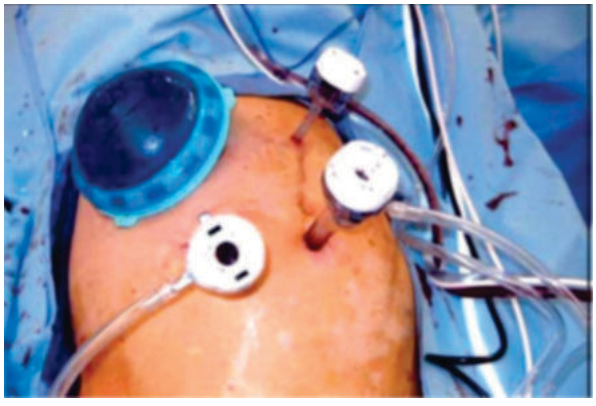


Fig 1: Pancreatic Debridement

Laparoscopic Necrosectomy

The transverse mesocolon was used to access the smaller sac via an infracolic technique. The transverse colon and omentum pad were briefly swept into the upper abdomen. A tiny incision was made in the transverse mesocolon immediately superior and lateral to the duodenojejunal flexure (DJ flexure) after locating its location. We found that this area is usually indurated and is often covered with small bowel adhesions. The small bowel adhesions are swept away and the transverse mesocolon is visualized. Because of pressure from collected fluid and/or necrotic tissue in the smaller sac, the transverse mesocolon in this region is frequently discoloured, thinned down, and bulges into the infracolic compartment. Gentle dissection into this transverse mesocolon with a 5-mm Endo dissector readily allows access to the lesser sac behind the stomach. When entry is gained to the smaller sac, it is frequently met with an outpouring of the dark grey material that is indicative with pancreatic necrosis. A finger injected through the hand access port helps to widen the opening and prevent any damage to the middle colic vessels. The transverse mesocolon opening is digitally enlarged using the hand. To allow insertion of the palm into the smaller sac, the incision is widened (Figure 2), and all necrotic material that readily yields to gentle finger dissection is removed. Avoid pulling on tissues that are resistant to mild finger dissection in order to prevent damaging any vascular structures in the smaller sac. Any bleeding in the smaller sac or during the retrocolic dissection was clearly seen. Patients with a stiff, bulky, or engorged omental pad may not be good candidates for this treatment because bleeding from ruptured omental adhesions can occasionally be difficult to see. With this technique, we were able to debride all the necrotic areas in the lesser sac and often extensions to the left paracolic gutter and the head of the pancreas if these regions communicate with the lesser sac. The greater omentum, which is located between the stomach and colon, has also been employed as a direct route to the lesser sac. A retroduodenal approach or dissection at the root of the mesocolon is frequently required to enter the region of the head of the pancreas in order to gain access to collections on the right side. After the debridement is completed, a triple lumen sump drain and a suction drain are left behind for postoperative drainage.

Fig 2: Laparoscopic View Of The Debrided Lesser Sac Cavity

Statistical Analysis

Statistical analysis was performed using SPSS software, version 20. Data are expressed as mean ± SD & frequency with percentages N (%). Statistical significance was assumed if P value less than 0.05.

OBSERVATION AND RESULT

Table 1: Distribution of Clinical History

Sr No	Variables	Number of Cases N (18)	Percentage %
1	Age		
	a. 18 to 30	2	11 %
	b. 31 to 40	11	61 %
	c. 41 to 50	4	23 %
	d. > 50	1	6 %
2	Gender		
	a. Male	12	67 %
	b. Female	6	33 %
3	Comorbidities		
	a. COPD	3	17 %
	b. Asthma	2	11 %
	c. Diabetes	2	11 %
	d. CKD	2	11 %
	e. Hypertension	1	6 %
4	Causes		
	a. Gall stone	8	44 %
	b. Alcohol	6	33 %
	c. Hyperlipidaemia	3	17 %
	d. Idiopathic	1	6 %

The majority of the patients were between the ages of 31 and 40 (61%) with 41 to 50 (23%) and 18 to 30 (11%) following closely behind. The least amount of patients (6%), however, were above 50. Patients ranged in age from 23 to 55 years old, with a mean age of 37.83 7.86 years. The male to female ratio of the patients was 2, with the majority being men (67%) The three comorbid conditions with the highest

prevalence were COPD (17%), asthma, diabetes, and chronic renal disease (each 11%). Hypertension, however, was the least frequent comorbidity (6%). Gallstones (44%) were the most frequent cause of NP, followed by alcohol (33%) and hyperlipidemia (17%). Idiopathic causes of NP were the least frequent (6%).

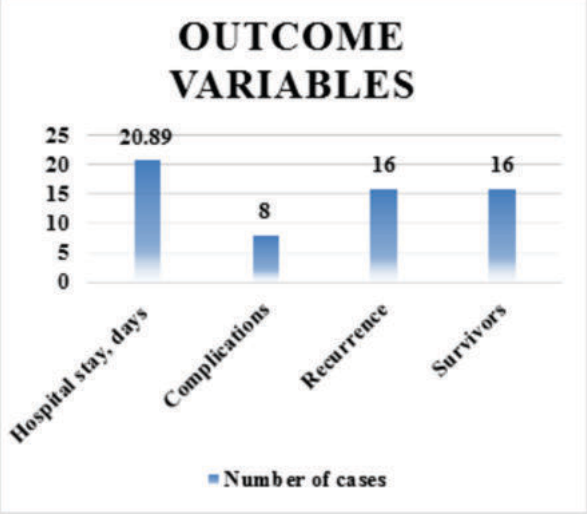
Table 2: Distribution Of Disease Severity Parameters

Sr No	Variables	Number of Cases N (18)	Percentage %
1	ASA a. II b. III c. IV	 2 12 4	 11 % 67 % 22 %
2	APACHE II score	14.89 ± 4.98	7 – 24
3	SOFA score	5.11 ± 1.81	2 – 9
4	CT severity score	8.11 ± 1.02	7 – 10
5	Extent of necrosis a. < 30% b. 30 – 50% c. > 50%	 2 11 5	 11 % 62 % 27 %

The majority of the patients (67%) and (22% of them) had an ASA status of III or IV. Although the fewest patients (11%) had an ASA status of II. The average SOFA, APACHE II, and CT severity scores were 5.11 ± 1.81, 14.89 ± 4.98 and 8.11 ± 1.02 respectively. The majority of the patients (62%) and those (27%) with pancreatic necrosis of greater than 50% had it. Yet, only 11% of the patients showed pancreatic necrosis that was less than 30%

Table 3: Distribution Of Outcome Variables

Sr No	Variables	Number of Cases N (18)	Percentage %
1	Hospital stay, days	20.89 ± 8.55	8 – 36
2	Complications a. New onset infection b. New onset MOF c. Intraabdominal bleeding d. Pancreatic fistula e. Enterocutaneous fistula	 4 2 1 1 0	 22 % 11 % 6 % 6 % 0 %
3	Recurrence a. Present b. Absent	 16 2	 89 % 11 %
4	Outcome a. Survivors b. Non-survivors	 16 2	 89 % 11 %



Graph 3: Distribution Of Outcome Variables

Hospital stays on average lasted 20.89 ± 8.55 days. The majority of the patients (22%) and those with new-onset MOF (11%) both had infections. While only 6% of patients each experienced pancreatic fistulas and intraabdominal haemorrhage. The majority of the patients (89%) didn't need ongoing treatment. While 2 (11%) required ongoing assistance. The majority of the patients (89%) recovered and were released. Only 2 (11%) patients passed away. Due to sepsis-induced MOF, both patients passed away

Table 4: Correlation of Causes of AP with Extent of necrosis

Causes of AP	Extent of necrosis, n (%)			P Value
	30% (n=2)	30 – 50% (n=11)	> 50% (n=5)	
Gall stone (n=8)	1 (50 %)	6 (54.55%)	1 (20%)	0.181 (NS)
Alcohol (n=6)	1 (50%)	1 (9.09%)	4 (80%)	
Hyperlipidemia (n=3)	0 (0%)	3 (27.27%)	0 (0%)	
Idiopathic (n=1)	0 (0%)	1 (9.09%)	0 (0%)	

One patient (50%) each had AP caused by a gall stone and alcohol among the two patients with less than 30% necrosis. Six patients (54.55 %), three (27.27 %), one (9.09 %), and one (9.09 %) of the 11 patients with 30 to 50% necrosis, respectively, had AP caused by gall stones, hyperlipidemia, alcohol, and idiopathic reasons. Four (80%) of the five patients with > 50% necrosis had alcohol-related AP, while one (20%) had gallstone-related AP. Causes of AP and the extent of necrosis did not have a statistically significant relationship

DISCUSSION

A common gastrointestinal condition with a potentially fatal danger is acute pancreatitis (AP). About 20 % of AP is caused by necrotizing pancreatitis (NP)[23]. Although though surgical necrosectomy with laparotomy has a postoperative mortality rate of 20–40 % and a morbidity rate as high as 78 %, it is still the gold standard treatment for symptomatic pancreatic necrosis[24,25]. In order to reduce perioperative trauma and its detrimental effects on organ function, minimally invasive approaches have been established for the management of infected NP. Nowadays, AP is treated with endoscopic, radiographic, laparoscopic, and hybrid methods that combine various minimally invasive modalities. We conducted a prospective, observational, single-centre, cross-sectional study to assess the results of laparoscopic pancreatic necrosectomy done on 18 patients with NP based on the documented safety and benefits of this treatment in the western population. Discussion follows the present study's findings

Patients in the current study ranged in age from 23 to 55, with a mean age of 37.83 ± 7.86 years. The male to female ratio of the patients was 2, with the majority being men (67 %) Gall stones were the most frequent cause of AP in the current study (44 %) and were followed by alcohol (33 %) and hyperlipidemia (17 %). Similar to the current study, Garg et al (2020)[26] found that the average age of patients undergoing laparoscopic surgery was 34.11 ± 2.7 years, with a range of patients' ages from 14 to 59. Males were primarily impacted, according to Han et al (2022)[27] and the male-to-female ratio was 2. They discovered that the most frequent causes of AP were gall stones (43.33%), alcohol (20%), and hypertriglyceridemia (15.56%). The mean APACHE II, SOFA, and CT severity scores in the current investigation were 14,89 ± 4,98, 5,11 ± 1,81, and 8,11 ± 1,02, respectively. Similar to the current study, Han et al (2022)[27] discovered that the mean CT severity score, median SOFA score, and median APACHE II score, respectively, were 8 (7-15), 0 (0-4), and 7.2. In the current investigation, the majority of the patients (61.11 %) and those with pancreatic necrosis greater than 50 % (27.78 %) had this condition. However, the least amount of patients (11.11 %) showed pancreatic necrosis that was less than 30 %. Han et al (2022)[27] observed that, similarly to the current study, 63.33 %, 25.56 %, and 11.11 % of patients had pancreatic necrosis that was between 30 and 50%, > 50%, and 30%, respectively. In their study, Cao et al (2021)[28] found that, respectively, 7.69%, 23.08%, and 69.23% of the patients showed pancreatic necrosis between 30% and 50%. 8 (44.44%) of the individuals in the current study experienced problems. The majority of the patients (22.22%) and new onset MOF (11.11%) were present. Although the least amount of patients (5.56% each) suffered pancreatic fistulas and intraabdominal haemorrhage. Two individuals (11.11%) required ongoing treatment. Additionally, sepsis-induced MOF caused the deaths of 2 (11.11%) individuals. In their study, Cao et al (2021)[28] found that 19 patients experienced postoperative problems, with an overall morbidity of 39.6%. Twelve individuals' infection symptoms persisted after the initial operation. Further percutaneous draining was performed on four individuals and surgery was performed on eight others. During their second or third procedure, three patients passed away as a result of widespread organ dysfunction brought on by uncontrollable septic shock. Additionally, 48 patients underwent successful laparoscopic surgery, while 5 patients passed away from severe haemorrhage or uncontrollable sepsis. Mortality was 9.4 % overall. Han et al (2022)[27] reported in another study that 6.67 % of patients died and 18.89% experienced problems. Pancreatic fistula (14.44 %), new-onset MOF (8.89 %), intraabdominal haemorrhage (7.78 %), and new-onset infection (6.67

%) were among the complications. The limited sample size in the current study may be to blame for the discrepancy in results. According to Mathew et al (2014)[29] pancreatic fistula occurred in 28.6 % of patients, recall occurred in 10.7 %, wound infection occurred in 10.7 %, and death occurred in 3.6 % of patients.

CONCLUSION

Throughout the past 20 years, there have been significant changes in the management of infected necrotizing pancreatitis, and these changes continue today thanks to increased knowledge, innovative treatments, and continuous research. With better anatomical identification, laparoscopic necrosectomy appears to overcome the main drawback of the retroperitoneal approach, which was that the necrotic tissue was not completely debrided. This procedure provides better exposure of the lesser sac, left paracolic gutter, and head of the pancreas. Moreover, it might make fluid collections that are resistant to endoscopic approaches easier to reach. They might make it easier to debride the necrotic cavity more thoroughly. To conclude, laparoscopic pancreatic necrosectomy is a secure procedure for PN patients. It has been discovered to be linked to a lower incidence of serious complications and mortality.

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