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Image-guided posterior transperineal drainage for presacral abscess: An analysis of 21 patients

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KEYWORDS
Percutaneous drainage;
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Abstract
Objective: The purpose of this study was to retrospectively evaluate the safety and efficacy of posterior transperineal drainage in patients with presacral abscess.
Materials and method: The records of 21 patients (14 men, 7 women; mean age: 62.1 ± 10 years) who underwent posterior transperineal drainage for the treatment of presacral abscess, either using fluoroscopy or computed tomography guidance, were retrospectively reviewed. Data were analysed with respect to technical success, tolerance, duration of drainage, complications and short-term outcome.
Results: A total of 28 posterior transperineal drainage procedures of presacral abscesses were performed in 21 patients, either using fluoroscopy (24/28; 86%) or computed tomography (4/28; 14%) guidance. Technical success rate was 89% (25/28 procedures) and clinical success rate 88% (22/25 technically successful procedures). Transperineal catheter drainage was maintained for 3—105 days (mean 31 days ± 26 [SD]). After three procedures (3/28; 11%) patients reported discomfort. No major complications were reported.
Conclusion: This study suggests that posterior transperineal drainage is an effective, safe and well-tolerated procedure for the treatment of presacral abscess.

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Percutaneous image-guided drainage is a safe alternative to surgery for the management of infected or symptomatic fluid collections in the abdomen or pelvis. Deep pelvic abscess is a frequent complication in patients who had had abdominoperineal resection (APR) or low-anterior resection (LAR) for intestinal malignancy. In such patients, the approach is challenging due to anatomical obstacles (i.e., bowel, bladder, nerves and vessels) [1—3]. When the abscess is inaccessible via an anterior route, fluoroscopy- or computed tomography (CT)-guided transperineal drainage is a simple alternative approach to transrectal or transgluteal drainage. Currently this approach has received limited attention in the literature [2,4—7].

The purpose of this study was to retrospectively evaluate the safety and efficacy of posterior transperineal drainage in patients with presacral abscess.

Material and methods

Patients

The database of our institution was queried to retrieve all patients who underwent fluoroscopy- and CT-guided drainage between January 2010 and December 2017. Patients who underwent drainage using a parasacral, transrectal, transvaginal or transgluteal approach were initially excluded and only patients who underwent a posterior transperineal, imaging-guided drainage for a presacral fluid collection were included. Twenty-two patients who underwent a transgluteal approach and one who had a parasacral approach were excluded. This database did not include patients with a solely ultrasound-guided drainage but did contain patients who underwent drainage using a combination of ultrasound- and fluoroscopy- or CT-guidance.

A total of 21 patients (14 men, 7 women) with a mean age of 62.1 years ± 10 (SD) (range: 39—80 years) underwent a total of 28 posterior transperineal, imaging-guided drainages of presacral abscess. Twenty-four procedures were performed using fluoroscopy guidance (24/28; 86%) and 4 (4/28; 14%) using CT guidance. Due to relapsing abscess formation after initial successful drainage, two patients had two posterior transperineal drainage procedures, one patient three procedures, and one patient four procedures. All patients provided informed consent before the start of a procedure. Requirement for informed consent to use patients' data for research purpose was waived given the retrospective design.

The pre-interventional CT examinations and the medical records were analyzed with respect to the etiology, size and morphology of the abscess, the diameter (in French) of the catheter used, drainage duration, bacteriological results, inflammatory parameters including white blood cell count (WBC) and C-reactive protein serum level (CRP), outcome and complications. Patients were asked after the procedure if they experienced discomfort during the procedure and were asked during inpatient and outpatient visits if they experienced discomfort due to the drainage catheter.

Simple and complex abscesses were distinguished. A simple abscess was defined as a single, uniloculated collection without enteric fistula. A complex abscess was defined as a multiloculated collection with or without enteric fistula.

Drainage procedure

Posterior transperineal drainages were performed by 4 general radiologists and 2 interventional radiologists. The indication for percutaneous drainage was agreed in consensus by a surgeon and a radiologist. Hemostasis parameters were checked and corrected when coagulation disorder was present. The area between the abscess and the sacrum was evaluated on CT to ensure that no other structures were present on the presacral path (Figs. 1 and 2). The selection of CT or fluoroscopy for imaging guidance was based on radiologist experience and preference and the location and size of the abscess. CT-guidance was favored for collections close to visceral structures. No specific bowel preparation was used prior to transperineal drainage.

The patients were placed in the lateral decubitus position with the hips flexed. The perineum was cleaned with chlorhexidine antiseptic fluid. General anesthesia or sedation was not required. When the patient was not already receiving antibiotics, one gram of intravenous ceftriaxone was administered prior to the procedure. The coccyx was palpated and the skin site just anterior to the tip of the coccyx was considered the puncture site. Local anaesthesia in the form of 10—30 cm^3 lidocaine 2% solution was administered in the planned, midline puncture trajectory. In case of close relationship between the abscess and the rectum, rectal contrast material was used to ensure a safe retrorectal puncture route. When little space between the rectum and sacrum was available, 10—20 cm^3 of saline was injected between the rectum and sacrum to create a safe puncture route.

An 18-gauge trocar needle was placed in the midline of the perineum dorsal of the anus, just anterior to the tip of the coccyx. Under fluoroscopic- or CT-guidance with use of osseous landmarks, the needle tip was directed in a horizontal plane, parallel to the table, towards the presacral abscess. To ensure the midline position of the needle when using fluoroscopy, the beam was intermittently rotated 90° on a C-arm table. When the needle had reached the abscess area, based on landmarks on fluoroscopy or on repeat CT, the stylet was removed and suction was applied to confirm that the tip had reached the abscess cavity by aspiration of fluid or purulent material. Material was aspirated for culture and Gram staining. Using Seldinger technique, a multi-side-hole locking pigtail drainage catheter (8—24 Fr) was placed in the collection. In some patients, a small amount of water-soluble iodinated contrast material (iodixanol; 270 mg I/mL) was injected through the needle or catheter to confirm the correct position in the abscess and to evaluate or confirm the extension and complexity of the abscess. The size of the catheter was determined by the radiologist based on the size and morphology of the abscess and the viscosity of the aspirated fluid. A thicker catheter was used for purulent or hemorrhagic fluid. The catheters were fixed paraperineal using a suture and/or a releasable, lock-tight securement device (StatLock®).

Patients underwent clinical follow-up and subsequent imaging as necessary. To maintain catheter patency, the catheter was flushed with sterile saline solution every 8—12 hours. Catheter removal was decided by both the radiologist and the surgeon, on the basis of clinical, biochemical and/or imaging parameters.

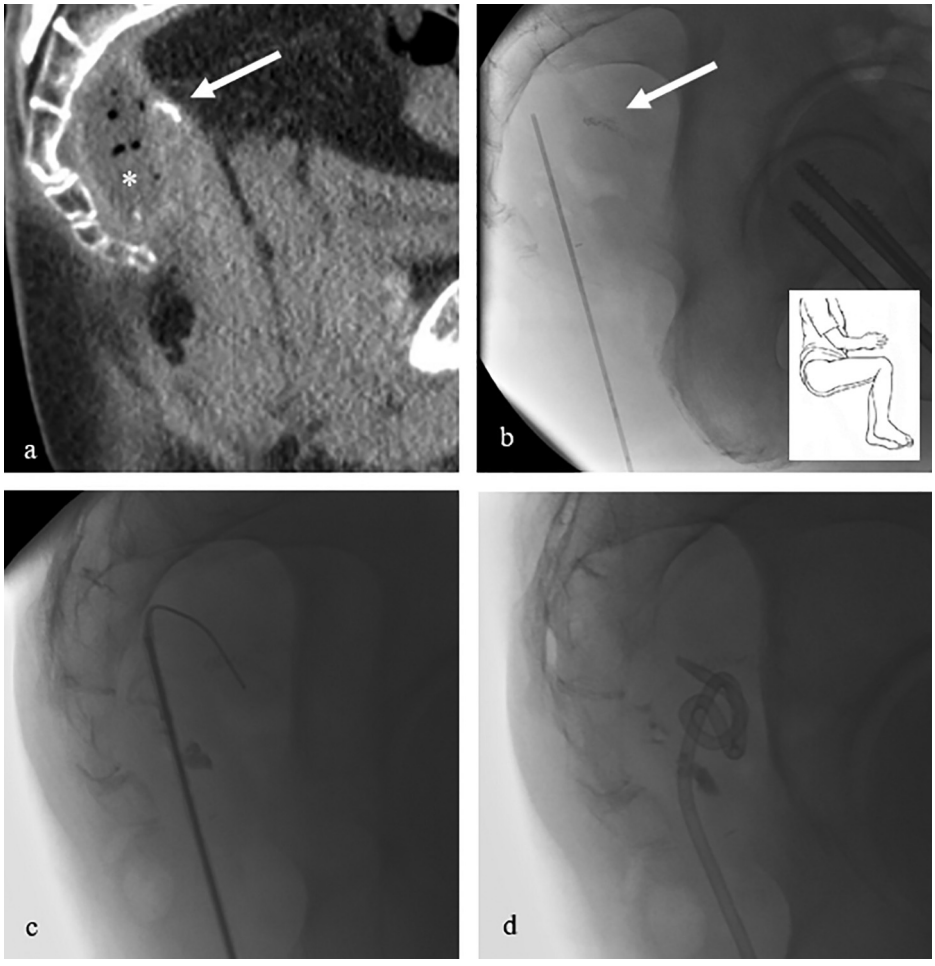

Figure 1. A 57-year-old man who underwent a low anterior resection. Two months earlier, he underwent CT-guided transgluteal drainage of presacral abscess. Now, he presents with fever caused by a relapse of the abscess: a: preprocedural CT image in the sagittal plane shows presacral abscess with internal gas (white asterisk) adjacent to the staples at the rectal stump (white arrow). The abscess is in the midline directly anterior to the sacrum, with no structures between the sacrum and the abscess; b: fluoroscopic image during transperineal puncture shows the needle pointing towards the abscess, the staples (white arrow) being used as landmarks. Subsequently, pus was aspirated; c: a guidewire is placed through the needle, easily curling in the fluid collection; d: over the guidewire, the locking pigtail catheter is positioned in the abscess.

Outcome

Drainage was considered successful if there was complete resolution of the abscess on CT and/or when the patient clinically improved with a lack of catheter output, fever and biochemical inflammatory parameters. Drainage was considered failed in the event of persistent sepsis or the need for surgery.

Statistical analysis

Quantitative variables were expressed as mean ± standard deviation (SD) and range. Qualitative variables were expressed as raw numbers, proportions and percentages. The Mann—Whitney U test was used to compare the duration of drainage in simple and complex abscesses. A *P*-value < 0.05 was considered statistically significant.

Results

The mean characteristics of the patients and drainages are summarized in Table 1. In all patients, the diagnosis of presacral abscess was made on initial CT. The mean diameter of the abscess was 5.7 cm ± 2.2 (SD) (range: 1.1—11.2 cm), the mean abscess volume was 113 cm^3 ± 95 (SD) (range: 4.5—340.3 cm^3). Twenty-one abscesses were simple (21/28; 75%) and 7 were complex abscesses (7/28; 25%).

Two abscesses (2/28; 7%) were primary abscesses due to acute complicated colonic diverticulitis (1/28; 4%) and intestinal perforation after an incarcerated parastomal hernia (1/28; 4%). Twenty-five abscesses (25/28; 89%) were postoperative abscesses and one abscess (1/28; 4%) occurred in a patient with a malpositioned percutaneous endoscopic gastrostomy catheter who developed peritonitis and subsequently a presacral abscess. Postoperative abscesses developed after oncologic colorectal surgery (23/28; 82%), after laparoscopic cholecystectomy (1/28; 4%) and after surgical removal of dropped stones (1/28; 4%). The mean time

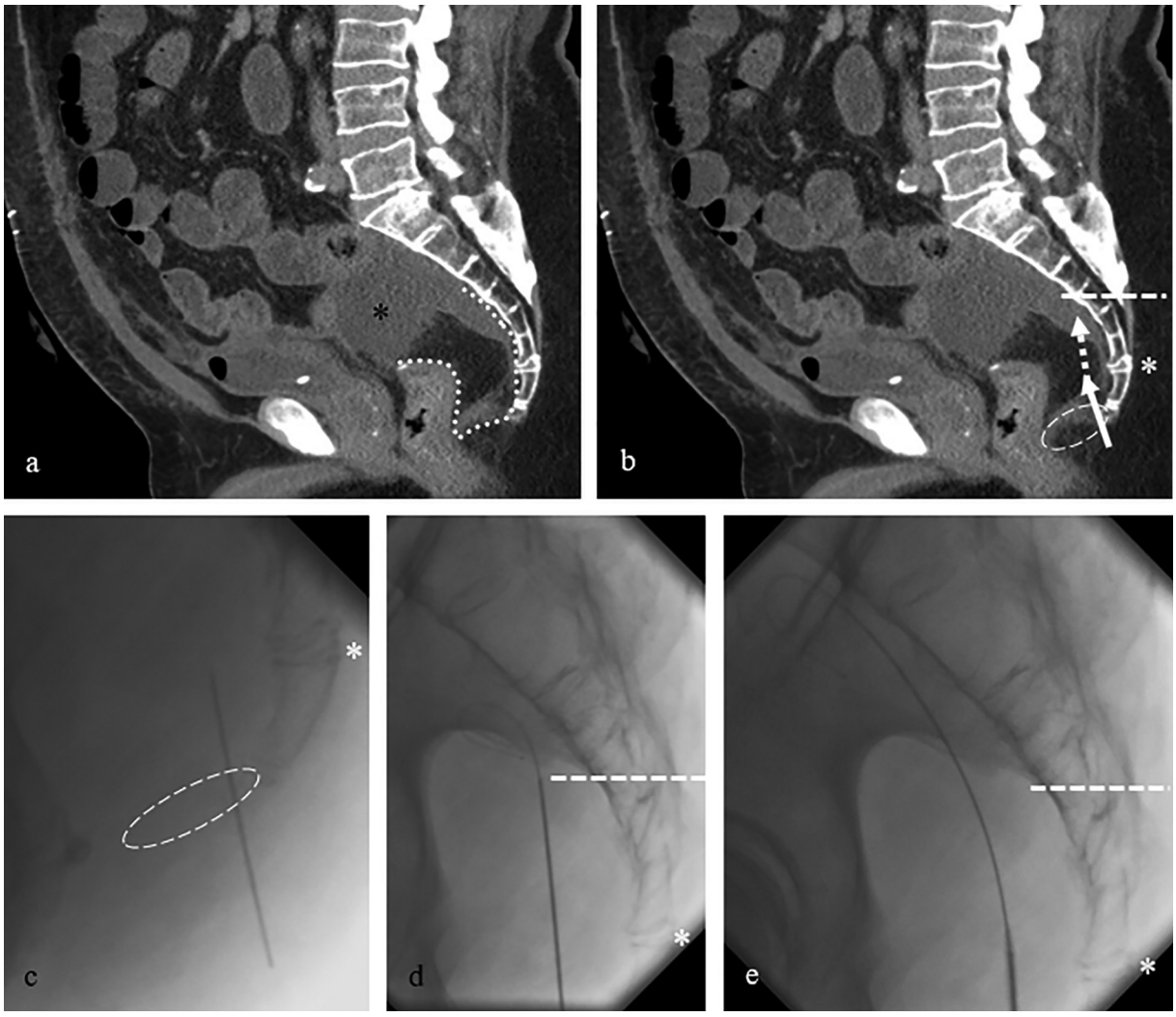

Figure 2. A 64-year-old man presenting with presacral abscess 10 days after low anterior resection: a—b: preprocedural CT images in the sagittal plane show a single simple presacral abscess with a volume of 250 cm^3 (black asterisk) extending caudally along the sacrum. The presacral space — the area between the rectal stump and the sacrum — (white dotted line) is quite voluminous and composed of fatty tissue. The posterior perineum, between the anus and the coccyx, is the puncture area (white striped ellipse). Determine landmarks (white asterisk and white striped line) for a safe puncture route. The trocar needle will be inserted towards the first landmark (white asterisk) as parallel as possible to the sacrum (white arrow) and will then be tilted further towards the sacrum (white striped arrow) to stay as far away as possible from the rectum, until reaching the second landmark (white striped line) at the level of the abscess; c: fluoroscopy image shows puncture of posterior perineum (white striped ellipse). The trocar needle is, as parallel to the sacrum as possible, inserted a few centimetres until reaching the level of the first osseous landmark (white asterisk); d: the trocar needle is tilted and inserted further towards the second osseous landmark (white striped line). After aspiration a guidewire is inserted; e: after needle withdrawal, the guidewire is placed further into the fluid collection.

between surgery and drainage procedure was 85 days ± 138 (SD) (range: 3—650 days).

All but one patients were already treated with antibiotics prior to the procedure, either orally or intravenously. For one patient the medical record did not indicate whether he was treated with or got one dose of antibiotics prior to the procedure. CRP serum level was elevated in all patients (mean: 177 mg/L ± 100 (SD); range 22—483 mg/L) (normal reference value < 8 mg/L). White blood cell count (WBC) was elevated before 19/28 procedures (68%). The mean WBC prior to all procedures was 12.3×10^9/L ± 3.9 (SD) (range: 4.3—23.1 $\times 10^9$/L, reference range 4.0—10.0 $\times 10^9$/L). Fever was present before 17/28 procedures (61%). The CRP serum level gradually decreased after drainage, with a mean value of 145 mg/L ± 74 (SD) (range 35—333 mg/L) after one day and a mean value of 62 mg/L ± 47 (SD) (range 3—177 mg/L) after one week. The WBC initially decreased from a mean of 12.3×10^9/L to 9.4×10^9/L ± 3.2 (SD) (range 4.2—14.7 $\times 10^9$/L) on day one, though stagnated with a mean of 9.8×10^9/L ± 2.4 (SD) (range 5.7—13.8 $\times 10^9$/L) after one week.

In one procedure, there was a malposition of the transperineal needle using fluoroscopy, subsequently a successful transperineal drainage with CT-guidance was performed (Fig. 3). Including this procedure, the technical success rate of the drainage procedures was 89% (25/28

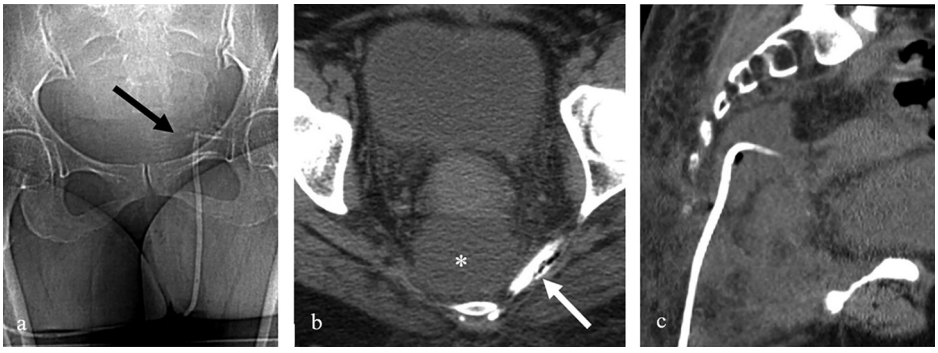

Figure 3. A 53-year-old woman who underwent abdominoperineal resection. Failed fluoroscopy-guided drainage and followed by successful CT-guided drainage: a: scout image after fluoroscopy-guided drainage shows misplaced drainage catheter (black arrow) left lateral to the sacrum; b: CT image in the axial plane shows contrast material and iatrogenic air in the piriformis muscle (white arrow) injected during the fluoroscopy-guided drainage-attempt, lateral to the presacral abscess (white asterisk); c: CT image in the sagittal plane after successful repeat CT-guided transperineal catheter placement shows the catheter in the centre of the abscess.

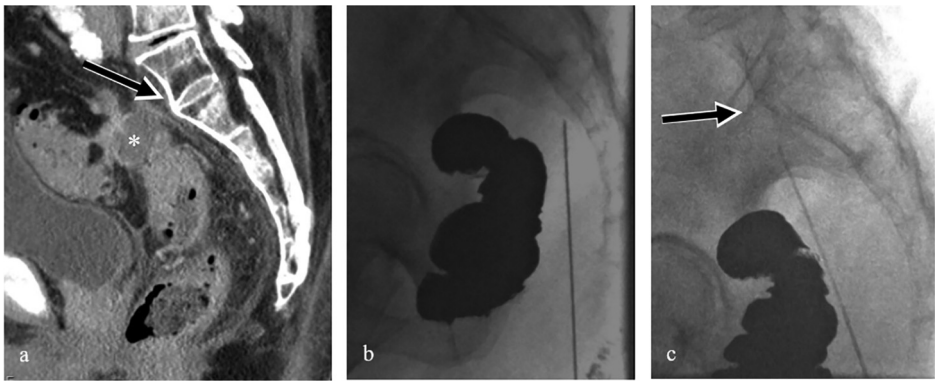

Figure 4. A 77-year-old man with no history of previous abdominal surgery presenting with a presacral abscess caused by acute complicated diverticulitis: a: CT image in the sagittal plane shows small presacral abscess (white asterisk). The abscess is located anterior to S1—S2 (arrow) which can be used as an anatomical landmark on fluoroscopy; b: fluoroscopy image shows the puncture route with the needle pointing cranially in the presacral space. Intrarectal contrast material was used to avoid puncture of the rectum given the close relationship between abscess and rectosigmoid; c: fluoroscopy image shows the needle, which is angulated anteriorly towards the level of S1—S2 (arrow), unfortunately the abscess could not be reached, resulting in technical failure.

procedures). Three fluoroscopy-guided transperineal procedures were not successful, a CT-guided attempt was not immediately conducted. The first procedure concerned the patient with the smallest abscess of this study, an abscess-volume of only 4.7 cm^3 with an elongated cranio-caudal course. Reassessment of the fluoroscopy images suggested a lateral malposition of the catheter to the small abscess. In another patient, pus was aspirated after the second puncture-attempt, though subsequently there was a malposition of the needle due to movement of the patient who experienced discomfort. The third unsuccessful procedure concerned the patient with acute complicated diverticulitis of the sigmoid. The abscess was relatively small (25.8 cm^3) and rather cranially located (Fig. 4). There was no fever and inflammatory parameters were only mildly elevated (CRP = 64 mg/L; WBC = 11.3 $\times$ 10^9/L). Another approach was not attempted. The patient recovered uneventful after the unsuccessful drainage with CRP serum value that dropped to 3 mg/L one week later.

Twenty-one 8-F catheters were placed, one 10-F, two 12-F and one 24-F catheters. One patient reported discomfort directly postprocedural, two patients reported discomfort from the drain after discharge from the hospital during daily activities. Transperineal catheter drainage was maintained for 3—105 days (mean 31 days $\pm$ 26 [SD]). Simple abscesses had a mean drainage duration of 24 $\pm$ 22 (SD) days, whereas complex abscesses had a mean of 54 $\pm$ 37 (SD) days (P = 0.049). Clinical and/or radiological resolution of the abscess was observed in 22/25 technically successful drainages, yielding a clinical success rate of 88%. The other three patients (3/25; 12%) had further surgery because the abscesses did not resolve after drainage. Two of the 3 were complex abscesses with intestinal fistula.

No major complications were reported during or after the procedure. After 5 technical successful procedures there was a minor complication, concerning catheter problems (5/25; 20%). In one patient the catheter was kinked after 26 days, in four patients the drain dislocated after a mean of 13.3 days $\pm$ 8.6 (SD) (range 7—28). One of these 5 patients recovered uneventful, in one patient the catheter was fluoroscopy-guided relocated, in three patients there was a recurrence of the abscess in 4, 20 and 49 days.

Bacteriological samples of the aspirated fluids were examined after 21 procedures. Eighteen samples were positive (18/21; 86%) and 10 revealed a polymicrobial infection (10/18; 56%). *Escherichia coli* was present in 10 samples

Table 1 Characteristics of 21 patients who underwent posterior transperineal drainage for presacral abscess.

Gender (male/female)	14/7
Number of procedures per patient	
1	17
2	2
3	1
4	1
Age (years)	62.1 ± 10 [39—80]
Origin of abscess, *n* (%)	
Primary abscess	2 (7)[a]
Acute diverticulitis	1
Intestinal perforation	1
Secondary abscess	26 (93)[a]
Colorectal surgery	23
Cholecystectomy	1
Removal dropped stones	1
Post-interventional peritonitis	1
Abscess diameter (cm)	5.7 ± 2.2 [1.1—11.2]
Abscess volume (cm^3)	113 ± 95 [4.5—340.3]
Abscess characteristics	
Simple	21 (75)[a]
Complex	7 (25)[a]
C-reactive protein (mg/L)	177 ± 100 [22—483]
White blood cell count ($\times 10^9$/L)	12.3 ± 3.9 [4.3—23.1]
Fever (> 38 °C)	17 (61)[a]
Imaging method drainage	
Fluoroscopy	24
CT	4
Catheter drainage duration (days)	31 ± 26 [3—105]
Time between surgery and drainage (days)	85 ± 138 [3—650]

Quantitative variables are expressed as mean ± standard deviation (SD). Numbers in brackets are ranges.
[a] Percentages are calculated on a per procedure basis.

(10/18; 56%). The second most prevalent germ was *Enterococcus faecalis*, present in 6 samples (6/18; 33%).

Discussion

This study shows a technical success rate of 89% (25/28) and a clinical success rate of 88% (22/25) for posterior transperineal drainage of presacral abscesses. In our institution, this approach is considered a feasible and safe method because of the absence of anatomical structures such as large vessels, muscles and nerves on the puncture route. It is also well tolerated with limited patient discomfort.

Deep pelvic abscesses may occur as a complication of abdominal or pelvic surgery, infection or trauma. Percutaneous drainage is the preferred treatment in patients not requiring immediate surgery, especially the transabdominal approach because of the high success rate, ease of catheter care and the high level of patient acceptance and comfort [1—3]. This anterior approach is not always feasible for deep pelvic abscesses because of anatomical overlying structures. The paracoccygeal and transgluteal approach, commonly achieved with CT-guidance, are reported alternatives [7—13]. These approaches require precise anatomical knowledge of the pelvis and anatomical landmarks to avoid neural and vascular complications. The transrectal approach is a suitable alternative for presacral abscesses but with limitations for patients with prior rectal surgery who represent 81% of our study population. This route is not possible after abdominoperineal resection and undesirable in case of recent anastomosis or radiation-induced proctitis [8]. The transvaginal route for a presacral abscess drainage is, based on anatomical characteristics, excluded in patients with an intact rectum and in men. Moreover, it is associated with patient discomfort and catheter fixation is difficult after an endocavitary approach [2,10,14].

A few studies have reported the transperineal drainage as an alternative to aforementioned approaches [2,4—7]. The posterior transperineal route is thought to be associated with less complications and patient discomfort, due to the absence of anatomical structures in the puncture route, most importantly large muscles, vessels and nerves. Advantages of transperineal drainage, though comparable to transvaginal or transrectal, are the dependent drainage for full evacuation of a fluid collection, and the extraperitoneal route to prevent intraperitoneal spread of infection [6,15]. This study shows that posterior transperineal drainage is a safe and achievable approach for presacral abscesses. A limitation of this study is the retrospective design. Ideally, a randomized controlled trial was conducted with comparison groups of patients with alternative drainage-routes.

The principal cause of failed percutaneous drainage is reported to be misdiagnosis of the magnitude, extent, complexity and location of the abscess [15]. This, combined with a probable unjustified indication, seems to have happened in the two unsuccessful fluoroscopy-guided drainages of the 4.7 cm^3 abscess with lateral malposition of the needle and the small, cranially located abscess due to acute diverticulitis. CT-guided transperineal drainage might have been feasible in the patient with the small, elongated abscess with the lateral malposition of the needle, due to better spatial and contrast resolution [10]. This spatial resolution is not strictly necessary in presacral abscesses located in the midline with usable anatomical landmarks. Angulation of the patient and the beam are described to be easier using fluoroscopy than CT, plus fluoroscopy is a real-time imaging modality where, using Seldinger technique, the loss of access or kinking can be monitored during catheter placement [2,8]. CT-fluoroscopy is emerging as a useful real-time instrument, though vigilance is required to reduce the radiation dose to the patient and medical personnel [2,16]. Fluoroscopy is accompanied by less radiation doses and is less expensive and time-consuming than CT [5]. When an abscess is not directly presacral with interposed structures like the rectum, CT- or CT-fluoroscopic guided drainage is the preferred intervention, either transperineal or transgluteal.

No major complications were reported in our study. Major complications after transgluteal or paracoccygeal drainage are rare, though procedures with bleeding and gluteal abscesses have been described [9—11]. Catheters in the transgluteal location have a reported incidence of pain or discomfort up to 20% [1]. These catheters are prone to

kinking and are reported to cause discomfort when walking or when in the supine position [8,14]. Longo et al. reported one patient with severe transient pelvic discomfort and one patient with fistulous communication to a vas deferens after transgluteal drainage. Three patients in this study reported discomfort after transperineal drainage (3/28; 11%) [8]. Sperling et al. reported a patient with a transperineal catheter who did not return to the hospital for scheduled follow-up for 146 days, which implies that the transperineal catheter is well tolerated [6]. In our study, 5 patients experienced catheter problems, including kinking or premature dislocation. Premature withdrawal of catheters is reported the most common technical error in abdominal abscess drainage [3,15]. Robert et al. did not report on dislocation of transgluteal catheters, though with a shorter mean duration of drainage (8.3 days) [11]. Consistent with other studies, in our study patients with simple abscesses had a shorter drainage duration than those with complex abscesses [7,10].

In conclusion, percutaneous drainage of a presacral abscess with a posterior transperineal approach, either fluoroscopically- or CT-guided, has been scarcely reported in the literature. This study, which to our knowledge, is the largest series of patients who underwent a transperineal drainage, shows that it is a safe, well-tolerated and effective alternative to transgluteal or transcavitary drainage for presacral abscess.

Disclosure of interest

The authors declare that they have no competing interest.

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