

Clinical Science

# Predictors of postoperative outcomes for patients with diverticular abscess initially treated with percutaneous drainage



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## KEYWORDS:

Sigmoid diverticulitis;  
Diverticular abscess;  
Percutaneous drainage;  
Postoperative  
outcomes

## Abstract

**BACKGROUND:** The aim of our study was to evaluate factors associated with percutaneous drainage (PCD) failure, complications, and stoma creation for patients undergoing sigmoidectomy for diverticular abscess.

**METHODS:** Data for patients with diverticular abscess greater than or equal to 3 cm in diameter treated with initial PCD from 1994 to 2012 were identified.

**RESULTS:** One hundred fourteen patients (54% male) with a mean age of 57 years and a mean abscess diameter of  $7.1 \pm 2.4$  cm were identified. American Society of Anesthesiologists 4 was the only independent factor associated with PCD failure ( $P < .001$ ). On multivariate analysis, factors associated with postoperative morbidity ( $n = 42$ , 37%) included PCD failure ( $P = .02$ ) and older age ( $P = .04$ ), while risk for stoma creation was associated with PCD failure ( $P < .001$ ), multiple PCD attempts ( $P = .002$ ), older age ( $P < .001$ ), Hinchey II ( $P = .03$ ), and increased body mass index ( $P = .01$ ). American Society of Anesthesiologists 4 was the only factor associated with permanent stoma ( $P = .02$ ).

**CONCLUSIONS:** In patients with large diverticular abscess, a successful PCD is associated with reduced postoperative morbidity. However, a large proportion of patients require stoma creation. Significant comorbidity is associated with both failure of PCD and permanent stoma risk.

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It is estimated that approximately 15% to 20% of the individuals with sigmoid diverticulosis will develop

diverticulitis,<sup>1</sup> with an annual incidence of approximately 10 in 100,000 individuals, and 200,000 hospital admission per year in the United States.<sup>2,5</sup>

It has been reported that diverticular abscess might be the most common complication of sigmoid diverticulitis.<sup>3</sup> Historically, the treatment of diverticular abscess has been surgical drainage. However, computed tomography (CT)-guided percutaneous drainage (PCD) of intra-abdominal abscesses is currently the preferred initial approach in the treatment of diverticular abscess.<sup>4,6</sup> The management guidelines issued by a number of surgical societies have recommended PCD as the most appropriate initial

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treatment for the majority of patients with a large diverticular abscess to avoid an emergency operation and a multi-stage approach requiring a stoma creation.<sup>8-10</sup> The aim of our study was to evaluate outcomes in patients with diverticular abscess initially approached with PCD and to identify factors associated with PCD failure, postoperative complications, and need for ostomy creation at the time of surgery.

## Methods

All cases of diverticular abscess with a diameter of at least 3 cm treated with PCD from 1994-2012 were identified from an institutional review board-approved diverticular disease database and retrospectively examined. Both the diagnosis of diverticulitis and the measurement of the abscess were based on CT imaging. Abscesses with a smaller diameter were excluded because they were generally not amenable to PCD based on the assessment by our interventional radiologists. Drainage procedures carried out in our unit were performed by staff radiologists with expertise in both interventional procedures and gastrointestinal disorders, using a combination of intravenous conscious sedation and local anesthetic injection at the drain insertion site. Inserted percutaneous drains were locking pig-tail catheters with diameters ranging from 10 to 14 French, which were connected to a Jackson-Pratt bulb under negative pressure and sutured to the skin. All cases treated with PCD had synchronous treatment with broad-spectrum antibiotics for a duration of 1 to 3 weeks, depending on the individual colorectal surgeon. Antibiotics were administered intravenously on hospital admission and then switched to oral once patients could tolerate a regular diet and after discharge from the hospital. Success of PCD was defined as the resolution of clinical symptoms as described above in the 24 to 48 hours immediately following PCD, leading to a subsequent elective operation. Conversely, failure of PCD was defined as lack of clinical improvement in the general condition of the patient within 48 hours after initial PCD, requiring urgent surgery to treat the diverticular abscess. All patients with successful PCD underwent elective surgery after an interval of 4 to 6 weeks from the time of PCD.<sup>6,7</sup>

The definition of multiple attempts included patients who required repeat PCD to achieve successful abscess drainage during the same or different procedural sessions. The decision to remove the percutaneously placed drain was made following resolution of the patient's symptoms and signs (abdominal pain, fever, tachycardia, leukocytosis) and after the drain output had either ceased in an asymptomatic patient or following a drain injection study indicating resolution of the abscess without colonic fistulization, based on the individual surgeon's preference. At the time of drain removal, all patients were hemodynamically stable and asymptomatic. The drain removal was carried out during

an office visit or in the radiological suite following outpatient drain injection study.

Electronic medical records were reviewed for demographic data, comorbidity, clinical variables, and biochemistry values related to the initial presentation of disease, size, location, and multiplicity of abscesses, previous episodes of diverticulitis, interval between drainage and surgery, complications, and clinical outcomes after PCD. In particular, age was analyzed by 5-year increments and body mass index (BMI) by 5 kg/m<sup>2</sup> increments, while comorbidities were assessed using both the American Society of Anesthesiologists (ASA) classification and the Charlson Comorbidity Index (CCI)<sup>11</sup> analyzed by 1-point increments. Postoperative complications were recorded based on the number of patients with at least one complication. Our definition of postoperative ileus was the absence of bowel function on postoperative day 5, or need for insertion of a nasogastric tube because of abdominal distension, nausea, or emesis. We also collected information on the specific type of surgery and timing of the procedure, urgent versus elective, as well as postoperative outcomes. Patients with diverticular abscess treated with PCD followed by observation, those having an abscess with a diameter of less than 3 cm and/or diverticular abscesses reported as incidental finding in the course of treatment for other presentations of complicated diverticular disease were excluded. Variables specifically related to the abscess characteristics were its diameter, the CT aspect characterized as round shaped versus multiloculated, single versus multiple, Hinchey I (pericolic abscess) or II (distant abscesses) based on CT assessment,<sup>12</sup> pelvic and/or intra-abdominal location, interval between initial drainage and surgery, presence of yeast in the abscess culture,<sup>13</sup> and the number of radiological attempts required to place the percutaneous drain. We recorded the causes of urgent surgery because of PCD failure and the surgeon-reported causes of stoma creation. In addition, we considered the 87 patients undergoing both PCD and surgical management within our unit, and performed both univariate and multivariate analyses to examine factors associated with failure of PCD, postoperative morbidity, and stoma creation at the time of surgery. We also performed a similar subgroup analysis limited to the 70 patients who had successful PCD. Twenty-seven patients who underwent initial PCD at outside institutions were excluded from any analyses involving PCD-related variables, but were still included in the assessment of perioperative outcomes.

## Statistical analysis

Quantitative data were expressed as mean  $\pm$  standard deviation, and association with categorical variables were analyzed by the Fisher's exact test or chi-square test. Multivariable models to identify independently predictive factors associated with PCD failure, postoperative morbidity, and stoma creation were created by using

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