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Endoscopic Necrosectomy for Walled-Off Pancreatic Necrosis

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Approximately 20% of patients with acute pancreatitis develop pancreatic necrosis with significant mortality. Surgical debridement is the traditional management of necrotizing pancreatitis, but it is associated with significant morbidity and mortality. Endoscopic necrosectomy using repeats session of debridement and stent insertion has been more frequently used within the last decade and half. This technique continues to evolve as we attempt to optimize the post-procedural outcomes.

Key Words: Pancreas; Necrosis; Endoscopic necrosectomy

INTRODUCTION

Approximately 20% of patients with acute pancreatitis develop pancreatic necrosis, and mortality rates up to 39% have been reported.[1] Surgical debridement is the traditional management of necrotizing pancreatitis.[1-5] However, it is associated with significant morbidity and mortality of up to 92% and 56%, respectively.[6-18] Image-guided percutaneous techniques have emerged as alternative effective therapeutic options[19-24] but require an indwelling catheter for an extended period of time and multiple sessions for drainage. It can also be complicated by stent lumen occlusion, secondary infections, and fistula formation.[25-28] Endoscopic necrosectomy using repeats session of debridement and plastic stents insertion has been more frequently used within the last decade and half. It offers a non-invasive way to treat patients with a severe disease.

By contrast, fully covered self-expandable metallic stents might provide a safer and more efficient platform for internal drainage through a larger diameter stent.[29-33] Antillon et al.[34] reported the first case of transgastric endoscopic necrosectomy using a metallic esophageal stent for the treatment of infective pancreatic necrosis with successful response. Thus, this alternative approach could potentially be safer and more efficient when compared to conventional necrosectomy with plastic stents in the future.

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TECHNIQUE

Using a linear array echoendoscope (GF-UCT 140-180; Olympus America, Center Valley, PA, USA), the region of pancreatic necrosis is first located. Color Doppler ultrasound is used to identify surrounding vasculature. Drainage can be attained using the Seldinger technique. Specifically, a needle knife (Boston Scientific, Natick, MA, USA) or 19 gauge fine needle aspiration needle (Wilson-Cook, Winston Salem, NC, USA) is used to obtain transenteric access into the pancreatic necrosis, creating a fistula. Once access was secured, fluid is aspirated for microbiology analysis. A 0.035 inch guidewire was advanced through the needle and coiled into the cavity. Contrast injection of the necrotic cavity can be done under fluoroscopy at the discretion of the endoscopist. Dilation of the fistula is then performed using a CRE balloon of 15 mm (Boston Scientific). Once the fistula is dilated, this provides access for active endoscopic irrigation with a standard gastroscope (Olympus America) and debridement of cystic contents using biopsy forceps, Roth nets and polypectomy snares. Debridement can be repeated for several sessions until the necrotic debris are removed. Occasionally, a nasocystic drain can be placed to irrigate the fluid collection (1 L normal saline/ 24 hours). At the end of the procedure, multiple plastic stents can be placed to keep the fistula open, or alternatively a large esophageal covered metal stent.

For patients requiring nutritional support, Percutaneous endoscopic gastrostomy with jejunal arm extension (PEG-J) is typically placed. Briefly after placing a 24 Fr PEG (Boston Scientific) facing the pylorus using the pull-through technique, a 90 cm jejunal arm was placed into the jejunum under fluoroscopic guidance. In those patients receiving PEG-J, the gastric port was connected to low wall suction and the necrosis irrigated with normal saline via the nasocystic drain to lavage the necrosis and expedite its resolution.

DISCUSSION

Although acute pancreatitis in the majority of patients is a self-limited disease, up to one third may have severe pancreatic necrosis. Infection is one of the most serious complications of pancreatic necrosis, and open necrosectomy with post-operative irrigation was conventionally the standard method of treatment. However, increasing morbidity and mortality rates prompted a search for alternative methods of minimally invasive treatments such as placement of percutaneous large-bore catheters by interventional radiologists, percutaneous necrosectomy using sinus tract endoscopy, percutaneous laparoscopic necrosectomy, and endoscopic transmural necrosectomy. This continuum of evolving invasive necrosectomy shares the common goal of avoiding laparotomy. Disadvantages of the percutaneous methods such as the indwelling catheter serving as a nidus for infection and a significant rate percutaneous fistula formation have led to the emergence of endoscopic approach.

From the initial pioneering work of Wiersema[35] and Binmoeller and Soehendra[36] in 1990's on endoscopic transmural drainage of pancreatic pseudocysts, this has now been established as the mainstay of treatment. In 2006, Antillon et al.[37] conducted a prospective cohort study with 33 patients and demonstrated that single step endoscopic ultrasonography (EUS)-assisted transmural drainage with a large endoprosthesis was a safe and effective therapy for both simple and complicated pancreatic pseudocysts. Kruger et al.[29] also reported a similar cyst resolution rate. Most recently, Bakker et al.[38] of the Dutch Pancreatitis Study Group randomized 22 patients to endoscopic transgastric or surgical necrosectomy. Endoscopic transgastric necrosectomy reduced post-procedural interleukin-2 and was associated with fewer episodes of pancreatic fistulas and multiple organ failure.[38] Seewald et al.[39] showed that endoscopic drainage of pancreatic fluid collections (PFCs) is not only safe and effective immediately, but is also successful in the long term (72%).

The growing advances in endoscopic instrumentation resulted in a significant expansion of the management of pancreatic necrosis. However, with pancreatic necrosis there was an added need to evacuate the solid debris, which made it more challenging than pseudocyst. Hookey et al.[40] in 2006 reported a success rate of 90.6% in patients who underwent EUS guided transmural drainage for patients with acute fluid collection secondary to necrosis, acute pseudocysts, chronic pseudocysts, and pancreatic abscesses. This data suggests that with the evolution of EUS, indications for transmural drainage has now expanded to include pancreatic abscesses, organized liquefied necrosis, and non-bulging PFCs. Further, direct sonographic visualization of pancreatic necrosis allows for safer transmural drainage in patients with a high-risk of bleeding, such as those with portal hypertension and coagulopathy.

Studies show that the placement of larger diameter or multiple stents would facilitate resolution in PFCs with significant debris since conventional plastic stents were limited to 10 Fr. Metal stents with larger diameter have an increased patency and decreased overall cost due to reduction in the frequency of endoscopic interventions, and have been proven to be superior to plastic stents in malignant biliary obstruction. Even though they have a high initial cost, the overall cost is reduced by decreased need for endoscopic interventions, tempting us to use them in PFCs. In 2008, Talreja et al.[33] published a prospective case series of 18 patients to demonstrate the efficacy and safety of transenteric drainage by PFCs using covered self-expanding metal stent (CSEMS). Their findings confirm the decreased time required for resolution of the PFCs due to larger diameter access fistula for drainage. In addition, the use of metal stents is advantageous because they provide a radial force that can tamponade bleeding vessels within the wall of the PFC, particular stents might better appose the PFC wall to the stomach wall, and they provide better drainage.

Esophageal metallic stents are larger diameter CSEMS used primarily for palliation in malignant dysphagia. In 2009, Antillon et al.[34] first described their use in a patient with infected pancreatic necrosis who refused surgery and failed four endoscopic sessions with plastic stents. The patient did well with quick resolution of pancreatitis.

CONCLUSIONS

Over the last two decades, transluminal endoscopic necrosectomy has become the mainstay of treatment for infected PFCs. This technique continues to evolve as we attempt to optimize the post-procedural outcomes. In the future, we need randomized controlled trials to compare plastic stents to larger metallic stents in this patient population.

Conflicts of Interest

The author has no financial conflicts of interest.

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