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Classical, Minimally Invasive Necrosectomy or Percutaneous Drainage in Acute Necrotizing Pancreatitis. Does Changing the Order of the Factors Change the Result?

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Over the last years many international surveys have witnessed a substantial reduction of the mortality rate in severe acute pancreatitis [1, 2, 3, 4, 5, 6]. Several factors, such as a better identification and characterization of patients having the poorest prognosis, improvement of intensive care measures, and a clearer definition of the indication/timing of surgery play a significant role in this positive scenario. In this regard the avoidance of early intervention to allow resuscitation, stabilization, and demarcation of the necrotic areas and innovations in drainage and evacuation of fluid and devitalized tissues represent important steps in the evolution of therapeutic strategies in acute pancreatitis [7, 8]. In the recent past, the most important controversies in the field of the surgical treatment of necrotizing acute pancreatitis are mainly related to the approach to be used in patients with sterile necrosis and to the choice between the different techniques of necrosectomy/drainage. The first topic still remains uncertain and, independently from what has been suggested by international guidelines/recommendations, the clinician's expertise or the attitude of the individual working-care group guides the definitive management in daily clinical practice [9]. As regards the surgical procedure of necrosectomy/drainage, the choice is mainly between the open necrosectomy with open packing and planned re-laparotomy/lavage [10, 11] and with open necrosectomy followed by continuous closed lavage of the lesser sac and retroperitoneum [12, 13, 14, 15]. Percutaneous catheter drainage through an anterior or retroperitoneal approach (guided by CT scan or ultrasound) was mainly considered over the last years to be complementary to an intensive care support in unstable patients, often as a bridging procedure able to delay surgery [16, 17, 18]. The best results with this procedure were achieved in draining pus or fluid collections whereas debridement of thick necrotic pancreatic tissue was incomplete even though large catheters with multiple side holes were utilized [19]. The actual position of endoscopic drainage seems to differ only slightly from that of the percutaneous techniques. Based upon the success of endoscopic intervention in the management of uncomplicated pancreatic pseudocysts, endoscopic (trans-gastric or trans-jejunal) catheter-drainage of pancreatic necrosis has been proposed [2, 5], mainly as second-line treatment in patients unfit for surgery. The experience with this method is poor and almost confined to sterile necrosis [20, 21]. Repeated procedures are generally required to perform complete necrosectomy with possible serious complications and a high frequency of fluid collections relapses [22]. The results in infected necrosis are limited to small, selected series [23].

The surgical scenario is currently widened by the so-called "minimally invasive approaches". Basically, recent advances in laparoscopic technology with relative instrumentation have permitted the use of minimally invasive techniques for the management of pancreatic necrosis. The aim which these techniques have in common is the attempt to minimize the surgical stress and physiological insult in patients who are already critically ill [6, 23, 24]. Natural orifice trans-luminal endoscopic surgery (NOTES) and laparoscopic retroperitoneal/trans-peritoneal debridement represent the mini-invasive surgical approaches most widely used. NOTES permits actively working outside the gastrointestinal tract with an endoscope (by widening transgastric access using balloon dilation); repeated sessions with forceful irrigation and suction, as well as endoscopic removal of debris using various devices, may allow complete recovery. Seifert *et al.* [25]

Key words Drainage; Pancreatitis, Acute Necrotizing; Surgical Procedures, Minimally Invasive; Surgical Procedures, Operative

Abbreviations NOTES: natural orifice trans-luminal endoscopic surgery

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recently published the result of a multicenter study (the GEPARD study) on transluminal endoscopic necrosectomy for treatment of patients with severe acute pancreatitis. Ninety-three patients were enrolled; 75 had successful NOTES and underwent a mean of six interventions starting at a mean of 43 days after an attack of severe acute pancreatitis. Clinical success (symptom-free patients) and radiologic success (defined as no residual necrosis, cyst on the day of discharge) were obtained in 80% and 52% of patients, respectively. Complications related to necrosectomy (bleeding, perforations, fistula formation and air embolism) were encountered in 24 cases (26%); mortality at 30 days was 7.5% (7 patients). Long-term outcome showed that after a mean follow-up period of 43 months, 84% of the initially successfully treated patients had sustained clinical improvement, with 10% receiving further endoscopic treatment and 4% receiving surgical treatment for recurrent necrosis/ pseudocyst. The authors concluded that direct transluminal endoscopic removal of pancreatic necrosis represents a valuable option with good short- and long-term results and acceptable morbidity and mortality. Even if comparative studies between the different methods used to achieve a successful necrosectomy are not yet available, transluminal endotherapy may furnish an opportunity for a less invasive treatment alternative to the traditional primary surgical approach.

Very recently, van Santvoort *et al*. [26] reported the results of a multicenter randomized trial comparing treatment of pancreatic and peripancreatic necrosis by open laparotomy with a hybrid ("step-up") approach in which percutaneous drainage was the first step, while necrosectomy by means of a less invasive video-assisted retroperitoneal debridement route was reserved for patients in whom drainage failed. Eighty-eight patients with necrotizing acute pancreatitis and suspected/confirmed infected necrotic tissue were enrolled and randomly assigned to undergo primary open necrosectomy or a step-up approach. The primary end point chosen for the study was a composite of major complications (new-onset multiple organ-failure or multiple systemic complications, perforation of a visceral organ or enterocutaneous fistula, or bleeding) or death. By using this criterion, the primary end point occurred in 31 of 45 patients (69%) assigned to open necrosectomy and in 17 of 43 patients (40%) assigned to the step-up approach (P=0.0006). Of the patients assigned to step-up approach, 35% were treated with percutaneous drainage only. The mortality rate did not differ significantly between groups but new-onset multiple-organ failure occurred less often in patients assigned to the step-up approach than in those assigned to open necrosectomy (P=0.002). The feasibility and probable greater safety of the "step-up" approach to severe necrotizing acute pancreatitis is an important synthesis and integration of evolving techniques [8]. In the presence of infection of pancreatic/peripancreatic necrosis, the possibility of evacuation of the fluid infected component may allow recovery from the infection by using concomitant antibiotic treatment; otherwise, it may play a bridging role between the critical early time after onset of acute pancreatitis and a later optimal time point for definite intervention.

The era of alternative, less invasive, procedures which allow safe necrosectomies in patients with acute pancreatitis, has arrived. Methodologies are still in progress and standardization is currently evolving; nevertheless, these alternative treatment options should notably ameliorate the management of severe acute pancreatitis in the near future.

"…The human mind is like a parachute: when open, it best works …"
(Earl Derr Biggers: Charlie Chan Carries On, 1930)

Conflict of interest The author has no potential conflict of interest

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