

Pancreatic necrosectomy using an automated mechanical endoscopic tissue extraction device



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A 66-year-old man with uncontrolled diabetes mellitus and prior cholecystectomy presented to an outside hospital with symptoms of intractable abdominal pain, nausea, and vomiting. He received a diagnosis of acute pancreatitis and was treated conservatively and eventually discharged. He continued to have persistent symptoms and was admitted again. An abdominal CT scan revealed a pancreatic fluid collec-

tion (PFC) with evidence of solid debris. The patient was transferred to our facility for further evaluation and treatment.

On initial evaluation, the patient was tachycardic and febrile. The results of laboratory testing were remarkable for leukocytosis and elevated lipase. The patient met the criteria for sepsis and, given the CT findings, we were concerned about an infected PFC. EUS revealed a large 70- × 70-mm encapsulated

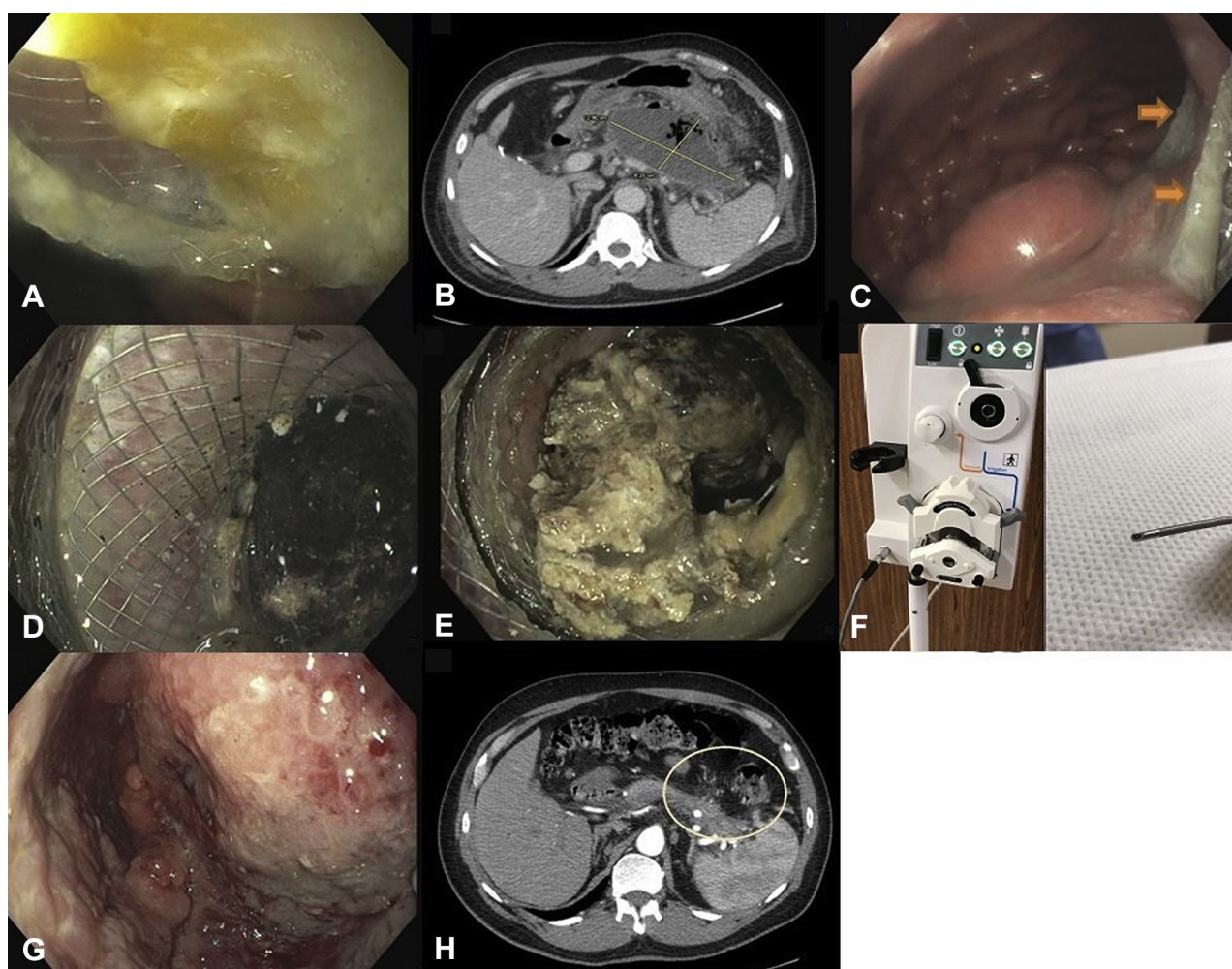


Figure 1. **A**, EUS-guided placement of LAMS with immediate drainage of thick, purulent yellow fluid. **B**, CT view of abdomen showing increasing size of PFC and peripancreatic inflammatory changes. **C**, Placement of 2 LAMSs. **D**, Upper endoscopic view showing occlusion of secondary LAMS by necrotic debris. **E**, Large remnant pancreatic necroma. **F**, Console and catheter system for automated endoscopic tissue extraction device. **G**, Endoscopic view showing postprocedural necrosectomy with complete resection. **H**, CT view of abdomen showing near resolution of PFC after the procedure. LAMS, Lumen-apposing metal stent; PFC, pancreatic fluid collection.

fluid collection along the body of the pancreas with a moderate amount of solid debris consistent with walled-off necrosis (WON). The patient subsequently underwent EUS-guided placement of a lumen-apposing metal stent (LAMS).

After placement of the LAMS, there was immediate drainage of thick purulent yellow fluid (Fig. 1A). The patient's clinical course improved, and he was discharged home. However, 8 days later he returned once again to the emergency department with a clinical picture of recurrent sepsis. A repeated CT scan of the abdomen and pelvis performed 5 days later revealed that the PFC had increased in size, and there were increasing peripancreatic inflammatory changes (Fig. 1B). Repeated upper endoscopy and EUS revealed that the initial LAMS was occluded by necrotic debris, and a large portion of the debris was removed with the use of snares and retrieval nets.

A decision was made to place a secondary LAMS by use of a multiple transluminal gateway technique (Fig. 1C) rather than a double-pigtail stent. Unfortunately, we did not have an appropriately sized double-pigtail stent available, and were concerned about using a longer pigtail stent because of the possibility of injuring the back wall of the cyst, based on prior experiences. Therefore, we thought that using a multiple gateway approach would potentially provide multiple drainage points.

The patient underwent a total of 3 endoscopic treatments with minimal improvement. Given the large size of the pancreatic necroma and the recurrence of the patient's symptoms, it was thought that an alternative approach was more suitable. We discussed further options with the patient and offered him consultation with the pancreatic surgery team, repeated endoscopic necrosectomy, or consideration of a novel, off-label approach to potentially decrease the number of endoscopic procedures and multiple interventions. This particular device is designed to suction, cut, and obtain tissue samples from the edges of mucosal resection sites; however, its design can allow for controlled resection of necrotic tissue in a patient with WON.

This off-label approach for repeated necrosectomy was performed (Video 1, available online at www.VideoGIE.org). The gastric mucosa was inspected, and a large amount of necrotic debris was seen partially occluding the secondary LAMS (Fig. 1D). As the LAMS was traversed we noticed purulent fluid and a large remnant necroma (Fig. 1E). We attempted to remove it by traditional maneuvers, such as net and snare extraction; however, a significant amount of tissue remained adherent.

Next, we used the automated mechanical tissue extraction device to clear the residual tissue. As illustrated in Fig. 1F, the 2 main elements are the console and the catheter. The catheter has a cutting blade and tubes for suction and irrigation. Before activation of the device, the angle of approach has to be adjusted to achieve the

desired trajectory. This is accomplished by manipulating the rotation handle to place the cutting blade in the anticipated direction. The solid black line is located 180° from the blade, and there are hashed lines that visibly mark 90° from the cutting blade. Finally, a perpendicular solid black line indicates the center of the cutting opening.

The device is used by initiating cutter rotation with depression of a foot pedal. The blades rotate clockwise and can be adjusted from 1000 to 1700 revolutions per minute. A second foot pedal initiates suction. The design of the catheter allows for the resected tissue to be aspirated immediately and collected in a trap. The procedure lasted approximately 2 hours, and complete removal of the necroma was achieved (Fig. 1G). We removed both LAMSs from the cavity, and it was left open. After the procedure, an abdominal CT scan revealed a near-complete resolution of WON as compared with prior imaging (Fig. 1H). The following day, the patient experienced significant improvement of symptoms, and he was able to tolerate food without exacerbation of nausea, vomiting, or abdominal pain. The patient's condition was deemed stable, and he was discharged home with close follow-up.

Infected PFC is a significant cause of morbidity, mortality, and health-care costs. Using this novel, off-label approach with a through-the-scope automated mechanical endoscopic tissue extraction device, we were able to completely extract a large pancreatic necroma safely and effectively. An alternative to this approach includes a repeated endoscopic necrosectomy or surgical intervention. We opted to do this because we had failed to remove all of the debris using standard methods, and the patient was amenable to trying this alternative approach.

This method may potentially improve patient outcomes by decreasing multiple instrumentation and exchanges, avoiding repeated procedures, and avoiding invasive surgery. However, more data and research need to be pursued to make this method competitive with current treatment strategies.

DISCLOSURE

Dr Sachdev and Dr Das are consultants for Boston Scientific. All other authors disclosed no financial relationships relevant to this publication.

Abbreviations: LAMS, lumen-apposing metal stent; PFC, pancreatic fluid collection; WON, walled-off necrosis.

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<https://doi.org/10.1016/j.vgje.2018.08.005>