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Surgical and Interventional Management and its Outcome in Severe Acute Pancreatitis

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Abstract **Original Research Article**

Background: Acute pancreatitis is an acute inflammation of the pancreas resulting from an auto-digestion of the gland. Acute pancreatitis represents a spectrum of disease ranging from a mild, self-limited course to a rapidly progressive, severe illness. In 20–25% of acute pancreatitis are severe, characterized by the development of pancreatic or peri-pancreatic necrosis, resulting in general and local complications responsible for a high mortality rate. The most common indication for intervention in acute pancreatitis is for the treatment of complications and most notably the treatment of infected walled off necrosis. ***Aims:*** The aim is to study the intervention to surgery and its outcome in managing severe acute pancreatitis and its complications. ***Methods:*** A total of 36 patients with severe acute pancreatitis with its complications not responding to conservative treatment were studied. In this prospective observational study, patients were divided based on the mode of treatment received: percutaneous drainage with pigtail catheterisation, endoscopic cystogastrostomy/drainage procedure and necrosectomy (in patient failed to respond by other intervention). ***Results:*** In our study, out of 36 patient 22 patient are treated with percutanous drainage with pig tail catheterization,8 patient are treated with endoscopic cystogastrostomy,6 patient underwent necrosectomy (3 patient underwent minimally invasive laparoscopic necrosectomy and 3 underwent open necrosectomy).Higher complication occured in patient underwent surgical intervention.Mortality occurred in 80% of patient who underwent necrosectomy. Most common cause of death is sepsis with multi organ failure. ***Conclusion:*** Surgeons have an important contribution to make in the multidisciplinary care of patients with complicated acute pancreatitis .Patients with acute pancreatitis should be managed conservatively in a step up approach. Early surgical intervention is not recommended even for necrotizing pancreatitis. Infected pancreatic necrosis accompanied by signs of sepsis is an indication for surgical intervention. Patients undergoing interventional management have a lower complication when compared with surgical intervention Almost all patients undergoing necrosectomy developed significant early or late complications or both.

Keywords: Necrotizing pancreatitis, infected pancreatic necrosis, sterile pancreatic necrosis, pancreatic abscess.

INTRODUCTION

Acute Pancreatitis is characterized by intra-acinar cell activation of digestive enzymes and the subsequent systemic release of proinflammatory cytokines [1, 2]. In the early phase of severe acute pancreatitis (first 14 days), a systemic inflammatory response develops and can progress to multi organ dysfunction due to excessive inflammatory mediator release. In the late phase (after 2weeks), however, the multi organ failure is usually secondary to sepsis from infected pancreatic necrosis, which develops in 40% to 70% of patients [3]. Today, infection of pancreatic necrosis is still the major risk factor of sepsis related multiple organ failure and the main life threatening complication of severe acute pancreatitis [4]. The risk of infection increases with the extent of intra and extra pancreatic necrosis [5]. In recent years, treatment of severe acute pancreatitis has shifted away from early surgical debridement/necrosectomy to aggressive intensive medical care. While the treatment is conservative in the earlier phase of the disease, surgery must be considered in the second phase. Advances in radiological imaging, new developments in interventional radiology, and other minimal access interventions have revolutionised the management of many surgical conditions. Thus, the aim of the present study of intervention to surgical management of acute pancreatitis and its complications and the outcome of management.

The most common indication for intervention is for infected local complications of acute pancreatitis. Other indications for intervention include complications of acute pancreatitis, and these may require surgery alone or combined with other treatment modalities, including interventional radiologic and endoscopic techniques.

Table-1: Indications for surgical treatment of acute necrotising pancreatitis

(1) Infected pancreatic necrosis
(2) Sterile pancreatic necrosis:
(a) persistent necrotising pancreatitis
(b) ‘‘fulminant acute pancreatitis’’
(3) Complications of acute pancreatitis:
For example, bowel perforation, bleeding

Today, more patients survive the first phase of severe acute pancreatitis due to improvements in intensive care medicine, thus increasing the risk of later sepsis [6, 7, 8].

‘‘Infected pancreatic necrosis is an indication for surgery or interventional drainage’’

Diagnosis of Infected Necrosis

Direct CT evidence of retroperitoneal gas or a positive fine needle aspiration for bacteriology (FNAB) of pancreatic or peripancreatic necrosis [9, 10].

Table-2: Complication of Acute Pancreatitis

Content	Acute (<4 weeks, no defined wall)		Chronic (>4 weeks, defined wall)	
	No infection	Infection	No infection	Infection
Fluid	**Acute pancreatic fluid collection**	Infected APFC	**Pseudocyst**	Infected pseudocyst
Solid ± fluid	**Acute necrotic collection**	Infected ANC	**Walled off necrosis**	Infected WON

Management of Acute Pancreatitis and its Complication

Most patients of acute pancreatitisare treated conservatively via step up approach symptomatic complication like peripancreatic fluid collection, necrotic collection, pseudocyst are managed with interventional technique like percutaneous drainage with pig tail catheterization and endoscopic drainage procedure. Even infected pancreatic fluid and necrotic fluid are initially managed with pig tail catheterization. All patients recovered from gall stone pancreatitis underwent cholecystectomy to prevent recurrence. Surgical intervention is only indicated when the patient don’t respond or detoriates after pig tail catheterization. When infection develops, the therapeutic approach must be directed towards mechanical removal of infected necrotic tissue. Years ago, early surgical intervention was favoured when systemic organ complications were present. Mortality rates of up to 65% have been described with early surgery in severe pancreatitis. Today, there is general agreement that surgery in severe pancreatitis should be performed as late as possible. The third to fourth week after the onset of disease is agreed as providing optimal operative conditions with well demarcated necrotic tissue present, thus limiting the extent of surgery to pure debridement and to only one single intervention. This approach decreases the risk of bleeding, minimizes the surgery related loss of vital tissue, and thus reduces endocrine and exocrine pancreatic insufficiency except in case of massive bleeding or bowel perforation, where early surgery be performed.

MATERIALS AND METHODS

This prospective study was conducted for 2 years from October 2018 to September 2020 with sample size of 36 patients diagnosed with severe acute pancreatitis with local complications. Patients were subject to careful history taking including age, sex and submitted to complete clinical examination. Patients underwent the following laboratory and radiological investigations.

Complete blood count, Serum electrolytes, Serum calcium, Serum amylase and lipase levels.

Ultrasonogram of abdomen and pelvis in all patients to confirm diagnosis of acute pancreatits and its complication.

Contrast Enhanced Computed Tomography of abdomen to obtain an accurate picture of complications (Pseudocysts, walled off necrosis).

Patients who fulfilled this criteria were taken up for intervention were included in the study and followed up for a period of 6 months. Intervention implemented in this study was percutaneous drainage with pigtail catherisation, endoscopic cystogastrostomy, and necrosectomy (open and laparoscopy).

Inclusion criteria

Patients above 18 years of age having severe acute pancreatitis with one or more of the following: Bedside Index of Severity in Acute Pancreatitis (BISAP) score > 2, modified computed tomography (CT) severity index ≥ 8, Acute Physiology, Age, Chronic Health Evaluation (APACHE) II score ≥ 8, with pancreatic pseudocyst, peripancreatic necrosis and/or persistent single or multiple organ failures were included.

Exclusion criteria

Patients with acute or chronic pancreatitis requiring surgery at presentation and those with a pigtail catheter before presentation were excluded.

RESULTS

In our study, 36 patients with acute pancreatitis with local complications were evaluated. The age group of patients in the study ranged from 18-70 years with 29 males and 7 females.

Age, gender, and etiology

The most common age group included in our study is 18 to 65 years with mean age of 51.4years. Gender distribution was highly variable, with only 7 females and 29 males. Alcohol abuse was the most common cause of pancreatitis in 72% of cases (26/36). Gallstone was the second most common cause, with nine patients (25%) in total and one patient developed pancreatitis following trauma (2.7%).

Mortality

A total of six deaths occurred in our study. Four (80%) patients in the surgery group died due to sepsis and organ failure. Two (5%) patients in the pigtail group died after pigtail insertion due to sepsis. Multi organ failure is the most common cause of death.

Characteristics of intervention

In 22 patients pigtail catheters were used. Average duration of pig tail catheterization drainage is 8 days. All PCD insertion was performed by surgeons, with the assistance of the duty radiologist. Catheter-related complications like gastro intestinal fistula occurred in two patients and the two patients died of sepsis and 4 patients developed secondary infection following pig tail catheterization and treated with antibiotics based on culture and sensitivity. In 8 patients with large pseudocyst at the neck of pancreas abutting the stomach endoscopic cystogastrostomy was done.

Characteristics of necrosectomy

Six patients underwent necrosectomy (3 patient underwent minimally invasive laparoscopic surgery and 3 patient underwent open surgery) with continuous lavage. Five patient developed enterocutaneous fistula which are treated conservatively. Among five patients 4 patient died of sepsis with multi organ failure.

Duration of hospital stay

Duration of hospital stay is more in patients treated surgically with mean duration of hospital stay of 24 days when compared with intervention groups like percutaneous drainage (mean duration of hospital stay of 8 days),endoscopic cystogastrostomy for pseudocyst (mean duration of hospital stay 12 days).

Microbiology

Most patient had monomicrobial infection.

Escherichia coli was most common organism present in the culture. The second most common organism cultured was *Klebsiella*.

Table-3: Microbiology

	Percutaneous drainage	Endoscopic cystogastrostomy	Necrosectomy
Number of patients	22	8	6
APACHE II score	8.05 +/- 0.37	8.1+/-0.4	9.38 +/- 1.30
Infection	4 (18%)	0	6 (100%)
Organ failure	4(18%)	0	4 (80%)
Avg. duration of hospital stay	8	12	24
Mortality	2(9%)	0	4(80%)

DISCUSSION

Acute pancreatitis (AP) represents a disease characterized by acute inflammation of the pancreas and histologically acinar cell destruction. The diagnosis of AP requires at least the presence of two of the three following criteria: (i) abdominal pain consistent with the disease, (ii) biochemical evidence of pancreatitis (serum amylase and/or lipase greater than three times the upper limit of normal), and (iii) characteristic findings from abdominal imaging [11]. The natural course of pancreatic necrosis is associated with gradual liquefaction of the solid debris forming a collection of liquefied necrosis that can finally be absorbed. This process may anytime become complicated by superinfection of the necrotic tissues what usually requires surgical or radiological intervention.

Necrosectomy should be performed as late as possible after the onset of acute pancreatitis to allow maximal demarcation and liquefaction of the devitalized tissues [12]. Freeny *et al*. [13] were first to use the technique of percutaneous catheter drainage for the treatment of IPN.Success rate of percutaneous drainage in our study is 82%. The success rate of percutaneous catheter drainage in infected pancreatic necrosis is relatively varied and ranges from 0 to 78 % [13-17] in various studies which is comparable to our study. Van Baal *et al*. [18] reported a meta-analysis of PCD used as primary treatment for necrotizing pancreatitis, which included 384 patients from 11 studies.

Table-4: Outcome of percutaneous or endoscopic drainage

Series	Patients (n)	Infected (%)	Mortality	Successful	SepsisQ	Complications
Percutaneous drainage						
Gmeinwieser 199757	29	100%	8 (27%)	20 (69%)	25 (86%)	Fistula 7%
Freeny 199853	34	100%	4 (12%)	16 (47%)	25 (74%)	None
Echenique 199859	20	100%	0	20 (100%)	–	Fistula 50%
Gouzi 199960	32	81%	5 (15%)	21 (65%)		Fistula 52%
Szentkereszty 200161	24	?	3 (12.5%)	3 (12.5%)	11 (45%)	None

Pancreatic pseudocysts usually appear 4 weeks after an episode of chronic pancreatitis, acute pancreatitis, or disruption in the pancreatic duct such as blunt, penetrating trauma, or injury during surgeries [19- 21]. To date, there is no consensus on the ideal management of pancreatic pseudocysts. Recently, due to the advancement in the endoscopic era, endoscopic drainage of pancreatic pseudocysts has been performed with variable success rates. EUS-guided drainage has been conventionally performed for the peripancreatic fluid collection (PFC) with a plastic stent such as double-pigtail stent (DPS) and a fully covered self-expanding metal stent. The average duration of hospital stay is 12 day which is lower than surgical intervention and comparable to other studies [22].

The Dutch Acute Pancreatitis Group has since coined the 3 D's approach to treatment: 'Delay, Drain and Debride' [23]. Open necrosectomy serves as a salvage technique for complications following other interventions or the (peri) pancreatic necrosis itself and is a treatment option after treatment failure following a minimally invasive step-up algorithm. The overall mortality rate reported in our study is in line with recent reported cohorts of patients undergoing open necrosectomy [24-27]

Table-5: Outcome of open necrosectomy

Series	Patients (n)	Infected	Mortality	Complications overall (bleeding/fistulas)
Fagniez 198972	40	97%	33%	50% (45%/45%)
Villazon 199173	18	100%	22%	38% (6%/32%)
Van Vyve 199374	20 abscess	20%	25% (5%/20%)	
Nakasaki 199975	8	100%	25%	65% (12.5%/?)

CONCLUSION

Surgical management in the treatment of severe acute pancreatitis has dimnished, but it has not disappeared. Less invasive approaches such as percutaneous drainage with pig tail catheterization and endoscopic drainage procedures plays an important role in managing severe acute pancreatitis and its complications thereby reducing morbidity and mortality .Management of acute pancreatitis is multi-disciplinary, and the surgeon remains a vital member of the team. In our study there is significant sepsis reversal by pigtail catheter drainage, and most of the patients recovered completely without requiring any surgical intervention. The step-up approach is the standard of care, with initial drainage (percutaneous or endoscopic), and open necrosectomy only if these approaches fail.

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