Thieme

EUS-guided transcolonic drainage and necrosectomy in walled-off necrosis: a retrospective, single-center case series

Authors
Mohamed Ebrahim[1], Srdan Novovic[1,2], Palle Nordblad Schmidt[1], Erik Feldager Hansen[1], John Gásdal Karstensen[1,2]

Institutions
1 Pancreatitis Centre East, Gastrounit, Copenhagen University Hospital - Amager and Hvidovre, Hvidovre, Denmark, Hvidovre Hospital, Hvidovre, Denmark
2 Department of Clinical Medicine, University of Copenhagen, Kobenhavn, Denmark

Corresponding author
Dr. Mohamed Ebrahim, MD, Hvidovre Hospital, Pancreatitis Centre East, Gastrounit, Copenhagen University Hospital - Amager and Hvidovre, Hvidovre, Denmark, Hvidovre, Denmark
mohamed.ebrahim.01@regionh.dk

submitted 2.3.2023
accepted after revision 11.5.2023
accepted manuscript online 16.5.2023

Bibliography
Endosc Int Open 2023; 11: E618–E622
DOI 10.1055/a-2095-0272
ISSN 2364-3722

Georg Thieme Verlag KG, Rüdigerstraße 14, 70469 Stuttgart, Germany

ABSTRACT

Background and study aims Transgastric endoscopic ultrasound (EUS)-guided drainage and, if needed, necrosectomy is the preferred treatment in patients with pancreatic walled-off necrosis. EUS-guided transcolonic or transrectal drainage and necrosectomy may serve as a minimally invasive alternative in cases in which transgastric or percutaneous drainage is either impossible or fails to secure sufficient drainage. In this paper, we retrospectively evaluated the feasibility, safety, and efficacy of the treatment. We included nine patients and found a technical success rate of 100%, clinical success in 89%, and one adverse event (11%). Transrectal/transcolonic endoscopic necrosectomy was needed in seven patients (78%).

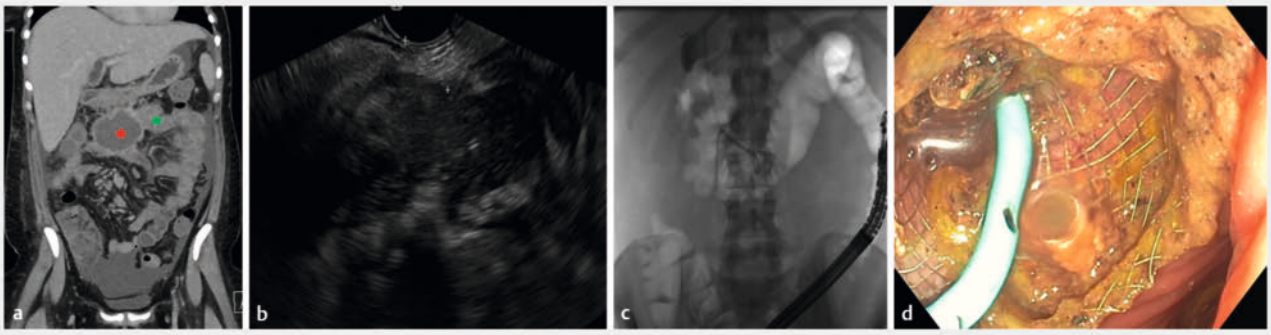
Introduction

Transgastric or transduodenal endoscopic ultrasound (EUS)-guided drainage and, if needed, necrosectomy has become the modality of choice in the treatment of pancreatic walled-off necrosis (WON) [1,2,3,4,5,6]. However, some WON may not be in proximity to the upper gastrointestinal tract or may extend into the paracolic gutters, the root of the mesentery, or the pelvis, necessitating multi-gate drainage. In such cases, a percutaneous approach including percutaneous catheter drainage or surgical techniques including video-assisted retroperitoneal debridement (VARD) may be required; however, this is associated with considerable risk of pancreatico-cutaneous fistulas [7]. While EUS-guided transrectal (TR) and transcolonic (TC) drainage of abdominopelvic abscesses has been described elsewhere [8], only one case report has described the use of this technique in managing WON [9].

Procedure

In this paper, we report our experience with EUS-guided TR or TC drainage and necrosectomy in nine consecutive patients with culture-proven infected WON who were admitted to our tertiary referral center. During the study period of January 1, 2020, to December 31, 2022, 91 adult patients (> 18 years) underwent EUS-guided drainage for WON. Permission for this study was granted by the Center for Regional Development, Capital Region of Denmark (ID no. R-20075169). No permission from the Regional Ethics Committee was needed since the study was retrospective.

EUS-guided TR or TC drainage was performed using a curved linear array echoendoscope (GF-UCT180, Olympus, Japan) and ultrasound scanner (Arietta 850, Hitachi Medical Corporation, Tokyo, Japan) by: 1) needle puncture of the collection with a 19G needle (ECHO-HD-19-A, Cook Medical, Bloomington, Indi-



▶ **Fig. 1** Transcolonic endoscopic ultrasound-guided drainage and necrosectomy for WON with proximity to the oral transverse colon. a Coronal CT slice depicting a WON (red asterisk) with proximity to the oral part of the transverse colon (green asterisk) before placement of lumen-apposing metal stent (LAMS). b Endosonographic view of the WON. c Fluoroscopic view of the LAMS and double pigtail plastic stent. d Endoscopic view of the LAMS and coaxial double pigtail plastic stent.

ana, United States); 2) insertion of a 0.025- to 0.035-inch/450-cm guidewire (VisiGlide 2, Olympus Medical Systems Europe, Hamburg, Germany or Dreamwire, Boston Scientific Natick, Massachusetts, United States) through the needle; 3) balloon dilatation of the tract over the wire with a 4- to 8-mm balloon (Hurricane, Boston Scientific Natick, Massachusetts, United States); and 4) insertion of one or two 7F double pigtail stents (DPT) of various lengths (Zimmon, Cook Medical, Bloomington, Indiana, United States). Alternatively, a lumen-apposing metal stent (LAMS) (Hot AXIOS 20 × 10 mm, Boston Scientific, Natick, Massachusetts, United States) with a 7F/4-cm coaxial double pigtail stent was used (▶ **Fig. 1**). Endoscopic necrosectomy was performed through the working channel of either a gastroscope or colonoscope (Olympus Medical Systems Europe, Hamburg, Germany) using forceps, snare or EndoRotator (Interscope Medical, Inc. Worcester, Massachusetts, United States) at the discretion of the endoscopist. During endoscopic debridement, irrigation was performed with 0.3% hydrogen peroxide solution. Bowel cleansing was achieved by administration of a polyethylene glycol (PEG)-based bowel preparation including Plenvu or macrogel (Movicol) before the endoscopic procedures. Between endoscopic procedures, antibiotic and/or antifungal treatment was administered depending on microbiological findings at index drainage procedure and further treatment was adjusted according to subsequent culture findings. The procedures were performed under conscious sedation with midazolam and sufentanil, or under general anesthesia, depending on the clinical condition of the patient. The pigtail stents were removed after 1 year, while the LAMS was removed after clinical resolution and before discharge from the hospital. As for transgastric drainage, indwelling coaxial double pigtail stents were left in place after removal of the LAMS for a year, aiming at minimizing recurrence of pancreatic fluid collections especially in case of disconnected pancreatic duct syndrome.

In all patients the treatment strategy including need for step-up was discussed after thorough review of relevant clinical information and radiological images at a weekly multidisciplinary pancreas team meeting including advanced endoscopists, surgeons, gastroenterologists, microbiologists, and radiologists [6].

Results

Overall, nine patients with WON, all with culture-proven infection, according to the Revised Atlanta classification [10] were included in the study (▶ **Table 1**). In all but two of the patients, the TR/TC drainage was performed in addition to transgastric drainage and necrosectomy (▶ **Table 1**). Drainage was performed through the colon in seven patients and through the rectum in two patients. Double pigtail stents were used in six patients and LAMS was used in three patients.TR/TC necrosectomy was needed in seven patients (78%) (▶ **Video. 1**). Drainage was successfully performed in all patients and clinical resolution was achieved in eight of the nine patients at follow-up (89%). In one patient, a small, isolated remnant of the WON reoccurred as a psoas abscess and was first drained percutaneously at the referring hospital and subsequently in our center through the colon. The overall adverse event rate was 11% (n = 1). A transverse colonic perforation occurred in a patient after faulty insertion of double pigtail stents into what was believed

VIDEO

▶ **Video 1** Endoscopic transcolonic necrosectomy.

▶ **Table 1** Overview of patients with WON who underwent transrectal/transcolonic EUS-guided drainage and necrosectomy.

ID	Age, sex	Etiology	Comorbidity	WON size and location	Puncture site	Index intervention, days since index intervention	Indication for transcolonic/transrectal intervention	Transcolonic/transrectal necrosectomy	Stent, type and size	Adverse events	Clinical success	Number of transcolonic procedures before resolution
1	27, M	Gallstones	Diabetes	10 × 12 cm, splenic flexure, medial to the descending colon	Descending colon	Transgastric drainage followed by necrosectomy, 15 days	Remnant necrotic collection at the splenic flexure not accessible by transgastric drainage	No	7F 12 cm DPT stent	Yes, colonic perforation[1]	Yes	2
2	28, M	Alcohol	None	15 × 4 cm, pelvic cavity	Rectum	Transgastric drainage followed by necrosectomy and VARD, 104 days	Slow clinical progression and poor infection control why a multi-gate technique was used (concomitant transgastric necrosectomy and transrectal drainage)	No	7F 15 cm DPT stent	None	Yes	3
3	63, M	Alcohol	None	7 × 3 cm, splenic flexure, medial to the descending colon	Descending colon	Transgastric drainage followed by necrosectomy, 13 days	Remnant necrotic collection at the splenic flexure not accessible by transgastric drainage	Yes	7F 6 cm DPT stent	None	Yes	1
4	50, F	Post-ERCP	Primary biliary cholangitis and liver transplantation	26 × 4 cm, pelvic cavity	Rectum	Transrectal, N/R	Transrectal drainage and necrosectomy used as single-therapy due to WON location	Yes	7F 15 cm DPT stent	None	Yes	4
5	40, F	Ischemic pancreatitis following newly liver transplantation	Neuroendocrine tumor with previous Whipple procedure	24 × 16 cm, at the left paracolic gutter extending medially to the mesenteric root	Transverse colon	Concomitant transgastric and transcolonic drainage and necrosectomy at index procedure	Refractory septic shock in an immunocompromised patient	Yes	LAMS (Hot AXIOS stent, 20 mm x 10 mm)	None	Yes	2

▶ **Table 1** (Continuation)

ID	Age, sex	Etiology	Comorbidity	WON size and location	Puncture site	Index intervention, days since index intervention	Indication for transcolonic/transrectal intervention	Transcolonic/ transrectal necrosectomy	Stent, type and size	Adverse events	Clinical success	Number of transcolonic procedures before resolution
6	33, F	Post-ERCP	None	9 × 7 cm, at the mesenteric root, infero-medial to the transverse colon	Transverse colon	Transcolonic	Collection not accessible by transgastric approach	Yes	LAMS (Hot AXIOS stent, 20 mm x 10 mm)	None	Yes	3
7	73, F	Gallstones	Hypertension	11 × 6 cm, at the splenic flexure, extending medially to the descending colon	Descending colon	Transgastric drainage and necrosectomy, 39 days	Remnant necrotic collection at the splenic flexure not accessible by transgastric drainage	Yes	7F 6 cm DPT stent	None	Yes	2
8	46, M	Gallstones	None	24 × 7 cm, at the left paracolic gutter extending medially to the mesenteric root	Descending colon	Transgastric drainage and necrosectomy, 62 days	Remnant collection at left paracolic gutter not accessible by transgastric approach	Yes	LAMS (Hot AXIOS stent, 20 mm x 10 mm)	None	Yes	1
9	35, M	Alcohol	None	8 × 4 cm, at the splenic flexure extending medially to the descending colon	Descending colon	Transgastric, 32 days	Remnant collection at the splenic flexure not accessible by transgastric drainage	Yes	7F 8 cm DPT stent	None	Yes	2

M, male; F, female; ASA, American Society of Anesthesiology; WON, walled-off pancreatic necrosis; ERCP, endoscopic retrograde pancreatography; DPT, double pigtail; VARD, video-assisted retroperitoneal debridement; PBC, primary biliary cholangitis; LAMS, lumen-apposing metal stent.

[1] A transverse colon perforation occurred during insertion of double pigtail stents, necessitating surgery (explorative laparotomy with suture repair); however, a further transcolonic drainage procedure was performed successfully.

to be a WON. This was treated with laparotomy and suture repair, followed by an uneventful recovery (Patient ID 1, ▶**Table 1**). A successful transcolonic drainage was later performed in this case.

Discussion

No patient in our cohort developed pancreatico-cutaneous fistula, a complication associated with substantial morbidity and more commonly encountered in patients drained through percutaneous routes or surgical approaches including VARD and open necrosectomy [4, 7]. We believe that endoluminal drainage and necrosectomy minimize that risk. Moreover, necrotic collections extending into the root of the mesentery may be challenging to drain sufficiently with percutaneous techniques including VARD due to a central location in the abdomen. We find that transcolonic drainage in collections inaccessible to a transgastric or transduodenal route may serve as a minimally invasive alternative to percutaneous or surgical techniques.

EUS-guided TR/TC drainage may be performed both with DPT and LAMS. However, when puncturing from the transverse colon, which is intraperitoneally located, the use of LAMS is preferred to seal the trajectory.

Conclusions

While our study is limited by its small number of patients, it is the first to demonstrate the technical feasibility of EUS-guided TR/TC drainage and necrosectomy in patients with WON. TR/TC drainage of WON appears to be safe and practical, and the combination of transgastric and transcolonic drainage may be recommended for multi-gate treatment of WON extending to the paracolic gutters, the root of the mesentery, or in the presacral space. Hypothetically, bacterial translocation from the colon and subsequent superinfection of the WON may be an issue. However, the WON in our cohort were already infected, as confirmed by culturing findings. Finally, it remains to be explored in a prospective setting whether EUS-guided TR/TC drainage improves clinical outcomes.

Conflict of Interest

ME, SN, PNS, and EFH have no conflicts of interest to declare. JGK is a consultant for Boston Scientific, Ambu, and SNIPR Biome.

References

[1] Hines OJ, Pandol SJ. Management of severe acute pancreatitis. BMJ 2019; 367: 6227 doi:10.1136/bmj.l6227

[2] Hollemans RA, Bakker OJ, Boermeester MA et al. Superiority of step-up approach vs open necrosectomy in long-term follow-up of patients with necrotizing pancreatitis. Gastroenterology 2019; 156: 1016–1026

[3] Karstensen JG, Novovic S, Hansen EF et al. EUS-guided drainage of large walled-off pancreatic necroses using plastic vs lumen-apposing metal stents: a single centre randomised controlled study. Gut 2023; 72: 1167–1173

[4] Bakker OJ, Van Santvoort HC, Van Brunschot S et al. Endoscopic transgastric vs surgical necrosectomy for infected necrotizing pancreatitis: A randomized trial. JAMA 2012; 307: 1053–1061 doi:10.1001/jama.2012.276

[5] Lindgaard L, Lauritsen ML, Novovic S et al. Simultaneous endoscopic and video-assisted retroperitoneal debridement in walled-off pancreatic necrosis using a laparoscopic access platform: Two case reports. World J Gastroenterol 2022; 28: 588–593 doi:10.3748/wjg.v28.i5.588

[6] Ebrahim M, Werge MP, Hadi A et al. Clinical outcomes following endoscopic or video-assisted retroperitoneal management of acute pancreatitis with large (>15 cm) walled-off pancreatic necrosis: Retrospective, single tertiary center cohort study. Dig Endosc 2022; 34: 1245–1252 doi:10.1111/den.14295

[7] Onnekink AM, Boxhoorn L, Timmerhuis HC et al. Endoscopic versus surgical step-up approach for infected necrotizing pancreatitis (EXTENSION): long-term follow-up of a randomized trial. Gastroenterology 2022; 163: 712–722.e14

[8] Alis H, Soylu A, Dolay K et al. Endoscopic transcolonic catheter-free pelvic abscess drainage. Can J Gastroenterol 2008; 22: 983–986 doi:10.1155/2008/848737

[9] Law R, Wong Kee Song LM et al. Simultaneous transgastric and transcolonic debridement of walled-off pancreatic necrosis. Gastrointest Endosc 2014; 80: 1172

[10] Banks PA, Bollen TL, Dervenis C et al. Classification of acute pancreatitis - 2012: Revision of the Atlanta classification and definitions by international consensus. Gut 2013; 62: 102–111 doi:10.1136/gutjnl-2012-302779