

CONSERVATIVE MANAGEMENT OF ACUTE APPENDICITIS: A NARRATIVE REVIEW OF EFFICACY AND SAFETY

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Abstract

Non-operative management of acute appendicitis has seen an increasing trend in the management of acute appendicitis, especially after the Covid-19 outbreak. With better imaging modalities like computerized tomography and better broad-spectrum antibiotics, non-operative treatment of acute appendicitis is now considered as an alternative to appendectomy. This article will investigate the role of non-operative treatment of acute appendicitis in adults and children and compare its efficacy and recurrence rate. We will look at the type and duration of antibiotic therapy. The effectiveness of non-operative treatment is also compared with appendectomy in the treatment of acute appendicitis.

Keywords: Appendicolith; antibiotics; acute appendicitis; conservative treatment; non-operative treatment; recurrence.

INTRODUCTION

Acute appendicitis is one of the most common causes of acute abdominal pain and it accounts for 5.7 to 50 cases per 100,000 population with its peak incidence in the second and third decade of life. Non-operative treatment of acute appendicitis has been proposed as an alternative to appendectomy which is associated with increased morbidity and mortality. The negative appendectomy rate has also not reduced with appendectomy, while the length of hospital stay and cost of treatment have also increased. No operative treatment of acute appendicitis involves the use of intravenous antibiotics and monitoring with imaging modalities like ultrasound and computerized tomography" (Bendib, 2024; Grönroos, 2011; Weledji et al., 2023). "The advantage of non-operative treatment of acute appendicitis is that it can eliminate the risk of surgery including morbidity and sometimes. The type of antibiotic that is used and the duration of the antibiotic given are also important when subjecting the patient to non-operative treatment of acute appendicitis. The disadvantage of non-operative

treatment of acute appendicitis is the recurrence rate which can be as high as 20% within 1 year and this affects its efficacy when compared with performing an appendectomy for acute appendicitis” (Pisano et al., 2013). “The World Society of Emergency Surgeons (WSES) has recommended non-operative treatment of acute appendicitis in selected patients without the presence of appendicolith and advised these patients about the possibility of failure of this therapy and the risk of misdiagnosing complicated appendicitis. They have recommended non-operative treatment of acute appendicitis for both adults and the pediatric population” (Di Saverio et al., 2020). The European Association of Emergency Surgeons (EAES) did not recommend non operative treatment of acute appendicitis, and they favored performing an appendectomy for acute appendicitis based on the evidence presented (Gorter et al., 2016). “Non-operative treatment of complicated appendicitis has been in practice since Ochsner and Shereen introduced it. It has been used for patients who present with an appendicular mass or a localized perforation of the appendix. The reason for initiating non-operative treatment was the risk of complications that could occur if an emergency appendectomy was performed like injury to the cecum or terminal ileum and the risk of post-operative complications like the development of a fistula or peritonitis” (Garba & Ahmed, 2008; Panahi et al., 2020). As there is no current consensus on non-operative management of acute appendicitis, we have conducted this review article looking into the role of non-operative management of acute appendicitis including its efficacy and recurrence rate. We also look at the duration of antibiotic therapy and compare its efficacy with appendectomy. We conducted a literature review using PUBMED, the Cochrane database of systemic reviews, Google scholar and semantic scholar looking for randomized control trials, nonrandomized trials, observational and cohort studies, clinical reviews, systemic reviews, and meta-analysis from 1995 to 2025. The following keywords were used, “non-operative treatment”, “Conservative treatment”, “appendicolith”, “antibiotics”, “Acute appendicitis”, and “recurrence”. All articles were in English, and all articles were assessed by manual cross-referencing of the literature. Commentaries, case reports and editorials were excluded from this review. Adult and pediatric patients with acute appendicitis were included in this study and pregnant patients with acute appendicitis were excluded.

NON-OPERATIVE TREATMENT OF ACUTE APPENDICITIS IN ADULTS

“In the past twenty years, the number of studies of patients who have undergone conservative treatment for acute appendicitis has increased. The outcomes from conservative treatment have improved, and the recurrence rates have also reduced” (Coccolini et al., 2018; Akbar et al., 2022). “A systemic review by Talan et al looked at the methods of conservative treatment of acute uncomplicated appendicitis. 34 Studies with 2,944 patients were included in this study. Antibiotics were prescribed for one week with an initial three days of intravenous antibiotics followed by oral preparations. The patients were kept under fluid restrictions for up to 48 hours and there was improvement in up to 90% of cases after 48 hours of therapy. This study showed that proper

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optimization of conservative treatment for patients is important for this form of management of acute appendicitis” (Talan et al., 2019). “Another systemic review by Poon et al that looked at the current management of acute uncomplicated appendicitis found that patients who underwent an appendectomy were associated with a better efficacy rate when compared to conservative treatment but the morbidity rates were similar between the groups” (Poon et al., 2017). “A systemic review and meta-analysis of randomized control trials comparing surgery versus conservative antibiotic treatment in acute appendicitis was conducted by Ansaloni et al. Four studies with 741 patients were included in this study and surgery was associated with a higher efficacy than conservative treatment. Complications were higher in the surgery group when compared with those who underwent conservative treatment” (Ansaloni et al., 2011). “A meta-analysis was conducted by Yang et al. (2019) comparing conservative treatment with antibiotics and appendectomy for acute appendicitis in adults. Eleven studies totaling 2751 patients of which 1463 underwent conservative treatment and 1288 underwent an appendectomy. Conservative treatment was associated with fewer complications and reduced length of stay in the hospital, but it was associated with lower efficacy than those who underwent an appendectomy”. “Another met analysis of randomized control trials comparing antibiotic therapy with appendectomy for acute appendicitis was conducted by Mason et al. (2012) Five trials with 980 patients were included in this study and although antibiotic therapy was associated with fewer complications and better pain relief, the treatment failure rate was 40.2% against 8.5% of patients who underwent an appendectomy”. “A systemic review and meta-analysis on antibiotic therapy for acute appendicitis was conducted by Prechal et al. (2019) Five studies with 1430 patients were included in this study and the effectiveness of conservative treatment was 62.2% compared to 96.3% for those who underwent an appendectomy. There were no differences in the length of hospital stay and complications between the groups”. “A met analysis and trial sequential analysis comparing no operative versus operative management for uncomplicated appendicitis was conducted by Brucchi et al. eight studies with 3213 patients of which 1615 underwent conservative treatment and 1598 underwent appendectomy. The efficacy of non-operative treatment was 69% compared to 87% for those who underwent an appendectomy. There were no differences regarding the complication rates and length of hospital stay” (Brucchi et al., 2024). “An umbrella review of systemic reviews and meta-analyses comparing the efficacy and safety of conservative treatment versus appendectomy in uncomplicated acute appendicitis was conducted by Emile et al. Eighteen systemic reviews were included in this study of conservative treatment and were associated with a treatment failure rate of 25% when compared to appendectomy. The complications rate and length of hospital stay were slightly lower in the conservative treatment group compared to the appendectomy group” (Emile et al., 2022). “The Appendicitis Acuta (APPAC) randomized clinical trial comparing antibiotic therapy versus appendectomy for the treatment of uncomplicated appendicitis was conducted by Salminen ET al. 540 patients were included in this study, of which 273 underwent

an appendectomy and 257 underwent antibiotic therapy. The success rate for those who underwent appendectomy was 99.6% and the success rate for antibiotic therapy was 76%. The failure rate for antibiotic therapy was 27, 3% but this study could not determine the non-inferiority of antibiotic treatment for acute appendicitis” (Salminen et al., 2015). “Another randomized trial called the comparison of outcomes of antibiotics drugs and appendectomy (CODA) was conducted by Flum et al. 1552 patients were randomized to 776 who underwent antibiotic therapy and 776 who underwent appendectomy. The complication rates were higher in the antibiotic group than the appendectomy group, but the results of this trial showed that antibiotic therapy was non-inferior to appendectomy in the management of acute appendicitis” (CODA Collaborative et al., 2020). “A randomized controlled trial of antibiotic therapy versus appendectomy as the primary treatment of acute appendicitis was conducted by Hansson et al. 202 patients underwent conservative treatment and 167 underwent appendectomy. The treatment efficacy was 90.8% in the antibiotics group and 89.2% in the appendectomy group. The recurrence rate was 13.9% after one year of follow-up for the patients who undertook antibiotic therapy. This study also showed that antibiotic therapy was a safe and effective first-line therapy for acute appendicitis” (Hansson et al., 2009).

NON-OPERATIVE TREATMENT OF ACUTE APPENDICITIS IN THE PEDIATRIC POPULATION

“The use of antibiotic therapy for the management of pediatric patients who are present with acute appendicitis is feasible but the diagnosis of complicated or uncomplicated appendicitis is important when deciding this form of therapy. The recurrence rate after the completion of antibiotic therapy ranges from 10%-20% and this calls for the need to better define the role of conservative management of acute appendicitis in the pediatric patient” (Jumah & Wester, 2022). “A meta-analysis was conducted by Georgiou et al looking at the efficacy and safety of non-operative treatment of acute appendicitis. Ten articles with 413 patients were included in this study and the efficacy rate was 79% with a recurrence rate of 14%. The complication rate and length of hospital stay were similar between non-operative treatment and appendectomy” (Georgiou et al., 2017). “A systemic review and meta-analysis comparing conservative treatment versus appendectomy for acute appendicitis in children was conducted by Kessler et al. Five studies including 442 patients were included in this study, of which 189 underwent conservative treatment and 253 underwent an appendectomy. Conservative treatment was associated with a reduced efficacy rate and increased readmission rate. The complication rates were comparable between both groups. This study showed that conservative treatment was less effective than appendectomy in the treatment of acute appendicitis in children” (Kessler et al., 2017). “Another systemic review and meta-analysis on the non-operative treatment for no perforated appendicitis in children was conducted by Maita et al. Twenty-one studies were included and the acute appendicitis in children” (Maita et al., 2020). A systemic review was conducted by

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Mosuka et al. (2021) comparing non-operative management to appendectomy for uncomplicated appendicitis in children. Twelve articles with 6673 patients were included in this review. This review concluded that non-operative treatment was safe and cost-effective in the management of acute appendicitis. The complication rates were comparable in both groups. Tan et al. (2022) conducted a prospective comparative cohort study comparing conservative treatment of pediatric acute appendicitis during the COVID-19 outbreak. 139 children were included in this study and the success rate of conservative treatment was 89.7% and the recurrence rate was 24.3%. Despite the high recurrence rate, conservative treatment was safe and effective in the management of acute appendicitis.

THE TYPE AND DURATION OF ANTIBIOTIC THERAPY FOR ACUTE APPENDICITIS

Success rate for conservative treatment was recurrence rate was 11.9% and the long-term 92% and the recurrence rate was 16% recurrence rate after 2 years was 13.8%. This study concluded that conservative treatment study showed that antibiotic therapy may be used was safe and effective in the management of to treat acute appendicitis (Di Saverio et al., 2014).

Table 1. Findings from three different papers

Study Study type Year N=numbers Efficacy rate Efficacy rate of non- Operative appendectomy treatment (%) (%)

Mason et al.	Meta-analysis	2012	980	59.8%	91.5%
Prechal et al.	Systemic review &	2019	1430	62.6%	96.3% meta-analysis
Brucchi et al.	Meta-analysis	2024	3213	64.5%	96.8%

Table showing the efficacy rate of non-operative treatment and appendectomy for acuteThe types of appendicitis antibiotics that are prescribed for acute appendicitis include cefotaxime and tinidazole or ceftriaxone and metronidazole. Other antibiotic agents can be used, including ertapenem and quinolones like ciprofloxacin. For high-risk patients' piperacillin/tazobactam or imipenem may be used instead (Huston et al., 2017). The non-operative treatment of acute appendicitis (NOTA) study looked at the safety and efficacy of antibiotics in treating patients with right lower quadrant abdominal pain and their long-term follow-up. This prospective study included 159 patients with acute appendicitis who were treated with one week of therapy with amoxicillin/clavulanic acid. The short-term Steiner et al. (2017) reassessed the practical safety of conservative treatment of acute appendicitis in children. A three-day course of intravenous antibiotics was administered followed by another five days of oral antibiotics. Intravenous ceftriaxone and metronidazole were given to these patients, and the success rate was 87%. The hospital stay was also reduced. Antibiotics should be administered for an initial 48 hours and the clinical response to therapy is assessed by monitoring the patient's vital signs and this is followed by the conversion to oral antibiotics for 7 days. The antibiotic should

Have coverage against gram-negative bacteria and anaerobes (Pisano et al., 2014; Gayer & Nguyen, 2019).

THE FACTORS THAT CAN PREDICT FAILURE OF CONSERVATIVE TREATMENT FOR ACUTE APPENDICITIS

There are risk factors for predicting failure of conservative treatment and the risk of developing recurrent attacks of acute appendicitis. Some of the factors include distension of the appendix that is more than 10mm in diameter detected during imaging (Ramadan et al., 2024). The other factor is the presence of an appendicolith detected during imaging, which is also associated with a higher risk of treatment failure and recurrent appendicitis (Ando

et al., 2021). Other indices that may indicate failure of conservative treatment are the presence of pyrexia and free fluid in the pelvic cavity, as these may predict the risk of developing complicated appendicitis and these patients need to be counseled about the risk of failure of conservative treatment (Hosokawa et al., 2024). Monsell et al looked at the patient factors associated with appendectomy within 30 days of initiating antibiotic treatment for acute appendicitis. This study concluded that the female gender, radiological findings of wider appendicular diameter, and the presence of appendicolith are associated with a higher risk of failure of conservative treatment and hence an appendectomy may be performed in these patients (Writing Group for the CODA Collaborative et al., 2022).

CONCLUSION

Non-operative treatment of acute appendicitis is a safe and effective form of treatment for the management of acute appendicitis. The complications and length of stay in the hospital were reduced but its efficacy was reduced compared to patients who underwent an appendectomy. The recurrence rates were higher with antibiotic therapy compared to surgery, and all these factors are important when a patient is counseled about the risks and benefits of non-operative therapy. Non-operative treatment of acute appendicitis may be a useful form of therapy, especially in high-risk patients, patients who are not fit for surgery, and patients who want to avoid surgery. Imaging like ultrasound or computerized tomography is essential when non-operative treatment is initiated, and an appendectomy should not be delayed in patients who do not respond to nonoperative treatment.

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