

Pancreatic Necrosectomy: When and How?

K Vagholkar, A Singhal, S Pandey, I Maurya

Citation

K Vagholkar, A Singhal, S Pandey, I Maurya. *Pancreatic Necrosectomy: When and How?*. The Internet Journal of Surgery. 2013 Volume 30 Number 4.

Abstract

Acute pancreatitis continues to be a challenging abdominal condition for the attending surgeon. Infected pancreatic necrosis is a lethal complication of severe acute pancreatitis which occurs despite aggressive supportive treatment. Prompt diagnosis of this complication, optimum timing for intervention and proper choice of procedure determine the outcome in such patients. The paper aims at discussing the diagnosis of infected pancreatic necrosis, timing and the various therapeutic options for managing such complicated cases.

INTRODUCTION

Acute pancreatitis is a common condition the incidence of which is increasing with every passing year. Between 5% - 10% of patients with acute pancreatitis develop infected pancreatic necrosis. [1] Though the initial treatment of acute pancreatitis is predominantly medical, surgical intervention is still indicated in a select group of complicated cases. [2] The timing and nature of surgical intervention continues to be a matter of debate with a wide spectrum of literature highlighting different modalities of surgical intervention including the step-up approach.

INFECTED NECROSIS

Severe pancreatitis leads to necrosis of pancreatic tissue despite aggressive supportive care including antibiotics. However, initially the necrotic tissue remains sterile which is largely determined by the extent of pancreatic necrosis. Once infected the septic process commences immediately leading to multiple organ failure and high mortality. [1, 2] Therefore early diagnosis of infected pancreatic necrosis is pivotal for positive outcome in such patients. Clinical features suggestive of sepsis may not always be well defined in the majority of cases. [2] Therefore great reliance is on laboratory and etiological diagnosis of sepsis. An ultrasound-guided FNAC (fine-needle aspiration cytology) accompanied with radiological evidence of infection on CT scan by way of presence of fluid and gas in the peripancreatic area is diagnostic of infected pancreatic necrosis. [2]

TIMING OF SURGERY

Controversy still remains as to what is the ideal timing for

surgical intervention. [4] Prospective randomized trials were conducted to determine the issue; however, the trial had to be abandoned as early surgery lead to increased mortality. [5] Various case series have reported improved results by delaying the procedure of necrosectomy. Necrosectomy performed beyond 3 weeks from onset of an acute attack usually yields better results. [5, 6]

RATIONALE OF NECROSECTOMY

Infected and necrotic pancreatic tissue serves as nidus for proinflammatory factors to be released in large amounts both locally and systemically. [7] This elicits a severe inflammatory reaction thereby exacerbating or amplifying features of SIRS. Persistence of these effects eventually leads to septicemia and multiple organ dysfunction syndrome (MODS), eventually terminating to death. Therefore removal of this infected necrotic debris undoubtedly reduces the quantum of proinflammatory factors released into the system thereby reducing the systemic inflammatory response. [4, 7] A single sitting of necrosectomy may not always offer a complete eradication of the source. In most of the cases multiple sittings may be required to ensure complete eradication of the infected source.

THERAPEUTIC OPTIONS

The spectrum of therapeutic options has widened over time. Open surgical methods, minimally invasive methods, step-up approach and endoscopy provide a complete spectrum for therapeutic intervention. Each methodology has its own advantages and disadvantages. Proper choice of the approach is a very significant factor which in most of the times

determines the prognosis of the patient.

1) Open Surgical Necrosectomy:

Through a midline incision the entire abdominal cavity is assessed. A diverting ileostomy is performed in those cases wherein the retrocolic area is also involved. Once the focus of necrosis is exposed, blunt necrosectomy is performed, which ensures atraumatic removal of necrotic tissue without damaging the residual pancreatic tissue. (Figure 1) This is followed by one of the four techniques. [4]

a) Open Packing – The cavity is irrigated vigorously with saline and is packed with a non-adherent dressing. [7] The patient needs to be brought to the operating room every 48 hours for further debridement and repacking until the process of necrosis is halted and no necrotic tissue debris are seen. The abdomen is closed over drains.

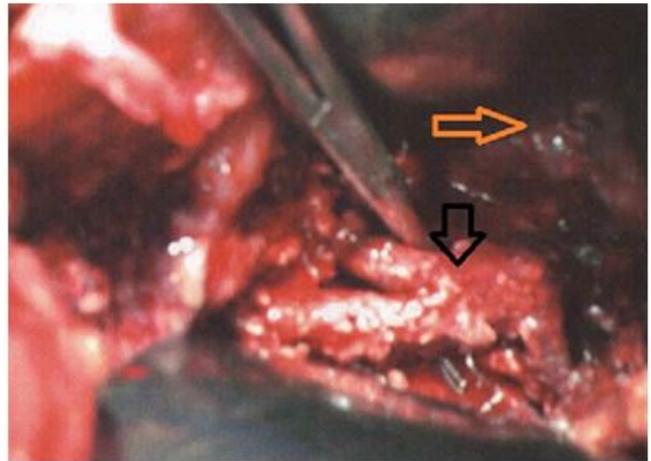
b) Planned staged re-laparotomies with repeated lavage – This method involves planned reoperations after primary necrosectomy on every alternate day until all devitalized tissue has been removed, growth of granulation tissue has commenced and there is substantial evidence that the necrotic process has been brought under control. [4] Repeated opening of the peritoneal cavity may be cumbersome and cause irreversible damage to the abdominal wall leading to significant morbidity. This can be eased by using a zipper being attached to the incised edges. Peritoneal drains also help in drainage of infected material.

c) Continuous lavage of the lesser sac and retroperitoneum is a very effective method of cleaning all necrotic residual debris. [8, 9,10,11] After primary necrosectomy multiple tube drains, usually 4, are kept in the retroperitoneal area in juxtaposition to the pancreatic remnant. Continuous irrigation with dialysis fluid or even normal saline measuring approximately 35 liters/day may help reduce the septic process significantly. The end point of lavage is a clear effluent from the drains.

d) Closed Packing – After primary necrosectomy the cavity is irrigated and packed with large gauze mops. [4] Drains are also kept. Drains are removed after 7 days along with removal of the packs.

Figure 1

Intraoperative photograph after necrosectomy showing exposed splenic vessels (black arrow) as the entire pancreatic body and tail was necrotic and was removed. (The colored arrow points to the spleen.)



2) Minimally Invasive Approach

The introduction of laparoscopy has added an additional modality to the therapeutic armamentarium. Minimally invasive techniques confirm significant advantage with respect to surgical outcome. [12, 13] However, the technique has its limitations and is best utilized if the pancreatic necrosis is <30% with massive fluid collections in the left retroperitoneal space. The advantages of laparoscopy are reduced inflammatory response to intervention, considerably reduced incidence of bacteremia, reduced rate of development of multiorgan failure, reduced rate of wound complications, shorter stay in ICU and fast recovery. [13] The limitations of this method are availability of expertise and lack of evidence to substantiate a statistical advantage of this methodology over the open technique.

3) Step-up Approach

This consists of percutaneous drainage followed by minimal invasive retroperitoneal necrosectomy. [14, 15] The first step is percutaneous or endoscopic drainage of collection of infected fluid to reduce sepsis. This may postpone the need for surgical necrosectomy during the acute phase of systemic inflammatory response (SIRS). If the drainage is still inadequate, the next step is minimally invasive retroperitoneal necrosectomy. [14]

The main factor which limits the use of this methodology is blockage of drainage tube before complete drainage has been achieved, thereby necessitating early necrosectomy by either

minimal access approach or open method. [15]

4) Endoscopic Methods

The transgastric endoscopic approach which has evolved recently is an alternative approach to drain an infected pancreatic necrosis. [16, 17, 18] Endoscopic necrosectomy has similarity to natural orifice transluminal endoscopic surgery (NOTES). The main disadvantage of this technique is significant bleeding which can in quite few cases prove to be fatal as it is difficult to control.

CONCLUSION

The therapeutic armamentarium enriched by a wide spectrum of techniques ranging from the traditional open necrosectomy to endoscopic methods has caused considerable confusion in making a choice of procedure. Expertise is the important factor while making a judgment as to when necrosectomy should be performed. Having made this judgment, the choice of procedure should be guided by the extent of infected necrosis, severity of septic process and general condition of the patient with respect to the status of various organ systems.

On the Indian subcontinent financial restraints and availability of a multidisciplinary team are important determinants in decision making. Minimally invasive methodologies need a long learning curve which may not be always available, thereby limiting the use of this option. The endoscopic approach may sound to be simplistic but the complications associated with this approach can prove to be lethal and difficult to manage. The open method therefore still continues to be the safest option which not only ensures complete removal of the infected necrosis followed by acceptable postoperative management. Primary necrosectomy followed by closed tube irrigation appears to be the best surgical option.

References

1. Traverso LW, Kozarek RA: Pancreatic necrosectomy: definitions and technique. *J Gastrointest Surg*; 2005; 9: 436-9.
2. Shi X, Vagholkar KR, Friess H, Uhl W, Buechler MW:

- Management of severe acute pancreatitis: Standards and Future Perspectives. *Bombay Hosp J*; 2001; 43: 16-27.
3. Werner J, Hastwig W, Hackert T, Buechler MW: Surgery in the treatment of acute pancreatitis - open pancreatic necrosectomy. *Scand J Surg*; 2005; 94: 130-134.
4. Huguier M: Early versus late necrosectomy for necrotizing pancreatitis. *Am J Surg* 1999; 177: 528.
5. Mier J, Leon E, Castillo A, Robledo F, Blanco R: Early versus late necrosectomy in severe necrotizing pancreatitis. *Am J Surg*; 1997; 173: 71-75.
6. Mayer J, Rau B, Gansauge F, Beger HG: Inflammatory mediators in human acute pancreatitis: clinical and pathophysiological implications. *Gut*; 2000; 47: 546-552.
7. Orlando III R, Welch JP, Akhari CM, Bloom GP, Macaulay WP: Techniques and complications of open packing of infected pancreatic necrosis. *Surg Gynecol Obstet* 1993; 177: 65-71.
8. Rau B, Bothe A, Beger HG: Surgical treatment of necrotizing pancreatitis and closed lavage: Changing patient characteristics and outcome in a 19 year, single center series. *Surgery*; 2005; 138: 28-29.
9. Larvin M, Chalmers AG, Robinson PJ, Mc Mahon MJ. Debridement and closed cavity irrigation for the treatment of pancreatic necrosis. *Br J Surg*; 1989; 76: 465-71.
10. Villazon A, Villazon O, Terrazas F, Rana R: Retroperitoneal drainage in the management of the septic phase of severe acute pancreatitis. *World J Surg* 1991; 15: 103-107.
11. Wig JD, Mettu SR, Jindal R, Gupta R, Yadav TD: Closed lesser sac lavage in the management of pancreatic necrosis. *J Gastroenterol Hepatol*; 2004; 19: 1010-1015.
12. Windsor JA: Minimally invasive pancreatic necrosectomy. *Br J Surg*; 2007; 94: 132-3.
13. Horvath KD, Kao LS, Wherry KL, Pellegrini CA, Sinanan MN: Laparoscopic assisted percutaneous drainage of infected pancreatic necrosis. *Surg Endosc*; 2001; 15: 1221-5.
14. Warshaw AL: Improving the treatment of necrotizing pancreatitis, a step up. *N Eng J Med*; 2010; 362: 1529-35.
15. Van Santvoort HC, Besselink MG, Bakker OJ, Hofker HS, Boermeester MA, Dejong CH, van Gooij H, Schaapherder AF, van Eijck CH, Bollen TL, van Ramshorst B, Nieuwenhuijs VB, Timmer R, Lameris JS, Kruyt PM, Manusama ER, vanderharst E, van der Schelling GP, Karsten T, Hesselink EJ, van Laarhoven CJ, Rosman C, Bosscha K, de Wit RJ, Hondijk AP, van Leeuwen MS, Buskens E, Gooszen HG; Dutch Pancreatic Study Group: A step up approach or open necrosectomy for necrotizing pancreatitis. *N Engl J Med*; 2010; 362: 1491-502.
16. Baron TH: Endoscopic Pancreatic Necrosectomy. *Gastroenterology & Hepatology*; 2008; 4: 617-20.
17. Werner J, Feuerbach S, Uhl W, Buechler MW: Management of acute pancreatitis from surgery to interventional intensive care. *Gut*; 2005; 54: 421-436.
18. Strobel O, Buechler MW: Endoscopic transgastric necrosectomy due to infected pancreatic necrosis. *Chirurg*; 2012; 83: 670.

Author Information

Ketan Vagholkar, MS, DNB, MRCS, FACS Professor

Department of Surgery. Dr.D.Y.Patil Medical College

Navi Mumbai, INDIA

kvagholkar@yahoo.com

Ashish Singhal, MS Senior Resident

Department of Surgery. Seth V C Gandhi & M A Vora Municipal General Hospital

Navi Mumbai, INDIA

Shashiprakash Pandey, MBBS Resident

Department of Surgery. Dr.D.Y.Patil Medical College

Navi Mumbai, INDIA

Inder Maurya, MBBS Resident

Department of Emergency Medicine. Dr.D.Y.Patil Medical College

Navi Mumbai, INDIA