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Research Article

Effectiveness and safety of primary medical treatment in uncomplicated acute appendicitis: a single-center retrospective cohort study

Komplikasyonsuz akut apandisit vakalarında birincil tıbbi tedavinin etkinliği ve güvenliği: tek merkezli retrospektif kohort çalışması

Gurkan Guneri[1], Dogus Can Kurular[2], Mehmet Emin Gonullu[1*], Kadir Corbaci[1], Mucahit Unal[1]

[1]Department of General Surgery, Faculty of Medicine, Bilecik Seyh Edebali University, Bilecik, Türkiye
[2]Department of General Surgery, Bilecik Training and Research Hospital, Bilecik, Türkiye

Abstract

Aim: Acute appendicitis is one of the most common causes of acute abdominal pain and has traditionally been treated with appendectomy. However, increasing evidence suggests that antibiotic therapy may be a safe alternative in selected patients with uncomplicated acute appendicitis. This study aimed to evaluate the effectiveness and safety of primary medical treatment in patients with uncomplicated acute appendicitis using real-world clinical and radiological data.

Material and Methods: A single-center retrospective cohort study was conducted including 289 patients diagnosed with acute appendicitis. Patients were classified as having uncomplicated appendicitis based on clinical and computed tomography findings. Twenty-three patients (7.9%) received primary medical treatment, while 266 patients (92.1%) underwent primary surgery. Demographic characteristics, appendix diameter, presence of appendicolith, treatment outcomes, and need for delayed surgery were analyzed.

Results: The mean age was 40.6 years in the medical treatment group and 44.8 years in the surgical group. The median appendix diameter was significantly smaller in patients treated medically (8.0 mm [IQR: 7.5–8.25]) compared to those treated surgically (11.5 mm [IQR: 9.5–13.0], $p < 0.001$). No appendicolith was detected in the medical treatment group, whereas it was present in 12.8% of surgically treated patients.

Clinical recovery without surgery was achieved in 19 of 23 patients (82.6%) receiving medical treatment. Four patients (17.4%) required delayed appendectomy due to clinical deterioration. No cases of perforation, generalized peritonitis, or major postoperative complications were observed.

Conclusion: Primary medical treatment is a safe and effective alternative to surgery in carefully selected patients with uncomplicated acute appendicitis. Appropriate patient selection, particularly exclusion of appendicolith and close clinical follow-up, allows a substantial proportion of patients to avoid surgical intervention without increasing complication rates.

Keywords: Acute Appendicitis, Antibiotic Therapy, Conservative Treatment, Appendectomy, Computed Tomography

Corresponding Author*: Mehmet Emin Gonullu, MD. Department of General Surgery, Faculty of Medicine, Bilecik Seyh Edebali University, Bilecik, Turkiye.
E-mail: dr.m.emin.gonullu@gmail.com Phone: +90 530 608 90 02
Orcid: 0000-0001-9126-2396
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Öz

Amaç: Akut apandisit, akut karın ağrısının en yaygın nedenlerinden biridir ve geleneksel olarak apandektomi ile tedavi edilmiştir. Bununla birlikte, artan kanıtlar, antibiyotik tedavisinin, komplike olmayan akut apandisitli seçilmiş hastalarda güvenli bir alternatif olabileceğini göstermektedir. Bu çalışma, gerçek dünya klinik ve radyolojik verilerini kullanarak, komplike olmayan akut apandisitli hastalarda primer tıbbi tedavinin etkinliğini ve güvenliğini değerlendirmeyi amaçlamıştır.

Gereç ve Yöntemler: Akut apandisit tanısı konmuş 289 hastayı içeren tek merkezli retrospektif kohort çalışması yapılmıştır. Hastalar, klinik ve bilgisayarlı tomografi bulgularına göre komplike olmayan apandisit olarak sınıflandırılmıştır. Yirmi üç hasta (%7,9) primer tıbbi tedavi alırken, 266 hasta (%92,1) primer cerrahi geçirmiştir. Demografik özellikler, apendiks çapı, apandikolit varlığı, tedavi sonuçları ve gecikmiş cerrahi ihtiyacı analiz edilmiştir.

Sonuçlar: Tıbbi tedavi grubunda ortalama yaş 40,6 yıl, cerrahi tedavi grubunda ise 44,8 yıldı. Apendiks çapının medyan değeri, tıbbi tedavi gören hastalarda (8,0 mm [IQR: 7,5–8,25]) cerrahi tedavi görenlere (11,5 mm [IQR: 9,5–13,0], $p < 0,001$) göre anlamlı derecede daha küçüktü. Tıbbi tedavi grubunda apandikolit saptanmazken, cerrahi tedavi gören hastaların %12,8'inde apandikolit mevcuttu.

Tıbbi tedavi gören 23 hastanın 19'unda (%82,6) cerrahi müdahale olmadan klinik iyileşme sağlandı. Dört hasta (%17,4) klinik durumun kötüleşmesi nedeniyle gecikmeli apandektomiye ihtiyaç duydu. Perforasyon, yaygın peritonit veya büyük ameliyat sonrası komplikasyon vakası gözlenmedi. Birincil tıbbi tedavi, komplike olmayan akut apandisitli, dikkatlice seçilmiş hastalarda cerrahiye güvenli ve etkili bir alternatiftir. Uygun hasta seçimi, özellikle apandisit taşı dışlanması ve yakın klinik takip, komplikasyon oranlarını artırmadan hastaların önemli bir bölümünün cerrahi müdahaleden kaçınmasını sağlar.

Anahtar Kelimeler: Akut Apandisit, Antibiyotik Tedavisi, Konservatif Tedavi, Apandektomi, Bilgisayarlı Tomografi

Introduction

Acute appendicitis is among the most frequent diagnoses in patients presenting to emergency departments with acute abdominal pain and is regarded as one of the fundamental emergency conditions in general surgery. The lifetime risk of developing acute appendicitis has been reported to be approximately 7-8%, with the highest incidence observed in the second and third decades of life. Nevertheless, the disease can occur at any age, which complicates both diagnosis and management in clinical practice [1].

The classical pathophysiology of acute appendicitis is attributed to obstruction of the appendiceal lumen, leading to increased intraluminal pressure, impaired venous drainage, ischemia, bacterial proliferation, and progressive inflammation. If left untreated, this process may result in perforation and peritonitis. However, recent studies suggest that acute appendicitis is not a uniform, inevitably progressive disease and that inflammation may remain localized or even resolve spontaneously in certain cases.

Delay in diagnosis and treatment is one of the most critical factors increasing morbidity and mortality in acute appendicitis. Complications such as perforation, intra-abdominal abscess, diffuse peritonitis, and sepsis can be life-threatening, particularly in elderly patients and those with comorbid conditions. Therefore, acute appendicitis requires prompt diagnosis and timely clinical decision-making [2,3].

Despite advances in imaging techniques, the diagnosis of acute appendicitis remains challenging due to variable clinical presentations, atypical symptoms, and anatomical variations. Clinicians often face a critical dilemma between reducing negative appendectomy rates and avoiding delayed diagnosis that may lead to severe complications [4,5].

For decades, appendectomy has been considered the gold standard treatment for acute appendicitis. However, over the past two decades, randomized controlled trials have demonstrated that antibiotic therapy may serve as an alternative to surgery in selected patients with uncomplicated acute appendicitis. This evolving perspective has raised important questions regarding patient selection, safety, and long-term outcomes of conservative management [6].

The present study aims to evaluate the effectiveness and safety of primary medical treatment in patients with uncomplicated acute appendicitis based on real-world clinical data.

Materials and Methods

This single-center retrospective cohort study was conducted at the General Surgery Department of Bilecik Training and Research Hospital. The study protocol was reviewed and approved by the Bilecik Şeyh Edebali University Non-Interventional Clinical Research Ethics Committee (meeting no: 8, date: December 5, 2023; decision no: 14).

A total of 289 patients were diagnosed with acute appendicitis during the study period. Of these, 23 patients (%7.9) were managed with primary medical treatment, while 266 patients (%92.1) underwent primary surgical intervention.

The mean age of patients treated with primary medical therapy was 40.6 years, whereas the mean age in the surgical group was 44.8 years. Patients selected for medical treatment were relatively younger, which is consistent with patient profiles described in the literature as being more suitable for conservative management of uncomplicated acute appendicitis.

The median appendix diameter in the medical treatment group was 8.0 mm (interquartile range [IQR]: 7.5–8.25 mm), compared to 11.5 mm (IQR: 9.5–13.0 mm) in the surgical group. Intergroup comparison was performed using the Mann–Whitney U test, revealing a statistically significant difference ($p < 0.001$). Although the appendix diameter was significantly smaller in the medically treated patients, the predominance of values around 8 mm suggests that the 7–8 mm range represents a clinical "gray zone", indicating that surgical decision-making should not rely solely on appendix diameter.

No appendicolith was detected in the medical treatment group (0/23; 0%), whereas appendicolith was present in approximately 12.8% (≈34/266) of patients in the surgical group. Although this difference did not reach statistical significance ($p = 0.088$), it is considered clinically relevant. The absence of appendicolith in the medical group reflects a deliberate patient selection strategy, as appendicolith is a well-known risk factor for failure of conservative treatment. The limited number of patients in the medical group may have reduced the statistical power of this comparison (Table 1).

Table 1. Baseline characteristics of patients with acute appendicitis

Characteristic	Medical Treatment (n = 23)	Surgical Treatment (n = 266)	p
Age (years), mean	40.6	44.8	–
Appendix diameter (mm), median (IQR)	8.0 (7.5–8.25)	11.5 (9.5–13.0)	< 0.001
Presence of appendicolith, n (%)	0 (0%)	34 (12.8%)	0.088
Total patients, n (%)	23 (7.9%)	266 (92.1%)	–

The success rate of primary medical treatment, defined as avoidance of surgery, was 82.6% (19/23). Four patients (17.4%) required conversion to surgical treatment. Importantly, the decision to proceed with surgery was based on clinical deterioration rather than radiological progression, emphasizing the role of close clinical monitoring in conservative management strategies (Table 2).

Table 2. Outcomes of primary medical treatment in uncomplicated acute appendicitis

Outcome	n (%)
Total patients treated medically	23 (100%)
Successful medical treatment (no surgery required)	19 (82.6%)
Conversion to surgery	4 (17.4%)
Reason for surgery	Clinical deterioration
Radiological progression	None
Perforation or generalized peritonitis	0
Major postoperative complications	0

Patients were classified as having uncomplicated acute appendicitis if they met all of the following criteria: absence of perforation or free intraperitoneal air on computed tomography (CT), no evidence of intra-abdominal abscess, absence of appendicolith, and no marked appendiceal dilatation. Additionally, a hemodynamically and clinically stable condition was required for this classification. Twenty-three patients meeting these criteria received primary medical treatment.

Medical treatment was initiated with broad-spectrum intravenous antibiotics. Patients demonstrating clinical improvement were transitioned to oral antibiotics to complete the treatment course. Close clinical and laboratory monitoring was performed during hospitalization. Surgical intervention was undertaken in cases of clinical deterioration, persistent abdominal pain, fever, or lack of laboratory improvement (Figure 1).

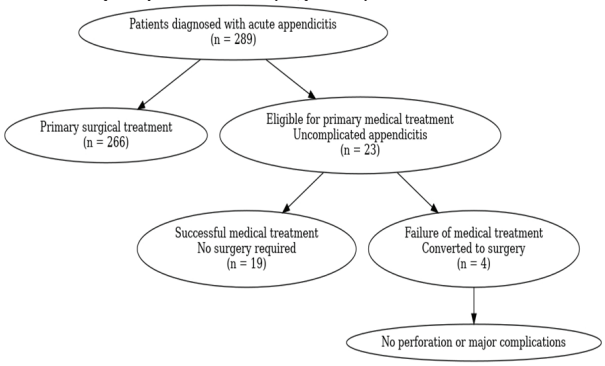

Figure 1. Flow diagram illustrating patient selection and treatment outcomes. Among 289 patients diagnosed with acute appendicitis, 23 patients met the criteria for uncomplicated disease and received primary medical treatment. Nineteen patients (82.6%) achieved clinical recovery without surgery, while four patients (17.4%) required delayed appendectomy due to clinical deterioration. No perforation or major complications were observed in patients converted to surgery.

Discussion

In this study, it was demonstrated that clinical recovery could be achieved without the need for surgical intervention in the majority of patients who received primary medical treatment for uncomplicated acute appendicitis. The fact that surgery was completely avoided in 19 of 23 patients (82.6%) supports the view that antibiotic-based treatment may represent an effective alternative when appropriate patient selection is performed. This success rate is close to the upper limit of the 60-75% range reported in the literature and is even higher than that reported in some series, suggesting that the meticulous selection of patients based on clinical and radiological criteria played a decisive role in the outcomes of the present study [7,8].

The primary rationale for considering surgery as the sole treatment option for acute appendicitis for many years has been the potential for disease progression and the risk of developing complications. However, in recent years, increasing evidence has suggested that acute appendicitis constitutes a heterogeneous disease spectrum and that not all cases inevitably progress to perforation [1,5]. This evolving perspective forms the basis of the hypothesis that medical treatment may be a safe option in selected cases of uncomplicated acute appendicitis.

An important finding of this study is that no perforation, generalized peritonitis, or major postoperative complications were observed in the four patients (17.4%) who required surgery after failure of medical treatment. This result indicates that antibiotic therapy does not render surgery more hazardous even in cases of treatment failure and suggests that delayed surgery is not necessarily associated with adverse clinical outcomes. Similar findings have been reported in the literature, where complication rates were not increased in patients who underwent surgery following unsuccessful medical treatment and were comparable to those who underwent immediate appendectomy [7,8].

One of the main criticisms of medical treatment is the concern that it may increase the risk of progression to complicated appendicitis. However, in the present study, only a limited proportion of patients required surgical intervention after medical treatment, and no advanced complications developed even in these cases. This finding suggests that conservative management can be a safe approach when applied to appropriately selected patients under careful clinical surveillance. Moreover, the fact that only four out of 289 patients (1.38%) required surgery following initial medical treatment indicates that this approach may significantly reduce the overall surgical burden in the general patient population.

The presence of an appendicolith is widely recognized as one of the most important factors negatively affecting the success of medical treatment. Several studies have reported higher failure rates of antibiotic therapy and an increased need for early surgery in patients with appendicolith [3,9]. In the present study, the exclusion of patients with appendicolith may partially explain the high success rate observed and further emphasizes the importance of radiological assessment in patient selection.

In addition to clinical and laboratory parameters, radiological findings play a pivotal role in identifying patients who may benefit from conservative management, and among these findings, the presence of an appendicolith has emerged as a key determinant of treatment success. Appendicolith is believed to represent persistent luminal obstruction and a more severe inflammatory phenotype, which may limit the effectiveness of antibiotic therapy and predispose patients to early treatment failure.

Current international guidelines emphasize the importance of careful patient selection when considering non-operative management for uncomplicated acute appendicitis. The 2020 update of the World Society of Emergency Surgery (WSES) Jerusalem guidelines highlights that patients with imaging features associated with increased risk particularly those with appendicolith should be approached with caution when selecting antibiotic-based treatment strategies. Consequently, the presence of an appendicolith is frequently regarded as a relative or absolute exclusion criterion for conservative treatment in clinical practice, aiming to reduce the likelihood of early clinical deterioration and complications [10].

Evidence from randomized controlled trials further supports this cautious approach. In the CODA trial, the largest randomized study comparing antibiotic therapy with appendectomy, patients with appendicolith who were initially treated with antibiotics demonstrated significantly higher rates of subsequent appendectomy and complications compared with patients without appendicolith. While the overall outcomes of antibiotic therapy were acceptable, the increased rates of treatment failure and complications were largely driven by the appendicolith-positive subgroup [11]. Subsequent cohort analyses from the CODA population reported that appendicolith presence was associated with an approximately twofold increase in the likelihood of appendectomy within the first 30 days following initiation of antibiotic therapy [12].

In the present study, the absence of appendicolith in the medical treatment group (0/23) likely represents a major contributor to the high success rate of conservative management (82.6%). This finding supports the notion that favorable outcomes were achieved through deliberate

and stringent radiological selection rather than chance. By excluding patients with appendicolith, the risk of early treatment failure was minimized, allowing medical treatment to be applied safely without an increase in perforation, generalized peritonitis, or postoperative complications.

Taken together, these findings indicate that appendicolith status should be regarded as a central component of decision-making algorithms for uncomplicated acute appendicitis. Routine assessment of appendicolith on computed tomography may enhance patient selection, improve the success of conservative treatment strategies, and facilitate informed shared decision-making when discussing non-operative management options with patients.

Computed tomography plays a key role in the diagnosis of acute appendicitis and in determining whether the disease is complicated or uncomplicated. In this study, CT findings were decisive in guiding the decision to initiate medical treatment. Numerous studies have demonstrated the high sensitivity and specificity of CT in both diagnosing acute appendicitis and identifying complications [9,13,14].

Nevertheless, considering the radiation exposure and cost associated with CT, the routine use of this modality in every patient remains controversial. In this context, the combined evaluation of clinical, laboratory, and imaging findings may help reduce unnecessary imaging and its associated risks [15,16].

Another important advantage of medical treatment is its potential contribution to reducing negative appendectomy rates. Although negative appendectomy is associated with low mortality, it represents unnecessary surgical trauma, anesthesia-related risks, and postoperative morbidity for patients. In patients who recovered with medical treatment in this study, it can be argued that a potentially unnecessary surgical intervention was avoided in all cases. This represents a clinically meaningful benefit, particularly in younger and low-risk patient populations [6].

Patient education and shared decision-making also play a crucial role in the applicability of medical treatment. Providing patients with clear information regarding the advantages and disadvantages of surgical and medical treatment options, as well as the risk of recurrence and possible need for surgery, may improve treatment success and patient satisfaction. Although the retrospective design of this study did not allow for a detailed evaluation of this process, its importance in clinical practice should be emphasized.

Limitations of the Study

One of the main limitations of this study is the relatively small number of patients who received medical treatment. However, this is consistent with the principle that conservative management should be reserved for a selected patient group and is in line with similar studies in the literature. Additional limitations include the retrospective design and the lack of long-term recurrence data. Nevertheless, the findings provide valuable insights by reflecting real-world clinical practice.

In conclusion, primary medical treatment is a safe and effective alternative to surgery in carefully selected patients with uncomplicated acute appendicitis. When applied with appropriate patient selection and close clinical follow-up, conservative management allows a substantial proportion of patients to avoid surgery without increasing complication rates. These results support the consideration of medical treatment as a first-line option in selected cases of uncomplicated acute appendicitis.

Declaration of conflicting interests

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Ethics Approval

This study was approved by the Bilecik Seyh Edebali University Non-Interventional Clinical Research Ethics Committee (Meeting No: 8, Date: December 5, 2023; Decision No: 14).

Authors' Contributions

G.G.: Conceptualization, methodology, formal analysis, investigation, writing - original draft, visualization, supervision. D.C.K.: Methodology, investigation, data curation, writing - review & editing. M.E.G.: Methodology, formal analysis, investigation, data curation, writing - review & editing, project administration, supervision. K.Ç.: Formal analysis, investigation, resources, data curation. M.Ü.: Investigation, resources, validation, writing - review & editing.

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