

Will right versus left acute colonic diverticulitis location affect the likelihood of emergent operation?

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Abstract

Purpose

Modified Hinchey classification with computed tomography (CT) provides a good predictive factor for medical failure. By using CT, the location of diverticulitis is proved as an important factor for medical treatment and right-sided diverticulitis is successfully treated medically more. However, will more accurate location for diverticulitis affect treatment is not evaluated.

Methods

Patients who were diagnosed with acute colonic diverticulitis by abdominopelvic CT were retrospectively recorded and analyzed. Patient demographics and clinical features were obtained from patients' records. Abdominopelvic CT findings were categorized using the location in the colon, distribution of free air in the bowel lumen, fluid accumulation, and type of extra-luminal free air.

RESULTS

Patients with right-sided diverticulitis were more likely to be younger and elevation of C-reactive protein (CRP) in patients with left-sided diverticulitis without significantly different. Only 6.3% of patients received surgical treatment and left-sided diverticulitis is more suitable for operation ($P = 0.02$). Most patients with local free air underwent successful medical treatment. The distribution of diverticulitis is different between right- and left-sided diverticulitis and lateral distribution included more cases of surgery.

CONCLUSIONS

Although there was no statistical difference between location and emergent operation, we observed that location in the lateral region was an indicator for emergent operation. Right- and left-sided diverticulitis manifest in different locations, which maybe one of the causes of medical treatment failure. As fewer emergent operations have been performed in recent years, we suggest conducting additional studies with larger cohorts to confirm the relationship between location and surgery.

Introduction

Diverticular disease of the colon is a common disease causing acute abdominal pain in the emergency room (ER). In prior literature, the prevalence of diverticular disease was reported to increase with age, and was observed in more than 50% of individuals aged > 80 years. Among individuals with diverticulosis, around 4–15% will experience a diverticulitis episode(1). Most cases of colonic diverticulitis are successfully treated conservatively with antibiotics. Surgical treatment for diverticulitis has been rare in recent years, and most cases involve severe sepsis, uncontrolled complications, and repeat

episodes. Traditionally, the Hinchey classification is used to determine disease severity as a guideline for surgery(2).

Recently, computed tomography (CT) is increasingly used in the ER in patients with abdominal pain, and the diagnosis of acute diverticulitis has become more accurate and timely. These advancements give clinicians more options regarding noncomplicated colon diverticulitis; thus, CT guided classification was proposed and analyzed (3). According to this study, only diffuse free air is indicated for colon resection with or without stomy. In cases with local free air and local fluid accumulation noted by CT, IV antibiotic treatment, lavages, or drainage may be able to treat the diverticular episode. The location of diverticulitis is also an important factor regarding medical treatment (4).

Previous research demonstrated that right-sided diverticulitis is successfully treated medically more often than left-sided diverticulitis. Several differences have been described to suggest why fewer surgical treatments are performed for right-sided diverticulitis(5). In this study, we aimed to determine whether the position of diverticula would affect the outcome of medical treatment or risk for operation.

Methods

Patients who were diagnosed with acute colonic diverticulitis by abdominal/pelvic CT at Taipei Tzu-Chi Hospital in 2019 were retrospectively recorded and analyzed. Our study was approved by our institution's Ethical Committee. Patient demographics and clinical features, including age, sex, length of hospital stay, CT findings, inflammation location, and laboratory data were obtained from patients' records.

Abdominal/pelvic CT findings were categorized using the location in the colon, distribution of free air in the bowel lumen, fluid accumulation, and type of extra-luminal free air. Patients with no radiographical evidence of acute diverticulitis, such as diverticulosis with bleeding, were excluded from the study. Diverticula with inflammation were classified into three groups according to location: medial, medial to lateral, and lateral. Free air was classified by local or extensive distribution. Fluid accumulation was classified by local accumulation or distribution across the abdomen.

Data were compared using the Chi-squared and Fisher's exact tests; continuous variables were compared using the Student's t-test with SPSS software (SPSS Inc., Chicago, IL, USA). Results with P-values < 0.05 were considered statistically significant. For continuous data with more than three factors, ANOVA was used.

Results

During the study period, 79 patients (34 males [43.1%] and 45 females [56.9%]), were diagnosed with diverticulitis, including 57 patients (72.2%) with right-sided and 22 (27.8%) with left-sided colonic diverticulitis. Among patients with right-sided diverticulitis, 29 cases occurred at the ascending colon or cecum, and five cases occurred at the proximal transverse colon. Among patients with left-sided diverticulitis, 10 cases occurred at the descending colon, and others were at the sigmoid colon or

rectosigmoid junction. Patients with right-sided diverticulitis were more likely to be younger; however, this was not significantly different (right: 49.95 ± 16.435 years, left: 58.59 ± 22.826 years; $P = 0.115$). Other variables are also shown in Table 1. While we observed an elevation of C-reactive protein (CRP) in patients with left-sided diverticulitis, this was still not significantly different. Differences between emergent surgery and medical treatment are compared in Table 2.

We encountered few cases of emergent surgery for acute diverticulitis during our study period (Table 3). Only 6.3% of patients received surgical treatment; however, left-sided diverticulitis is more suitable for operation ($P = 0.02$). Statistical analysis also showed that extensive free air distribution was more common in left-sided diverticulitis, while diverticulitis with no free air was more common in right-sided diverticulitis. Most patients with local free air underwent successful medical treatment, and not all patients with extensive free air required surgery (Table 4).

We divided the inflamed or perforated diverticulitis region into three categories using CT. Location 1 was medial to the 12 o'clock region, location 2 was the lateral region of the colon, and location 3 was in the mesocolon region (Figs. 1A, 1B). We found that the distribution differed between right- and left-sided diverticulitis. On the left side, location 2 (lateral region) was predominant, while on the right, location 3 (mesocolon region) was common (Table 5). After analyzing data regarding surgery and location, we found that lateral distribution included more cases of surgery, and no patients with diverticulitis in location 3 underwent operation; still, this was not significant (Table 6, $P = 0.236$). The relationship between location and laboratory data were reassessed, and no difference was found (Table 7); however, the mean CRP was highest at location 3, with no surgical cases.

Discussion

The Hinchey classification was proposed in 1978 based on clinical and surgical findings, and has since been used as an important determinant of risk factors for clinical decision-making (6, 7). Several studies report that either medical treatment, drainage, or colectomy are required based on classification. For class 2, medical treatment is still considered a major approach, and surgery is regarded as a salvage strategy (8). Hinchey class 3 and 4 are considered to indicate surgical treatment (2), with Hartman's operation or colectomy with primary resection both representing common choices (9). Still, emergent surgery for diverticulitis is riskier, and Hartmann's operation for this condition has a lower likelihood of closure ostomy (10).

Since CT is widely used as a noninvasive diagnostic tool in the ER (11), diagnosis of acute diverticulitis has become more accurate and safe. In particular, when patients exhibit signs of infection, CT can provide more data regarding the intra-abdominal condition, including the presence of abscesses or free air (12). Modified Hinchey classifications were introduced in 1997 by Sher et al. (7), and 1999 by Wasvary et al. (13); both were modified according to clinical findings. According to the literature, the severity of diverticulitis determined via CT is a good predictive factor for medical failure (14), especially when abscesses, extraluminal free air, or contrast were observed. A study in 2005 listed a more detailed classification using

CT, which was used as decision making tool; only 22% of patients with abscesses required urgent surgery (15).

The WSES guidelines have been suggested since 2016 with increasing evidence for emergent treatment using CT findings (16). The guidelines indicate medical treatment for pericolic air or small fluid collection, and distant air without diffuse fluid accumulation can also be treated medically initially. These guidelines were revised in 2020 to guide right-sided diverticulitis treatment (17). The principles of diagnosis and treatment for both sides are the same; however, stool type is different in the right and left colon. Diverticulitis pattern is also different between sides, including formation, etiology (18–20).

Our data mimics that of previous literature within the Asian population where the right side is predominant (Table 1); additionally, we observed that white blood count (WBC) was not a good index (Table 2). Although our CRP data was not statistically different between right- and left-sided diverticulitis, the difference in mean value was still obvious (6 vs. 9); still, CRP was significantly higher in patients who underwent surgery. Our data showed that the likelihood of surgery was higher in patients with left-sided diverticulitis (Table 3). Previous research also demonstrates more emergent operations are performed for complicated left-sided diverticulitis; however, no reasons were reported (21).

Not all patients with free air require operation (Table 4), especially when air is limiting in the pericolic region. Most cases of colon diverticulitis appear within limited locations (22), and the relationship between the colon and surrounding organs is not symmetrical. There are also differences in the proportion of mesocolon coverage to colon lumen, as well as stool type, which may have produced these results. Thus, we doubt that major inflammation of the lumen will affect patients' appearance and treatment.

In our study, we classified the major inflammation sites using CT scan in the ER. Location 1 included the medial side to anterior region, as this portion generally has no fixed organs or tissue to help the external-adhesion process. The small intestine and omentum are commonly known to randomly attach to perforation or severe inflammation. Location 2 included the lateral side of body, which is easily sealed by the abdominal wall or retroperitoneal region. In this region, inflammation does not spread easily; however, abscess formation along the abdominal muscle may occasionally occur. Drainage in this area is less risky for the small intestine, and multiple drainage may also be performed. Location 3 was defined as the region near the mesocolon. The tenia mesocolica and mesocolon promote muscular support and resistance against minor inflammation, and this region can be observed via CT (23).

In our data analyses, we observed more cases with right-sided diverticulitis in locations 1 and 3; conversely, location 3 in left-sided diverticulitis was rare (Table 5). Thus, we evaluated the location and likelihood of emergent operation (Table 6). Although there was no significant difference between location and surgery, we still found that no surgeries were performed for location 3, and few surgeries were performed in location 1. Additionally, emergent surgery was found to be riskier for diverticulitis on the lateral side of the lumen. We consider that these results may be limited by the limited number of surgery cases, and additional research with a larger cohort is required to understand whether abdominal wall adhesion is a good or poor prognostic factor for medical success. We further analyzed our data regarding location,

age, and inflammatory condition. Our data demonstrated no significant differences regarding region, age, WBC, or CRP (Table 7); however, we found that the mean CRP was minor for location 1.

Conclusion

Although there was no statistical difference between location and emergent operation, we observed that inflammation in the lateral region was an indicator for emergent operation. Right- and left-sided diverticulitis manifest in different locations, which may be one of the causes of medical treatment failure. As fewer emergent operations have been performed in recent years, we suggest conducting additional studies with larger cohorts to confirm the relationship between location and surgery.

Declarations

Author Contributions:

T.-J.L. executed the study and drafted the manuscript. P.-C.L., C.-W.C., and K.-H.H. assisted the data collection and the analyses. K.-H.H. modified the manuscript. All authors have read and agreed to the published version of the manuscript.

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Tables

Tables 1 to 7 are available in the Supplementary Files section.

Figures

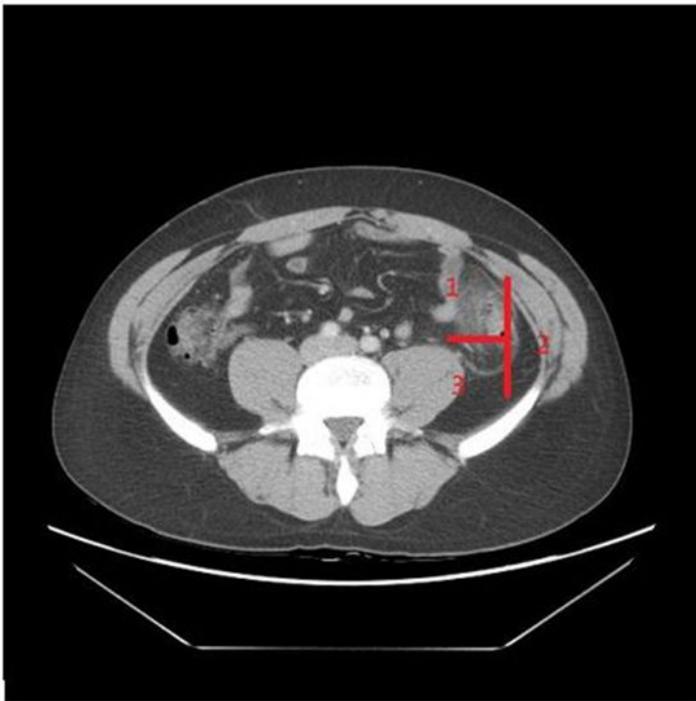


Figure 1

Right- (A) and left-sided (B) locations

Supplementary Files

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