Ultrasound-Guided Abscess Drainage: Technical and Clinical Aspects

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KEYWORDS

• Ultrasound • Abscess • Drainage

KEY POINTS

- Preparation for percutaneous drainage of a fluid collection requires a thorough review of the patient's clinical history as well as any additional laboratory or radiologic information.
- It is important to select the appropriate transducer to visualize the targeted fluid collection as well as any adjacent structures to avoid, such as bowel loops or vessels.
- Major complications from percutaneous abscess drainage are rare but include pseudoaneurysms, vessel lacerations, and vascular fistulae. Such complications may be avoided with thorough Doppler interrogation of adjacent vasculature before and during the procedure.
- For pelvic collections, transvaginal and transrectal abscess drainage are alternative routes to draining collections bordered by the urinary bladder, reproductive organs, prostate, bowel, or bony structures.

INTRODUCTION

Advancements in ultrasound-guided abscess drainage have benefited patients with a safe and effective minimally invasive alternative to surgical intervention. Ultrasound-guided percutaneous abscess drainage (PAD) has evolved into one of the most widely used methods of patient care provided by interventionalists.[1] PAD technique has been substantially refined since one of the first reported case series of ultrasound-guided percutaneous aspiration of abscesses by Smith and Bartrum in 1974.[2] Five years later, a study published by Gerzof and colleagues[3] using computed tomography (CT) or ultrasound guidance concluded that nonsurgical drainage by percutaneously placed catheters of relatively small size in combination with appropriate antibiotics may suffice for definitive therapy in many abdominal abscesses.

INDICATIONS

Abscess formation results from a variety of causes. Some of the more common causes of abdominal abscess formation include

1. Postoperative complications, including anastomotic biliary leakage
2. Pancreatitis
3. Gangrenous or perforated cholecystitis
4. Diverticulitis or perforated appendicitis
5. Perforated bowel

In 2010, Wallace and colleagues[4] of the Society of Interventional Radiology Standards of Practice Committee concluded that the prerequisites for percutaneous drainage procedures are an abnormal fluid collection and at least one other criterion included in **Box 1**.

Certain clinical and radiographic signs may suggest that a fluid collection is infected. Clinically, patients may present with refractory fevers, persistent abdominal pain, or localized tenderness. Subsequent laboratory workup may reveal leukocytosis or bacteremia. In unstable patients presenting with septic shock, hypotension with tachycardia, decreased urine output, or other signs and symptoms indicating organ dysfunction may manifest. CT has a 96% accuracy for identifying abdominal abscesses.[5] Intravenous contrast is

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Box 1
Indications for percutaneous drainage

Abnormal fluid collection and at least one of the following:

1. Suspicion that the fluid is infected or the result of an abnormal fistulous communication
2. Need for fluid characterization
3. Suspicion that the collection is producing symptoms sufficient to warrant drainage
4. Temporizing maneuver to stabilize the patients' condition before definitive surgery
5. As an adjunctive procedure to facilitate the improved outcome of a subsequent intervention

Data from Wallace MJ, Chin KW, Fletcher TB, et al. Quality improvement guidelines for percutaneous drainage/aspiration of abscess and fluid collections. J Vasc Interv Radiol 2010;21:431–5.

routinely given unless contraindicated. Oral contrast for suspected intra-abdominal abscesses can be beneficial, particularly in patients with minimal intraperitoneal fat or to assist diagnosis of a perforated viscus. CT characteristics of an infected fluid collection include wall enhancement (hyperemia) after intravenous contrast and obliteration of adjacent fat planes caused by inflammatory stranding.

Certain instances may require a fluid sample for further characterization. For example, postoperative patients that have undergone a lymph node dissection may subsequently develop a fluid collection. However, the differential diagnosis may include a postoperative lymphocele, seroma, or an abscess. Thus, laboratory analysis of the fluid can guide further therapy, such as catheter placement and alcohol ablation in lymphoceles or antibiotic therapy for infected fluid collections.

A percutaneous catheter may be placed as a temporizing measure before a definitive surgical procedure (**Fig. 1**). This scenario is commonly encountered after postoperative bile leaks,

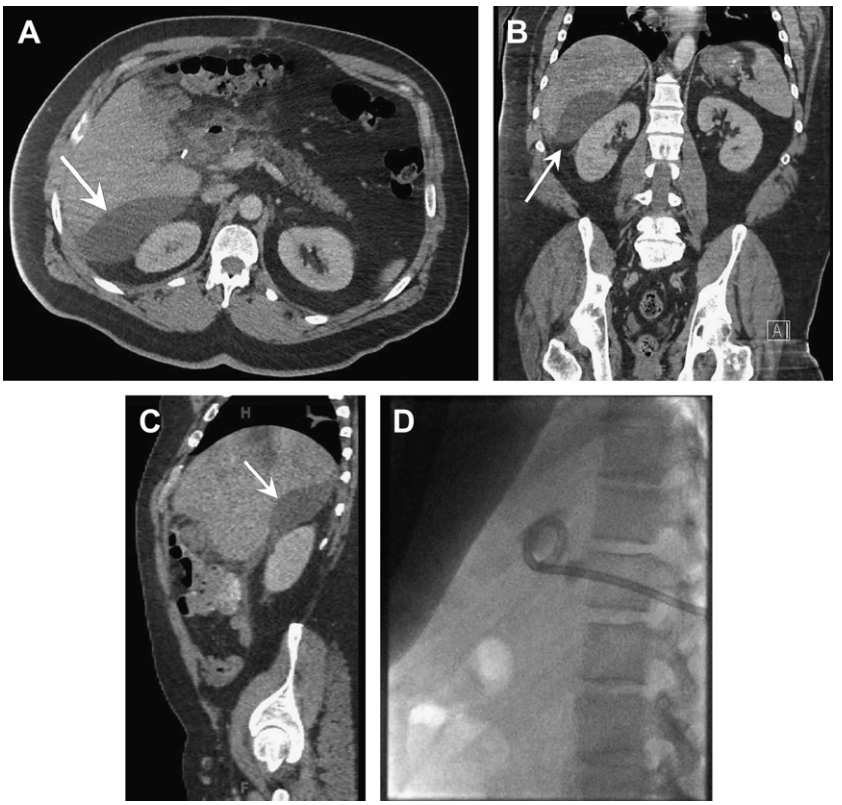

Fig. 1. A 55-year-old man status after cholecystectomy for acute cholecystitis. (*A*) Axial, (*B*) coronal, and (*C*) sagittal contrast-enhance CT images show a partially loculated fluid collection (*arrows*) extending from the gallbladder fossa into the Morrison space. (*D*) Lateral projection fluoroscopic image demonstrates successful placement of a 16F Cope Loop (Cook, Bloomington, Indiana) catheter into the corresponding fluid collection.