



Acute Right-sided Colonic Diverticulitis is an Unusual Cause of Right Lower Quadrant Pain: A Retrospective Single-center Cohort Study

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Abstract

Introduction: Acute right lower quadrant pain is a common symptom in emergency departments. The most common etiology is acute appendicitis, while other causes may be overlooked. Acute right-sided colonic diverticulitis is one of them. It is usually seen in young male patients. Ultrasonography (USG) and computed tomography (CT) are used for radiologic diagnosis. The aim of this study was to investigate the diagnosis, treatment, and surgical management of right-sided colonic diverticulitis.

Methods: Patients hospitalized in our clinic between 2018 and 2022 with a diagnosis of right-sided colonic diverticulitis were retrospectively analyzed. Age, gender, WSES grade, surgical status, laboratory values, intravenous antibiotic therapies, length of hospitalization, and mortality were evaluated.

Results: Between 2018 and 2022, a total of 20 patients were followed with acute right-sided colonic diverticulitis. Twelve patients were diagnosed by imaging and clinical examination, while 4 patients (20%) were operated on with a prediagnosis of acute appendicitis, and right-sided colonic diverticulitis was detected perioperatively. All patients diagnosed with acute right-sided colonic diverticulitis in the emergency department and hospitalized were managed conservatively and did not require surgery.

Discussion and Conclusion: In the differential diagnosis of right-sided colonic diverticulitis and acute appendicitis, physical examination and laboratory values are insufficient. Radiologic imaging, especially USG and CT, is essential. Following diagnosis, right-sided colonic diverticulitis can be effectively managed with conservative treatment. In our study, all patients with a radiologic diagnosis were followed conservatively and did not require percutaneous drainage or surgery.

Keywords: Acute; conservative treatment; right lower quadrant pain; right-sided diverticulitis.

Acute diverticulitis (AD) affects approximately 50% of the population over the age of 60 in Western societies [1]. In Asian societies, however, this rate has been increasing in

recent years, with the incidence rising to around 0.5% [2]. The prognosis of acute diverticulitis varies, with uncomplicated diverticulitis being the most frequently observed form [3].

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Complicated diverticulitis, on the other hand, can present with an abscess, obstruction, or perforation [4]. In Western societies, left-sided diverticulitis is more common, whereas in Asian societies, right-sided diverticulitis is more frequently observed [5,6]. Ultrasonography (USG) is highly sensitive in the diagnosis of uncomplicated diverticulitis [7]. Computed tomography (CT) has become the gold standard imaging method for the diagnosis of diverticulitis and assessment of its severity, offering high sensitivity and specificity [8]. In uncomplicated acute diverticulitis, outpatient treatment is more common [9].

Intravenous (IV) hydration, along with oral or IV antibiotherapy, is considered part of inpatient treatment for diverticulitis [10]. As our understanding of the disease improves, the need for imaging techniques to differentiate uncomplicated acute diverticulitis from the presence of diverticula has become increasingly important [11]. The World Society of Emergency Surgery (WSES) recommends intravenous (IV) antibiotics up to grade 2a, and percutaneous drainage is suggested if an abscess larger than 4 cm is present and the procedure is feasible. For WSES grade 2b and higher grades, source control with surgery is advised [12]. In a study in the literature, the surgical procedures described included appendectomy with diverticulectomy, ileocecal resection, right hemicolectomy, and prophylactic appendectomy [13].

Right lower quadrant pain is an important cause of emergency admission that requires experience and extreme caution in management, as it can lead to increased morbidity when rare conditions are missed. The most common cause of right lower quadrant pain is acute appendicitis (AA) [14]. Other causes include gynecologic diseases, urinary system pathologies, terminal ileitis, inflammatory bowel disease, typhlitis, isolated cecal ischemia, and right colon diverticulitis [15].

Diverticulitis is the active inflammation of diverticula, and diverticula are herniations of the colonic mucosa and submucosa through defects in the circular muscle layers within the colonic wall. In Western countries, diverticula are more common in the sigmoid and descending colon, whereas right colonic diverticula and right colonic diverticulitis are more common in Asian populations [16]. In Western countries, right-sided diverticulosis affects approximately 5% of the population and accounts for 1.5% of patients presenting with diverticulitis. Disease prevalence is significantly higher in Asian countries, where right-sided diverticulosis accounts for 20% of patients with diverticular disease and 75% of cases of diverticulitis.

Right colonic diverticulitis is usually single and represents a true diverticulum [17]. It is a rare diagnosis in Western countries [18]. For this reason, it may be confused with more common conditions such as acute appendicitis, which requires emergency surgery. Typically, it presents with right lower quadrant abdominal pain, tenderness, nausea, and vomiting.

Right colonic diverticulitis is mostly seen in young and male patients [1]. It has been reported that hospitalization, restriction of oral intake, intravenous fluids, and antibiotic treatment may be sufficient for the conservative management of uncomplicated right colonic diverticulitis [19]. In the diagnosis of acute right colonic diverticulitis, ultrasonography (USG) and computed tomography (CT) are useful radiologic examinations [20]. One study reported high accuracy and specificity for US performed by an experienced radiologist, but this finding was not supported by other studies [21]. Although CT offers high specificity and sensitivity, it can be confused with other diseases in some cases [1].

There are several classification systems for diverticulitis severity grading, most of which are for left colonic diverticulitis. The grading system we used was the WSES classification, introduced in 2015, for left colonic diverticulitis. There is no specific classification system for acute right colonic diverticulitis (ARCD). The WSES classification is a simple system based on CT findings, dividing acute diverticulitis into two groups: uncomplicated (Stage 0) and complicated (Stage 1–4) (Table 1) [22].

In recent years, there has been a rise in studies on the differential diagnosis of right colonic diverticulitis. However, the presence of appendiceal pathologies and the lack of studies by radiologists focusing on differentiating ARCD from acute appendicitis (AA) continue to challenge surgeons in managing this condition.

In our study, we aimed to analyze the management of ARCD in our clinic in light of the literature. The management of ARCD is less extensively covered compared to left-sided diverticulitis, which has been more widely studied and understood. Since the guidelines for colonic diverticulitis are usually based on left colonic diverticulosis, it remains unclear whether the recommendations for left-sided diverticulitis are applicable to right-sided diverticulitis. We aimed to share our experience with the diagnosis, treatment, and management of this disease.

Materials and Methods

Study approval was obtained from the local ethics committee with registration number 2023/126. Our study was registered and approved as Clinical Trials number NCT06153030. The study was conducted in accordance with the Declaration of Helsinki. Patients with right colonic diverticulitis who were followed up in our clinic were screened using our hospital's health information system. There is no specific 10th revision of the International Classification of Diseases (ICD-10) code for ARCD. The K57 code represents diverticular disease of the intestine.

We reviewed 121 patients diagnosed with ICD-10 code K57 and its subgroups between 2018 and 2022. Patients over 18 years of age who were diagnosed with ARCD radiologically, pathologically, or intraoperatively were included in the study. Patients under 18 years of age and those whose diagnosis could not be confirmed were excluded. A total of 20 of these 121 patients were diagnosed with ARCD and were eligible for our study. Among them, 19 patients had CT at the time of initial diagnosis, while 1 patient had only USG.

Age, gender, World Society of Emergency Surgery (WSES) grade, surgical status, laboratory values, intravenous antibiotherapies administered, length of hospitalization, and mortality were analyzed.

Statistical Analysis

SPSS version 28.0 was used for the analysis. Mean, standard deviation, median, minimum, maximum, frequency, and ratio values were used in the descriptive statistics of the data.

Table 1. WSES Driven Classification of Diverticulitis^[22]

Stage	Description
Uncomplicated diverticulitis	
Stage 0	Diverticula, thickening of the colonic wall or increased density of the pericolic fat
Complicated diverticulitis	
Stage 1	Pericolic air bubbles or little pericolic fluid without abscess (within 5 cm from inflamed bowel segment)
Stage 2	Abscess ≤ 4 cm
Stage 3	Abscess > 4 cm
Stage 4	Distant air (>5 cm from inflamed bowel segment)

Table 2. Demographic and clinic characteristics of the groups

	Min-Max	Mean (SD)	n (%)
Age	19.0-65.0	40.1 (12.9)	
Length of Stay	1.00-14.00	4.9 (2.9)	
Sex			
Male			8 (40)
Female			12 (60)
WSES CD classification			
Uncomplicated			17 (85)
Complicated			3(15)
Ia			1 (5)
Ib			1 (5)
IIa			1 (5)
Antibiotherapy			
Ciprofloxacin+ Metronidazole			5 (25.0)
Ceftriaxon + metronidazole			15 (75.0)
Surgical Intervention			4 (20.0)
Relapse			0 (0.0)
Mortality			0 (0.0)

WSES: World Society of Emergency Surgery, CD: Complicated Diverticulitis, Min: Minimum, Max: Maximum, SD: Standard Deviation.

Table 3. Laboratory Results

	Min – Max	Median	Mean (SD)
CRP(mg/L)	0.20–213	13.9	45.3 (62.8)
WBC (/μl)	7110–17520	13990	12906 (3061)
Neutrophil(/μl)	4110–12950	10925	9797(2620)
Eosinophil (/μl)	0–370	145	156.5 (120)
Lymphocyte/μl)	810–3170	2330	2110.5 (722.3)
Monocyte(/μl)	350–1930	795	849.5 (340.7)
Platelet(/μl) (x10 ³)	138–390	254.5	258.8 (53.3)

WBC: White Blood Cell, MIN: Minimum, MAX: Maximum, SD: Standard Deviation, mg/L: miligram/litre, μl: microlitre.

Results

Among the patients diagnosed with ARCD, 8 were female (40%) (Table 2). The mean age of the participants was 40.1 years. The mean CRP level among the patients was 45.3 mg/L, and the mean WBC count was 12,906/μL (Table 3). The initial radiological examination included CT for 19 patients, while 1 patient had USG only, and this patient was among those diagnosed perioperatively.

Seventeen patients had noncomplicated diverticulitis. The WSES classification included 3 patients in the Grade 1A–1B and 2A categories, with one patient in each category. For treatment, 5 patients received ciprofloxacin

and metronidazole, while 15 patients were treated with ceftriaxone and metronidazole. The average length of hospital stay was 4.9 days (Table 2). Thirteen patients were diagnosed with CT; 10 of these patients were given intravenous (IV) contrast only, while 3 of them were given oral and IV contrast. Four patients initially diagnosed with acute appendicitis were found to have ARCD during surgery. Thirteen patients were managed conservatively and discharged without complications.

Colonoscopy was performed on 9 patients starting 6 weeks after discharge according to American Gastrointestinal Association (AGA) guidelines, with no malignancies detected. Right hemicolectomy was performed on 1 patient, and the pathology result was reported as complicated diverticulitis. Other patients were followed for a median of 26 months (range, 5–70 months), and no recurrence was observed during this period.

The recurrence status of the patients was obtained from the records in the hospital information system. Additionally, there were no deaths among the patients.

Discussion

It is very difficult to differentiate right colonic diverticulitis from acute appendicitis by physical examination and laboratory investigations. CT and USG are effective methods in differentiating acute right colonic diverticulitis from acute appendicitis and other causes of right lower quadrant pain [23]. In our study, CT was the first radiologic choice for diagnosis. Computed tomography (CT) is widely recognized as the preferred imaging method for diagnosing colonic diverticulitis. However, ultrasonography (US) is a more cost-effective option and does not involve radiation, which is especially significant given that patients with right-sided diverticulitis are generally younger and more vulnerable to radiation-induced malignancies [24].

While CT has a sensitivity of 79% to 99%, US for right-sided diverticulitis, when performed by an experienced operator, has reported 91.3% sensitivity and 99.8% specificity for correct diagnosis [25,26]. In our study, CT diagnosis of 19 patients was confirmed in retrospective analysis, while USG was performed in 1 patient.

In order to make more effective and accurate decisions in the management of ARCD, care should be taken to distinguish it from AA, which is much more common. In a retrospective study of 450 patients, 92 patients were evaluated as ARCD and 358 patients as AA, and it was reported that it was difficult to distinguish these two diseases based on clinical findings [27].

In our literature review, we could not find a prevalence study on patients who underwent surgery for AA and were diagnosed with ARCD. We believe that the prevalence of laparoscopy is a protective factor against increased morbidity and mortality in this diagnostic complexity. However, we still believe that information sharing should be encouraged in multidisciplinary meetings so that this patient group can be recognized in emergency services, just like acute left colonic diverticulitis (ALCD).

In Türkiye, CT reporting in emergency services often lacks clinical information, which is one of the obstacles preventing radiologists from focusing on the distinction between ARCD and AA. If we want to manage ARCD well, we must first eliminate the deficiencies in differential diagnosis and correctly determine the incidence of this disease. The presence of the retroperitoneal part of the right colon may be an advantage over the sigmoid colon in terms of self-limiting the disease and reducing the incidence of peritonitis [28].

The lifetime risk of diverticulitis in a patient with diverticulosis is between 10–25% [14]. Therefore, right colonic diverticulitis should be considered in right lower quadrant pain, especially in patients with known diverticulosis. One study reported that the pain duration of right colonic diverticulitis was longer than that of acute appendicitis [27]. Right colonic diverticulitis is a disease in which conservative treatment is effective [17,19,29]. In our study, all patients who could be diagnosed radiologically were treated conservatively. Although some cases of right colonic diverticulitis are congenital, there are increasing medical opinions that some are acquired [14].

Diverticulitis of the cecum is usually single and located on the anterior Wall [30]. In a meta-analysis investigating risk factors for recurrence in diverticulitis, no risk factors were reported [31]. However, multiple diverticula and intraperitoneal diverticulitis were reported as risk factors for recurrence in one study [32,33]. In another study, smoking and prolonged hospitalization were reported as risk factors for recurrence [34]. Kim et al. [35] reported a high rate of recurrence of right colonic diverticulitis in patients over the age of 40. Since right colonic diverticulitis is usually single, recurrence rates are low. In a meta-analysis, the recurrence rate was reported to range from 0% to 26.9% [31]. Another study reported that the recurrence rate of right-sided diverticulitis after conservative treatment was approximately 3% to 15% [36].

Colonoscopy was recommended after an attack in a study that found a 0.3% probability of cancer following

colonoscopy performed in patients with uncomplicated right colonic diverticulitis [37]. In our study, colonoscopy was performed in 9 patients during follow-up, and no malignancy was found.

We think that prospective multicenter studies with long follow-up periods and evaluating all causes of right lower quadrant pain will provide a better understanding of right colonic diverticulitis and may help create a more effective management algorithm. To summarize the results we have drawn from our literature review, although treatment strategies have been determined for uncomplicated ARCD, patient-based evaluations regarding antibiotic therapy and IV hydration would be useful. There is not enough literature on the use of percutaneous treatments in the management of complicated ARCD. We believe that the literature on this subject will expand with the widespread use of CT in the differential diagnosis of right lower quadrant pain.

The first main issue we want to emphasize in complicated ARCD surgery is that CT should definitely be evaluated together with the radiologist working in the clinic, and an aggressive decision for surgery should not be made. If possible, we think that performing a colonoscopy before surgery will prevent poor oncological outcomes that may arise from incorrect diagnoses. Additionally, if surgery is to be performed, initiating the procedure laparoscopically, if feasible, will contribute to determining the right strategy.

Study Limitations

The most important limitations of our study are that it was designed as a retrospective, single-center study and included a small number of patients. Another limitation is that colonoscopy was not performed on all patients. This restriction limited our data in determining the presence of diverticula in other colonic segments in patients who did not undergo colonoscopy.

In a prospectively designed study, the inclusion of emergency physicians and radiologists will allow for a more accurate estimate of the ARCD rate in emergency department presentations and will help determine whether outpatient cases present with more complicated features. In addition, evaluating patients together with the surgeon and radiologist before deciding on surgery will contribute to understanding the effectiveness of conservative treatment and guide future research on how to better manage this patient group. Furthermore, initiating surgery laparoscopically in patients initially planned for appendectomy may help prevent morbidity in overlooked cases despite clinical and radiologic efforts.

Conclusions

Right colonic diverticulitis is an important cause of right lower quadrant pain that should be managed in general surgery clinics when recognized, and conservative treatment should be attempted. However, morbidities may occur when the diagnosis is delayed or missed. Therefore, in this article, we aimed to emphasize that right colonic diverticulitis should be considered in the differential diagnosis of right lower quadrant pain. Patient history and radiologic imaging are essential for accurate diagnosis. Especially in cases where ultrasonography cannot distinguish the condition from acute appendicitis, cross-sectional imaging should be performed, and the patient should be evaluated for right colonic diverticulitis before surgical intervention.

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