

## Overview of acute pancreatitis, surgical management approach

Mokhleef Khalefah Alanazi, Fahad Faris Almanjam, Sulaiman Ahmed Asiri

### Abstract:

Acute pancreatitis is inflammation of the pancreas that could be mild or life threatening. In this review we discuss the pathogenesis, clinical features and focus on the effectiveness of surgery, MEDLINE, PubMed, and Embase, were searched for studies concerning acute pancreatitis, which were published in English language from database inception through March 2018. Acute pancreatitis continues to be a condition that is self-limiting and rarely needs surgery of the pancreas itself. Reoccurring acute pancreatitis could commonly be related to anatomic problems of the pancreatic ducts or biliary system that will require corrective surgery. Chronic pancreatitis is unusual in kids however is efficiently treated with drainage treatments.

### Introduction:

The management of acute pancreatitis has been debatable for greater than 100 years, varying between a conventional medical method on the one hand and a surgical technique on the various other. There has been terrific renovation in understanding of the natural path and pathophysiology of acute pancreatitis over the previous 20 years. The scientific training course of acute pancreatitis

differs from a light temporal form to an extreme necrotizing condition. Severe pancreatitis is related to organ failing and/or local problems such as necrosis, abscess formation, or pseudocysts [1].

Extreme pancreatitis can be recognized in 15-20 % of all cases. The initial two weeks after start of symptoms are characterized by the systemic inflammatory action disorder (SIRS). In parallel, pancreatic necrosis creates within the first 4 days after the beginning of signs and symptoms to its complete degree, while infection of pancreatic necrosis creates most frequently in the 2nd and 3rd week [2]. Infection of pancreatic necrosis is still the significant danger variable of sepsis-related numerous body organ failing and the major deadly issue in the later phase of extreme acute pancreatitis [3-5]. Pancreatic infection associates with the period of the condition, and as much as 70 % of all patients with necrotizing condition present with infected pancreatic necrosis 4 weeks after the start of the disease [2]. In addition, the threat of infection raises with the extent of intra- and extra-pancreatic necrosis [2],[3].

Since surgery can just work when a septic emphasis could be recognized and potentially removed, it is crucial to set apart between sterilized and infected necrosis once pancreatic necrosis has developed. Infection of necrotic pancreatic tissue is normally presumed in patients that establish medical indications of sepsis [7]. These patients ought to undertake CT- or ultrasonography-guided fine-needle aspiration (FNA) of pancreatic or peripancreatic necrosis [5],[7]. FNA is a precise, secure, and reliable method to set apart in between sterile and contaminated necrosis [8]. It is necessary to strike that just those patients who provide clinical indicators of sepsis need to go through FNA, considering that FNA bears a prospective threat of additional infection. In this period, even more patients go through early phase of extreme acute pancreatitis because of renovations of intensive care medicine, thus boosting the threat of later sepsis [5],[9]. While surgical treatments should be used only in selected instances within the first two weeks after beginning of

the illness [10], surgery and minimal invasive interventional procedures are necessary in the therapy alternatives in the later phase of the illness.

Acute pancreatitis is inflammation of the pancreas that could be mild or life threatening. In this review we discuss the pathogenesis, clinical features and focus on the effectiveness of surgery,

### **Methodology:**

MEDLINE, PubMed, and Embase, were searched for studies concerning acute pancreatitis, which were published in English language from database inception through March 2018. Furthermore, references list of included studies were manually searched for more relevant articles to be supportive for our recent review.

### **Discussion:**

#### **Etiology - pathogenesis**

The main reasons of acute pancreatitis are alcohol consumption and gallstones. The other reasons are: infectious diseases, injury of the pancreas, hyperlipemia, drugs, postoperative pancreatitis, pancreatitis caused by ERCP or endoscopic sphincterotomy, congenital anomalies such as pancreatic divisum.

The pathogenic sensations leading to autodigestion of the pancreatic and bordering tissues arise from premature activation of pancreatic enzymes. The devices by which intracellular activation of enzymes happen, irrespective of the etiology of pancreatitis, remain uncertain [11].

In 2 stages severe pancreatitis develops: a very first phase characterized by the consequences of systemic inflammatory response causing organ failures, and a 2nd phase dominated by the local problems of pancreatic and peri-pancreatic auto-digestion, generally infection of fluid collections and necrosis. Infection of necrosis is the major cause of death [12].

#### · **Clinical course of acute pancreatitis**

The majority of acute pancreatitis cases (around 80%) are self-limiting and mild, and the patients spontaneously recuperate within 4-5 days after start. Moderate cases have a death rate of 1% or much less and seldom need extensive care or surgical management [7].

Nonetheless, extreme acute pancreatitis develops in 10%-20% of instances and component of the pancreas and surrounding tissue ends up being necrotic. Serious cases are connected with neighborhood difficulties such as major organ failure, pancreatic necrosis, pancreatic abscess, and pancreatic pseudocysts and are typically categorized into 2 phases [13]. The initial phase of extreme acute pancreatitis, the period within 2 weeks after the start of the illness, is characterized by the systemic inflammatory response syndrome (SIRS), and pancreatic death develops in parallel with that within the initial 4 days after onset. The 2nd stage begins 2 or 3 weeks after beginning with the growth of infectious pancreatic difficulties such as contaminated pancreatic necrosis (bacterial infection of the pancreatic death) and pancreatic abscess. Infection of pancreatic necrosis is a major prognostic factor consider extreme pancreatitis, and sepsis-related multiple organ failing is the main serious difficulty with a death rate of 20%-50%.

## · **Clinical features**

Developing the medical diagnosis of pancreatitis and identifying the etiology are vital for effective therapy. The diagnosis needs scientific, biochemical, and radiographic evidence and is validated when 2 of the 3 proof are present. Acute pancreatitis has a broad spectrum of seriousness and most commonly presents with epigastric stomach pain, nausea, vomiting, and stomach distension from the connected ileus. Serum amylase and lipase are one of the most reliable biochemical markers, with level of sensitivities between 50% and 85%.

One of the most frequently accepted limit is  $> 3$  times the upper limit of normal to establish the medical diagnosis, although typical levels might not in fact omit the disease. Ultrasonography is the first imaging modality of choice to assess the degree of pancreatic parenchymal edema, procedure pancreatic and bile duct diameter, and examine for the presence of bile air duct sludge and stones and review pseudocyst formation. Using magnetic resonance cholangiopancreatography (MRCP) in children is acquiring enhancing popularity as a result of the enhancement in the precision and brevity of the exam. MRCP is noninvasive, without radiation and, unlike endoscopic retrograde cholangiopancreatography (ERCP), could be executed in the acute phase of pancreatitis. While providing duct visualization to a level of 1 mm at physiological, rather compared to supraphysiologic, pressures during ERCP, the method is restricted by tiny caliber nondilated ducts and motion artifacts, especially in infants and kids. ERCP could be performed in children weighing much less than 10 kg, yet it is not commonly readily available. It is intrusive and has a difficulty rate of around 10% [14]. Its primary duty remains in the diagnosis and therapy of biliary pancreatitis using stent positioning, stone extraction, or sphincterotomy. Huge pseudocysts have additionally been successfully treated transgastrically or in combination with laparoscopy in hybrid treatments.

· **Indication for surgery**

There have been dramatic modifications in the role of surgery for acute pancreatitis (AP) over the last 20 years, and some have predicted its demise. While it is true that open surgery now has an extra restricted role in patients with serious and crucial AP, there are still a variety of signs for which surgery remains an important and occasionally life-saving treatment (Table 1). The most common indication for intervention is for infected regional complications of AP, and these have recently been re-defined (Table 2) [15]. Other signs for intervention include difficulties of acute pancreatitis, and these could need surgery alone or incorporated with other treatment modalities, including interventional radiologic and endoscopic methods. The function of this chapter is to give an existing overview of the role of surgery in AP, in the context of these bigger modifications in intervention.

**Table 1.** Indications for surgery in acute pancreatitis[15].

1. Surgery for diagnosis
2. Surgery to treat complications of pancreatitis
a. Abdominal compartment syndrome
b. Infected necrosis
c. Non-occlusive intestinal ischaemia and necrosis
d. Enterocutaneous fistulae
e. Vascular complications
f. Pseudocyst
3. Surgery to prevent recurrent acute pancreatitis

**Table 2.** The local complications of acute pancreatitis defined by chronicity, infection and content [15].

Content	Acute(<4weeks,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 ANS	Walled off necrosis	Infected WOD

Acute pancreatic fluid collection-APFC, Acute necrotic collection-ANS, Walled off necrosis-WOD.

· **Surgical management of necrotizing pancreatitis**

The principle of surgical management of acute necrotizing pancreatitis needs extensive care management, determining infection and if shown, debridement of any kind of infected necrotic areas [16]. Invasive procedures for serious acute pancreatitis can be indicated in biliary pancreatitis, infected pancreatic necrosis, huge hemorrhage, sterilized pancreatic necrosis, drainage of pancreatic abscess and symptomatic arranged necrosis [17-19]. The current consensus is that a diagnosis of biliary pancreatitis requires a laparoscopic cholecystectomy at the point of medical diagnosis or within 2 weeks of medical diagnosis. This may soothe the obstruction and as a result boosts the opportunity of effective resolution of extreme acute pancreatitis without resorting to treatments with higher threat of problems [36]. Initial management of extreme acute pancreatitis requires constant surveillance as a result of the risk of superadded bacterial infections in a necrosed pancreas. Bacterial infection happens in 3%-7% of all situations of pancreatitis [20]. About 10%-50% of individuals with pancreatic necrosis establish a superadded bacterial infection [10],[36],[21]. In these cases infection normally presents after 2-3 weeks from the factor of presentation [20]. In sight of this, some randomized regulated researches have discovered the duty of prophylactic prescription antibiotics with results being undetermined [36],[22],[23]. Clear-cut

diagnosis of infective pancreatitis needs making use of CT imaging with or without a positive fine needle aspiration for bacteriology[11,12].Patients with relentless pain or attributes dubious of underlying sepsis with better than 30% necrosis confirmed radiologically ought to go through great needle aspiration [12].Without treatment, death in such group of people has been mentioned as high as 80% [24].Prior to the standard by the British Society of Gastroenterology, the general consensus was that infected necrosis is an indicator for surgical therapy or interventional drainage. [36].If less than 30% of pancreatic tissue is necrotic with liquid collections, this could be managed by minimally invasive necrosectomy [16].Current information revealed that surgical procedures could be avoided. A meta-analysis by Mouli et al showed that 64% of patients that were detected with contaminated pancreatic death had successful resolution with conventional management with a mortality rate of 12%. The present paradigm is shifting to a conventional method [25].Surgery in pancreatic necrosectomy must typically be postponed for 14 days in order to permit demarcation of the necrosus, unless the condition could be resolved by removal of the reason, such as when it comes to cholecystectomy for gallstone generated pancreatitis[18].Early surgery is only chosen tried and tested contaminated necrotizing pancreatitis. In truth mortality rates of as much as 65% have been kept in mind with very early surgery in severe acute pancreatitis [10],[26].Patients with extreme necrotizing pancreatitis would certainly as a result eventually go through surgical debridement with the suitable time being established at the third or fourth week from the onset of disease.

The choice of operation is at existing really arguable and is primarily based upon the facilities and surgical ability of the specialist executing the procedure [10].The current treatments went with consist of the typical surgical open necrosectomy, endoscopic necrosectomy and minimally invasive necrosectomy. This approach to get rid of the infected necrotic tissue was connected with



a high rate of complications with studies keeping in mind between 34%-95% of procedures with difficulties. Death results in numerous researches are in between 6% and 50% [10],[17],[16],[27],[28].Considering these findings one might describe why the rate of interest in open necrosectomy is losing favor. It is kept in mind in the literature that choice is changing towards the much safer treatment of minimally intrusive necrosectomy [10] In a research by Bakker et alia, endoscopic necrosectomy showed far better results in regards to pro-inflammatory feedback and scientific end factor recognized by taping IL-6 levels which were kept in mind to reduce after endoscopic treatments when compared with open up surgery with significant worths on relationship [28].

Castellanos et alia [29] states that patients undergoing translumbar retroperitoneal endoscopy revealed excellent results with the procedure. They were noted to avoid succeeding surgical operations for debridement. Similar studies have revealed high success rates [30].The NICE guidelines list two types of endoscopic necrosectomies, particularly the percutaneous retroperitoneal endoscopic necrosectomy and the endoscopic transluminal necrosectomy [31],[32].In a meeting done to Baron, despite the threat of complications, with proper competence 90% of patients could have total resolution of the necrotizing pancreatitis with endoscopic necrosectomy. Nonetheless, such a treatment has to be carried out in specialist centers [28].Sileikis et al [16] indicated that minimally invasive necrosectomy is captured as being the most effective alternative in dealing with necrotising pancreatitis. Such patients have less risks of complications including decreased incidence of bacteremia, several organ failure and post-operative problems. They additionally have a reduced operating table to discharge time [27].Sadly similar to the endoscopic approach, the procedure needs several sittings in order to resect the entire necrosom [37].

The existing standard is moving in the direction of a step-up strategy, where catheterization for drainage is followed by videoscopic assisted retroperitoneal debridement [10],[20],[34]. Van Stantvoort et al [35] kept in mind that when as compared to primary open necrosectomy, the step-up technique provided less complications. Removal of pressure and infected fluid from around the pancreas with each other with intravenous anti-biotics could prevent further invasive management and any kind of staying necrotic tissue would be removed by the patient's very own immune system [34]. Videoscopic assisted retroperitoneal debridement has the tendency to adhere to the first drainage if the symptomatology continues.

#### **Conclusion:**

Acute pancreatitis continues to be a condition that is self-limiting and rarely needs surgery of the pancreas itself. Reoccurring acute pancreatitis could commonly be related to anatomic problems of the pancreatic ducts or biliary system that will require corrective surgery. Chronic pancreatitis is unusual in kids however is efficiently treated with drainage treatments.

## Reference:

1. Bradley EL: A clinically based classification system for acute pancreatitis. Summary of the International Symposium on Acute Pancreatitis. *Arch Surg* 1993;128(5):586–590
2. Beger HG, Bittner R, Block S , Büchler MW: Bacterial contamination of pancreatic necrosis – a prospective clinical study. *Gastroenterology* 1986;91:433–441
3. Isenmann R, Rau B, Beger HG: Bacterial infection and extent of necrosis are determinants of organ failure in patients with acute necrotizing pancreatitis. *Br J Surg* 1999;86:1020–1024
4. Gloor B, Müller CA, Büchler MW: Pancreatic infection in severe pancreatitis: The role of fungus and multiresistant organisms. *Arch Surg* 2001;36:592–596
5. Büchler MW, Gloor B, Müller CA, Friess H, Seiler CA, Uhl W: Acute necrotizing pancreatitis: treatment strategy according to the status of infection. *Ann Surg* 2000;232:619–626
6. Bassi C, Larvin M, Villatoro E: Antibiotic therapy for prophylaxis against infection of pancreatic necrosis in acute pancreatitis. *The Cochrane Database of Systematic Reviews*. 2005; 4:CD002941
7. Uhl W, Warshaw AL, Imrie C, Bassi C, McKay C, Lankisch P, Carter R, DiMagno E, Banks P, Whitcomb D, Dervenis C, Ulrich C, Satake K, Ghaneh P, Hartwig W, Werner J, McEntee G, Neoptolemos J, Büchler MW: IAP Guidelines for the surgical management of acute pancreatitis. *Pancreatology* 2002;175
8. Banks P, Gerzof S, Langevin R, Silverman S, Sica G, Hughes M: CT-guided aspiration of suspected pancreatic infection: bacteriology and clinical outcome. *Int J Pancreatol* 1995; 18:265
9. Neoptolemos J, Raraty M, Finch M, Sutton R: Acute pancreatitis: the substantial human and financial cases. *Gut* 1998; 42:886–891
10. Werner J, Feuerbach S, Uhl W, Büchler MW: Management of acute pancreatitis: from surgery to interventional intensive care. *Gut* 2005;54:426–436
11. Steer M L. How and where does pancreatitis begin? *Arch Surg.* (1992);127:1–4.
12. Renner I A, Savage W T, Pantoja J L, Renner V J. Death due to acute pancreatitis. A retrospective analysis of 405 autopsy cases? *Dig Dis Sci.* (1985);30:1005–1018.

13. Werner J, Uhl W, Hartwig W, Hackert T, Muller C, Strobel O, Buchler MW, et al. Modern phase-specific management of acute pancreatitis. *Dig Dis.* 2003;21:38–45. doi: 10.1159/000071338.
14. Pfau PR, Chelimsy GG, Kinnard MF, et al. Endoscopic retrograde cholangiopancreatography in children and adolescents. *J Pediatr Gastroenterol Nutr* 2002;35:619-23.
15. Windsor JA, Petrov MS. Acute pancreatitis re-classified. *Gut.* 2013;62:4–5. doi: 10.1136/gutjnl-2012-303725.
16. Sileikis A, Beiša V, Beiša A, Samuilis A, Serpytis M, Strupas K. Minimally invasive retroperitoneal necrosectomy in management of acute necrotizing pancreatitis. *Wideochir Inne Tech Maloinwazyjne* 2013;8:29-35.
17. Reber HA, McFadden DW. Indications for surgery in necrotizing pancreatitis. *West J Med* 1993;159:704-707.
18. Doctor N, Agarwal P, Gandhi V. Management of severe acute pancreatitis. *Indian J Surg* 2012;74:40-46.
19. Bucher P, Pugin F, Morel P. Minimally invasive necrosectomy for infected necrotizing pancreatitis. *Pancreas* 2008;36:113-119.
20. Charbonney E, Nathens AB. Severe acute pancreatitis: a review. *Surg Infect (Larchmt)* 2008;9:573-578.
21. Lapauw S, Wilmer A, Bobbaers H. Incidence of organ failure in patients with severe acute pancreatitis. *Crit Care* 2003;7:211.
22. Mazaki T, Ishii Y, Takayama T. Meta-analysis of prophylactic antibiotic use in acute necrotizing pancreatitis. *Br J Surg* 2006;93:674-684.
23. Dellinger EP, Tellado JM, Soto NE, Ashley SW, Barie PS, Dugernier T, et al. Early antibiotic treatment for severe acute necrotizing pancreatitis: a randomized, double-blind, placebocontrolled study. *Ann Surg* 2007;245:674-683.
24. van Brunschot S, Bakker OJ, Besselink MG, Bollen TL, Fockens P, Gooszen HG, et al. Treatment of necrotizing pancreatitis. *Clin Gastroenterol Hepatol* 2012;10:1190-1201.
25. Mouli VP, Sreenivas V, Garg PK. Efficacy of conservative treatment, without necrosectomy, for infected pancreatic necrosis: a systematic review and meta-analysis. *Gastroenterology* 2013;144:333-340.e2.
26. 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.
27. Raraty MG, Halloran CM, Dodd S, Ghaneh P, Connor S, Evans J, et al. Minimal access retroperitoneal pancreatic necrosectomy: improvement in morbidity and mortality with a less invasive approach. *Ann Surg* 2010;251:787-793.
28. Bakker OJ, van Santvoort HC, van Brunschot S, Geskus RB, Besselink MG, Bollen TL, et al. Endoscopic transgastric vs surgical necrosectomy for infected necrotizing pancreatitis: a randomized trial. *JAMA* 2012;307:1053-1061.

29. Castellanos G, Piñero A, Serrano A, Llamas C, Fuster M, Fernandez JA, et al. Translumbar retroperitoneal endoscopy: an alternative in the follow-up and management of drained infected pancreatic necrosis. *Arch Surg* 2005;140:952-955.
30. Fogel EL. Endoscopic pancreatic necrosectomy. *J Gastrointest Surg* 2011;15:1098-1100.
31. Percutaneous retroperitoneal endoscopic necrosectomy. National Institute of Clinical Excellence. 2015 [cited 2016 January 6]. Available from: <https://www.nice.org.uk/guidance/ipg384/chapter/2-the-procedure>
32. Endoscopic trans-luminal necrosectomy. National Institute of Clinical Excellence. 2015 [cited 2016 January 6]; Available from: <http://www.nice.org.uk/guance/IPG411/chapter/2-Theprocedure>
33. Baron TH. Endoscopic pancreatic necrosectomy. *Gastroenterol Hepatol (N Y)* 2008;4:617-620.
34. Besselink MG, van Santvoort HC, Nieuwenhuijs VB, Boermeester MA, Bollen TL, Buskens E, et al. Minimally invasive 'step-up approach' versus maximal necrosectomy in patients with acute necrotising pancreatitis (PANTER trial): design and rationale of a randomised controlled multicenter trial [ISRCTN13975868]. *BMC Surg* 2006;6:6.
35. van Santvoort HC, Besselink MG, Bakker OJ, Hofker HS, Boermeester MA, Dejong CH, et al. A step-up approach or open necrosectomy for necrotizing pancreatitis. *N Engl J Med* 2010;362:1491-1502.
36. Party of the British Society of Gastroenterology; Association of Surgeons of Great Britain and Ireland; Pancreatic Society of Great Britain and Ireland; Association of Upper GI Surgeons of Great Britain and Ireland. UK guidelines for the management of acute pancreatitis. *Gut* 2005;54:iii1-9.
37. Dellinger EP, Forsmark CE, Layer P, Lévy P, Maraví-Poma E, Petrov MS, et al. Determinant-based classification of acute pancreatitis severity: an international multidisciplinary consultation. *Ann Surg* 2012;256:875-880.