Management of Infected Pancreatic Necrosis—The “Step Up” Approach and Minimal Access Retroperitoneal Pancreatic Necrosectomy

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Abstract Infected pancreatic necrosis (IPN) is associated with high morbidity and mortality. It is increasingly being recognized that noninvasive management, radiological guided drainage, and minimally invasive procedures rather than the traditionally advocated open necrosectomy are associated with a better outcome in IPN. We present a patient with IPN who was managed with the now popular “step up” approach and describe the procedure of Minimal access retroperitoneal pancreatic necrosectomy.

Keywords Pancreatic necrosis · Infection · Necrosectomy · Step up approach

Introduction

Acute pancreatitis (AP) usually follows a benign self limiting course. However, 15–25 % develop a more severe form of the disease characterized by pancreatic/peripancreatic necrosis, infection, organ failure, prolonged hospital admission, and mortality [1]. The treatment of infected pancreatic necrosis (IPN) has changed over the years. Traditional open necrosectomy has been replaced by the now well recognized “step up” approach wherein IPN is treated sequentially with

antibiotics, percutaneous/endoscopic drainage, and if required, minimally invasive surgical necrosectomy [1].

We present a patient with IPN managed by the “step up” approach and describe the technique of minimal access retroperitoneal pancreatic necrosectomy (MARPN). We review the current literature on management of IPN and describe the benefits, limitations, and alternatives to MARPN.

Case Report

A 30-year-old male was diagnosed with necrotizing pancreatitis secondary to alcohol abuse. He presented with renal and respiratory failure and klebsiella septicemia secondary to urosepsis. He was ventilated, dialyzed, and started on antibiotics following which he recovered. However, 3 weeks into the course of his admission he redeveloped sepsis secondary to peripancreatic collections extending into both flanks. These were drained percutaneously under ultrasound guidance. He was discharged in a stable condition following 7 weeks of in-hospital stay.

He was readmitted a couple of months later with recurrence of sepsis secondary to infected collections in the peripancreatic bed and pelvis. Both were drained percutaneously (Fig. 1). Cultures showed *Escherichia coli* sensitive to meropenem. Despite adequate drainage and antibiotics, his fever persisted and hence was considered for MARPN.

The patient was placed in a supine position with sandbags under the left flank. Serial dilatation of the percutaneous peripancreatic drain tract was performed under image intensification using the percutaneous nephrolithotomy dilator kit. A nephroscope was passed into the infected cavity to visualize the necrotic pancreas. A combination of jet irrigation and endoscopic forceps/snare manipulation was used to debride the necrotic tissue. Following adequate debridement, a 32-Fr drain was positioned into the abscess cavity (Fig. 2).

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Fig. 1 CT scan showing peripancreatic fluid collection with air pockets. Percutaneous drain in situ

Postoperative management included antibiotics, analgesics, and four hourly flushes of the cavity with 100 ml of saline. The patient was managed for the initial 24 h in ICU and was then shifted to the ward. He was discharged on postoperative day 7 with the drain in situ. The drain was removed 8 weeks later after ultrasound documented complete resolution of the collection.

Discussion

Necrotizing pancreatitis is often complicated by infection which is thought to be secondary to bacterial translocation through the gut [2]. Infection generally occurs during the second or third week of the disease when the initial SIRS is replaced by a compensatory anti-inflammatory response [1]. Current concepts in management of necrotizing pancreatitis focus on the initial aggressive management and the subsequent treatment of IPN should it occur.

Early aggressive management aims to reverse SIRS and organ failure [3, 4]. It includes aggressive fluid resuscitation, early enteral nutrition, and culture-directed antibiotics/antifungals [1]. Patients deteriorating following initial

improvement, or failing to improve despite adequate resuscitative measures is usually a sign of IPN.

It is now clear that avoiding or delaying surgical intervention in IPN results in a better outcome. Further, the morbidity of open surgery has led to emergence of various minimally invasive and endoscopic necrosectomy techniques [5]. The “step up” protocol for IPN involves antibiotics, percutaneous drainage (PCD), and surgical intervention instituted sequentially based on response. PCD is indicated if the patient fails to respond to antibiotics alone. Surgery is indicated if the patient fails to improve despite adequate PCD. The PANTER trial compared the “step up” approach to conventional open necrosectomy in IPN clearly demonstrated that the former was associated with a lower risk of major complications [6]. Interestingly, it also showed that about 40 % of these patients were managed with PCD alone and did not require surgical intervention [6]. If surgery is indicated, the preferred technique is minimally invasive, based on the available local expertise.

Minimally invasive surgical techniques include laparoscopic necrosectomy, video-assisted retroperitoneal debridement, and MARPN [5]. MARPN is easy to perform and learn. It enables direct access to the necrotic tissue and offers debridement under vision. Unlike laparoscopic procedures, the coelom is not breached and, hence, peritoneal contamination is avoided. However, it is unlikely to be successful in patients with multiple collections. Further, the need for radiological guided drainage prior to the surgical procedure requires a separate skill set to be available. Complications include bleeding, persistent infection, pancreatic fistula, damage to spleen and bowel, and incomplete debridement with the need for repeat procedures.

Endoscopic transgastric pancreatic necrosectomy is an alternative that involves endoscopic access to the necrotic area through the posterior wall of the stomach. The TENSION trial comparing endoscopic to minimally invasive surgical necrosectomy is currently underway and will determine the role of endoscopic necrosectomy in IPN [7].

In conclusion the “step up” approach is the current standard of care in IPN. MARPN is an effective and safe procedure in selected patients with IPN.

References

1. Da Costa DW, Boerma D, van Santvoort HC, Horvath KD et al (2014) Staged multidisciplinary step-up management for necrotizing pancreatitis. *Br J Surg* 101:e65–e79
2. Flint RS, Windsor JA (2003) The role of the intestine in pathophysiology and management of severe acute pancreatitis. *HPB* 5(2):69–85
3. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG et al (2013) Pancreatitis Classification Working Group. Classification of acute pancreatitis—2012: revision of the Atlanta

Fig. 2 CT scan showing completely drained peripancreatic collection following MARPN with large drain in situ

- classification and definitions by international consensus. *Gut* 62:102–111
4. Sing VK, Wu BU, Bollen TL, Repas K et al (2009) Early systemic inflammatory response syndrome is associated with severe acute pancreatitis. *Clin Gastroenterol Hepatol* 7:1247–1251
 5. Easler JJ, Zureikat A, Papachristou GI (2012) An update on minimally invasive therapies for pancreatic necrosis. *Expert Rev Gastroenterol Hepatol* 6(6):745–753
 6. Van Santvoort HC, Besselink MG, Bakker OJ, Hofker HS et al (2010) A step-up approach or open necrosectomy for necrotizing pancreatitis. *NEJM* 362:16
 7. Van Brunschot S, van Grinsven J, Voermans RP, Bakker OJ et al (2013) Transluminal endoscopic step-up approach versus minimally invasive surgical step-up approach in patients with infected necrotizing pancreatitis (TENSION trial): design and rationale of a randomized controlled multicenter trial [ISRCTN09786711]. *BMC Gastroenterol* 13:161