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## Case Report

# Perforated cecal diverticulitis with CT diagnosis and medical management

Caleb Tsetse<sup>a,\*</sup>, Shazia Rahat Chaudhry<sup>b</sup>, Feraas Jabi<sup>a</sup>, Jennifer Nicole Taylor<sup>a</sup>

<sup>a</sup> Department of Radiology, SUNY Upstate University Hospital, 750 East Adams Street, Syracuse, NY 13210, USA

<sup>b</sup> Medical University of the Americas, P.O. Box 701, Charlestown, Nevis, West Indies

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## ABSTRACT

Acute diverticulitis is a painful condition of the gastrointestinal tract that results from sudden inflammation of one or more diverticula in the bowel wall. Right-sided acute diverticulitis, such as cecal diverticulitis, is uncommon diagnosis that can be easily misdiagnosed as acute appendicitis as it shares similar clinical presentation. An unusual complication of right-sided acute diverticulitis such as perforated cecal diverticulitis has different management from acute appendicitis. Thus, definitive diagnosis of this clinical condition with imaging is crucial to optimal management. We report a case of 43-year-old man who presented to the Emergency Department with acute onset severe right lower quadrant abdominal pain associated with anorexia, fever, and nausea. Computed tomography scans obtained showed findings consistent with perforated diverticulitis limited to the cecum, and normal caliber appendix. Conservative medical treatment was decided based on localized imaging findings with excellent outcome.

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## Case report

A 43-year-old male patient presented to the emergency room due to a 3-day history of severe right lower quadrant abdominal pain. His symptoms also included lack of appetite, fever, and nausea, but no vomiting. Rebound tenderness was elicited in his right lower quadrant on physical examination. His WBC count was measured at 19.8 with neutrophilia. Other hematology and biochemical parameters were unremarkable.

Emergency computed tomography (CT) scans were performed and showed that the appendix was normal. However, multiple right-sided colonic diverticula were present with adjacent inflammatory fat stranding and locules of free gas. No diverticula were identified in the distal segments of descending or sigmoid colon. Findings were consistent with isolated Hinchey stage 1 acute cecal diverticulitis. He was successfully treated with intravenous (IV) antibiotics and rehydration with resolution of his symptoms and scheduled for follow-up colonoscopy 6 weeks later (Figs. 1–4).

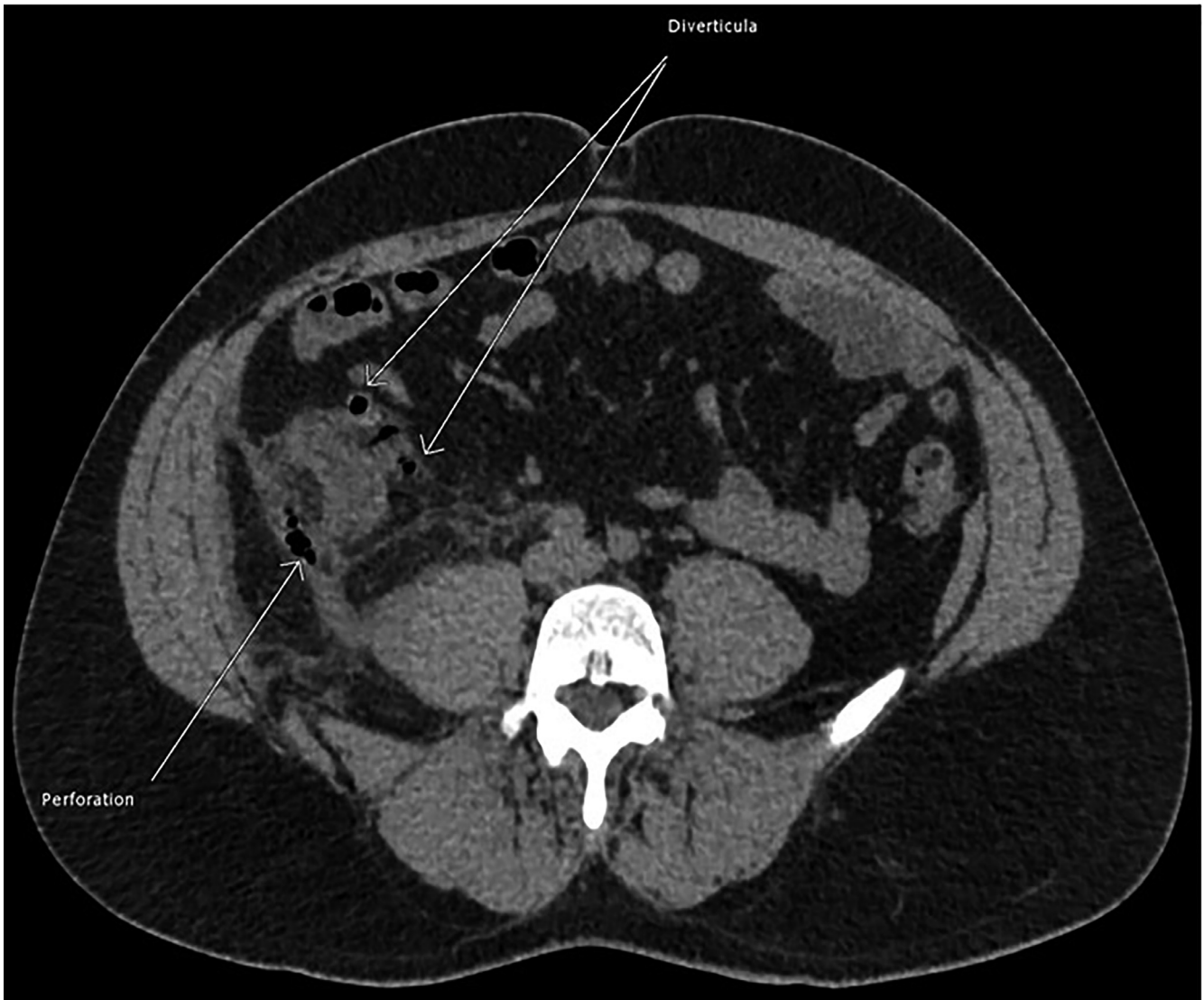
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\* Corresponding author.

E-mail address: [tsetsec@upstate.edu](mailto:tsetsec@upstate.edu) (C. Tsetse).

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**Fig. 1 – Axial CT image demonstrating multiple cecal diverticula, pocket of gas, and surrounding mesenteric fat stranding due to perforation.**

## Discussion

Diverticula are small outpouchings within bowel walls that typically form within the large intestine, including the cecum. They form in an area of relative weakness in the bowel where the vasa recta penetrate the bowel wall. Increased intraluminal pressure or trauma from food particles erodes the wall and causes a localized microperforation, which is usually walled off by adjacent fat. These are pulsion-type pseudodiverticula. Pseudodiverticulum is often seen with involvement of the distal and sigmoid colon as the diverticula does not involve the muscular layer [3,9]. Right-sided cecal diverticula are believed to be congenital, developed in the sixth week of gestation, as it involves all the three layers of the colon making them a true diverticulum. The terms “diverticulosis” and “diverticular disease” are used to describe the presence of uninflamed diverticula.

The term “diverticulitis” indicates the inflammation of a diverticulum or diverticula, which is commonly accompanied by gross or microscopical perforation. Diverticulitis can be divided into two categories, left colonic diverticulitis (LCD) that arises from left colonic diverticula and right colonic diverticulitis (RCD) that arises from right colonic diverticula. In one study involving 37 patients with right-sided diverticulitis and 23 with LCD, it was noted that the RCD patients were on average 32.3 years younger than those with LCD, suggesting that RCD occurs at a younger age than LCD [1,6]. Another study reported that of 881 cases reviewed of cecal diverticulitis, it was found that the average age of patients with the condition was 43.6 years with a male to female ratio of 3:2, similar to the findings of the aforementioned case [4,5,8].

Acute diverticulitis may cause partial obstruction, accounting for 10% of all large bowel obstruction [17], and is a relatively uncommon cause of complete obstruction. Clinical presentation of cecal diverticulitis perforation can



**Fig. 2 – Sagittal CT image demonstrating multiple cecal diverticula, pocket of gas, and surrounding mesenteric fat stranding due to perforation.**

often mimic acute appendicitis, with signs and symptoms of right iliac fossa pain and tenderness, low-grade fever, nausea, vomiting, and leukocytosis. Other differential consideration, other than acute appendicitis, includes infectious or inflammatory colitis, advanced cecal malignancy, inflammatory bowel disease (especially Crohn's disease), pelvic inflammatory disease, tubal pregnancy, and cystitis. In a previous study which reviewed 881 cases of cecal diverticulitis, it was noted that in 85% of those cases, the patients presented with symptoms resembling those of appendicitis [8]. It is therefore frequently misdiagnosed as an issue related to the appendix [9]. Some suggested reported clinical features that may aid in distinguishing diverticulitis from appendicitis include a longer history of abdominal pain without toxicity, less frequent vomiting, and tenderness realized through deep palpation [8,11,13]. Recognizing the clinical presentation of

diverticulitis is especially important as surgery is not always indicated for correction of the condition.

Radiological imaging plays a crucial role in the diagnosis of diverticula disease and diverticulitis. More specific imaging characteristic features in addition to history and physical examination findings could help make definitive diagnosis. This is corroborated in previous publications that demonstrated that definitive diagnosis of diverticulitis in the absence of exploratory laparotomy would be through imaging studies [2,4,12]. In the past, RCD was diagnosed through the use of contrast enema; however, presently CT and ultrasonography (US) are the imaging modalities of choice due to their high specificity and sensitivity [4,14]. In cases of distinguishing RCD, specifically in the cecal region, from acute appendicitis, CT performed with 98% sensitivity and specificity [5,7]. In other cases of LCD, CT has had reported performance rang-



**Fig. 3 – Axial CT image demonstrating normal caliber appendix.**

ing from 91% to 95% sensitivity and 72% to 77% specificity [7]. With similarly excellent performance, in a study of 934 patients who presented with right lower quadrant abdominal pain, abdominal US performed with 91.3% sensitivity and 99.5% specificity, allowing for a cecal diverticulitis diagnostic accuracy rate of 99.5% [5,8,10]. Colonoscopy has also been an imaging modality used for exploring colorectal conditions but has no role in acute diverticulitis due to the risk of perforation of already inflamed bowel [2]. MRI is not popularly used for diagnosis of diverticulitis. However, studies in the Netherlands have demonstrated successful use of MRI for accurate RCD diagnosis [4]. MRI is usually considered by physicians after a nondiagnostic ultrasound result, and potential contraindication to CT [4].

The severity of diverticulitis is often graded with the use of Hinchey's criteria (Table 1), although this classification system does not take into account the effects of coexisting conditions on disease severity or outcome. The risk of death is less than 5% for most patients with stage 1 or 2 diverticulitis, approx-

**Table 1 – Hinchey classification scheme.**

Hinchey classification	Features of disease	Risk of death
Stage 1 disease	Diverticulitis with pericolic abscess or phlegmon	5%
Stage 2 disease	Diverticulitis with walled off pelvic, intra-abdominal or retroperitoneal abscess	5%
Stage 3 disease	Generalized purulent peritonitis	13%
Stage 4 disease	Generalized fecal peritonitis	43%

imately 13% for those with stage 3, and 43% for those with stage 4 [18].

There is no clear consensus on the treatment of diverticulitis of the cecum, and various methods have been applied, ranging from conservative medical treatment to surgical intervention such as right hemicolectomy [15,16]. In one study





**Fig. 4 – Coronal CT image demonstrating the appendix is of normal caliber (arrow).**

of 226 patients with RCD, it was found that most of the cases of RCD were minor in severity, and as such, it was deemed that conservative management would be more successful in most patients [15]. The study also noted that under 10% of patients treated conservatively had recurrent flare-ups or required surgery over a 5-year period following initial conservative treatment; however, it was stressed that the need for surgical intervention should be based on the treating surgeon's judgment and clinical evaluation [15]. Other factors contribut-

ing to the choice of treatment, operative versus nonoperative, include the extent of inflammation and complications that are better delineated on imaging. Many patients with small pericolic abscesses (4 cm or less in diameter) (Hinchey stage 1) can be treated conservatively with bowel rest and broad-spectrum antibiotics [19]. For patients with peridiverticular abscesses that are larger than 4 cm in diameter [19,20] (Hinchey stage 2), studies demonstrate that CT-guided percutaneous drainage can be beneficial. The indications for emergency operative

treatment include features of Hinchey stage 3 and 4 disease [19,20]. Colonoscopy is usually performed after the inflammatory symptoms have completely resolved to exclude underlying colonic malignancy that can present similar imaging characteristics on CT.

Therefore, based on the clinical presentation and imaging findings, the best choice of treatment can be made. The clinical and imaging features of the reported case are consistent with Hinchey stage 1. Thus, conservative approach with bowel rest and intravenous broad-spectrum antibiotics was determined to be appropriate and resulted in successful resolution of symptoms.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi: [10.1016/j.radcr.2018.08.030](https://doi.org/10.1016/j.radcr.2018.08.030).

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