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Original Article

Operative and conservative treatment of right colon diverticulitis

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Abstract

Aim: This study assessed the results of conservative and surgical treatment of right colon diverticulitis. Right colon diverticula contain all layers of the colon and are called true diverticula. Perforation of these diverticula is observed less frequently due to their full thickness.

Materials and Methods: 150 patients treated for colonic diverticulitis between 2015-2020 were retrospectively screened. Following exclusions, a total of 26 patients data were assessed. The patients were divided into two groups as conservative or surgical treatment. The outcomes for these two groups were compared and analyzed.

Results: Most patients in the sample were female (n=18, 69%). The average age was 47 (22-83). Data from the conservative treatment group (n=17, 65%) and the surgical treatment group (n=9, 35%) were examined. Comorbidity, recurrence, and white blood cell count were all greater following conservative treatment (p> 0.05). In the surgical group, two (22% of the group) patients developed wound infections. Patients with fever at admission were in the surgical group (p <0.01). All patients in the conservative group had a Hinchey classification of 1a, while those in the surgical group were Hinchey 1a, 1b, and 3 (p <0.05). The median hospital stay was higher for the surgical group (p <0.05). No mortality was observed.

Conclusion: Right colon diverticulitis has low complications and it can be treated conservatively. The differential diagnosis of right-sided colonic diverticulitis should be kept in mind when relevant symptoms present to prevent unnecessary surgeries. Surgical treatment is inevitable in instances of recurrent diverticulitis, generalized peritonitis, and suspected malignancy.

Keywords: Diverticulum; diverticula; surgery; appendicitis sigmoid volvulus; caecum

INTRODUCTION

Genetic and geographical factors play an important role in the formation of colon diverticulum (1). Even the structure of the diverticulum varies according to its location in the colon. Diverticula located in the right colon are true diverticula and contain all layers of the colon, while those located in the left colon are pseudo-diverticula and contain only the mucosal and submucosal layers (2). Although right colon diverticula are less common, 7-30% of patients with diverticulosis of the left colon also have diverticula in the right colon (3).

The reasons for colonic diverticulitis in Western societies are advanced age and the nature of Western diets (4). However, the increasing popularity of Western foods among Eastern populations has led to an increased incidence of left colon diverticulosis also increases in Eastern countries (5). However, the incidence of right colon diverticulosis differs significantly between Eastern and Western societies. In Western countries, the incidence is 6-14%, while in Asia, it is 55% (6, 7). Right colon diverticula are primarily found in middle-aged patients, while left colon diverticula are seen most often in somewhat older populations; although the mean ages for both differ between clinical series. While the average age for right colon diverticulosis is 41 to 55 years, the average age for left colon diverticulosis is 53 to 65 years (8, 9).

The most common symptom of right colon diverticula is diverticulitis (10). Many different clinical conditions with intra-abdominal mass and abscess should be considered in the differential diagnosis (11). Correct diagnosis is very important because clinical symptoms of acute right lower quadrant pain can lead to unnecessary operations for suspected appendicitis (12). Unlike patients with acute

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appendicitis, patients with right colon diverticula can be treated conservatively where there are no complications such as abscess formation or free perforation (13). Here, we discuss the medical and surgical treatment results of patients treated for right colon diverticulitis in our clinic, with reference to the literature.

MATERIALS and METHODS

This retrospective study was conducted at the General Surgery Clinic of Tepecik Training and Research Hospital in Turkey in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study protocol was approved by our institutional Ethics Committee (no. 2020/ 14-6) and registered in an international database (ClinicalTrials.gov NCT04746326). Patients treated at our clinic for colonic diverticulitis between January 2015 and January 2020 were retrospectively screened. The data of 150 patients in total were accessed. Patients diagnosed with right colon diverticulitis who were followed up after either surgical or conservative treatment were included in the study. Patients with left colon diverticulitis, those with missing data, and those whose right colon diverticulitis was detected incidentally were excluded from the study. This left a total of 26 patients for inclusion in this study. Computed tomography was utilized with all patients and modified Hinchey scoring was performed (14). Conservative treatment was planned for diverticulitis with Modified Hinchey classification 1 and 2. Surgical treatment was planned for Modified Hinchey classification 3 and 4. The patients were divided into two groups according to whether they received conservative or surgical treatment. Data on patients' gender, age, modified Hinchey score, treatment mode, length of hospital stay, morbidity, mortality, comorbidities, laboratory findings, and operation method (in the surgical group), were analyzed. The information was compared between the two groups and the results were recorded. In both groups, gender, recurrence, comorbidity, fever, length of hospital stay, mortality, and wound infection were compared. Statistical analyses were performed using SPSS v.22.0 (IBM, Armonk, NY, USA). Quantitative variables were expressed as means, standard deviations, medians, and ranges. Qualitative variables were reported as numbers and percentages (%). Means and standard deviations were used for homogeneous distributions, while medians and ranges were used for heterogeneous distributions. Fisher's Statistical analyses were performed to compare qualitative variables. The Mann-Whitney-U test was used for heterogeneous distributions and the Student's t-test for homogeneous distributions. A p-value below 0.05 was considered statistically significant.

RESULTS

Most of the patients were female (n=18, 69%). The average age was 47 (range = 22-83). Seven (27%) patients in the sample had at least one comorbid disease. The comorbid conditions were hypertension (n=5), diabetes mellitus (n=4), hypertension, coronary artery disease (n=3), chronic renal failure (n=2). One patient presented due to recurrence. This patient was a 34-year-old male scheduled for elective surgery after medical treatment. The laboratory findings of the patients showed a median white blood cell count of 12100 10^3/ uL (6800-19000). Four (15%) patients had a fever on admission. Computed tomography findings gave a modified Hinchey classification of 1a for 20 patients, 1b for three patients, and 3 for three patients in the sample. However, 6 patients with Hinchey 1a and 1b were taken into operation because acute appendicitis could not be ruled out. The remaining 3 patients were Hinchey 3. Surgical procedures included right hemicolectomy (n=4), wedge resection of the cecum (n=1), diverticulectomy plus appendectomy (n=1), diverticulectomy (n=2), and appendectomy plus drainage (n=1). Wound infection was seen in only two (8% of the total sample) patients. The median hospital stay for all patients was five days (range = 3-9 days). Mortality was not observed in any patient (Table 1).

Table 1. Clinical and demographics findings of patients

Demographics features	Number (n: 26) (%, range)
Age	47 (22-83)
Gender	
Male	8 (30,8%)
Female	18 (69,2%)
Comorbidity	7 (26,9%)
Hypertension	5
Diabetes mellitus	4
Coronary artery disease	3
Chronic kidney failure	2
Recurence	1 (3.8%)
Clinical features	
White blood cell (10^3/uL)	12100 (6800-19000)
Fever presentation	4 (15.4%)
Modified Hinchey classification	
1a	20 (76,9%)
1b	3 (11.5%)
3	3 (11.5%)
Treatment	
Operative	9 (34.6%)
Conservative	17 (65.4%)
Operative procedure	9 (34.6%)
Right hemicolectomy	4 (44.4%)
Wedge resection of cecum	1 (11.1%)
Diverticulectomy + appendectomy	1 (11.1%)
Diverticulectomy	2 (22.2%)
Appendectomy + drainage	1 (11.1 %)
Wound infection*	2 (7.7%)
Hospital duration (day)	5 (3-9)
Mortality	0

* Two patients with wound infection had diabetes mellitus, and both of these patients underwent right hemicolectomy

There were 17 (65%) patients in the conservative

treatment group and 9 (35%) in the surgical treatment group. The number of female patients was higher in both groups, but not significantly so (p> 0.05). The incidences of comorbidity and recurrence and the white blood cell counts were higher in the conservative group but none were significantly higher (p> 0.05). Two (22%) surgical patients developed wound infections. The four patients with fever on admission were all from the surgical group and there was a significant difference in the incidence of fever between groups (p <0.01). All patients in the conservative group had a modified Hinchey classification of 1a. In the surgical group, three (33.3%) patients were modified Hinchey 1a, three (33.3%) were modified Hinchey 1b, and three (33.3%) were modified Hinchey 3 (p <0.05). The median duration of hospital stay was significantly higher in the surgical group (p <0.05) (Table 2).

Table 2. Comparative of operative and conservative treatment

Clinico-demographics findings	Konservative (n: 17) (%, range)	Konservative (n: 17) (%, range)	Operative (n: 9) (%, range)	p-value
Male	6 (35,3%)	6 (35,3%)	2 (22,2%)	0.66
Female	11 (64,7%)	11 (64,7%)	7 (77,8%)	
Comorbidity	6 (35,3 %)	6 (35,3 %)	1 (11,1%)	0,35
Recurence	1 (5,9%)	1 (5,9%)	0	1,00
White blood cell (10^3/uL)	12300 (6800-18300)	12300 (6800-18300)	11800 (6900-19000)	0,91
Fever presentation	0	0	4 (44,4%)	0.008
Wound infection	0	0	2 (22,2%)	-
Modified Hinchey classification 1a	17 (100%)	17 (100%)	3 (33,3%)	0.0004
Modified Hinchey classification 1b	none	none	3 (33,3%)	0.03
Modified Hinchey classification 3	none	none	3 (33,3%)	0.03
Hospital duration (day)	4 (3-8)	4 (3-8)	6 (4-9)	0.04

DISCUSSION

The incidence of diverticulosis is higher in Western societies than in the East. It is most often found in the left colon in the West and the right colon in Eastern societies (15, 16). Individuals with diverticula show an increased lifetime risk of diverticulitis attack. Rates of diverticulitis among these patients are between 10 and 25% (17). Solitary cecal diverticulitis is seen in younger patients, with a male/female ratio of 3/2 (18). Unlike the left, Comorbidity is seen less often with right colon diverticulitis than left but there is wide variation in the rates reported, with research showing a range of 4-40% (19, 20). In our study, the median age of patients was 47 (22-83). Contrary to the literature, the majority of our patients were female. Seven (27%) patients had at least one comorbid disease, with more in the conservative group (p> 0.05). The most common comorbid condition was hypertension.

As in many diseases that may lead to acute appendicitis and acute abdominal pain, complicated cases of right colonic diverticulitis can include symptoms of fever, right lower quadrant pain, and sepsis (21). The examination findings for right colonic diverticulitis may also be similar to those for acute appendicitis. For this reason, it is important to request computed tomography (CT) and ultrasonography in cases symptomatic of appendicitis and to ensure examination and evaluation is performed by experienced physicians. In right colon diverticulitis, focal or diffuse thickening with mesenteric fat can be observed on CT scans around the right colon or cecal wall (13). One study found one case of right colon diverticulitis in every 15 patients with sigmoid diverticulitis and one in every 30 patients with appendicitis. Ultrasonography (USG) combined with CT can prevent unnecessary surgery (22). Previous research found that the symptoms of 40% of patients undergoing right hemicolectomy for possible tumor formation were found to result from inflammatory conditions during surgery (23). While all patients in our study had abdominal pain, fever was present in only four. These four patients were all in the surgical treatment group. Patients with elevated white blood cell counts were seen in both groups and the counts were similar between groups.

Unlike the pseudodiverticula seen in the left colon, the perforation risk for true diverticula in the right colon is low due to the inclusion of all colonic layers. The rate of patients classified as Hinchey 3 and 4 is lower in right than left colon diverticulitis (high evidence value) (1). The Hinchey 3 rate in right colon diverticulitis ranges from 0% to 14.3%, and from 0% to 34% in left colon diverticula (24, 25). Hinchey 4 rates are 0% to 0.6% in right colon diverticulitis and 0% to 31.4% in left colon diverticulitis (19, 26, 27). CT was performed on all patients in the sample and modified Hinchey classifications were obtained. Conservative treatment was given to 17 of the 20 patients whose CT scans indicated modified Hinchey classifications of 1a.

The other three patients with Hinchey classifications of 1a were in the surgical group, along with three patients classified as modified Hinchey 1b, and three as modified Hinchey 3, according to their CT scans. There were no Hinchey 4 cases in our sample.

With advances in imaging technology, it is now possible to diagnose solitary cecal diverticulitis preoperatively (28). Previous research has generated an algorithm for the management of preoperatively diagnosed cecal diverticulitis (29). According to this algorithm, cases with localized peritonitis should receive conservative treatment, appendectomy plus drainage, and diverticulectomy plus appendectomy. In cases that fail to respond to conservative treatment, percutaneous drainage is recommended. Where this is insufficient, surgery is recommended. In surgical treatment, cecum resection or right hemicolectomy is recommended in cases of generalized peritonitis, suspected tumor, or necrosis or perforation of the cecum. There is no algorithm for the management of solitary cecal diverticulitis when it is detected during surgery but research suggests that appendectomy should be performed to avoid missing the diagnosis in subsequent attacks (30). The majority of our patients received conservative treatment. Four of the nine patients who underwent surgery were given hemicolectomies due to suspected tumors.

Operating on uncomplicated right colon diverticula prevents the risk of diverticulitis recurring in the future and reduces morbidity (4). However, the recurrence rate of right colon diverticulitis is between 2-27% (24, 25). In our study, one (6%) patient who received conservative treatment had recurrent diverticulitis. An elective operation was planned for this patient following conservative treatment. Operative morbidity is higher and hospital stays are longer in cases of emergency surgery for left colon diverticulitis than for the right (5). Mortality is lower with diverticula in the right colon than the left colon. It has been observed that mortality due to diverticulitis is reported mostly in diverticulitis located in the left colon (31). The duration of hospitalization was higher for the surgical group in our sample, with a median stay of six days (range = 4-9) ($p < 0.05$). Wound infection occurred in two (22%) of the surgical patients. In accordance with the literature, no mortality was seen in our sample.

The limitations of our study included its retrospective design, the relatively small sample size, and the lack of data pertaining to long-term outcomes. However, in line with previous research, our findings suggest that conservative treatment can be successful. Where surgical treatment is necessary, our results indicate that it can be performed safely with low mortality and morbidity.

CONCLUSION

Right colon diverticulitis should be considered in the differential diagnosis of cases with abdominal pain localized in the right lower region. Conservative treatment can be used safely in appropriate cases due to low complication and morbidity rates. However, if conservative treatment is unsuccessful or there is generalized peritonitis, we believe surgical treatment is inevitable.

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Ethical approval: The study protocol was approved by our institutional Ethics Committee (no. 2020/ 14-6) and registered in an international database (ClinicalTrials.gov NCT04746326).

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