Evaluation of Laparoscopic Management of Acute Necrotizing Pancreatitis

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Background: Acute pancreatitis is defined as an inflammatory process that involves the pancreas, peripancreatic tissues and less commonly other organ systems with increasing incidence globally. It is usually a self-limiting disease, however 25 % of patients will develop a potential life threating complication like pancreatic necrosis. Surgical debridement and drainage is advised for symptomatic necrosis with clinical deterioration with continuous postoperative closed lavage. Over the past decade minimally invasive approach for drainage and evacuation of pancreatic necrosis has dramatically evolved. The aim of this study was to evaluate the safety and efficacy of laproscopic management of acute necrotizing pancreatitis.

Patients and methods: This prospective interventional non-controlled study was conducted in the Department of General Surgery at Ain Shams University hospitals in the period from June 2012 to July 2016 on twenty-four patients (15 males and 9 females). All our patients presented with acute necrotizing pancreatitis. Informed consent was obtained from all patients included in the study. Operative time, hospital stay, re-exploration and other factors were recorded.

Results: Out of 24 cases 15 were men (62.5%), 9 were women (37.5%) with age ranging from 28-60 years (average 42.7). In twenty-one cases (87.5%) gall stones were the cause of necrotizing pancreatitis, two cases were due to excess alcohol (8.33%) and one case (4.16%) was idiopathic. Twenty cases (83.33%) were completed laparoscopic while four cases (16.66%) were converted to open, two cases (83.33%) developed pancreatic fistula and mortality was three cases (12.5%).

Conclusion: Laproscopic management seems to provide a safe and efficient option for treatment of acute necrotizing pancreatitis.

Key words: Acute pancreatitis, necrosis, laparoscopy.

Introduction

Acute pancreatitis (AP) includes a wide spectrum of disease, from mild self-limiting symptoms to a fulminant process with multiple organ failure and high mortality.[1] AP has been attributed to a wide range of etiologic factors, some are rare and rather obscure. Intra-acinar activation of trypsinogen, with subsequent activation of other pancreatic enzymes, is thought to play a central role in the pathogenesis of the disease. Furthermore, ischemia-reperfusion injury is believed to be critical to disease progression. A local inflammatory response in the pancreas is associated with the liberation of oxygen-derived free radicals and cytokines including interleukin (IL)-1, IL-6, IL-8, tumor necrosis factor alpha (TNF-α), and platelet activating factor (PAF); these mediators play an important role in the transformation from a local inflammatory response to a systemic illness.[2]

According to the Revised Atlanta Classification (2012), AP can be subdivided into two types: Interstitial edematous pancreatitis and necrotizing pancreatitis. Interstitial edematous pancreatitis usually resolves within the first week. The natural history of necrotizing pancreatitis is variable, it may remain solid or liquefy, remain sterile or become infected, persist or disappear over time. In the majority of patients with acute pancreatitis, the process is limited to parenchymal edema without necrosis. These patients require surgical therapy for very limited indications specially needed to deal with the etiology of pancreatitis or its complications. Interventions, either surgical or endoscopic, to prevent recurrent gall stone pancreatitis are recommended in any patient with suspected choledocholithiasis.[3]

In necrotizing pancreatitis, necrosis may be an acute necrotic collection without definite demarcation in the early phase or walled-off pancreatic necrosis, which is surrounded by a radiologically identifiable capsule. 10% to 30% of patients with acute pancreatitis develop severe illness, with pancreatic and peripancreatic necrosis and highly associated morbidity and mortality. The indications for surgical therapy for acute necrotizing pancreatitis have been evolved in recent years.

Extensive pancreatic debridement is the standard surgical approach done for patients with infected pancreatic necrosis. The traditional surgical approach to pancreatic necrosis was open necrosectomy which aims at wide drainage of all infected collections and removal of all necrotic tissue with the insertion of drains for continuous postoperative closed lavage. Frequently, repeated laparotomies were needed for complete debridement.[4] Gagner first described minimally invasive surgical treatment of necrotizing pancreatitis in 1996, including laparoscopic retrocolic, retroperitoneoscopic, and transgastric procedures.[5]

Patients and methods

This prospective interventional non-controlled study was conducted in the Department of General Surgery at Ain Shams University hospitals in the period from June 2012 to July 2016 on twenty four patients (15 males: 62.5% and 9 females: 37.5%). All patients presented to the emergency room by different presentations of acute pancreatitis were included (epigastric pain, vomiting, fever, chills). Apache II score of all patients was recorded at time of admission. Routine laboratory investigations were done including complete blood count, liver and kidney functions, serum amylase, serum lipase, random blood sugar, arterial blood gases and calcium level. Pelviabdominal ultrasound was done to rule out gall bladder disease or any intraabdominal collection. Patients were admitted to intensive care unit department before surgical intervention according to Apache II score. All patients received parenteral carbapenems, metronidazole, proton pump inhibitor and IV fluids. Pelviabdominal computerized topography (CT) scan with oral and IV contrast was done after stabilization of the patient within 48 hours from admission.

Inclusion criteria was radiologically proved pancreatic necrosis in a fit patient for laparoscopy.

Exclusion criteria were previous upper abdominal operations or patients unfit for laparoscopy.

All cases were managed by laproscopic pancreatic necrosectomy. Nasogastric tube was introduced in all cases and retained postoperatively. Patients were followed up for clinical outcome.

Surgical technique:

The procedure was done under general anesthesia.

Patients were positioned in French position. Operating surgeon stood inbetween the legs of the patients, camera assistant stood on the right side of the patient while first assistant and scrub nurse stood on the left side. Monitor was positioned beside the left shoulder of the patient. Access to the abdominal cavity was done by insertion of 10 mm trocar infraumbilically using open technique. Pneumoperitoneum was achieved using CO_2 insufflation at a pressure of 14-15 mmHg, and then other two 5 mm lateral pararectal trocars were inserted under vision after which diagnostic laparoscopy was done.

Aspiration and sampling of the pancreatic ascites was done at first from the Morrison pouch, perihepatic and perisplenic spaces and the pelvic cavity. Access to the pancreatic necrotic tissue was done through the gastrocolic ligament using 5 mm ultrasonic dissector, followed by blunt dissection of the retrogastric space and opening of all the loculi till visualization of the spleen. Necrotic tissue was dissected and removed using a suction device and non-traumatic grasping forceps. Large necrotic tissues were collected and extracted using an endobag. The resultant cavity was washed by 4 liters of warm normal saline. Two 24F tube drains were positioned inside the cavity for continuous postoperative lavage **(Figure 1)**.

Postoperative care & follow up:

Postoperatively, all patients were admitted to the intensive care unit for at least 24 hours, and then discharged to the ward when they were vitally stable.

Drain lavage with normal saline was started from the third day and was continued till the drain output was clear. In the initial week, lavage was done at the rate of 150 ml/hour continuously through one drain tube and drained out through the other tube. The lavage frequency was reduced to 500 ml twice a day after 1 week.

Tube drains were retained for 10 days after stoppage of lavage and removed after doing abdominal ultrasound to rule out any residual collection.

All Patients were followed up with abdominal ultrasonography after 3, 6 months and one year with drainage of any residual collection under radiological guidance. If these patients were asymptomatic even after 2 years, annual follow up was advised.
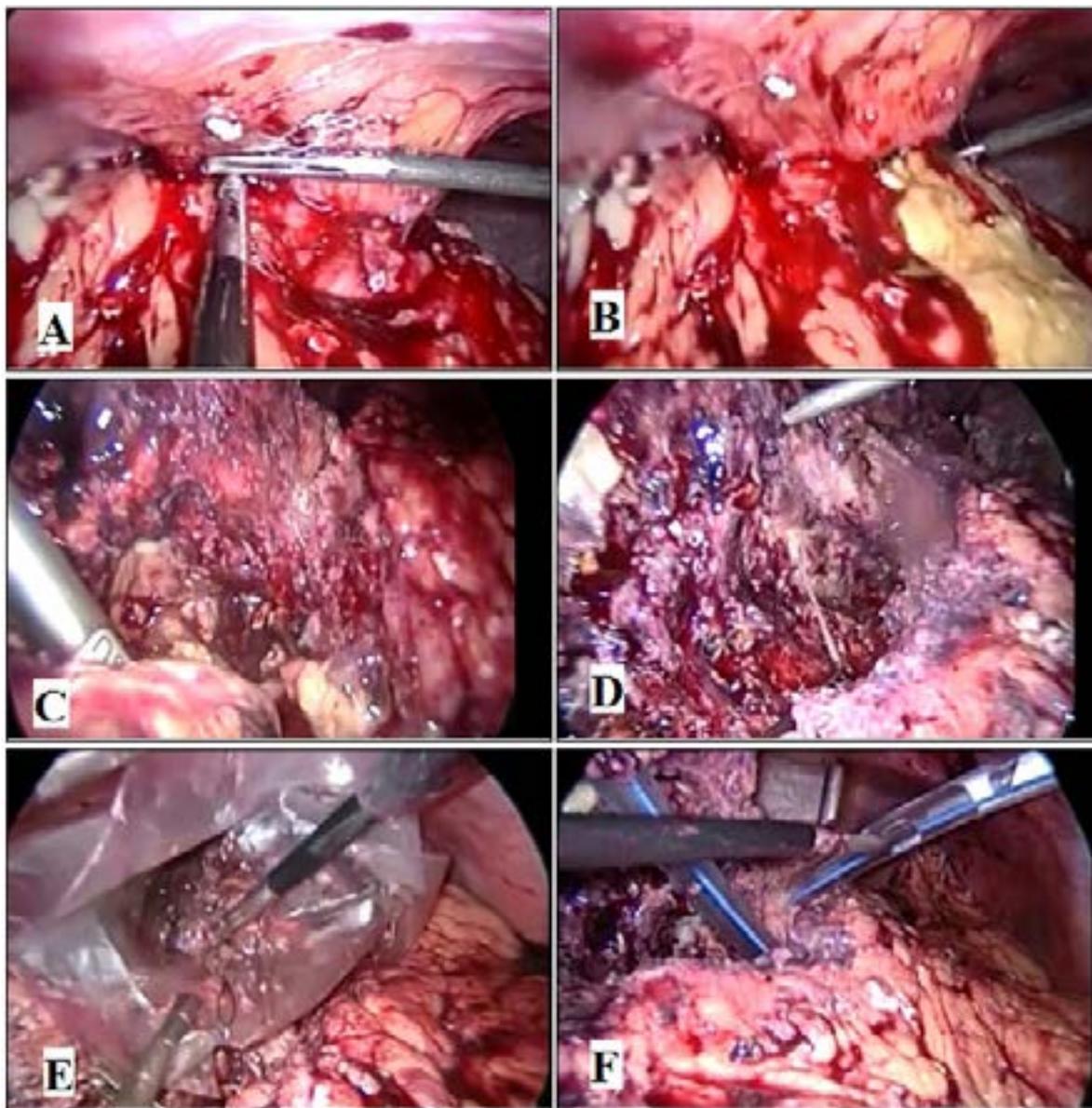
Fig 1A: Dissection of adhesions to the anterior abdominal wall, B: Drainage of pancreatic abscess, C: Removal of necrotic pancreatic tissue, D: Irrigation of abscess cavity, E: Removal of the necrotic debris in an endobag, F: Insertion of two wide bore drains inside the abscess cavity.

Results

Out of 24 cases 15 were men (62.5%), 9 were women (37.5%) with age ranging from 28-60 years (average 42.7). In twenty one cases (87.5%) gall stones were the cause of necrotizing pancreatitis, two cases were due to excess alcohol (8.33%) and one case (4.16%) was idiopathic. Twenty cases (83.33%) were completed laparoscopic while four cases (16.66%) were converted to open due to extensive adhesions with average operation time 82 minutes (range from 58-102 minutes), four cases (16.66%) needed re-exploration while three cases (12.5%) needed ultrasound guided drainage postoperatively. Two cases (8.33%) developed pancreatic fistula and

were managed conservatively and three cases (12.5%) developed port site infection that was managed by antibiotics and local wound care. One case (4.16%) suffered from an attack of secondary hemorrhage which was also managed conservatively. Average hospital stay was 25.4 days (range 21 to 29 days) with total mortality of three cases (12.5%) due to irreversible septic shock.

Discussion

The diagnosis of infected pancreatic necrosis is based on a combination of clinical manifestations, results of laboratory investigation (mainly increased levels of plasma C-reactive protein

and procalcitonin), and can be confirmed by image-guided fine-needle aspiration and culture of aspirates.[6] Serum procalcitonin is a valuable tool in predicting the severity of AP and is used as a marker of pancreatic necrosis.[7] CT scan of abdomen with contrast is helpful in determining the extent of necrosis and serially monitoring the progress.[8]

There have been dramatic changes in the role of surgery for AP over the last 20 years, and some have predicted its demise, while it is true that open surgery now has a more restricted role in patients with severe and critical AP, there are still a range of indications for which surgery remains an important and sometimes life-saving treatment.[9]

Traditionally, surgery includes open surgical necrosectomy and extensive drainage of peripancreatic collection during laparotomy. All the necrotic areas are debrided by finger dissection of pockets of semisolid pancreatic and peripancreatic necrosis, and multiple drains are inserted.

Extensive lavage and drainage are required to manage leakage of pancreatic tissue and to allow the continued flow of infected and necrotic material.[10]

Open necrosectomy is no longer considered the standard of care for the management of infected pancreatic collection and walled off pancreatic necrosis. Less invasive techniques have been developed and implemented and these have largely replaced the need for open procedures.[11]

Different minimally invasive intervention techniques, based on the method of visualization (laparoscopic, endoscopic) and the route of entry (transperitoneal, retroperitoneal and transmural) have been published.[12]

Van Santvoort et al., 2010[13] concluded that minimally invasive step-up approach, as compared with open necrosectomy reduced the incidence of the major complications and mortality among patients with pancreatic necrosis. With the step-up approach, more than one-third of patients were successfully managed with percutaneous drainage and did not require major surgery. In that study, 35% of patients with pancreatic necrosis, who were treated with the step-up approach, did not require pancreatic necrosectomy. Minimally invasive surgery was indicated in patients with persistent sepsis after percutaneous drainage. Minimally invasive approach provokes less surgical trauma in patients who are already critically ill.

Cuschieri, 2002[14] described the technique of laparoscopic infracolic necrosectomy with irrigation of the lesser sac as an alternative approach to open necrosectomy.

Wani et al., 2011[15] had reported minimally invasive pancreatic necrosectomy in fifteen patients. Pancreatic necrosectomy was done by laparoscopic transperitoneal approach in twelve patients, by retroperitoneal approach in two patients, and by a combination of methods in one patient. There were no postoperative complications related to the surgery itself, such as wound infections, intestinal fistulae, or postoperative hemorrhage with average hospital stay after surgery was 14 days.

Parekh, 2006[16] published a retrospective study on hand-assisted laparoscopic surgery for pancreatic necrosectomy. This study included eighteen patients with pancreatic necrosis who underwent laparoscopic necrosectomy using an infracolic approach to access the lesser sac with a hand access port in order to bluntly remove the necrotic tissue. The mean hospital stay was 16.3 days after the procedure with reduction in the incidence of major wound complications.

Tonsi et al., 2009[17] reported that despite the use of less invasive techniques, complications do occur after pancreatic necrosectomy. Pancreatic and enterocutaneous fistulae occur in 30% of patients and it seems related to the severity and extent of the underlying necrosis. Fistulae should be managed conservatively initially. Surgical treatment should be delayed until pancreatitis is completely resolved. Other complications include wound infection and wound dehiscence which is less common with the laparoscopic approach. Postoperative bleeding is usually managed with endovascular techniques. They also concluded that laparoscopic necrosectomy gives a better exposure of the lesser sac and better identification of the anatomy.

Bello and Matthews, 2012[18] also concluded that laparoscopic necrosectomy provides better access to fluid collections not feasible to endoscopic approach. This may facilitate debridement of the necrotic tissue and that endoscopic approach is technically not feasible if pancreatic liquefaction is minimal, with predominant solid debris, where laparoscopic necrosectomy is preferred.

Conclusion
Laparoscopic pancreatic necrosectomy is a safe and technically feasible approach in patients with pancreatic necrosis. A body of evidence now suggests that acceptable outcomes can be achieved with reduced incidence of major morbidity and mortality.

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