**Brief description of patient problem/setting (summarize the case very briefly)**

31 y/o female with no past medical history presents to the emergency department with right lower quadrant pain x4 hours.

**Search Question**:

Is conservative treatment of uncomplicated acute appendicitis with antibiotics as safe and effective as appendectomy?

**PICO search terms:**

|  |  |  |  |
| --- | --- | --- | --- |
| P | I | C | O |
| Acute appendicitis  | Antibiotics  | Appendectomy  | Treatment |
| Appendicitis  |  |  |  Efficiency  |
| Right lower quadrant abdominal pain  |   |   |  Safety  |
| Uncomplicated appendicitis  |   |   | Complications  |

**Results found:**

PubMed:

- antibiotics for appendicitis (Best Match) – 2401

- antibiotics for appendicitis (Best Match, Review) – 239

- antibiotics for appendicitis (Best Match, Clinical Trial) – 699

- antibiotics for appendicitis (Best Match, Review, 10 years publication date) – 283

Google Scholar:

- antibiotics for appendicitis – 19,000

- antibiotics for appendicitis (range 2015-2020, sort by relevance) – 5,627

**1. Citation:**

[Meta-analysis of studies comparing conservative treatment with antibiotics and appendectomy for acute appendicitis in the adult.](https://www.ncbi.nlm.nih.gov/pubmed/31412833)

Yang Z, Sun F, Ai S, Wang J, Guan W, Liu S.

BMC Surg. 2019 Aug 14;19(1):110. doi: 10.1186/s12893-019-0578-5.

**Type of article:**

Meta-analysis

**Abstract:**

Background

Appendectomy is considered the first treatment choice for appendicitis. However, controversy exists since conservative therapy is associated with fewer complications than appendectomy for patients with acute appendicitis (AA). This meta-analysis aimed to compare the outcomes between conservative therapy and appendectomy in the management of adult AA.

### Methods

A literature search was performed to screen eligible clinical studies. Subgroup analyses of the uncomplicated population, complicated population and mixed population of randomized clinical trials were subsequently performed. Clinical outcomes included the overall effective rate of treatment, complication rate, relapse rate (reoperation rate) and overall length of stay (LOS).

Results

Eleven trials totalling 2751 patients (conservative = 1463, appendectomy = 1288) were analysed. Patients receiving conservative treatment had a lower overall effective rate (OR: 0.11 ~ 0.17) and complication rate (OR: 0.21 ~ 0.51). The conservative group had a higher reoperation rate (5.6, 95% CI: 3.1% ~ 10.2%) than the appendectomy group (OR: 9.58 ~ 14.29). Conservative treatment was associated with a shorter overall length of stay (0.47 day, 95% CI: 0.45 ~ 0.5 day) than appendectomy.

Conclusions

For both uncomplicated and complicated adult AA, non-operative management with antibiotics was associated with significantly fewer complications and a shorter length of stay but a lower effective rate and higher relapse rate.

**2. Citation:**

[Antibiotics Versus Surgical Therapy for Uncomplicated Appendicitis: Systematic Review and Meta-analysis of Controlled Trials (PROSPERO 2015: CRD42015016882).](https://www.ncbi.nlm.nih.gov/pubmed/27759621)

Harnoss JC, Zelienka I, Probst P, Grummich K, Müller-Lantzsch C, Harnoss JM, Ulrich A, Büchler MW, Diener MK.

Ann Surg. 2017 May;265(5):889-900. doi: 10.1097/SLA.0000000000002039. Review.

**Type of article:**

Systematic review and meta-analysis

**Abstract:**

OBJECTIVE:

The aim was to investigate available evidence regarding effectiveness and safety of surgical versus conservative treatment of acute appendicitis.

SUMMARY OF BACKGROUND DATA:

There is ongoing debate on the merits of surgical and conservative treatment for acute appendicitis.

METHODS:

A systematic literature search (Cochrane Library, Medline, Embase) and hand search of retrieved reference lists up to January 2016 was conducted to identify randomized and nonrandomized studies. After critical appraisal, data were analyzed using a random-effects model in a Mantel-Haenszel test or inverse variance to calculate risk ratio (RR) or mean difference (MD) with 95% confidence intervals (CIs).

RESULTS:

Four trials and four cohort studies (2551 patients) were included. We found that 26.5% of patients in the conservative group needed appendectomy within 1 year, resulting in treatment effectiveness of 72.6%, significantly lower than the 99.4% in the surgical group, (RR 0.75; 95% CI 0.7-0.79; P = 0.00001; I = 62%). Overall postoperative complications were comparable (RR 0.95; 95% CI 0.35-2.58; P = 0.91; I = 0%), whereas the rate of adverse events (RR 3.18; 95% CI 1.63-6.21; P = 0.0007; I = 1%) and the incidence of complicated appendicitis (RR 2.52; 95% CI 1.17-5.43; P = 0.02; I = 0%) were significantly higher in the antibiotic treatment group. Randomized trials showed significantly longer hospital stay in the antibiotic treatment group (RR 0.3 days; 95% CI 0.07-0.53; P = 0.009; I = 49%).

CONCLUSIONS:

Although antibiotics may prevent some patients from appendectomies, surgery represents the definitive, one-time only treatment with a well-known risk profile, whereas the long-term impact of antibiotic treatment on patient quality of life and health care costs is unknown. This systematic review and meta-analysis helps physicians and patients in choosing between treatment options depending on whether they are risk averse or risk takers.

**3. Citation:**

[Are **antibiotics** a safe and effective treatment for acute uncomplicated **appendicitis**?- First update.](https://www.ncbi.nlm.nih.gov/pubmed/26817927.2)

Allende R, Muñoz R.

Version 2. Medwave. 2018 Jul 11 [revised 2018 Jan 1];18(4):e7228. doi: 10.5867/medwave.2018.04.7229. Review. Spanish, English.

PMID: 26817927

**Type of article:**

Systematic review

**Abstract:**

#### **INTRODUCTION:**

Appendicitis is a typical cause of acute abdominal pain and the most frequent cause of emergency abdominal surgery. In the last two decades, increasing evidence has been published about the use of antibiotics as an exclusive treatment for acute appendicitis.

#### **METHODS:**

To answer this question, we used Epistemonikos, the largest database of systematic reviews in health, which is maintained through searches from multiple sources of information, including MEDLINE, EMBASE, Cochrane, among others. We extracted the data from the identified reviews, reanalyzed the data from the primary studies, performed a meta-analysis and prepared a summary of findings table using the GRADE approach.

#### **RESULTS AND CONCLUSIONS:**

We identified 23 systematic reviews including 28 primary studies, of which eight were randomized trials. We concluded the exclusive use of antibiotics for the treatment of uncomplicated acute appendicitis could be less effective than appendectomy, but it might be associated with a lower rate of complications.

**Summary of Evidence**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Author (Date) | Level of evidence  | Sample/Setting (# of subjects/ studies/ cohort definition, etc) | Outcome(s) Studied | Key Findings | Limitations and Biases |
| Yang Z, Sun F, Ai S, Wang J, Guan W, Liu SYang Z, Sun F, Ai S, Wang J, Guan W, Liu S.August 2019 | Meta-analysis  | Eleven trials with 2,751 patients (conservative= 1,463, appendectomy (1,288). Conservative treatment include non-surgical options (antibiotics, etc). Studies with all adults suspected or diagnosed with AA were included and patients were divided into 3 subgroups: uncomplicated populations, complicated populations, and RCT populations | Overall effective rate, recurrence of appendicitis and mortality. Minor outcomes measured include surgical site infections, incisional hernias, abdominal, incisional pain, obstructive symptoms, abscesses, wound rupture, bladder dysfunction, diarrhea, and abdominal discomfort.  | The overall effective rate of conservative treatment in adult appendicitis was 82.8. The uncomplicated population was 95.2%, the complicated population was 83.4% and the RCT population was 74.1%.Effective rate showed a significant reduction in conservative treatment compared with appendectomies day patients in all subgroups.The complication rate and length of hospital stay was lower in all 3 subgroups treated conservatively.Relapse rate after appendectomy was lower than that after conservative treatment.  | The combined analysis of complicated and uncomplicated AA may result in publication bias because of inconsistent practices at different medical centers. Different antibiotics that were used could also be a potential bias.Conservative treatments other than antibiotics (drainage) can affect the outcome.WBC, CRP, BMI and severity of symptoms could affect the result of treatment.The time of diagnosis to treatment could affect the outcome.  |
| Harnoss JC, Zelienka I, Probst P, Grummich K, Müller-Lantzsch C, Harnoss JM, Ulrich A, Büchler MW, Diener MK.May 2017 | Systematic review and meta-analysis | Four trials and four cohort studies with 2,551 patients were included.  | Treatment efficacy, postoperative complications, the rate of adverse events, the incidence of complicated appendicitis, and length of hospital stay | Conservative treatment with antibiotics was effectively lower than treatment with appendectomy.Postoperative complications and rate of adverse effects was significantly higher in the conservative treatment group with antibiotics. There were longer hospital stays in those treated conservatively with antibiotics. | It is unknown what the long-term effect of antibiotics are in patients with AA. There may be different practices from other medical centers when treating AA. |
| Allende R, Munoz R.2018 | Systematic review  | 23 systematic reviews, including 28 primary studies, and 8 RCTs were included in this study. It included 901 patients, with 415 of them treated with antibiotics and 486 with appendectomy. All studies included adult patients with AA, and these patients were treated with IV antibiotics or oral antibiotics. All these studies were compared with the treatment of appendectomy. | Treatment efficacy (absence of symptoms within two weeks) without major complications within 1 year.Major complications including abscesses, ileus, deep wound infection, recurrence, re-operation, and secondary perforation.Minor complications such as negative appendectomy, diarrhea, and superficial wound infections.Duration of hospital stay, period of sick leave, and cost effectiveness. | Antibiotic treatment for acute appendicitis may be less effective than appendectomy. The use of antibiotics to treat AA can increase major complications compared with appendectomy.  | Evidence could change because there is at least 1 RCT that was not included in any of the identified systematic reviews, and at least 1 ongoing study. |

**Conclusions**

Yang Z et al concluded that for both uncomplicated and complicated acute appendicitis, conservative treatment with antibiotics had a lower effective rate and higher reoperative rate. However, conservative treatment was associated with fewer complications and a shorter length of hospital stay.

Harnoss J et al concluded that appendectomy is the definitive treatment for acute appendicitis although there are risks with surgery. Antibiotics may prevent some patients from surgery, however the long-term impact on quality of life and costs of this treatment is unknown.

Allende R et al concluded that conservative treatment with antibiotics may be less effective than treatment with appendectomy. It has also been shown to increase major complications compared with the surgical approach of an appendectomy. Antibiotic therapy may be reserved for patients who cannot undergo surgery.

**Clinical Bottom Line**

Weight of evidence:

Yang Z et al was a meta-analysis that included 2,751 patients. I chose this article because it answered my research question by comparing conservative management with antibiotics and appendectomy for the treatment of acute appendicitis in adults.

Harnoss J et al was a systematic review and meta-analysis that included 2,551 patients. This study focused on conservative treatment with antibiotics versus treatment with appendectomy for uncomplicated appendicitis.

Allende R et al included systematic reviews and RCT. They focused on many studies that treated their patients conservatively with antibiotics and compared that with treatment using surgery (appendectomy). This article included adult patients with uncomplicated AA.

Magnitude of any effects:

Yang Z et al: Patients who received conservative treatment had a lower overall effective rate (OR: 0.11 ~ 0.17) and complication rate (OR: 0.21 ~ 0.51). This group also had a higher reoperation rate (5.6, 95% CI: 3.1% ~ 10.2%) than the appendectomy group (OR: 9.58 ~ 14.29). There was a shorter overall length of stay (0.47 day, 95% CI: 0.45 ~ 0.5 day) in those treated conservatively than those with appendectomy.

Harnoss J et al: In the conservative group, 26.5% of patients needed appendectomy within 1 year. The conservative group had a treatment effectiveness of 72.6%, compared to 99.4% in the surgical group, (RR 0.75; 95% CI 0.7-0.79; P = 0.00001; I = 62%). Postoperative complications were similar in both groups (RR 0.95; 95% CI 0.35-2.58; P = 0.91; I = 0%). The rate of adverse events (RR 3.18; 95% CI 1.63-6.21; P = 0.0007; I = 1%) and the rate of complicated appendicitis (RR 2.52; 95% CI 1.17-5.43; P = 0.02; I = 0%) were significantly higher in the conservative (antibiotics) treatment group. For the RCT, there were longer hospital stays in the antibiotic treatment group (RR 0.3 days; 95% CI 0.07-0.53; P = 0.009; I = 49%).

Allende R et al: The certainty of evidence was low in the conservative treatment group with antibiotics (RR 0.79, CI 95%). The certainty of evidence was moderate for the rate of major complications with the use of antibiotics (RR 6.22, CI 95%).

**Clinical significance**

The clinically significant point from these 3 articles is that although there may be complications from surgery, appendectomy is the definitive treatment for acute appendicitis in adults. There are fewer complications when using conservative treatment with antibiotics, however, it is less effective and associated with a higher relapse rate.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6694559/pdf/12893_2019_Article_578.pdf>

<https://www.ncbi.nlm.nih.gov/pubmed/27759621>

<https://www.medwave.cl/link.cgi/English/Updates/Epistemonikos/6376>