



A Comparison of the Safety and Effectiveness of Appendectomy and Antibiotic Therapy for Acute Uncomplicated Appendicitis - Single Center Institutional Experience

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Abstract

Introduction: The gold standard for treating acute appendicitis is an appendectomy (Laparoscopic/open). The necessity of surgery has been questioned lately. The use of antibiotics as a non-operative therapy for acute appendicitis is becoming more and more popular with clinicians and patients. Treatment of appendicitis varies from emergency appendectomy to non-operative therapy with antibiotics; there is no clear standard protocol for treating this condition. As per few studies, it has been suggested that antibiotic medication be used to treat appendicitis instead of surgery. The best course of action for acute appendicitis is still up for debate. We aimed to evaluate the clinical results of individuals treated with an urgent surgery for acute uncomplicated appendicitis against a trial of nonoperative treatment.

Methods: In order to compare antibiotic treatment (10-day course) with appendectomy for patients with acute uncomplicated appendicitis at our institute, we undertook a pragmatic, non-blinded, non-inferiority, randomized study. Based on a 30-day health status, the Comparison of Outcomes of Antibiotic Drugs and Appendectomy (CODA) trial which we used it as protocol in our study indicated that antibiotics were not inferior to appendectomy. Adult patients (>18yrs) with acute uncomplicated appendicitis with no added comorbidities were included. The non-operative management group and the immediate surgery group's patient characteristics and results were compared.

Results: For a year, this study was conducted prospectively. 112 patients in all fulfilled our inclusion criteria. 46 of them had a first nonoperative management trial, with an 86.1% success rate. Compared to patients in the urgent surgery group, patients who failed nonoperative therapy needed far longer hospital stays (4 versus 10 days). 56 were given antibiotics (47% of whom not admitted without receiving the index therapy), and 76 had appendix removed (65% of whom underwent a laparoscopic surgery). Based on 30-day EQ-5D scores (European Quality of Life-5 Dimensions (EQ-5D) questionnaire) (mean difference, 0.01 points; 95% confidence interval [CI], -0.001 to 0.03), antibiotics were not inferior to appendectomy. Among the patients receiving antibiotics, 17% had undergone an appendectomy within the 3 months of availing antibiotics therapy; this included 61% of those with an appendicolith and 39 % of those without an appendicolith. In individuals assigned to receive antibiotic therapy, there were no significant problems linked to delayed appendectomy, including intra-abdominal abscesses.

Conclusion: For the treatment of appendicitis, antibiotics were non-inferior to appendectomy on the basis of results of a standard health-status measure. Almost 4 out of 10 individuals in the antibiotics group had undergone an appendectomy by 3 months. Compared to those without an appendicolith, those with an appendicolith had a greater risk of appendectomy and complications. During the three-month follow-up period, the majority of patients who were randomly assigned to receive antibiotic therapy for uncomplicated appendicitis did not require an appendectomy, and those who did not have any serious complications.

Keywords: Appendectomy; Computed Tomography (CT); Acute Appendicitis

Introduction

Appendectomy has long been the traditional treatment for appendicitis, despite the fact that antibiotic therapy was successfully used as an alternative over 60 years ago [1]. Acute appendicitis, affecting approximately 8 million people yearly, is the leading cause of emergency abdominal surgery. Acute appendicitis is caused by fecal waste or lymphoid tissue that blocks the appendiceal lumen, leading to excessive pressure and mucosal injury [2,3]. Acute appendicitis can be classed as uncomplicated or complicated. Uncomplicated acute appendicitis is defined as the lack of perforation, abscess, or peritonitis, and may or may not involve non-perforated gangrene or a faecolith [4,5]. Appendectomy complications include wound infection, intestinal adhesions, and incisional hernias, with rates ranging from 2% to 23%. Laparoscopic appendectomy is safer than open surgery and has fewer complications. However, open appendectomy is still required when the appendix bursts or access is problematic [6,7].

Recent research suggests that antibiotics, rather than surgery, can effectively treat acute appendicitis. The effectiveness of non-operative treatment for acute appendicitis is uncertain due to a lack of well-designed large prospective randomised controlled trials (RCTs) [8]. We conducted the Comparison of Outcomes of Antibiotic Drugs and Appendectomy (CODA) trial to compare antibiotic therapy with appendectomy in adults with appendicitis. The CODA study compared antibiotic treatment versus appendectomy in people with appendicitis, including those with appendicoliths. The study design takes into account that patients prioritize different outcomes for appendix care. Antibiotic therapy for uncomplicated appendicitis is restricted due to contradictory data and guidelines. This contradiction may be mostly due to a lack of evidence. New research on antibiotic treatment has made significant advances [9-11]. This study compared the results of individuals with complex appendicitis who got urgent surgery vs those who received antibiotics treatment. We hypothesize that antibiotics therapy is successful for most patients, although failure may result in greater morbidity and longer hospital stays. We expected that patients who had an urgent procedure would often need postoperative examination and treatments for intraabdominal abscess.

Methods

In order to compare antibiotic treatment (10-day course) with appendectomy for patients with acute uncomplicated appendi-

citis at our institute, we undertook a pragmatic, non-blinded, non-inferiority, randomized study. Based on a 30-day health status, the Comparison of Outcomes of Antibiotic Drugs and Appendectomy (CODA) trial which we used it as protocol in our study indicated that antibiotics were not inferior to appendectomy. Adult patients (>18yrs) with acute uncomplicated appendicitis with no added comorbidities were included. The non-operative management group and the immediate surgery group's patient characteristics and results were compared.

During the study period, all patients with acute uncomplicated appendicitis were admitted to surgical wards and surgical decisions were made at the discretion of the attending surgeon as there was no institutional protocol implemented for the management of uncomplicated appendicitis during the study period. Patients who were randomized to antibiotics therapy were extensively observed in the surgical observation unit, with regular physical examinations and lab testing. Patients presenting symptoms of an intraabdominal abscess, such as fever, abdominal discomfort, or leukocytosis, were assessed using computed tomography (CT) after appendectomy.

Data collection and statistical analysis

After receiving clearance from the Institutional Review Board, patients' demographics, laboratory data, radiographic findings, antibiotic medication, and choice of surgical or nonoperative care for uncomplicated appendicitis were collated. The research participants were then separated into two groups: immediate appendectomy (IOP group) and trial of nonoperative therapy (antibiotics) (TNO group). The primary outcome of interest was hospital length of stay (HLOS) in each research group. Secondary outcomes were antibiotic medication success rates, open surgery rates, and post-operative infection problems that necessitated diagnostic workups and percutaneous procedures.

Univariate analysis was used to compare patient characteristics and outcomes in the IOP and TNO groups. Categorical variable percentages were compared using Fisher Exact or Pearson's chi-squared tests, while continuous data medians were compared using the Mann-Whitney U test or Kruskal-Wallis test as applicable. All statistical analysis was done with SPSS for Mac OS X version 23.

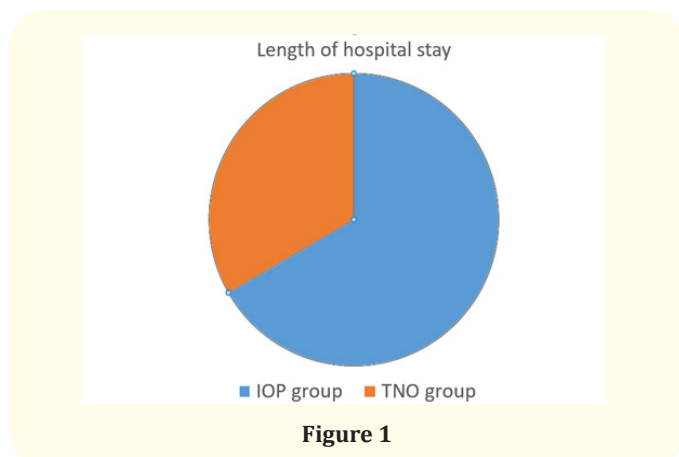


Figure 1

Results

For a year, this study was conducted prospectively. 112 patients in all, fulfilled our inclusion criteria. 46 of them had a first non-operative management (ANTIBIOTICS trial) TNO group, with an 86.1% success rate. Compared to patients in the urgent surgery group (IOL), patients who failed nonoperative therapy needed far longer hospital stays (4 versus 10 days). 56 were given antibiotics (47% of whom not admitted without receiving the index therapy), and 76 had appendix removed (65% of whom underwent a laparoscopic surgery).

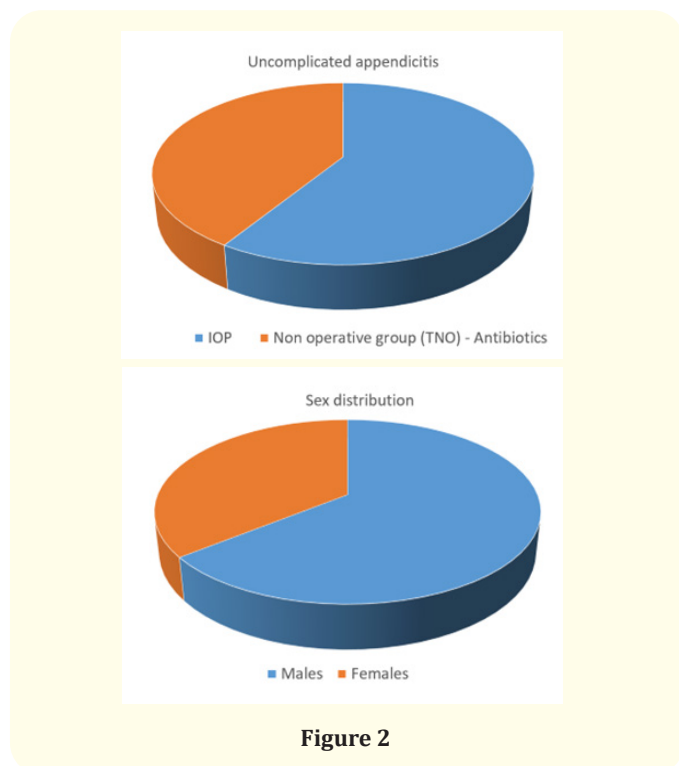


Figure 2

Based on 30-day EQ-5D scores (European Quality of Life-5 Dimensions (EQ-5D) questionnaire) (mean difference, 0.01 points; 95% confidence interval [CI], -0.001 to 0.03), antibiotics were not inferior to appendicectomy. Among the patients receiving antibiotics, 17% had undergone an appendectomy within the 3 months of availing antibiotics therapy; this included 61% of those with an appendicolith and 39 % of those without an appendicolith. In individuals assigned to receive antibiotic therapy, there were no significant problems linked to delayed appendicectomy, including intra-abdominal abscesses. Postoperatively, two patients (1%) required percutaneous drainage for intraabdominal abscess.

The median HLOS of the successful nonoperative patients (TNO) was 5 days, which was equivalent to the patients in the IOP group. In contrast, the median HLOS in patients who failed nonoperative management was 10 days, which was significantly longer than the IOP group. Only one patient in the TNO group required readmission within 30 days for emesis, but did not require any surgical interventions.

Discussion

When comparing treatment outcomes between the antibiotic and surgical groups, the complication-free cure rate is more objective. The antibiotic group in this study had a cure rate of 86.1%, which is comparable with a few other similar studies and trials. Numerous research indicates that the rate of negative appendectomies ranges from 3.75 to 21% [11-13].

The large range is often due to two factors: (1) Preoperative imaging, including CT and US, has significantly reduced the number of negative appendices in recent years. CT has been demonstrated to be more sensitive and specific than US in diagnosing appendicitis [15-17]. Some regard a negative appendectomy to be a perfectly normal appendicitis, whereas others consider hyperplasia, atrophy, and fibrosis. The current study uses the latter definition. The incidence of negative appendectomy was reduced in both groups (antibiotics vs. surgery: 4.2% vs. 3.7%), consistent with a previous research [13].

This study found that patients who underwent surgery after failing antibiotic treatment experienced similar surgical complications (9.5% vs. 11.9%). This suggests that delaying appendectomy due to antibiotic failure may not increase the risk of postoperative compli-

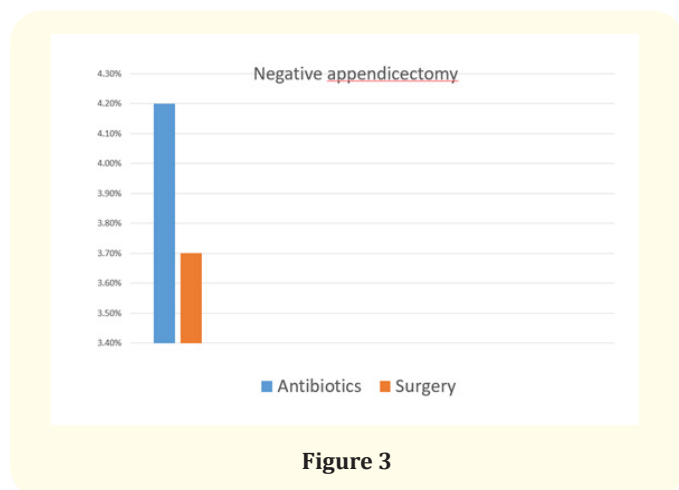


Figure 3

cations. Research indicates that untreated, non-perforated appendicitis often resolves on its own and that perforation can only be avoided in rare cases [18]. Antibiotic therapy will not worsen the course of uncomplicated appendicitis. If the patient relapses after first antibiotic treatment, antimicrobial therapy might be repeated if appendicitis is diagnosed.

Conclusion

For the treatment of appendicitis, antibiotics were non-inferior to appendectomy on the basis of results of a standard health-status measure. Almost 4 out of 10 individuals in the antibiotics group had undergone an appendectomy by 3 months. Compared to those without an appendicolith, those with an appendicolith had a greater risk of appendectomy and complications. During the three-month follow-up period, the majority of patients who were randomly assigned to receive antibiotic therapy for uncomplicated appendicitis did not require an appendectomy, and those who did not have any serious complications.

Author Contributions

- Collection and/or assembly of data: Amar Hegde, Anand Bhandary Panambur, Ashok Hegde.
- Manuscript writing and approval: Anand Bhandary Panambur, Ashok Hegde.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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