EUS-guided transrectal drainage of pelvic fluid collections using electrocautery-enhanced lumen-apposing metal stents: a case series

Andrea Lisotti, MD,[1] Anna Cominardi, MD,[1] Igor Bacchilega, MD,[2] Romano Linguerri, MD,[3] Pietro Fusaroli, MD[1]

Background and Aims: Pelvic fluid collections (PFCs) are frequent adverse events of abdominal surgery or inflammatory conditions. A percutaneous approach to deep PFCs could be challenging and result in a longer, painful recovery. The transvaginal approach has been considered easy but is limited by the difficulty of leaving a stent in place. The transrectal approach has been described, but issues related to fecal contamination were hypothesized. Data on EUS-guided transrectal drainage (EUS-TRD) with lumen-apposing metal stents (LAMSs) are few and suggest unsatisfactory outcomes. The aim of this study was to evaluate the safety and efficacy of EUS-TRD with LAMSs in patients with PFCs.

Methods: A retrospective analysis of a prospectively maintained database on therapeutic EUS was conducted. All EUS-TRD procedures were included.

Results: Five patients (2 male, age 44-89 years) were included. Four patients had postoperative PFCs, and 1 presented with a pelvic abscess complicating acute diverticulitis. Two of 5 had fecal diversion; the remaining 3 had unaltered large-bowel anatomy. One case had a concomitant abdominal collection, treated with percutaneous drainage in the same session. An electrocautery-enhanced LAMS delivery system (15 × 10 mm) was used in all cases. EUS-TRD was performed with the direct-puncture technique and lasted less than 10 minutes in 4 cases; in the remaining case, needle puncture and LAMS placement over a guidewire was required, and the procedure length was 14 minutes. The clinical success rate was 100%. LAMSs were removed after a median of 14 (range, 12-24) days. One patient reported partial proximal LAMS migration after 24 days (mild adverse event). No PFC recurrence was observed.

Conclusion: EUS-TRD with LAMSs is a safe and effective technique for treatment of PFCs. The use of 15- × 10-mm LAMSs allows rapid PFC resolution. EUS-TRD could be performed not only in patients with fecal diversion but also in cases of unaltered anatomy. (VideoGIE 2020;5:380-5.)

Pelvic fluid collections (PFCs) are frequent adverse events of bacterial abdominal infections. They are areas of necrosis and pus that are demarcated by a thick fibrous wall, formed by an exudative reaction of surrounding tissues.[1] Common etiologies of PFCs are iatrogenic (GI or genitourinary surgery) or spontaneous, complicating an underlying inflammatory condition (ie, diverticulitis, Crohn's disease, appendicitis, tubo-ovarian abscess, or endometriosis).[2]

Because antibiotic treatment often fails to reach adequate concentrations within PFCs,[3] drainage should be considered for collections larger than 3 cm and for all patients with sepsis, regardless of PFC size. Drainage should be performed preferentially by imaging-guided puncture, with laparoscopy or open surgery as back-up strategies.[4]

Percutaneous approaches include transabdominal anterior and transgluteal posterior routes; the former is limited by possible organ interposition (ie, bowel loops, uterus, or urinary bladder), whereas the latter is burdened by high risk of sciatic nerve injury. Moreover, even when technically and clinically effective, drainage of deep PFCs requires a prolonged and often painful recovery period. The transvaginal approach has been described as an alternative route to overcome these issues, but leaving a stent or a tube in place here is difficult.

EUS-guided drainage of fluid collections is an established procedure for treatment of inflammatory and postoperative collections adjacent to the upper GI tract.[5-7] Available evidence on EUS-guided transrectal drainage (EUS-TRD) of PFCs is based on retrospective studies reporting, in most cases, on the use of either plastic stents or catheters.[8-11] A recent French study reported a 5-year clinical success rate of 86.5% in 37 patients treated by EUS-TRD; however, only 4 patients were treated with

TABLE 1. Detailed description of patients baseline characteristics, EUS-TRD procedures and outcomes.

Patient	Condition	Indication for drainage	Fecal diversion	Type of sedation
	Patient characteristics			EUS-TRD
Male, 88 years old	Pelvic collection after Hartmann resection for diverticulitis	Sepsis not responsive to antibiotics Percutaneous drainage not feasible Surgery contraindicated	Yes	Conscious sedation
Female, 89 years old	Abdominal (100 × 60 mm) and pelvic (80 × 50 mm) fluid collections after open surgery because of adhesive bowel obstruction	Sepsis not responsive to antibiotics Surgery contraindicated	No	Conscious sedation
Female, 85 years old	Acute diverticulitis complicated by microperforation and abscess	Percutaneous drainage not feasible (bowel loop interposition) Surgery contraindicated because of peritoneal metastasis from ovarian cancer	No	Conscious sedation
Female, 81 years old	Pelvic collection after Hartmann resection for diverticulitis	Percutaneous drainage not feasible Surgery contraindicated	Yes	Deep sedation
Male, 44 years old	Systemic sepsis and pelvic fluid collection after urinary diversion and cystectomy for complicated posttraumatic neurogenic bladder	Difficult percutaneous approach (distinguish collection from bowel loop because of bladder absence) Surgery as a back-up strategy	No	Conscious sedation

EUS-TRD, EUS-guided transrectal drainage; *LAMS*, lumen-apposing metal stent.

lumen-apposing metal stents (LAMSs), and they experienced poor results in terms of adverse events and need for subsequent surgery.[12]

The aim of our study was to report the safety and efficacy of EUS-TRD with LAMSs in patients with PFCs in whom surgery was contraindicated and percutaneous drainage was not feasible.

METHODS

Study design

A retrospective analysis of a prospectively maintained database was conducted; all patients with a PFC who underwent EUS-TRD from November 2018 to January 2020 were included. All cases underwent CT imaging before the EUS procedure. All were discussed by the Hospital Multidisciplinary Team, including at least 1 gastroenterologist, 1 surgeon, 1 oncologist, and 1 radiologist. Because percutaneous drainage was deemed not feasible by an interventional radiologist, EUS-TRD was indicated. Written informed consent for the interventional EUS procedure was obtained from all patients and clearly specified the procedure and the off-label use of LAMSs. The protocol was evaluated by the institutional review board and conducted according to local policy on retrospective studies.

EUS-TRD procedure

All procedures were conducted in our endoscopic suite. A curvilinear-array echoendoscope (GF-UCT-180; Olympus, Tokyo, Japan) with a dedicated ultrasound processor (EU-ME2; Olympus) was used. Patients were placed in the left lateral decubitus position under continuous cardiopulmonary parameter monitoring. An electrocautery-enhanced LAMS delivery system (Hot-Axios; Boston Scientific, Marlborough, Mass, USA) was used in conjunction with the ERBE VIO 300D electrosurgical unit using pure cut mode (AUTOCUT mode, effect 5, power 100 W). Procedures were done under EUS guidance only, without fluoroscopic assistance.

Clinical follow-up and stent removal

Oral feeding was resumed after 12 hours. Antibiotic treatment was maintained until clinical and biochemical resolution of sepsis. A CT scan was planned after 2 weeks. Stent removal was done after radiologic findings of PFC resolution using an operative gastroscope and a Rat Tooth Alligator Jaw forceps (FG-42L-1; Olympus).

RESULTS

Patients

Five patients (2 male; age 44-89 years) underwent EUS-TRD during the study period. Baseline characteristics,

TABLE 1. Continued

Stent type	Technique	Stent removal	Adverse events	Technical success	Clinical success	Outcome
	EUS-TRD			**Procedure outcomes**		
Hot Axios 15 × 10 mm	Direct puncture Intrachannel release	20 days	No	Yes	Yes	Discharged in 20 days Follow-up unremarkable
Hot Axios 15 × 10 mm (pelvic) 14F plastic pigtail drainage	Direct puncture Intrachannel release US-guided percutaneous drainage (Seldinger technique)	14 days (LAMS) 28 days (pigtail)	No	Yes	Yes	Pigtail catheter removed after 1 month Follow-up unremarkable
Hot Axios 15 × 10 mm	Direct puncture Intrachannel release	24 days	Yes (mild—proximal migration)	Yes	Yes	Collection resolved Medical treatment for diverticular disease Development of peritoneal carcinomatosis from ovarian cancer
Hot Axios 15 × 10 mm	Needle puncture and guidewire insertion Intrachannel release	12 days	No	Yes	Yes	Collection resolved Follow-up unremarkable
Hot Axios 15 × 10 mm	Direct puncture Intrachannel release	13 days	No	Yes	Yes	Symptoms dissipated after 3 days Patient discharged after 13 days

procedural details, and clinical outcomes are summarized in Table 1.

In detail, 4 patients had postoperative PFCs (Hartmann's resection for acute diverticulitis in 2 cases, open surgery because of adhesive bowel obstruction and cystectomy for neurogenic bladder in the other 2 cases). The remaining patient presented with acute diverticulitis complicated by microperforation and deep pelvic abscess (case 3); in this case, surgery was contraindicated because of the presence of peritoneal metastasis from ovarian cancer. Among the 5 patients who underwent EUS-TRD, 2 had fecal diversion and 3 had unaltered large-bowel anatomy. One patient (case 2) had a concomitant abdominal abscess and underwent percutaneous drainage with a 14F pigtail catheter under ultrasound guidance in the same session (Figs. 1-5).

Figure 1. CT scan showing the presence of an 8-cm pelvic fluid collection with gas content *(arrow)*.

EUS-TRD

No procedure required general anesthesia; 4 of 5 were conducted with the patient under conscious sedation

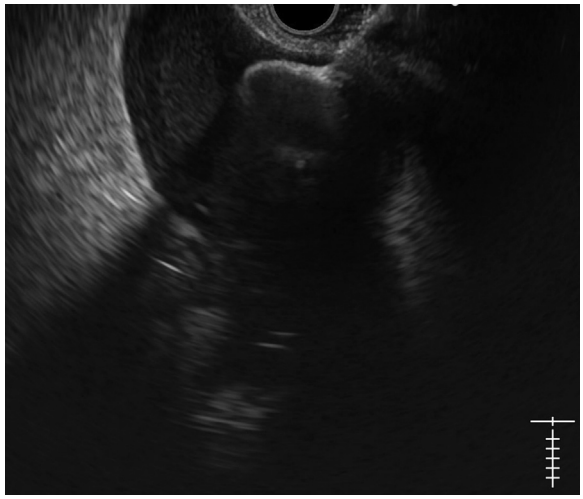

Figure 2. EUS image showing the deep pelvic collection adjacent to the anterior rectal wall. The collection was accessed with the electrocautery-enhanced tip of the lumen-apposing metal stent delivery system, and the distal flange was released under EUS control.

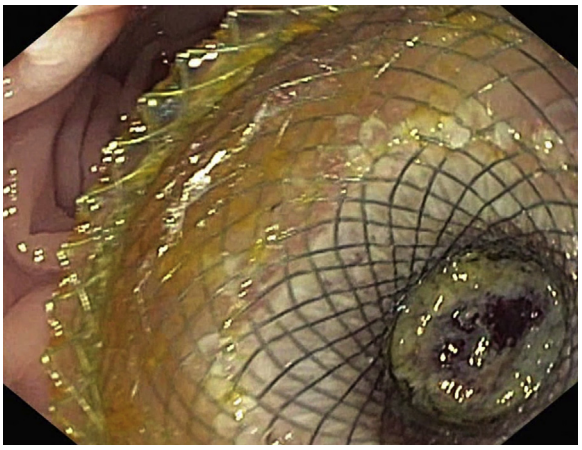

Figure 3. Lumen-apposing metal stents weeks after EUS-guided transrectal drainage. The cavity disappeared and the presence of granulation tissue was observed. No sign of residual infection or pus was present.

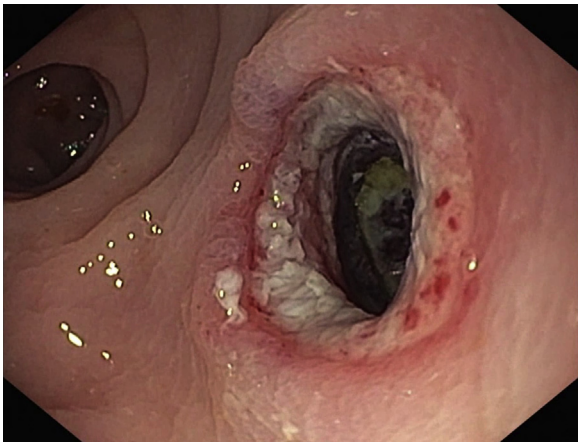

Figure 4. Endoscopy confirming the disappearance of pelvic fluid collection after lumen-apposing metal stent removal.

(fentanyl plus midazolam), and 1 was conducted with the patient under deep sedation (propofol). In all cases, a 15- × 10-mm LAMS (Hot Axios; Boston Scientific) was used (Video 1, available online at www.VideoGIE.org). In all but 1 case, the direct puncture technique was used. In the remaining case (case 4), we measured a 9 mm- to 10-mm distance between the PFC and rectal wall. To stabilize the position and to have a backup strategy in case of stent placement failure, we previously accessed the PFC with a 19-gauge FNA needle (Expect Slimline; Boston Scientific) and inserted a 0.035-in guidewire (Jagwire; Boston Scientific); the LAMS was placed over the guidewire. The technical success rate was 100%; the procedure length (scope-in to scope-out) was <10 minutes in all but 1 case that required puncture and guidewire placement (14 minutes).

Procedure outcomes

Complete PFC resolution was seen on CT 2 weeks after the procedure in 3 cases and 3 weeks after the procedure

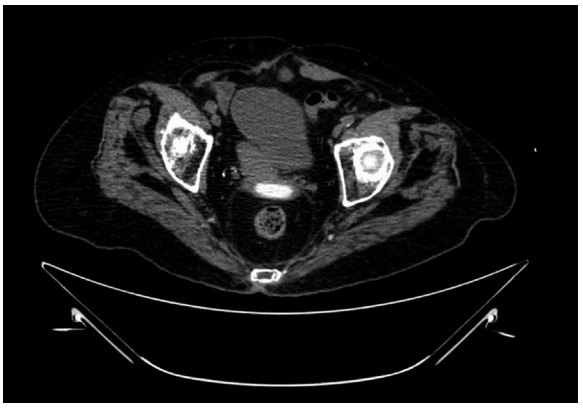

Figure 5. Nine-month follow-up CT scan showing complete resolution of the pelvic fluid collection.

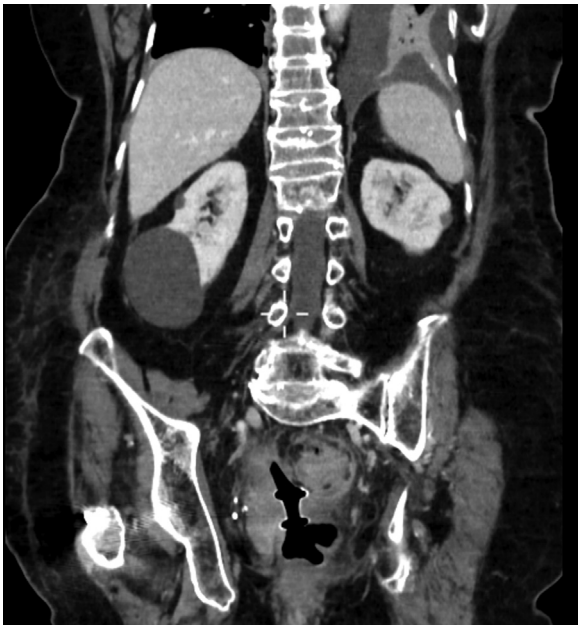

Figure 6. CT scan performed 3 weeks after EUS-guided transrectal drainage showing resolution of the collection and suspected stent proximal migration.

in the other 2 cases. LAMSs were removed after a median of 14 days (range, 12-24). In case 3, CT performed after 21 days showed resolution of the PFC; however, stent migration was suspected (Fig. 6). Urgent stent removal was done with a forward-view echoendoscope (TGF-UC180J; Olympus). Endoscopic and EUS view confirmed partial proximal LAMS migration (Figs. 7 and 8); however, a small residual orifice was still present, allowing grasping and extraction of the LAMS with the rat-tooth forceps. Endoscopic control showed no signs of perforation (Fig. 9), and the patient remained well after the procedure. The clinical success rate, defined as PFC resolution with no need for antibiotic treatment or any other intervention, was 100%.

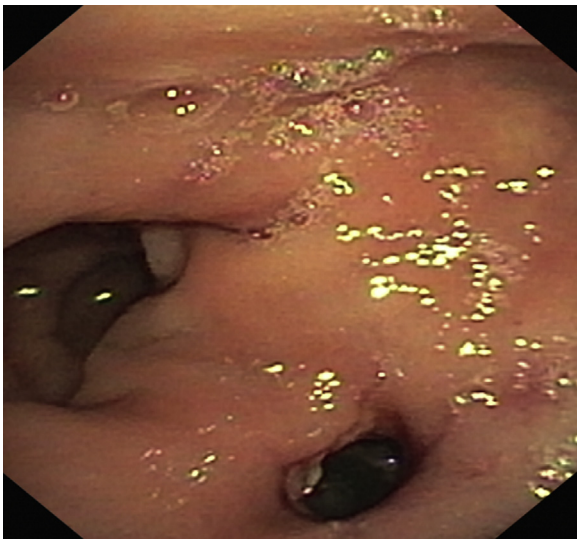

Figure 7. Endoscopic image (forward-view echoendoscope) confirming proximal stent migration with small residual tract allowing grasping of the stent with forceps.

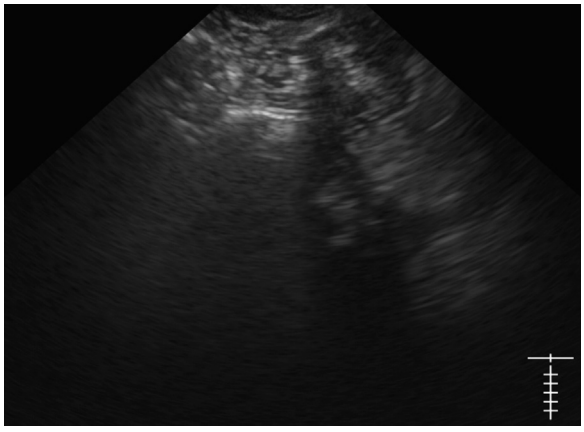

Figure 8. EUS image (forward-view echoendoscope) showing the dislodged lumen-apposing metal stent in the cavity.

No PFC recurrence was observed after a follow-up of 14 (2-16) months. Patient 3 developed peritoneal carcinomatosis from underlying known ovarian cancer but did not show signs or symptoms related to recurrent diverticulitis or PFC at 4-month follow-up.

DISCUSSION

Our study suggests that EUS-TRD with an electrocautery-enhanced LAMS delivery system is safe and effective for the treatment of postoperative or inflammatory PFCs. The electrocautery-enhanced LAMS delivery system allows a single-passage, exchange-free technique, reducing the risk of procedural adverse events (ie, leak, dislodgement, or perforation). The use of a 15- × 10-mm LAMS allowed rapid radiologic and clinical PFC resolution. We suggest close monitoring for a LAMS left in place for more than 3 weeks, owing to possible risk of proximal stent migration. Despite its large caliber, 15- × 10-mm LAMSs could be used not only in patients with fecal diversion but also in those with unaltered large-bowel anatomy. In particular, no issue with fecal contamination was encountered because large stent caliber and intrinsic negative luminal pressure ensure adequate drainage of PFC content. Spontaneous tract closure after stent removal was confirmed on follow-up CT. Large prospective studies are required to confirm these findings.

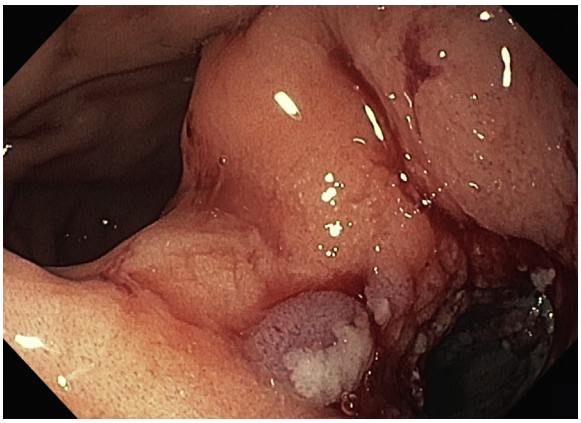

Figure 9. Endoscopic image of the residual tract and cavity after stent removal. No sign of adverse events (ie, perforation) except mild trauma to the tract.

DISCLOSURE

All authors disclosed no financial relationships.

Abbreviations: LAMS, lumen-apposing metal stent; PFC, pelvic fluid collection; EUS-TRD, EUS-guided trans-rectal drainage.

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Gastroenterology Unit, Hospital of Imola, Department of Medical and Surgical Sciences, University of Bologna, Bologna, Italy (1), Intensive Care Unit, Hospital of Imola, Imola, Italy (2), Surgery Unit, Hospital of Imola, Imola, Italy (3).

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