

Endoscopic ultrasound guided drainage of necrotic pancreatic fluid collections: a monocentric experience

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Abstract

An episode of acute pancreatitis can lead to complications of acute necrotic collection (ANC) or walled-off necrosis (WON) in 20% of patients. Many of these patients with pancreatic necrosis are symptomatic with infected necrosis, gastrointestinal obstruction, persistent pain or inflammation and require an intervention. Present guidelines on management of complication in acute pancreatitis advise against early invasive interventions for pancreatic necrosis. A four week time line is give, which usually coincides with the time an “acute necrotic collection” develops in to a WON and is suitable for safe interventions.

We present eleven patients who underwent endoscopic drainage of WON of the pancreas using endoscopic ultrasound (EUS), of which eight patients were successfully (72%) managed and three succumbed to their illness due to complications. Three patients needed additional surgical drainage of endoscopically inaccessible para colic collections.

EUS guided drainage is an effective and successful, minimally invasive method to drain WON in the appropriate patient.

Introduction

An episode of acute pancreatitis can lead to complications of acute necrotic collection (ANC) or walled-off necrosis (WON) in 20% of patients [1]. An ANC by definitions has “no definable wall encapsulating the collection,” whilst a WON is an “encapsulated collection” with a “mature wall”. A four week time line is give, which usually coincides with the time an “acute necrotic collection” develops in to a mature WON [1].

Many patients with pancreatic necrosis are symptomatic with infected necrosis, gastrointestinal obstruction, persistent pain or inflammation and require an intervention [2]. Consensus

guidelines on management of complications in acute pancreatitis advice postponing invasive interventions for pancreatic necrosis until the stage of WON has been reached, that is usually at least 4 weeks after disease onset [1].

At present management of pancreatic necrotic collections involves a multi-disciplinary staged step-up approach depending on the location of collection and the available expertise. Endoscopic trans luminal drainage, percutaneous drainage and surgical drainage have all been used successfully depending on the need of the individual patient.

Endoscopic step-up approach has been shown to be associated with reduced risk of external fistulae occurrence, shorter hospital stays, new onset multiorgan failure and physiological stress, better quality of life and ultimately lower costs to the health care system, with no significant difference in mortality when compared with surgical approach in three randomized trials [3].

The endoscopic approach involves creating a cysto gastrostomy/enterostomy and thereafter transluminal necrosectomy depending on the response to the initial drainage. While this has been accepted and practiced routinely in other parts of the world, there are no published data available in Sri Lanka. Here we present a mono centric experience of eleven cases of endoscopic necrosectomy performed at the tertiary care hospital in Sri Lanka.

Methods

Study sample

Gastroenterology and endoscopy unit in the university surgical unit, National Hospital Colombo is a main tertiary care referral center for managing patients with complicated pancreatic pathology, especially for endoscopic management. It maintains a unit database as an inception cohort, from which all patients who had undergone endoscopic drainage and necrosectomy for management of necrotic collections following acute pancreatitis for the past 5 years were identified. The presence of WON had been confirmed in all patients using CECT prior to the procedure.

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All interventions were performed by a single endoscopist (NF) in line with international guidelines. The Primary outcome of interest reported as clinical success was the resolution of WON on post intervention cross sectional imaging and ultimate clinical improvement of the patient.

Technical aspects of the procedure

Endoscopic ultrasound guided drainage and necrosectomy of WON is usually performed under deep sedation using midazolam or propofol with fentanyl. A linear-array endoscopic ultrasound (EUS) is performed to visualize the pancreatic fluid collection and to decide the optimal route for puncture which is usually via the posterior wall of the stomach or duodenum. There may be an endoscopically visualized bulging of the collection into the stomach or duodenum. Under EUS guidance, a 19G Needle is used to puncture the collection. The correct position of the needle can be confirmed by aspiration of the fluid content via the needle. A 0.035 guidewire used for ERCP is there after advanced through the needle under fluoroscopic guidance into the fluid collection. This is used as a railroad for passing of accessories in the next steps. A cystotome which is a electrocautery device with an 8.5Fr diameter sheath is used to create a puncture tract to enable the passage of the stent. Balloon dilatation of the puncture tract can be performed up to 15 mm to further dilate the tracts, which we did not use in any of our patients. A 2-3cm long 14-16mm diameter bi flanged self-expandable metal stent is there after inserted along the guide wire to create the cystogastrostomy/enterostomy. Necrotic fluid can be seen draining through the stent once the procedure is complete. To avoid blocking of the cystogastrostomy stent a nasocystic catheter may be positioned in the space of the walled-off necrosis which can be used for continuous irrigation of the collection with at least 1 liter of normal saline over 24 hours. Many centers do not routinely place nasocystic drains, but rather repeat the endoscopic interventions to irrigate the collection with saline and remove debris.

The effectiveness of EUS drainage on the clinical condition of the patient is monitored over the next 48-72 hours. A follow up endoscopic procedure is planned if there is no clinical improvement: improvement of the SIRS (Systemic inflammatory response syndrome) parameters, disappearance or reduction of fever, decrease in serum C-reactive protein and white blood cell count.

If necrosectomy is decided a forward-viewing endoscope (standard gastroscope) is advanced into the collection via the stent and the necrosectomy is performed. The pancreatic and

peripancreatic necrotic tissue can be removed using either a basket, a polypectomy snare or grasping forceps. During the subsequent days, an endoscopic necrosectomy may be repeated as needed, depending on the amount of necrosis left in the collection and the clinical condition of the patient.

Whenever there are pancreatic fluid collections not accessible by EUS, a percutaneous or surgical approach may be additionally needed as done in three of our patients with collection in the right para colic region.

Results

Eleven patients underwent endoscopic interventions for necrotic collections following acute pancreatitis. Intractable abdominal pain was the indication for the intervention in more than 50% of the patients, while other indications included gastric outflow obstruction, suspected infection and obstructive jaundice. All patients underwent endoscopic drainage after 4 weeks of the initial presentation. Following initial drainage, the majority required at least one additional session of necrosectomy. Of the 11 patients, 3 patients required a combined laparoscopic drainage to drain endoscopically inaccessible sites in the para colic gutters. Clinical success was achieved in eight patients, with three patients succumbing to their illness due to ongoing sepsis/multi organ failure and disseminated intra vascular coagulation. The results are outlined in Table 1.

Discussion

Despite acute pancreatitis being a common cause of hospital admissions in Sri Lanka, local published data is limited to a handful of articles and unpublished abstracts [3]. Local data on necrotic collections following acute pancreatitis is therefore unknown and management strategies utilized in such Sri Lankan patients are not covered in scientific discourse. Patients with acute pancreatitis are managed by a diverse range of clinicians including general surgeons, gastrointestinal surgeons, gastroenterologists and general physicians. While all resort to available international guidelines in their management, the notion of centralized specialized care for patients with pancreatic conditions is not yet established [3]. In the multidisciplinary staged step-up approach in management of necrotic collections, place of endoscopic interventions is well established internationally. In this paper we discuss outcomes of endoscopic approach in the local setting, which has not yet been described in Sri Lanka.

Table 1

		Frequency (n=11)	Percentage
Gender	Male	8	72.7
	Female	3	27.2
Indication	Abdominal Pain	6	54.4
	Gastric outflow obstruction	1	9.0
	Suspected Infection	3	27.7
	Obstructive jaundice	1	9.0
Necrosectomy	01	6	54.4
	02	3	27.7
	03	2	18.1
	>3	0	00
Size of the PFC (cm)	40 -60	5	45.4
	61-80	5	45.4
	> 80	1	9.0
Combined Laparoscopy		3	27.7
Mortality		3	27.7
Clinical success		8	72.7

As previously mentioned, necrotic collections following acute pancreatitis can be either an acute necrotic collection (ANC) or walled off necrosis (WON). Most patients will require interventions for adverse events such as infections, inability to eat, persistent pain, persistent systemic unwellness or GI obstruction (gastric, intestinal, biliary) and current international guidelines recommend invasive interventions to be postponed until the stage of WON has been reached, which typically occurs in four weeks. On Contrast enhanced CT (CECT), the presence of necrosis is defined as “non-enhanced pancreatic parenchyma”. A CECT should always be performed before an intervention is planned to anatomy of the collection can be seen and best intervention planned. Although MR scans can better characterize necrotic collections, CECT is the standard mode of investigation in most centers, which can identify parenchymal necrosis, extent of necrosis and local complications of necrosis. Endoscopic Ultrasound (EUS) is equal or better at characterizing non-liquid necrosis and debris within pancreatic and peri-pancreatic collections [4]. Accurate identification of necrosis from a pseudocyst is important and is usually defined when there is more than 25% of debris within a pancreatic fluid cavity [2].

In our sample persistent pain was the most common indication for endoscopic drainage and/or necrosectomy. Pain can occur due to the mass effect of collections which will be relieved by drainage [2]. Following the procedure a significant reduction of pain levels was observed in all six patients.

Suspected infection was another common indication for intervention in our sample, which was identified by clinical

deterioration, elevated inflammatory markers and imaging findings. Those patients underwent endoscopic drainage and necrosectomy along with systemic antibiotics. Infection of the collection typically occurs 3-4 weeks following presentation, however, can occur earlier [2]. In our sample infection was suspected 3-4 weeks after initial presentation in 03 patients. Due to high false negative rates, the place for percutaneous aspiration to identify infections is debatable and should not be practiced anymore. In addition, a positive culture does not necessarily require intervention as the decision to intervene is driven by other factors such clinical status of the patients [2]. Although current practice suggests delaying endoscopic interventions till WON is formed, some studies advocate earlier interventions especially when infections is suspected in a ANC. Occasionally infected ANC will require early radiological or endoscopic interventions, which will postpone or avoid surgical debridement all together [4]. Overall, delayed intervention is superior, especially in terms of adverse events. Delayed intervention allows pancreatic necrotic tissue to better demarcate between necrotic tissue from vital tissue, so vital pancreatic tissue will be preserved during necrosectomy enabling better long-term endocrine and exocrine outcomes for the patients [5]. All our patients underwent intervention after 4 weeks since presentation in lines with current recommendations. All patients with suspected infected necrosis needed an additional 2-3 necrosectomy after the initial drainage. Unfortunately, two of the three patients with suspected infected necrosis succumbed to the illness, questioning our approach to the patient. We feel we could have been more aggressive in the frequency of necrosectomy or stepped up to a surgical approach when endoscopic drainage wasn't improving the patient's overall status. The development of

coagulopathy was a major limiting factor even for surgery, in our approach to these complicated and complex cases.

Other patients underwent endoscopic drainage and necrosectomy due to gastric outlet obstruction and obstructive jaundice, which are well recognized indications for intervention. The patients who were asymptomatic despite having necrotic collections on imaging did not undergo any interventions and were not included in this study. These patients' pancreatic fluid collections spontaneously resolved over time regardless of size and extension in keeping with published evidence [2].

The recent advances in minimally invasive endoscopic, percutaneous and surgical techniques have revolutionized the management of necrotic collections. The scientific consensus regarding the role of open surgery in acute necrotizing pancreatitis has shifted significantly in the past decades. Initially, early surgical intervention for pancreatic necrotic collections [4],[2]. Open surgical management is associated with higher rates of complications and death [6]. Regardless of the advances endoscopic techniques and higher rates of complications in open surgical management, there's still a place for surgical management in certain indications for a minority of patients. Ischemic bowel, refractory abdominal compartment syndrome, perforation of a viscera and failure of step-up approaches are recognized indications for surgical management [2]. In three of our patients we had to seek the help of the surgeons to drain endoscopically inaccessible para colic collections which was not draining via the cystogastrostomy and causing an ongoing inflammatory response or infection.

All our patients underwent EUS guided drainage as opposed to conventional endoscopic drainage. When a collection is large enough it may create an endoscopically visible bulge which then can be punctured trans-luminally and drained using a standard endoscope. There is a potential risk of damaging intervening endoscopically invisible vessels causing life threatening bleeds. However, EUS guided drainage is now considered the standard, and it has advantages of being able to identify small collections and drain independent of the presence of a bulge. In addition, it can avoid puncture of vessels using color doppler [2].

The place for endoscopic approach in management of acute necrotizing pancreatitis is well established in the world. However, there are a few challenges to establishing the endoscopic approach in Sri Lanka. Limited availability of

expertise and resources with regards to utilizing EUS is a major challenge. The lack of published local data regarding the incidence of necrotic collections in acute pancreatitis, the varying management strategies utilized in patients in other major centers in the country are limiting factors to any future attempts of establishing specialized multidisciplinary centers for pancreatic conditions.

While acknowledging the limitations of our study, namely the limited sample size and retrospective study design, we share our experience in utilizing EUS guided drainage for necrotic collections in a firmly established scientific background for the procedure. Our research aims to lay the background necessary to set international standards in Sri Lanka by sharing our successful experience of using EUS guided drainage for necrotic collections following acute pancreatitis in a tertiary care center in Sri Lanka. We hope this work can serve as a steppingstone towards achieving our objectives for the country.

Conclusion

EUS-guided interventions for PFCs have become an important component of the treatment of acute severe necrotizing pancreatitis and at present should be the first line approach in centers with endoscopists experienced in EUS guided interventions. Recent guidelines also advocate endoscopic guided PFC drainage as a safe and effective way in managing these complications of pancreatitis. With the advancement of techniques and availability of novel accessories there is substantial promise for the improved and simplified treatment of these collections.

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