



# A novel technique for the non-surgical management of inadvertent bowel catheterization during percutaneous abscess drainage: a technical note

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## ABSTRACT

Percutaneous abscess drainage-related inadvertent bowel catheterization is an undesired complication that requires treatment. In two cases without signs of peritonitis that we examined, it was possible to achieve successful abscess drainage, and to treat abscess-related inadvertent bowel catheterization by using a novel technique without surgery.

## KEYWORDS

Abscess, catheter, CT, fluoroscopy, non-surgical management, ultrasound

Percutaneous abscess drainage (PAD) has been proven to be safe and effective as both a curative and temporizing means.<sup>1,2</sup> In addition, PAD can be used for abscesses in different localization like intraperitoneal, retroperitoneal, and inaccessible postoperative collections.<sup>3-5</sup> Although complications related to PAD are uncommon (in most series, the complication rate is 5%),<sup>1</sup> they can be life threatening. These complications range from minor issues, like pain and vasovagal syncope, to major complications, such as active bleeding and bowel perforation.<sup>6</sup> It has been reported that the small-bowel catheterization can be treated with conservative approach when there are no signs of peritonitis. It is also possible to wait until the tract maturation of the catheter, whereas emergency surgical intervention is required in cases of colonic catheterization.<sup>7</sup> In this paper, an outline of the non-surgical management of inadvertent bowel catheterization during PAD is shared by describing a novel technique.

## Methods

### Case 1

A 61-year-old male patient underwent computed tomography (CT)-guided PAD for an acute diverticulitis abscess. A fistula formation between the cavity and the sigmoid colon was viewed. After 31 days following medical therapy and PAD, the CT showed complete drainage of the cavity and the catheter was removed. Four days later, the patient had a fever, and the CT showed the recurrence of the abscess. It was thought possible to find the same tract that had been formed by the previous catheterization using ultrasound (US) guidance to carry out the PAD procedure. An 8F catheter was placed into the cavity with the Seldinger technique. Access was gained using a 19-G needle under US guidance, and contrast injection with fluoroscopy confirmed the cavity and showed there was no leakage to the adjacent structures. Subsequently, a 0.035-in Amplatz guidewire was advanced into the cavity after serial fascial dilatation had been performed. An 8F locking loop pigtail catheter with a stiffener was advanced over the wire into the collection. The stiffener and wire were removed, and the catheter was locked. The first day after catheter insertion, although the patient had no symptoms, we decided to perform a control CT to observe the collection and the inserted catheter to

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avoid the risk of possible complications. The CT showed the catheter was traversing an ileal segment (Figure 1a). We decided to keep the catheter in place and wait for tract maturation. At the same time, a second (12F) catheter was placed into the abscess cavity using CT guidance (Figure 1b). Contrast injection via 8F catheter 22 days after the first intervention showed contrast filling of the ileal segment. Then the 8F catheter was pulled back to the entry side of the ileal segment with the intention of keeping the catheter tip just outside of the bowel wall (Figure 1c). On the following day, injection of contrast media via the 8F catheter showed neither contrast entry into the bowel nor free contrast flow into the peritoneal cavity. The injected contrast agent was released from the side holes of the catheter, and it did not fill the ileal loops (Figure 1d). Then, the 8F catheter tip was removed. Meanwhile, contrast injection via the 12F catheter showed a fistula between the abscess cavity and sigmoid colon, while there was no filling of the ileal segment. The 12F catheter was withdrawn 10 days later after the fistula between the abscess cavity and sigmoid colon was sealed. It was concluded that the fistula was closed because it was not visible after contrast administration in fluoroscopy. Daily drainage had also dropped below 3 cc.

## Case 2

A 55-year-old female patient was referred to our hospital for a bladder rupture. The abdomen CT showed multiple collections in the lower abdomen. Percutaneous aspiration of the two collections were performed under US guidance without catheterization. For the third collection that located in the right lower quadrant, a catheter was placed under

US guidance. There was a possibility that the catheter could pass through the colon during the procedure. The patient had no symptom at that time. A 10F pigtail catheter was inadvertently advanced into the caecum, which was confirmed by contrast injection under fluoroscopic guidance (Figure 2a). As a first step, the targeted collection was evacuated by needle aspiration. The decision was made to wait for tract maturation and to follow up the patient for signs of peritonitis. After 19 days, the control cavitography via 10F pigtail catheter showed contrast filling of the caecum. The pigtail catheter was changed with an 8F straight-tip catheter (Figure 2b). The straight-tip catheter was then pulled back with the technique as described below (Figure 2c). The patient was free of symptoms on the following day, and the control abdominal US examination showed no collection. The control CT examination obtained one month after the patient's discharge was normal.

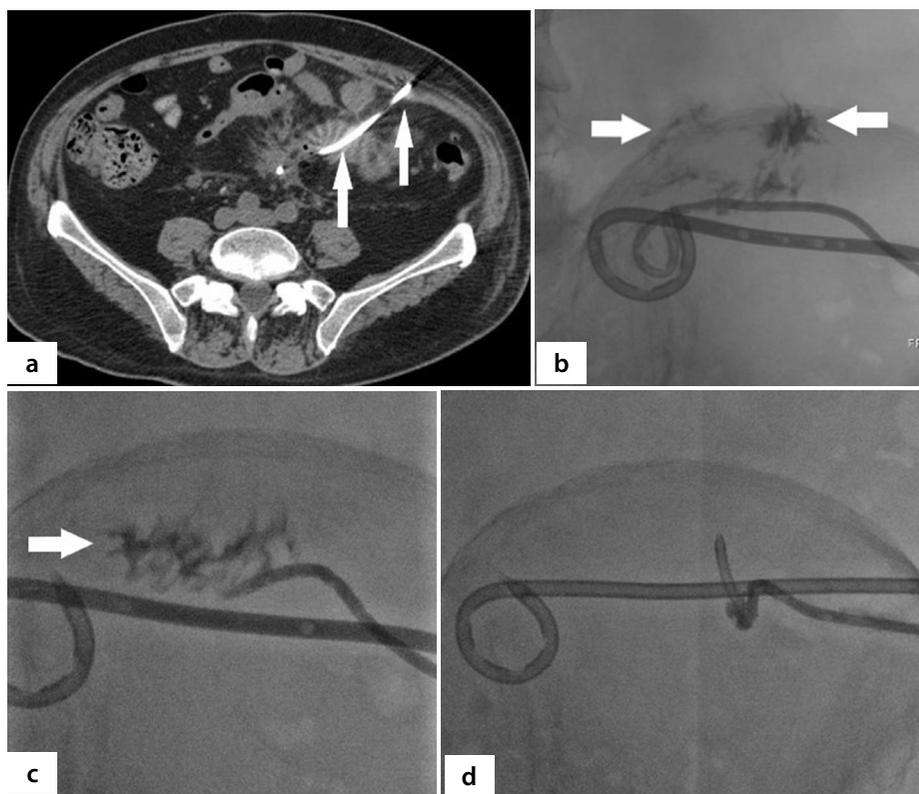
## Technique

In case of bowel transgression during PAD, a new catheter (12F pigtail) was immediately inserted into the abscess cavity by using a safe tract under CT guidance when

required—as occurred in case 1. On the other hand, the first catheter, which had transgressed the bowel loop, was maintained in the same location for tract maturation for approximately three weeks. After three weeks, the pigtail catheter inside the bowel loop was exchanged with a thin catheter (preferably an 8F straight-tip catheter) when needed—as seen in case 2. We pulled back the tip of the catheter to just outside the bowel loop to confirm there was no drainage from the catheter. We kept the catheter in the same position within close proximity of the bowel wall for possible drainage for one to two days. When there was no daily drainage, the catheter was pulled back by 1–2 cm the following day. The integrity of the catheter tract was evaluated by injecting contrast material under fluoroscopy guidance. When the injection of contrast media via 8F catheter showed no filling of the bowel loop, we confirmed that the tract maturation was complete, and the catheter was removed.

## Discussion

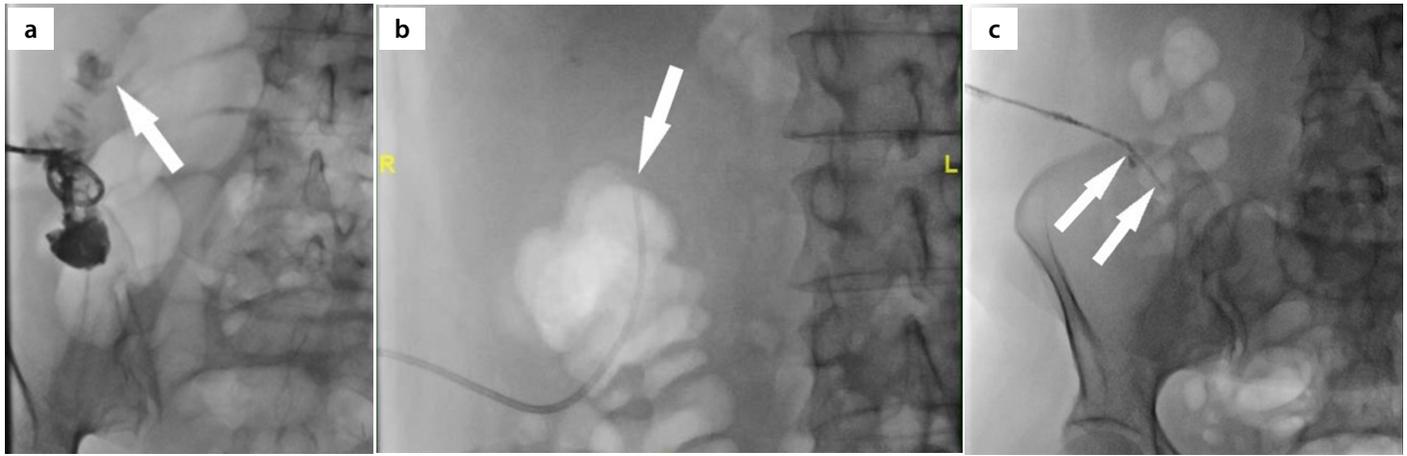
To the best of our knowledge, this is the first study to outline a novel technique for



**Figure 1.** (a) Sixty-one-year-old male patient, who was followed up for acute diverticulitis-related abscess, an 8F catheter was inserted due to recurrence of the abscess. One day later, an unenhanced abdomen computed tomography showed the catheter was traversing the ileal segment (arrows). On the same day, a 12F catheter was placed into the abscess cavity (not shown). (b) On 22<sup>nd</sup> after catheterization, contrast injection via 8F catheter showed filling of the ileal segment (arrows). (c) Then, on the same day, the 8F catheter was pulled back to just proximal to the ileal segment (arrow). (d) After two days, contrast injection via the 8F catheter showed no filling of the ileal segment, and the 8F catheter was removed.

### Main points

- Percutaneous abscess drainage-related inadvertent bowel catheterization is an undesired complication.
- This complication can be treated without surgery.
- Keeping the catheter in the cavity, waiting for tract maturation, using a straight-tip catheter, pulling the catheter back to close proximity of the bowel wall, following up fluid volume and filling of the cavity with cavitography is a novel technique
- When no filling is detected by cavitography, the fluid level has dropped under 3 cc, and after checking with ultrasound and a computed tomography scan, we can remove the straight-tip catheter and treat this complication.



**Figure 2.** (a) The patient was followed up for bladder rupture and multiple collections, and a 10F pigtail catheter was inserted into the right lower quadrant-located collection. Contrast injection via the inserted catheter showed that the catheter tip was located in the colon (arrow). (b) Nineteen days after the initial treatment, the pigtail catheter was replaced with a straight-tip catheter in the cecum (arrow). (c) One day later on the 20<sup>th</sup> day of the treatment, the tip of the catheter was pulled back to just outside the bowel loop (arrows).

the non-surgical management of abscess-related inadvertent bowel catheterization that occurs as a complication of PAD.

There are multiple types of radiologic approaches, techniques, and imaging guidance for carrying out PAD. The choice of drainage technique and imaging guidance depends on the type and location of the collection as well as the experience and habits of the operator.<sup>6</sup> It is recommended that intervening structures such as the bowel, pleura, kidney, spleen, bladder, uterus, nerves, and vessels must be avoided while performing PAD to reduce the risk of complications.<sup>6</sup> However, inadvertent bowel catheterization might occur as a serious complication while performing PAD, especially for deeply located collections.<sup>7,8</sup> In the cases managed in the present study, inadvertent bowel puncture and catheterization occurred as both procedures were carried out under US and fluoroscopic guidance. The CT provides more detailed data about intraabdominal collections or abscesses in terms of their location, relationship with the surrounding organs, and intervening structures than US does;<sup>2</sup> therefore, it is preferable to perform PAD procedures with CT guidance to avoid complications, especially for the deeply located abscesses.

The key point of the management technique outlined in this paper is waiting for tract maturation before catheter removal to avoid leakage of bowel content into the outside of the bowel loop. Waiting approximately three weeks before catheter removal and after tract maturation to avoid bile leakage is a common method used during percutaneous cholecystostomy procedures.<sup>9</sup> It is also recommended to wait for tract maturation when pleural transgression is detected

while performing percutaneous subphrenic collection drainage or percutaneous cholecystostomy.<sup>10,11</sup> The same procedure was performed for the patients with bowel transgression in the current study. It was essential to constantly evaluate tract maturation before catheter removal because, as Picus et al.<sup>11</sup> showed, tract maturation may be incomplete even after waiting for what is deemed a sufficient length of time. This is especially true in predominantly transperitoneal tracts.<sup>11</sup>

Removal of the catheter before tract maturation can lead to bowel perforation and require surgery. Therefore, in the cases featured in this study, the catheters were removed after the confirmation of complete tract maturation by contrast injection under fluoroscopy guidance. Although there are some studies related to PAD that report bowel transgression during procedures,<sup>1</sup> there is no paper that provide a detailed non-surgical management plan for inadvertent bowel catheterization. The novel technique described in the present study is recommended for the non-surgical management of cases with abscess drainage-related inadvertent bowel catheterization.

#### Conflict of interest disclosure

The authors declared no conflicts of interest.

#### References

1. vanSonnenberg E, Wittich GR, Goodacre BW, Casola G, D'Agostino HB. Percutaneous abscess drainage: update. *World J Surg.* 2001;25(3):362-369; discussion 370-372. [\[CrossRef\]](#)
2. Men S, Akhan O, Köroğlu M. Percutaneous drainage of abdominal abscess. *Eur J Radiol.* 2002;43(3):204-218. [\[CrossRef\]](#)

3. Ciftci TT, Akinci D, Akhan O. Percutaneous transhepatic drainage of inaccessible postoperative abdominal abscesses. *AJR Am J Roentgenol.* 2012;198(2):477-481. [\[CrossRef\]](#)
4. Akhan O, Durmaz H, Balci S, Birgi E, Çiftçi T, Akinci D. Percutaneous drainage of retroperitoneal abscesses: variables for success, failure, and recurrence. *Diagn Interv Radiol.* 2020;26(2):124-130. [\[CrossRef\]](#)
5. Akinci D, Akhan O, Ozmen MN, et al. Percutaneous drainage of 300 intraperitoneal abscesses with long-term follow-up. *Cardiovasc Intervent Radiol.* 2005;28(6):744-750. [\[CrossRef\]](#)
6. Robert B, Yzet T, Regimbeau JM. Radiologic drainage of post-operative collections and abscesses. *J Visc Surg.* 2013;150(3 Suppl):S11-S18. [\[CrossRef\]](#)
7. Lorenz J, Thomas JL. Complications of percutaneous fluid drainage. *Semin Intervent Radiol.* 2006;23(2):194-204. [\[CrossRef\]](#)
8. Maher MM, Gervais DA, Kalra MK, et al. The inaccessible or undrainable abscess: how to drain it. *Radiographics.* 2004;24(3):717-735. [\[CrossRef\]](#)
9. Akhan O, Akinci D, Ozmen MN. Percutaneous cholecystostomy. *Eur J Radiol.* 2002;43(3):229-236. [\[CrossRef\]](#)
10. Maher MM, Kealey S, McNamara A, O'Laoide R, Gibney RG, Malone DE. Management of visceral interventional radiology catheters: a troubleshooting guide for interventional radiologists. *Radiographics.* 2002;22(2):305-322. [\[CrossRef\]](#)
11. Picus D, Burns MA, Hicks ME, Darcy MD, Vesely TM. Percutaneous management of persistently immature cholecystostomy tracts. *J Vasc Interv Radiol.* 1993;4(1):97-101; discussion 101-102. [\[CrossRef\]](#)