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Abscess due to perforated appendicitis: factors associated with successful percutaneous drainage

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Abstract

BACKGROUND: Percutaneous drainage is the standard treatment for perforated appendicitis with abscess. We studied factors associated with complete resolution (CR) with percutaneous drainage alone.

METHODS: Ninety-eight patients underwent percutaneous drainage for acute appendicitis complicated by abscess (October 1990 to September 2010). CR was defined as clinical recovery, resolution of the abscess on imaging, and drain removal without recurrence. Patients achieving CR were compared with patients not achieving CR.

RESULTS: The rate of CR was 78.6% (n = 77). Abscess grade was the only radiological factor associated with CR ($P = .007$). The CR rate was higher with transgluteal drainage (90.9% vs 79.2%) than with other anatomic approaches ($P = .018$) and higher with computed tomography-guided drainage than with ultrasound-guided drainage (82.7% vs 64.3%, $P = .046$).

CONCLUSION: CR was more likely to be achieved in patients with lower abscess grade, computed tomography-guided drainage, and a transgluteal approach.

Immediate appendectomy is the widely accepted standard treatment for most cases of simple appendicitis; however, it has been associated with a high rate of complications in patients presenting with appendiceal abscess.[1–4] Percutaneous appendiceal abscess drainage (PAAD) has become the standard of care, with excellent overall success rates and less morbidity when compared with appendectomy. In spite of overall good results, a substantial minority (10% to 25%) of patients with periappendiceal abscess do not respond to PAAD. These patients may develop persistent

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fistulas after drainage, or require prolonged hospitalization, repeated percutaneous procedures, multiple follow-up radiologic examinations, and in some cases a delayed surgical procedure.[5–8] This study sought to identify demographic, radiologic, and technical factors associated with successful drainage and to describe the management of relatively rare conditions such as postintervention fistula which have not been discussed in smaller series.

Methods

After Institutional Review Board approval, a retrospective review of all patients who underwent PAAD at our institution from October 1, 1990 to September 30, 2010 was performed. The diagnosis of perforated appendicitis with an abscess was confirmed with either computed tomography (CT) or ultrasound (US). Details of each PAAD were recorded after review of interventional radiology procedure sheets which were completed by the attending radiologist at the end of every procedure.

Data on demographics, abscess characteristics, interventions, and hospital course were collected. Abscesses were graded according to the classification system described by Jeffrey et al[9] (Table 1). Patients with multiple abscesses were considered Grade 3. Abscess size, grade, and the presence or absence of phlegmon were determined by an interventional radiologist blinded to treatment outcomes.

Procedural data collected included the percutaneous approach (transabdominal, transgluteal, transrectal, and transvaginal), the imaging modality used for the procedure (CT or US), the size of the catheter used, and the aspirated volume. For patients who required multiple procedures, technical details were recorded individually for each of the procedures. We also identified patients who developed enteric fistula after PAAD. We defined fistula as an abnormal connection between the gastrointestinal tract and a drain or the exterior of the body. Fistulas were identified by either drainage of enteric contents or by contrast injection of an indwelling percutaneous drain. In all cases fistulas developed at the site of appendiceal perforation; we did not identify any cases of fistula occurring as a technical complication of PAAD. Patients whose fistula resolved with nonoperative therapy were compared with patients who underwent surgery before resolution of the fistula.

Table 1 Abscess grades

Abscess grade	Definition
Grade 1	Periappendiceal phlegmon or abscess smaller than 3 cm
Grade 2	Well-circumscribed periappendiceal abscess larger than 3 cm
Grade 3	Large, poorly defined periappendiceal abscesses extending to distant locations, such as the pelvic cul-de-sac, the interloop spaces, or beyond the peritoneal cavity
	Multiple abscesses

We defined complete resolution (CR) as resolution of clinical symptoms and the abscess without recurrence after drain removal. Patients who underwent surgery with the percutaneous drain still in place were defined as having persistent disease (PD). To explore the demographic, radiologic, and technical factors associated with successful PAAD, we compared the CR group with the PD group.

We identified patients who underwent appendectomy following percutaneous drainage. Indications for appendectomy were defined as follows: (1) "Interval appendectomy" in patients who achieved CR with percutaneous drainage and underwent elective appendectomy to prevent recurrent appendicitis, (2) "Fistula" in patients who had an indwelling percutaneous drain with demonstrated communication with the bowel at the time of appendectomy, (3) "Recurrent appendicitis" in patients who had CR, then suffered a second discrete episode of appendicitis treated surgically, (4) "Failed drainage" in patients whose abscesses could not be resolved with percutaneous drainage, and (5) "Other" for all other indications.

Data were summarized as means ± standard deviations, medians with interquartiles, or as frequencies (%) as appropriate. Two-sample *t* tests, Wilcoxon rank-sum tests, or Fisher's exact tests were used to compare variables between the patients with CR and with PD. Analyses were repeated to investigate the development of recurrent appendicitis and persistent fistula after initial nonoperative treatment. All analyses were conducted using SAS version 9.3 (The SAS Institute, Cary, NC). Two-sided *P* values less than .05 were considered statistically significant.

Results

Ninety-eight patients who underwent PAAD were identified (October 1990 to August 2010). Patient demographics and procedure variables are shown in Table 2. The mean patient age was 37.0 ± 24.2 (range 2 to 96) years with nearly equal distribution of both sexes (men 55.1%, n = 54). The median time from symptom onset until hospital admission was 7 days (range 1 to 60). The average abscess size was 5.8 ± 2.4 cm with grade 2 abscesses (48%, n = 47) being the most common; multiple abscesses were present on the initial imaging study in 20.4% of the cases (n = 20).

CT-guided drainage was used in 82.7% of the patients, and US-guided drainage in the remainder. A transabdominal approach was the most common (83.7%), followed by transgluteal (11.2%) and combined transgluteal/transabdominal approach (3.1%). A single catheter was used in 92.9% of the cases (n = 91). After the procedure, the patients stayed in the hospital for a median of 5 days (interquartile range [IQR] 3 to 7).

The main outcomes are summarized in Table 3. The CR rate was 78.6% (n = 77). The CR and PD groups are