



# Conservative treatment and follow-up for acute appendicitis: Is emergent surgery necessary?

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## Abstract

**Aim:** Emergent operation is the accepted standart therapy of acute appendicitis. But medical therapy is an emerging solution for acute appendicitis. We aimed to publish the conservative treatment experience of Inonu University Medical School, Department of General Surgery.

**Materials and Methods:** Between January 2020 and January 2022, patients with suspicious acute appendicitis were scanned by the hospital medical record system. Patients that had an emergent operation were excluded. Remaining patients were reviewed. All patients were followed up both by the Inonu University and Turkish Health Ministry medical record system. Patient demographics and clinical data were analyzed retrospectively.

**Results:** Fifteen patients were detected within the 2 years period that received medical therapy for acute appendicitis. Median age was 32.0 (min:19 - max:70), median appendix diameter was 7.2 mm (min:5.5 - max:11.0). One patient was died due to Non-Hodgkin Lymphoma after 16 days of diagnosis of acute appendicitis. None of the patients required an operation during surveillance. Most frequent reasons for conservative treatment were probability of pelvic inflammatory disease, inflammatory intestinal disease and urinary tract infections.

**Conclusion:** While some comorbidities may accompany with acute appendicitis such as cardiac and systemic haematologic diseases, some of them mimic acute appendicitis such as pelvic inflamatory disease or inflamatory bowel diseases. Elder patients, who have a suspicious case, may benefit from antibiotherapy. Low crp and neutrophilia counts are the predictors of uncomplicated appendicitis and medical treatment. More patients with an appendectomy history need to be evaluated on this aspect.



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## Introduction

Acute appendicitis is the most frequent cause of acute abdomen. Emergent appendectomy is the first choice of treatment. But in recent studies, some patients were shown to be treated with non-operative approach and follow-up with suitable antibiotherapies [1-7]. On the other hand, in a review that was demonstrated by Masson RJ et al. there is an antibiotherapy resistance with 40.2 % rates for acute appendicitis [8]. But there is not enough study about insufficient antibiotherapy. The most frequent reasons for non-operative treatment are cardiac comorbidities, cerebrovascular disorders, chronic pulmoner diseases, genetic and muscular disorders and patient reluctance for operation. Our aim is to demonstrate the results of conservative treatment of the patients with suspicious appendicitis symptoms, to show the demographic and clinical

variables and to define conservative treatment as an alternative to surgical treatment at Inonu University, General Surgery Department.

## Materials and Methods

All suspicious acute appendicitis cases, which were detected in emergent radiologic screening were retrospectively analyzed between 2020 and 2022 at Inonu University, Turgut Ozal Medical Center. Suspicious appendicitis was defined as, patients who were having a right lower quadrant pain and mild white blood cell count elevation but an information that was reported as normal or near inflamated appendicitis (6-8 mm diameter) radiologically, also having unusual clinical findings (no pain or reproductive or urinary pathologies at the same time). Patients, who had emergent appendectomies, were eliminated. Remaining patients, who were not operated and discharged with medical treatment were both questioned with phone calls and scanned by the state health system. Patient de-

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**Table 1.** Demographic and clinical variables.

Patient #	Age	Gender	Appendix Diameter (mm)	WBC (mg/dl)	NEUT %	CRP (mg/dl)	Hospitalization	Hospitalization day
1	39	F	6.7	11.3	65.3	0.3	-	0
2	57	M	8.0	13.6	73.0	14.9	+	1
3	40	F	7.2	8.9	78.6	0.3	+	4
4	61	F	11.0	6.7	9.0	3.8	+	8
5	21	F	6.5	4.3	58.3	3.2	-	0
6	25	M	6.4	7.6	60.4	0.3	-	0
7	29	F	5.5	7.9	68.3	0.7	-	0
8	22	M	7.0	NA	NA	NA	-	0
9	19	F	9.0	18.4	85.3	1.8	+	4
10	52	M	6.0	7.4	57.1	0.3	-	0
11	22	M	7.2	10.5	59.5	0.3	+	2
12	22	M	10.0	24.8	84.8	11.9	+	5
13	69	F	11.0	11.4	82.0	1.2	-	0
14	32	F	8.0	4.6	74.2	24.3	+	9
15	70	F	10.0	0.2	0.1	6.2	+	6

mographics, appendix diameters and laboratory parameters were defined and analyzed. Survival and recurrence were also analyzed. Consent was obtained from all patients in order to get and usage of their data for study. An ethical approval was obtained from the Inonu University Health Sciences Clinical Research Ethics Committee (Decision number: 2022/3848).

#### Statistical analysis

Continuous variables were expressed as median (range: min-max) or mean ( $\pm$  SD) if appropriate and categorical variables were expressed as percentage of the study cohort. Categorical variables were compared with Fisher exact test and Chi-square test. Continuous variables were compared with Mann-Whitney U test. A p value smaller than 0.05 is considered as statistically significant. Kaplan-Meier analysis was performed for survival analysis. Statistical analysis was performed with Statistical software Package for Social Sciences version 24.0 (SPSS v 24, IBM Inc, Chicago, USA).

#### Results

Fifteen patients, which were treated with medical therapy for acute appendicitis were detected (Table 1). Nine of them were females (60.0 %) and 6 were males (40.0 %). Mean age was  $38,7 \pm 18,5$  (SD). Mean appendix diameter was  $7,97 \pm 1,81$  mm (SD). Mean white blood cell (WBC) count at the referral was  $9,8 \pm 6,2$   $10^3$ /uL (SD). Median neutrophilia percentage in WBC was 61.1 % (min: 0,1 - max: 85.3). Median C-Reactive Protein (CRP) level was 1.5 mg/dL (min: 0.3 - max: 24.3). All patients were alive during the survey except 1 patient, who was died due to Hodgkin Lymphoma 16 days after detection of suspicious appendicitis. None of the patients had an appendectomy after discharge. Both 1 year and 5 years survivals were 93.3 %. Most common reason for non-operative treatment was suspicious other pelvic disorders such as pelvic inflammatory disease, urinary tract infection and inflammatory bowel disease. Other reasons for non-operative treatment

were patient reluctance for operation, hematologic diseases such as lymphoma, cardiac comorbidities such as sinus bradikardia and musculoskeletal disorder such as scoliosis. Eight patients were hospitalized (53.3 %) and 7 were discharged by the emergency clinic (46.7 %). Common antibiotherapy was cephalosporin + metronidazol combination. Other antibiotherapies were ciprofloxacin + metronidazol and Piperiasillin-Tazobactam for hospitalized patients. Median hospitalization period was 1 day (min: 0 - max: 9).

#### Discussion

Medical treatment of appendicitis is still preserving its actuality. Coldrey E, et al. speculated in 1959 that acute appendicitis have satisficing results with medical treatment [9]. In recent years, medical treatment took attention in selected cases [1-7]. Medical treatment is seem to be advantegous in terms of decreasing morbidity, preventing hernia and postoperative pain [10]. In a meta-analysis that Rocha LL, et al. conducted, they mentioned 20 % recurrence rates of medical treatment [11]. A study that Sindoh et al. conducted [12] showed that rate of conversion to surgery was 40.6 %. In the same study, CRP elevation and an appendicolith in the appendix lumen on computerized scan were associated with decreased rate of successful medical treatment.

In our series, mean age was 38.7. This is higher than the typical occurrence time interval of appendicitis in clinical practice. In our aspect, elder patients have a low response to appendicitis. For this reason, conservative treatment can be kept in mind in older patients.

Mean appendix diameter is nearly 8,0 cm in our study. It is known that more than 7,0 mm of appendix diameter in adults is in accordance with acute appendicitis clinic [13]. These findings is consistent with our suspected series and support our results. Median CRP level was 1.5 mg/dL in our study. As some of the studies report that high crp levels are associated with complicated appendicitis [14], our results are consistent with this information. CRP levels

are very low in our study and this was consistent with non-operative treatment.

It has been speculated that, high neutrophilia levels are associated with complicated or severe appendicitis [15]. Median neutrophilia percentage was in normal bounds in our study. Normal neutrophilia levels could be resulted in superior outcomes of conservative treatment. That's why we think that, normal neutrophilia counts can be in favor of conservative treatment of acute appendicitis.

Restrictions of our study are not inclusion of the cases that had a suspicious appendicitis before an operation. We only demonstrated the cases with no operation record. A broader spectrum of an analysis would be made by analyzing all cases with or without an operation to make an exact conclusion on this aspect.

## Conclusion

This study can predict the good outcomes of conservative treatment of acute appendicitis. Uncomplicated, elder and clinically suspicious cases are suitable for medical therapy.

## Ethics approval

Ethical approval was obtained from the Inonu University Health Sciences Clinical Research Ethics Committee (Decision number: 2022/3848).

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