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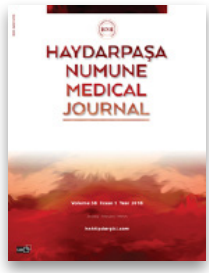

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ORIGINAL ARTICLE

Analysis of 85 Patients with Acute Diverticulitis: Retrospective Study

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Abstract

Introduction: The present study aims to evaluate the patients treated in our clinic for acute Diverticulitis and to review the treatment options.

Methods: In this study, demographic data, treatment approaches and results of cases treated for acute diverticulitis in our clinic were examined and the records of 85 patients were retrospectively analyzed.

Results: The average age was 50.49±13.22, and 51 cases were female and 34 were male. The BMI average was 29.26±5.86. There was abdominal pain in all cases and 83 presented with left lower quadrant pain, while two had right lower quadrant pain. In 55 cases, nausea and vomiting were noted, and in 39 cases, fever was present. When evaluated according to average CRP values (128.85), in patients with high CRP, the hospital's hospitalization day was significantly longer (p=0.042). Medical treatment was applied in Stage 1A and 1B, while radiological percutaneous drainage was applied to patients in stage 2 group. Surgical drainage was performed in two patients in stage 3 group, and Hartmann's procedure was performed on three patients. The case in Stage 4 was also performed on the Hartmann's procedure.

Discussion and Conclusion: In the treatment of diverticulitis, especially in the early stages, antibiotics remain the first option, while radiology-guided drainage was preferred for localized abscesses. In surgical applications, the Hartmann's procedure still an important procedure.

Keywords: Acute diverticulutis; diagnosis and treatment.

Diverticular disease, which has been rising rapidly among hospital admissions reasons in recent years, is a common condition seen in approximately 60% of the population over 65 years of age[1]. The incidence of diverticular disease increases with age, and only 10% of the patients are under the age of 50[2]. Diverticular disease is a condition that should be taken very seriously due to its consequences. Besides being one of the most common gastrointestinal diseases, it is one of the leading causes of nontraumatic colonic perforation and elective colon resections[3,4].

Gastrointestinal diverticulum is the herniation of the mucosa and submucosa, presenting with a sac outward through the muscle layers[5]. Colonic diverticular disease is defined by the presence of diverticula in the colonic mucosa[6]. Although the exact cause is unknown, factors, such as advanced age, poor fiber diet, obesity, bacterial colonization, increased intracolonic pressure, neuromuscular dysfunction, and intestinal motility changes have been reported to be effective in its etiology[7]. Acute Diverticulitis is an inflammation that occurs due to diverticulum microperforation and can be either symptomatic

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or asymptomatic[8]. Acute Diverticulitis was classified as uncomplicated and complicated. The uncomplicated disease is simple inflammation of the diverticulum. The complicated disease is characterized by abscess development, perforation, fistulization and/or obstruction[9].

Acute Diverticulitis may develop in approximately 10% of individuals with diverticular disease[10]. 85% of acute diverticulitis attacks are not complicated, and this group of patients can be easily treated with medical treatment. In patients with acute Diverticulitis, 15-30% of attacks may recur. With recurrent episodes, the risk of diverticular complication also increases[11].

Our study aims to evaluate the patients treated in our clinic for acute Diverticulitis and to review the treatment options.

Materials and Methods

Data of 85 patients hospitalized in the general surgery clinic of a tertiary training and research hospital with the diagnosis of acute Diverticulitis between January 2015 and July 2020i were retrospectively analyzed. The data of the patients were scanned by the researchers using the hospital automation system. Demographic, body mass index (BMI), symptoms, physical examination findings, laboratory and imaging findings of the patients were recorded. Table 1. Complications, length of hospital stay, and mortality data were analyzed. Ethical approval was obtained from the local Ethics Committee.

The diagnosis of patients who were admitted to the emergency department with complaints of abdominal pain, fever, and nausea-vomiting was defined by physical examination, hemogram, and computed tomography (CT). Patients were divided into groups according to the classification defined by Kaiser et al., in which the Hinchey classification was combined with CT findings (Table 2)[12].

Colonic localizations were recorded according to CT findings. Oral intake of all patients was restricted, and adequate intravenous fluid and analgesic administration was performed. Metronidazole (1.5 g/day) and 3rd generation cephalosporin (cefotaxime 3 g/day) were prescribed during the hospitalization period, and after discharge, an oral antibiotic was continued up to 10 days. Those patients were grouped as "the medical treatment group."

The percutaneous drainage technique was applied with an 18 French catheter under ultrasonography imaging. The operation decision was made based on the general condition of the patient, clinical findings, and CT findings. Surgical drainage was defined as placing drainage catheters

Table 1. Demographic data

Age (Mean±SD*)	50.49±13.22
Gender, n (%)	
Female	51 (60)
Male	34 (40)
BMI*	29.26±5.86
Symptoms, n (%)	
Abdominal pain	85 (100)
Left lower quadrant	83 (97.6)
Other	2 (2.4)
Nausea, vomiting	55 (64.7)
fever	39 (45.8)
WBC (Mean±SD)	13.06±4.45
CRP (Mean±SD)	128.85±96.62
Stage, n (%)	
1A	67 (78.2)
1B	10 (11.8)
2	2 (2.4)
3	5 (5.9)
4	1 (1.2)

*BMI: Body mass index; SD: Standard deviation; WBC: White blood cell; CRP: C-reactive protein.

Table 2. Kaiser classification

	Stage 1A	Stage 1B	Stage 2	Stage 3	Stage 4
Treatment, n (%)					
Medical	67	10	0	0	0
Percutaneous	0	0	2 (100)	0	0
Intervention, n (%)					
Surgery	0	0	0	5 (83.3)	1 (16.7)
Drainage	0	0	0	2 (40)	0
Hartmann's	0	0	0	3 (60)	1 (100)
Hospitalisation Mean (day)	5.27±2.47	8.3±2.49	16±9.89	9.2±3.70	6
Complication Wound infection	0	0	0	2 (40)	0

after washing the abdomen with saline. As a surgical technique, the Hartmann's procedure under general anesthesia was performed, in which the distal stump was closed and left in the abdomen after the resection of the diseased area with a median incision. The proximal loop was removed from the left upper quadrant of the abdomen as an end colostomy.

Continuous variables were expressed as mean±standard deviation, categorical variables as frequency or percentage. Normality test of numerical values was performed using the Shapiro-Wilk test. Mann-Whitney U test was used to compare the numeric values that did not conform to normal distribution. All analyzes were performed using the Social Sciences Statistics Package for Windows 22.0 (SPSS Inc., Chicago, Illinois, USA), and $p<0.05$ were considered significant.

Results

Eighty-five patients were included in our study. Mean age was 50.49±13.22 years. 51 (60%) cases were female and 34 (40%) were male. The mean BMI of our patient group was 29.26±5.86. All of the patients (n=85) were admitted to the emergency service with the complaint of abdominal pain, and 83 (97.6%) of them presented with left lower quadrant pain, while two (2.4%) patients had right lower quadrant pain. Fifty-five (64.7%) patients had nausea and vomiting, 39 (45.8%) patients had a fever. Mean Leukocyte and C- reactive protein (CRP) values were 13.06±4.45 -128.85±96.62, respectively. The patients were divided into two groups: high and low, based on the mean CRP value (128.85). The hospitalization day was 5.46±2.61 in the group with low CRP, while seven ±4.1 days in the higher group. Table 3. When the groups were compared, the hospitalization day was significantly longer in the high group (p=0.042). When the patients were divided into two groups as high and low based on the mean BMI value (29.26) and mean leukocyte value (13.06), there was no significant difference between the groups in terms of hospitalization days (p=0.082 - p=0.546).

There are 67 (78.2%) cases in Stage 1A, 10 (11.8%) in Stage 1B, 2 (2.4%) in Stage 2, 5 (5.9%) in Stage 3, 1 (1.2%) in Stage 4. Stage 1A and 1B patients received medical treatment. One of the patients in the stage 2 group had an 8 cm abscess of 10 cm in the other, and radiological percutaneous drainage was performed in both cases. Two patients in the stage 3 group had surgical drainage, and three patients underwent Hartmann's procedure. Wound infection developed in two of the patients who underwent the Hartmann's procedure. Hartmann's procedure was performed in the stage 4 group. The average length of stay was as follows: Stage 1A; 5.27±2.47, stage 1B; 8.3±2.49, Stage 2; 16±9.89, Stage 3; 9.2±3.70, Stage 4; 6 days.

Table 3. Day of hospitalization according to C-reactive protein values

	CRP		
	Low CRP (<128.85)	**High CRP (>128.85)**	**p**
Mean±SD*	5.46±2.61	7±4.1	0.042

*SD: Standard deviation; CRP: C-reactive protein.

Discussion

Diverticular disease of the colon is a very important disease concerning its consequences. It occurs over 60% in cases over 65 years of age. Its incidence decreases with younger age[1]. Lifestyle and environmental factors play an essential role in its etiology. Known risk factors include smoking, a low diet in fiber, and insufficient exercise[13]. The prevalence of colonic diverticula increases, especially in western societies, due to urbanization[14]. The increase in population in our city in recent years, the widespread use of poor western-type fiber diet and lack of exercise could be listed as predisposing factors. According to our results, although the number of cases is limited, it can be concluded that the frequency of diverticular disease increased at earlier ages. However, it could not be generalized for different countries or cities.

Epidemiological studies have shown a close relationship between colonic diverticulosis and obesity, although the results are inconsistent[15,16]. Karn Wijarnpreecha et al.[17] in a meta-analysis study of 2989 articles and 53,520 participants, reported that the risk of colonic diverticulosis was significantly higher in obese individuals than in non-obese individuals. The mean BMI of our study population was 29.26±5.86, similar to the published literature; the majority of our patients were in the obese group,

In Western societies, Diverticulitis mostly occurs in the left colon and especially in the sigmoid colon. Right colon diverticula are extremely rare[18]. Likewise, the Diverticulitis was mainly located in the left colon.

Acute Diverticulitis, which presents with colon diverticulosis inflammation, is more common in developed societies and occurs in approximately 10-25% of all diverticulum cases[19]. Patients in the emergency department are mostly presented with acute and/or persistent abdominal pain in the left lower quadrant. Other possible symptoms often in-

clude nausea and vomiting[20,21]. Besides, patients typically have a fever, with only nine of the 62 patients with acute Diverticulitis found to have no fever in one study[16,22]. When the symptoms of the patients in our study population were evaluated, while abdominal pain was present in all patients, nausea/vomiting and fever were secondary symptoms.

One of the most significant markers of inflammation is increased leukocyte values. Since 55% of patients with acute Diverticulitis have leukocytosis, a complete blood count should be ordered from all patients[23]. In our study, the leukocyte values were high and guided the diagnosis.

Measurement of CRP, an acute phase reactant, must be made. Floch MH et al.[19] reported that the possibility of acute Diverticulitis increased significantly at a CRP level greater than 50 mg/L, although there was no severe tenderness and vomiting in the left lower quadrant in patients admitted to the emergency department. However, this simple decision rule has not been validated prospectively. In a series of 247 patients (35 percent of perforated cases), 20% of perforations had a CRP level of less than 50 mg/L and 69% of perforated cases had a CRP level of 200 mg./L[24]. In a systematic review study by James et al.[25], a very serious correlation was found between the severity of Diverticulitis and high CRP values. In our study, we found mean CRP values of 128.85 mg/L, which supports acute inflammation. We also found that patients with high CRP values at the time of diagnosis were hospitalized longer. This supports that severe diverticulitis cases have high CRP values and that these patients stay in the hospital longer.

Radiological examinations are very valuable in the definitive diagnosis of Acute Diverticulitis. Abdominal CT is the most useful imaging modality in diagnosing patients with suspected Diverticulitis[26,27]. In a meta-analysis of eight studies involving 684 patients, the diagnostic accuracy of CT was excellent, and CT was the most preferred examination[26]. The most common CT findings were intestinal wall thickening, abscesses, facial thickening, free air, inflamed diverticula, intramural. or intraabdominal free air[27]. In our study, the final diagnosis was confirmed by CT in all cases. Acute Diverticulitis can lead to life-threatening colonic perforation from a simple inflammation. In the treatment of acute Diverticulitis, the classification of Diverticulitis is essential. Treatment planning has to be planned according to this classification[9]. In a systematic review study conducted by Morris et al.[11] in 2014, they found that 80% of Diverticulitis are uncomplicated, and 20% are complicated. The role of antibiotics in Diverticulitis has been largely examined in recent years. In the study of Chabok et al.[28], evaluating CT diagnosed 623 uncomplicated diverticulitis cases, the administration of IV antibiotics for at least seven days, and only IV serum was compared. They found no difference between the two groups in terms of improvement and complication rates. However, 32% of the patients who were not given antibiotics had abdominal pain, fever and had to provide antibiotic therapy because of increased CRP[28]. Daniels et al.[29] evaluated 528 patients with uncomplicated Diverticulitis diagnosed by CT in their study and reported no benefit in terms of improvement and long-term follow-up in the group that 10-day antibiotic therapy was given. However, despite these studies, antibiotics are still available in the initial treatment of acute uncomplicated Diverticulitis. The usual practice for treating Diverticulitis in the USA includes broad-spectrum antibiotics, including gram-negative bacteria and anaerobic bacteria[30,31]. A small randomized controlled trial of 79 patients found that oral antibiotics were as effective as intravenous antibiotics for uncomplicated Diverticulitis. Oral and intravenous regimens were ciprofloxacin [Cipro] and metronidazole [Flagyl][32]. Despite the studies critically approaching antibiotic treatment, metronidazole (1.5 g/day) and 3rd generation cephalosporin (cefotaxime 3 g/day) were used in all patients in our study. We discharged our patients without any complications.

Patients in stage Ib and II can be treated with antibiotics if their abscess is less than 5 cm[33]. Larger abscesses can be successfully drained percutaneously under the guidance of CT or ultrasonography. Surgical indication arises in cases where treatment is not successful despite drainage[34]. We had ten patients in the Stage 1b group. In all of these cases, the abscess was less than 5 cm and localized; all of them healed with antibiotic treatment without the need for additional treatment. Two patients in the stage 2 group had an intrapelvic abscess of 8 and 10 cm.

In stage 3 cases, laparoscopic drainage and/or surgical drainage or surgical procedures were advised. Laparoscopic drainage is not recommended in two randomized controlled studies, including 199 patients[35] and 90[36] patients, while Kohl et al. recommended laparoscopic lavage as a result of their multicenter randomized controlled study[37]. In our study, two of the five patients who were in Stage 3 and were treated with surgical drainage after open exploration.

Various surgical procedures can be performed in acute Diverticulitis with extensive peritonitis, one of which is

proximal colostomy and drainage of the perforated area. Another procedure is the resection of the diseased area + anastomosis + protective stoma. There is also controversy over this surgical procedure, as in the classical surgical approach, performing an anastomose could alter the risk of potential sepsis due to contamination[38].

In a meta-analysis study by Shaban et al.[39], 765 patients who were treated with either the Hartmann's procedure and the primary anastomosis were compared, which reveals lower morbidity and mortality rates in the anastomosis group. The anastomotic leak rate was found to be 5.9%. Resection of the area involved the closure of the end stoma and the distal rectal stump. Although there is controversy over this procedure, it still remains the standard surgical approach in acute perforated Diverticulitis[38]. We applied the Hartmann's procedure because it was a state of peritonitis, and there was no mortality. In cases where the Hartmann's procedure was applied, the procedure was terminated with a second operation. There was no problem in the follow-up of the cases.

Our study was planned to be a step for future prospective studies, primarily because of its retrospective type and the limited number of patients. In addition, the period between our patients' diagnosis and discharge was evaluated, and their developments during the follow-up period were not included in our study.

Conclusion

The admissions of acute diverticulitis cases to emergency services have been increasing in recent years. While antibiotics maintain their importance as the first treatment option in treating Diverticulitis, especially in the early stages, radiology-guided drainage comes to the fore in abdominal abscesses. In surgical applications, the Hartmann's procedure remains an important option.

Ethics Committee Approval: Ethical approval for the study was obtained from the University of Health Sciences, Kanuni Sultan Süleyman Research And Training Hospital Ethics Committee (22.07.2020/146).

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