EUS 2008 Working Group document: evaluation of EUS-guided drainage of pelvic-fluid collections (with video)

Shyam Varadarajulu, MD, Yuk Tong Lee, MD

Birmingham, Alabama, USA, Hong Kong, China

Pelvic-fluid collections or abscesses often present a clinical challenge because of their location: surrounded by the bony pelvis, bladder, bowel, uterus, vagina, prostrate, rectum, and other neurovascular structures. These collections may occur as a common complication of surgery and medical diseases. An anastomotic leak after large-bowel resection, particularly low anterior resection, is the most common surgical cause and may occur in 0.5% to 30% of cases.[1-4] Diverticulitis, ischemic colitis, Crohn's disease, appendicitis, and sexually transmitted diseases are other etiologies.[5] Because US often fails to detect deep or multifocal collections, the best diagnostic modality for patients suspected to have pelvic-fluid collections is a CT of the abdomen and pelvis.[5] The CT findings, in combination with the patient's clinical status, determine the most appropriate mode of treatment. This section of the EUS 2008 Working Group Proceedings evaluates the current evidence and potential role of EUS in the management of patients with pelvic-fluid collections that encompasses abscesses.

CURRENT APPROACHES TO MANAGEMENT AND THEIR LIMITATIONS

US-guided transrectal and transvaginal drainage

This is the most commonly practiced procedure at a majority of academic medical centers in the United States.[6] In this procedure, a biopsy catheter is secured to an endoluminal US probe, which is then used to direct passage of the needle into the pelvic-fluid collection. In male patients, rectovesical and presacral fluid collections can be drained via the transrectal route. In women patients, although fluid collections that involve the rectouterine space can be drained either via the transrectal or transvaginal route, presacral collections are accessible only via the transgluteal or transrectal approaches (Fig. 1A and B). However, fluid collections that involve the vesicouterine space or adjacent to the uterine body and fundus are best amenable for drainage via the transvaginal route. In both men and women, prevesical fluid collections require percutaneous drainage because they are not amenable for drainage by the transrectal and transvaginal routes. The overall treatment success rate for both drainage techniques is 75% to 91%.[7-10] Patients tolerate the transrectal approach better than the transvaginal approach, with a lower pain score and less limitation on daily activities.[11]).

Limitations of these techniques include the following:

1. For both techniques, only those pelvic-fluid collections that are within the reach of an US probe can be successfully drained.
2. Because concomitant stent deployment is not feasible by using this technique, only indwelling drainage catheters can be placed and result in prolonged physical discomfort to the patient and an added risk of accidental dislodgement.
3. For patients undergoing transvaginal drainage, the vaginal wall requires lidocaine infiltration to reduce pain and discomfort. Also, the thickness of the vaginal wall may sometimes preclude passage of any catheters.
4. Because urethral or fascial dilators are used to dilate the transmural tract, the maximum dilation achieved is only up to 14F.

CT-guided transgluteal and transabdominal drainage

The traditional percutaneous route includes a transabdominal (anterior) or a transgluteal approach (posterior). In a recent study that reported the use of CT-guided percutaneous drainage of pelvic abscess in 87 patients with Crohn's disease, 72% of the patients had abscess resolution without the need for surgery. There was no recurrence of abscess at a mean follow-up of 39 months.[12] The major disadvantage of the transabdominal approach is that the uterus, urinary bladder, and bowel loops intervene between the catheter and the fluid collection. The transgluteal approach provides better access to deeper pelvic abscesses and is more commonly practiced. With the patient in the prone position, an 18-gauge to 22-gauge spinal needle is passed via the transgluteal approach into the abscess cavity under CT guidance. After exchanging the needle for a guidewire, the tract is dilated, and an 8F to 14F indwelling single-pigtail catheter is deployed. In the largest reported study of 140 patients, the treatment success rate was 96%, at a mean duration of 8 days.[13] Being a retrospective study, the technical success rate was not reported.

DISCLOSURE: *S.Varadarajulu and Y. T. Lee disclosed no financial relationships relevant to this publication.*

0016-5107/$36.00
doi:10.1016/j.gie.2008.11.005

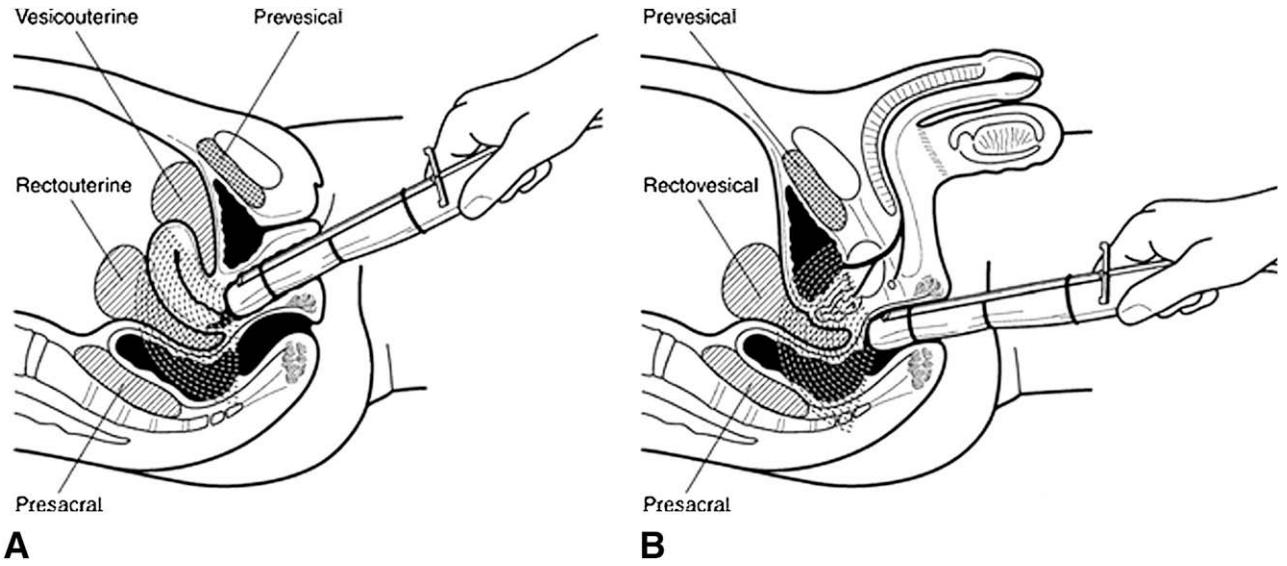

Figure 1. Schematic sagittal diagrams. **A,** The female pelvis during transvaginal US examination. **B,** The male pelvis during transrectal US examination. (Source: Ref. 5 [with permission]).

Limitations of this technique are the following:

1. Because the procedure is performed with the patient in a prone position, it may not be tolerated by those with recent surgery, ostomy, and spinal disorders.
2. Close to 20% of patients experience pain at the procedural site and the presence of a catheter protruding through the buttock limits ambulation and bed rest.
3. Injury to the inferior gluteal artery (2%) may lead to hemorrhage[13] or formation of a pseudoaneurysm.
4. Indirect damage to the sciatic nerve is a well-recognized complication of the procedure.
5. The procedure may not be possible in a substantial number of patients because of the lack of an adequate window to perform drainage.

Surgical drainage

Because most pelvic-fluid collection occur secondary to postsurgical complications, a less-invasive approach is generally preferred unless the patient presents with symptoms of peritonitis or sepsis. In patients with inflammatory bowel disease, surgery may be a better option, because transmural drainage may lead to formation of permanent fistulas. In a recent study, of 500 patients who underwent surgery for management of pelvic abscess,[14] the rate of reintervention was 7.6% (mostly because of incomplete drainage or missed loculations).

EUS-GUIDED DRAINAGE OF PELVIC-FLUID COLLECTIONS

Procedural technique

The procedural technique is shown in Video 1 (available online at www.giejournal.org). By performing a rectal EUS examination by using a therapeutic curvilinear echoendoscope, the pelvic-fluid collection (abscess) is first located. After ensuring the absence of intervening vasculature by using color Doppler US, a 19-gauge needle is used to puncture the abscess cavity to gain access to the fluid collection. Normal saline solution is used to flush the abscess cavity by using a 10-mL syringe and is reaspirated to clean out the cavity of as much pus as possible. A sample of the aspirate is sent for Gram staining and culture. A 0.035-inch guidewire is then passed via the 19-gauge needle and is coiled into the abscess cavity (Fig. 2).

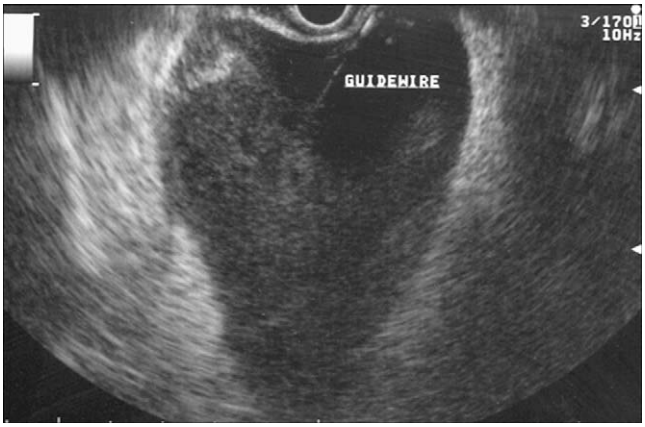

Figure 2. Passage of a 0.035-inch guidewire into the abscess under EUS guidance.

The puncture site of the abscess cavity is then further dilated by introducing a needle-knife catheter through the working channel of the echoendoscope and puncturing the abscess under EUS guidance. Alternatively, in patients who are at high risk for bleeding, a 4.5F to 5F ERCP cannula is passed over the guidewire to dilate the wall of the abscess cavity. This is then further dilated by

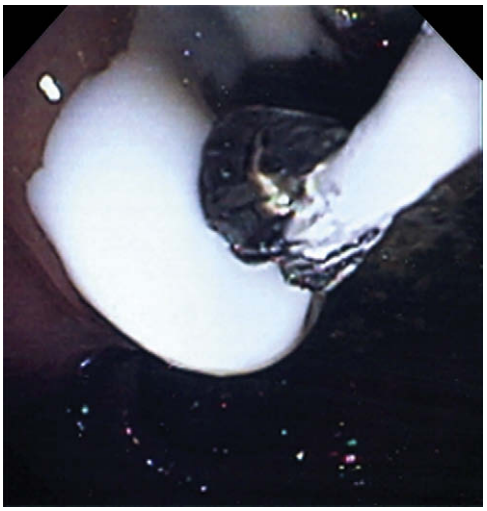

Figure 3. Dilation of the transmural tract to 8 mm by using over the wire balloon.

using an 8-mm over-the-wire balloon (Fig. 3). A large opening facilitates better drainage of the abscess and provides easier access for future interventions.

A 10F single-pigtail drainage catheter (Flexima; Microvasive Endoscopy, Boston Scientific Corp, Natick, Mass) is then deployed, under fluoroscopic guidance, over the guidewire into the abscess cavity to facilitate drainage. The drain is flushed with 25 mL of normal saline solution and aspirated every 6 hours until the abscess is completely evacuated or diminished in size by at least 80%. In patients with large pelvic abscesses (>9 cm), one or two 10F double-pigtail stents can be placed adjacent to the drainage catheter to facilitate quicker resolution of the abscess (Fig. 4A and B). Because drainage catheters can be a source of inconvenience, they are discontinued once response to treatment is confirmed by CT and improvement in symptoms is noted. The stents can be retrieved at outpatient follow-up sigmoidoscopy.

Summary of published data

Two studies (Table 1) evaluated the role of EUS-guided drainage of pelvic abscess.[15,16] The patient cohort included those in whom US-guided or CT-guided drainage was not possible because of the lack of an adequate window. With the exception of one patient who had a pericolonic (sigmoid) abscess, other abscesses were located around the rectum. In both studies, patients with multiloculated fluid collections were excluded. Apart from bowel preparation and administration of antibiotics, no special precautions were undertaken. The investigators emphasize performing the procedure after patient's voiding to avoid accidental puncture of the urinary bladder.

Although Giovannini et al[15] used the needle-knife catheter (under EUS guidance) to gain access to the pelvic-abscess cavity, Varadarajulu and Drelichman[16] used over-the-wire accessories for progressive dilation of the

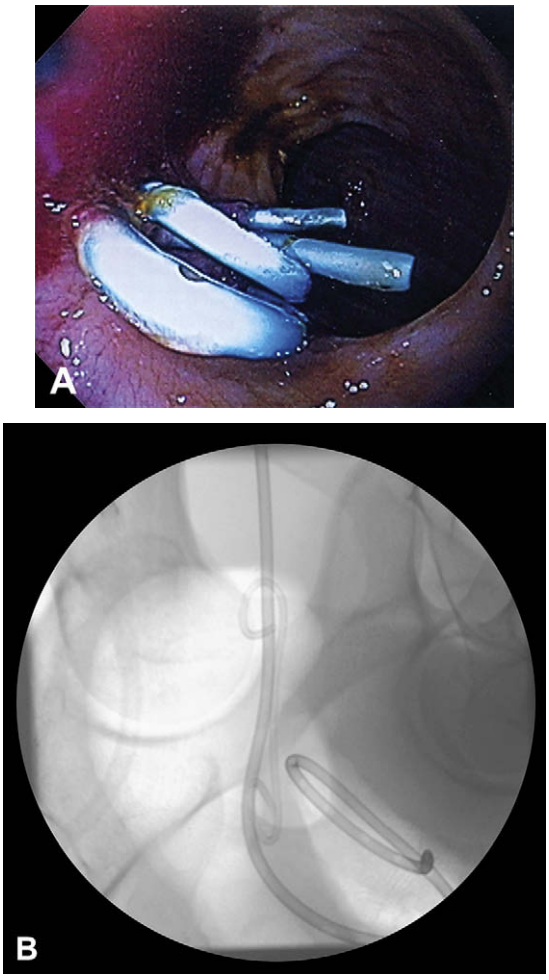

Figure 4. A, An endoscopic view of the transrectal stents. **B,** Fluoroscopic view of transrectal drainage catheter and a transrectal stent.

transmural tract to minimize the risk of perforation. Although Giovannini et al[15] deployed transrectal stents that were left in place for a mean duration of 4 months, Varadarajulu and Drelichman[16] placed 10F transrectal drainage catheters that were retrieved within 1 week in all patients. The drainage catheters were used for irrigation of the abscess and continued until the aspirate obtained was clear and the abscesses resolved. Although Varadarajulu and Drelichman[16] reported a 100% treatment success rate, 3 of 12 patients in the series by Giovannini et al[15] underwent surgery because of treatment failure. No procedural complications were reported in both series. In the series by Varadarajulu and Drelichman,[16] one patient died from worsening heart failure.

In a recent study, Trevino et al[17] reported on their experience of 4 patients with pelvic abscesses that were managed by placement of 7F double-pigtail stents in addition to indwelling drainage catheters. The pelvic abscess was larger than 90 mm in size (longest axis) in all the patients. The drainage catheters were discontinued at the time of the patient's discharge from the hospital when the abscess

TABLE 1. Summary of published studies on EUS-guided drainage of pelvic abscess

Study, y	Design	No. patients	Drainage modality	Technical success (%)	Treatment success (%)	Complications
Giovannini et al,[15] 2003	Retrospective	12	Stents	75	89	None
Varadarajulu and Drelichman,[16] 2007	Prospective	4	Drainage catheter	100	100	None
Trevino et al, 2008[17]	Prospective	4	Stents and drainage catheter	100	100	None

size had diminished by greater than 50%. The stents were then retrieved at outpatient sigmoidoscopy at 2 weeks. The procedures were technically successful in all 4 patients, and the mean procedural duration was 25 minutes (range 12-45 minutes). The drainage catheters were discontinued, and all the patients were discharged home at a mean duration of 2 days after transrectal drainage. At a mean follow-up of 221 days, all 4 patients had successful resolution of the abscess and were asymptomatic.

Limitations of the EUS approach

1. Only fluid collections within the reach of the echoendoscope can be drained under EUS guidance, ie, those located around the rectum or adjacent to the left colon.
2. As with other techniques, multiloculated fluid collections cannot be drained successfully.
3. If only transrectal stenting is undertaken, then the stents have the potential to clog easily; therefore, indwelling drainage catheters may be required, at least in the initial stages, to facilitate faster resolution of the abscess.

CLINICAL RESEARCH AGENDA

The exact role of EUS in the management of symptomatic pelvic-fluid collections requires further clarification. Currently, the procedure is limited to patients who fail US-guided or CT-guided drainage. Given the short procedural duration, clinical efficacy, the ability to deploy both drainage catheter and a stent in the same setting, and not requiring an indwelling drainage catheter for prolonged periods make this technique an attractive treatment alternative. Prospective multicenter trials that involve a large cohort of patients are required to confirm the technical efficacy and safety of the EUS-guided approach. Also, comparative outcome and cost-effectiveness studies with existing treatment modalities may potentially increase the application of this technique to more patients. It is important to be familiar with the pelvic anatomy when performing an examination with a linear echoendoscope. The role of EUS in management of pelvic abscesses related to inflammatory bowel disease requires further evaluation because this cohort encompasses a large subset of patients. However, caution must be exercised because of the potential for permanent fistula formation in these patients after transmural drainage.

DEVICE DEVELOPMENT

EUS examination of the proximal areas of the large intestine is currently not being performed because of the difficulty with maneuverability of the curvilinear echoendoscope. The ability to reach these areas by improving the echoendoscope design, eg, curvilinear colon echoendoscopes, may potentially enable the drainage of pelvic-fluid collections, such as postoperative and appendicular abscesses, that are more proximally located. The role of the new prototype forward-viewing echoendoscope for this purpose needs to be investigated.

WORKING GROUP RECOMMENDATIONS

Although clinical data are limited, given the technical ease and promising treatment outcomes, the working group accords a moderate priority for fostering clinical research in this area. Prospective multicenter trials that involve a large cohort of patients are required to confirm the technical efficacy and safety of the EUS-guided approach. Studies that compare the clinical outcomes and cost-effectiveness between EUS and current treatment modalities for management of pelvic-fluid collections are required. However, the limited therapeutic application of the technique does not warrant the immediate development of a dedicated echoendoscope for this purpose. The working group, therefore, sets the priority at low for device development.

REFERENCES

1. Fielding LP, Stewart-Brown S, Blesovsky L, et al. Anastomotic integrity after operations for large bowel cancer: a multicentre study. BMJ 1980;28:411-4.
2. Golub R, Golub RW, Cantu R, et al. A multivariate analysis of factors contributing to leakage of intestinal anastomoses. J Am Coll Surg 1997;184:364-72.

3. Isbister WH. Anastomotic leak in colorectal surgery: a single surgeon's experience. ANZ J Surg 2001;71:508-10.
4. Alves A, Panis Y, Trancart D, et al. Factors associated with clinically significant leakage after large bowel resection: multivariate analysis of 707 patients. World J Surg 2002;26:499-502.
5. Sudakoff GS, Lundeen SJ, Otterson MF. Transrectal and transvaginal sonographic intervention of infected pelvic fluid collections. Ultrasound Q 2005;21:175-85.
6. Jaffe TA, Nelson RC, Delong DM, et al. Practice patterns in percutaneous image-guided intraabdominal abscess drainage: survey of academic and private practice centers. Radiology 2004;233:750-6.
7. Kuligowska E, Keller E, Ferrucci JT. Treatment of pelvic abscesses: value of one-step sonographically guided transrectal needle aspiration and lavage. AJR Am J Roentgenol 1995;164:201-6.
8. Peres-Medina T, Huertas MA, Bajo JM. Early ultrasound-guided transvaginal drainage of tubo-ovarian abscesses: a randomized study. Ultrasound Obstet Gynecol 1996;7:435-8.
9. Ryan RS, McGrath FP, Haslam PJ, et al. Ultrasound-guided endocavitary drainage of pelvic abscesses: technique, results and complications. Clin Radiol 2003;58:75-9.
10. Feld R, Eschelman DS, Sagerman JE, et al. Treatment of pelvic abscesses and other fluid collections: efficacy of transvaginal sonographically guided aspiration and drainage. AJR Am J Roentgenol 1994;163:1141-5.
11. Hovsepian DM, Steele JR, Skinner CS, et al. Transrectal versus transvaginal abscess drainage: survey of patient tolerance and effect on activities of daily living. Radiology 1999;212:159-63.
12. Golfieri R, Cappelli A, Giampalma E, et al. CT-guided percutaneous pelvic abscess drainage in Crohn's disease. Tech Coloproctol 2006;10:99-105.
13. Harisinghani MG, Gervais DA, Maher MM, et al. Transgluteal approach for percutaneous drainage of deep pelvic abscesses: 154 cases. Radiology 2003;228:701-5.
14. Onaca N, Hirshberg A, Adar R. Early reoperation for perirectal abscess. Dis Colon Rectum 2001;44:1469-73.
15. Giovannini M, Bories E, Moutardier V, et al. Drainage of deep pelvic abscesses using therapeutic echo endoscopy. Endoscopy 2003;35:511-4.
16. Varadarajulu S, Drelichman ER. EUS-guided drainage of pelvic abscess. Gastrointest Endosc 2007;66:372-6.
17. Trevino JM, Drelichman ER, Varadarajulu S. Modified technique for EUS-guided drainage of pelvic abscesses. Gastrointest Endosc 2008;68:1215-9.

Current affiliations: Division of Gastroenterology-Hepatology (S.V.), University of Alabama at Birmingham School of Medicine, Birmingham, Alabama, USA, Division of Gastroenterology (Y.T.L.), Chinese University of Hong Kong, Prince of Wales Hospital, Hong Kong, China.

Reprint requests: Shyam Varadarajulu, MD, Division of Gastroenterology-Hepatology, University of Alabama at Birmingham Medical Center, 410 LHRB, 1530 3rd Ave S, Birmingham, AL 35294.

This article is from a meeting and has not undergone the GIE peer review process.