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Early signs indicating surgery during conservative treatment in patients with acute appendicitis

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Abstract

Acute appendicitis is the most common cause of acute abdomen. Although surgery is the gold standard in the treatment of acute appendicitis, conservative treatment has become an alternative to surgical treatment in suitable patients. In this study, we aimed to determine the follow-up results and early signs of the need for surgery in patients diagnosed with uncomplicated acute appendicitis and followed up with medical treatment. In this research, 38 patients who were diagnosed with acute appendicitis between December 2017 and April 2021 and were not operated on at the time of diagnosis and were treated medically were evaluated retrospectively. Patients who were followed up with medical treatment were operated upon development of complications. Patients were evaluated in terms of age, gender, blood tests and treatment processes. A total of 38 patients, 19 male and 19 female, mean age was 37.55 ± 15.32 . 30 patients were treated with conservative treatment. 8 patients were operated due to complications during follow-up. Patients who were followed up with conservative treatment and developed complications during follow-up were operated on a mean of 3.5 ± 0.75 days after hospitalization. There was a statistically significant decrease in the percentages of leukocytes, C-reactive protein and neutrophils on the 2nd day after medical treatment in non-operated patients. No significant decrease was observed in the 2nd day values of the patients who required surgery. We believe that there are predictors of the success of conservative treatment in patients with uncomplicated acute appendicitis. Although the number of patients included in our study is small, larger and multicenter studies are needed to reach more valuable results.

Keywords: Acute appendicitis, appendectomy, conservative treatment

Introduction

Acute appendicitis is the most common cause of acute abdomen. Its incidence peaks between the ages of 10-30. The incidence of appendicitis is 7-8% throughout life [1-3]. If appendicitis is not treated, mortality and morbidity increase. Although surgery is the gold standard in the treatment of acute appendicitis, medical treatment has become an alternative to surgical treatment in suitable patients [4,5]. Although appendectomy is the gold standard in treatment, many short and long term complications can be observed [6]. Evidence from randomized clinical trials and meta-analyses suggests that patients with uncomplicated acute appendicitis can be treated safely and effectively with antibiotics [7-11]. It is important to determine the success of treatment in conservatively treated patients. Delayed surgery

in patients with inadequate conservative treatment may lead to serious complications. In this study, patients with uncomplicated acute appendicitis treated conservatively were evaluated retrospectively and findings indicating early surgery were presented.

Material and Methods

Ethical approval was obtained from the Kahramanmaraş Sütçü İmam University, Medical Faculty Clinical Research Ethics Committee for this study.

In this research, 38 patients who were diagnosed with acute appendicitis between December 2017 and April 2021 and were not operated on at the time of diagnosis and were treated medically were evaluated retrospectively. The data of the

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patients were obtained from hospital records and in necessary cases patients were contacted via phone. Patients with other intra-abdominal pathologies accompanying the diagnosis of acute appendicitis and whose data were not available were excluded. The diagnosis of acute appendicitis was made by examination, laboratory and radiological findings. Abdominal computed tomography (CT) was performed to confirm the diagnosis of patients whose appendicitis could not be diagnosed or suspected in ultrasonography (USG). Patients diagnosed with acute appendicitis either did not accept surgery or were at high risk for surgery due to their general condition and comorbidities, therefore they were not operated.

Patients and their relatives were informed and complications were explained. Informed consent was obtained from the patients. Consent for surgery was also obtained from patients who needed surgery.

In the follow-up of the patients, ultrasonography was performed upon the development of acute abdominal findings, and if the findings could not be clearly evaluated on USG, they were evaluated with tomography. When complications were detected, the patients were informed and open appendectomy was performed after obtaining their consent for surgery. All patients were offered hospitalization, and those who refused hospitalization were followed up with oral antibiotic treatment.

Patients who did not accept hospitalization were called for daily control and evaluated. No complication developed in any of the outpatients and they were not operated. Outpatients were followed up by giving ciprofloxacin 500 mg tablet 2x1, metronidazole 500 mg tablet 2x1. Inpatients were treated by giving ceftriaxone 2x1 gr intravenous (IV), Metronidazole 500 vial 3x1 IV. The inpatients and the non-operated patients were discharged after being prescribed ciprofloxacin 500 mg tablet 2x1, metronidazole 500 mg tablet 2 x 1 at the end of their hospitalization. All patients were followed up with daily hemogram and C-reactive protein (CRP), radiologically re-evaluated when necessary. Patients with radiological perforation, increased complaints, and acute abdomen were operated. There were no complications in the postoperative follow-up of the operated patients.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS) 21.0 package program was used for statistical analysis of the data. Descriptive data and frequencies were calculated by computer. The conformity of the data to normal distribution was evaluated by Kolmogorov Smirnov test. Data were expressed both as mean±standard deviation and median (minimum-maximum). Categorical variables were presented as number (percentage). Paired Samples Test was used when there was normal distribution in dependent groups. Pearson Chi-Square test was used to compare categorical variables. The results were considered statistically significant when the p-value was less than 0.05.

Results

A total of 38 patients, 19 male and 19 female, were included in the study, the mean age was 37.55±15.32 years. 30 patients were treated with medical therapy. 8 patients were operated due to the development of complications or increased complaints during their follow-up. The operated patients were operated on average 3.5±0.75 days after hospitalization. The mean follow-up period of 30 patients who were not operated was 25.2±9.89 months, no case of recurrence has been observed.

30 of the patients received inpatient treatment, 8 patients refused to stay in the hospital and followed up with oral antibiotic therapy. Of the patients who did not accept hospitalization, 6 were male and 2 were female.

No complication developed in any of the outpatients and they were not operated. Inpatients and non-operated patients were hospitalized for a mean of 3.18±1.29 days. 8 patients were operated, 5 were male and 3 were female (Table 1).

Table 1. Patient demographics

Gender (male/female)	19 M / 19 F
Mean age (years)	37.55±15.32
Follow-up period (months)	25.2±9.89
Treatment	
Conservative treatment	30 (14 M/16 F)
Surgery	8 (6 M/5 F)

The patients were divided into two groups as operated (8 patients) and non-operated (30 patients). In both groups, white blood cell (WBC), CRP and neutrophil percentages at the first admission and WBC, CRP and neutrophil percentages on the 2nd day after the initiation of medical treatment were statistically compared. The distribution of values was compared with the Kolmogorov-Smirnov test. Parametric tests were used because the values were normally distributed in both groups. The first group of 30 people who did not develop complications after medical treatment and were not operated; WBC, CRP and neutrophil percentages at admission and 2 days after the start of treatment, dependent groups were evaluated with the Paired Samples Test, p<0.05 at all 3 values (Table 2). Values were significantly decreased after medical treatment. However, when the first admission values of 8 patients who were operated and the 2nd day values after medical treatment were compared, p>0.05, no significant decrease was observed in all 3 values after medical treatment (Table 3).

Table 2. Values at the beginning and day 2 of medical treatment in patients who did not need surgery

	Treatment before	2. day	N	t	p
WBC	12.26±3.8	6.81±1.52	30	8.687	0.001
CRP	88.46±39.99	39.35±11.29	30	7.150	0.001
Neutrophil	72.79±11.1	53.28±9.06	30	9.244	0.001

Table 3. Values at the beginning of medical treatment and on day 2 in patients requiring surgery

	Treatment before	2. day	N	t	p
WBC	19.17±4.76	16.79±2.73	8	2.158	0.068
CRP	156.6±48.59	134.26±30.84	8	1.858	0.105
Neutrophil	82.84±6.09	79.66±7.63	8	0.860	0.418

In the non-operated group, the maximum WBC value was 9800 u/L, CRP value was 72 mg/L, and the neutrophil percentage was 68.4% on the second day. In the operated group, the minimum values were WBC 13500 u/L, CRP 90.5 mg/dL, and the percentage of neutrophils as 69%. Both groups were compared statistically in terms of gender and age. No significant difference was observed between the two groups (Table 4).

Table 4. Statistical comparison between the two groups in terms of age and gender

	Non-operated	Operated	p
Gender (male/female)	14/16	5/3	0.693
Mean age (years)	35.2±15.34	46.38±12.39	0.066

Discussion

Since Fitz and Mc Burney laid the foundations for the treatment of acute appendicitis, patients diagnosed with appendicitis have been treated with appendectomy [12]. Early surgery is necessary to prevent complications. The medical treatment approach is similar to the treatment of plastron appendicitis, followed up with antibiotics. For the first time, it was shown by Coldrey in 1959 that appendicitis can be treated with medical treatment. In the study of 471 patients, abscess developed in 9 cases, appendectomy was required in 48 patients, and 1 patient with additional diseases died, 20% recurrence and 16% interval appendectomy performed [13].

In a prospective, randomized study conducted by Hansson et al. in 2009, 360 patients were included in the study. They found a success rate of 90.8% in antibiotic treatment and 89.2% in surgical treatment. As a result of the study, their recommendations were that medical treatment could be successfully applied in patients without perforation, and 5-10% of these patients would require surgery [14]. In our study, surgery was required in 21.05% of the patients.

Bakırköy study was planned prospectively and 290 patients were included in the study. Ampicillin 1 g 4x1/day, gentamicin 160 mg 1x1/day, metronidazole 500 mg 4x1/day parenterally were administered to the first group of patients who were treated with antibiotics. In patients who responded to the treatment, the treatment was completed with oral antibiotics for 10 days. The second group of patients underwent laparoscopic or open appendectomy. Success in antibiotic treatment 82.2%, As a result of one year follow-up, 8.4% relapsed acute appendicitis was

detected [4]. In our study, the success in antibiotic treatment was 78.95% and no recurrence was observed in the mean follow-up period of 25.2±9.89 months.

However, delays in treatment can lead to serious complications. Studies have been conducted to predict the success of nonoperative treatment in patients with uncomplicated acute appendicitis [6,15,16]. Many factors have been evaluated in these studies.

In our study, patients who accepted hospitalization were treated with parenteral medical therapy. Patients who were clinically relieved during their follow-up were discharged and followed up with oral antibiotics. Patients who did not accept hospitalization were followed up with only oral antibiotics without parenteral treatment. There was no need for appendectomy in patients who did not accept hospitalization. It was thought that the reason for this was not related to the superiority of oral treatment, that the patients were diagnosed at an early stage and that they did not accept hospitalization due to mild clinical symptoms. Even without parenteral treatment in patients with early diagnosis, surgery was not required with only oral antibiotic treatment and no complications developed. Therefore, early diagnosis and initiation of treatment show the importance of preventing complications and reducing costs. The most feared situation in patients receiving medical treatment is complications and delay in intervention. The question of when to intervene finds some answer in this study.

In the non-operated group, the maximum WBC value was 9800 u/L, CRP value was 72 mg/L, and the neutrophil percentage was 68.4% on the second day. In the 2nd group who needed surgery, minimum values were WBC 13500 u/L, CRP 90.5 mg/L, and neutrophil percentage was 69%. On the 2nd day of treatment of patients who did not develop complications, leukocyte values remained within normal limits. All patients with leukocytosis on the 2nd day of their treatment needed surgery. Some studies have reported that CRP and WBC values may be predictive in nonoperative treatment [6,16].

A study by Okuş et al. showed that a CRP value above 100 mg/L is a good marker for predicting treatment failure [17]. Our study supports this study.

Conclusion

In conclusion, medical treatment may be an option for patients who are diagnosed with acute appendicitis, have a high surgical risk and do not accept the operation. Daily examination, vital signs, laboratory and radiological follow-up are important in order to avoid complications during the medical treatment of patients. On the 2nd day of follow-up of patients receiving medical treatment, leukocytes, CRP values and neutrophil percentage can guide us in terms of complications and early surgical intervention. Surgery should be considered, especially in patients with a CRP value above 90 mg/L, leukocytosis, and a neutrophil percentage above 70% on the 2nd day of their treatment. Predicting the failure of

treatment in the early period in patients treated non-operatively provides early prevention of complications that may occur up to mortality in patients. Although the number of patients included in our study was small, larger and multicenter randomized studies are needed to reach more valudate results.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

Ethical permission was obtained from the Kahramanmaraş Sütçü İmam University, Medical Faculty Clinical Research Ethics Committee for this study with date 10/08/2021 and number 2021/25.

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