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Uncomplicated Appendicitis In Paediatrics Patients- Evaluate Outcome Of Surgical Or Non-Surgical Management

Dr. Ayushi Sharma[1], Dr Geetesh Ratre[2], Dr. Ashok Kumar Chopra[3], Dr. Geetika Mathur[4]

[1]Senior Resident, Department Of General Surgery, Raipur Institute Of Medical Sciences, Raipur, Chhattisgarh 492006
Email ID: ayushishrma10@gmail.com

[2]Assistant Professor, Department Of Pediatric Surgery, All India Institute Of Medical Sciences, Bhopal, 462020
Email ID: dr.geeteshratre@gmail.com

[3]Senior Resident, Department Of Pediatrics Surgery, Sms Medical College, Jaipur, 302004
Email ID: ashokchopra1993@gmail.com

[4]Assistant Professor, Department Of Pediatrics Surgery, Sms Medical College And Hospital Jaipur
Email ID: drgeetikamathur02@gmail.com

***Corresponding Author:**
Dr. Geetika Mathur
Email ID: drgeetikamathur02@gmail.com

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ABSTRACT

Introduction: Appendicitis most common abdominal surgical emergency in children with a lifetime risk of 8%. it accounts for over 11% of paediatric emergency room visits. Surgical management has been the mainstay of treatment over the years, however Non-surgical managemet has gained the popularity in recent years.

Aim: uncomplicated appendicitis in paediatrics patients- evaluate outcome of surgical or non-surgical management.

Materials and method: this is a prospective observational study done over a period of 3 years (January 2022-January 2025) in SMS Medical college, Jaipur were studied. Data of all chidren [less than 18 years of age] admitted for acute appedicitis (complicated/uncompliacted) over a period of 3 years. Diagnosis, mode of management i.e. surgical or conservative, post operative course/complications and duration of stay were redorded.

Results: A total of 300 children (200 male / 100 female) were admitted for acute appendicitis over 2 years i.e. January 2022-January 2024. Uncomplicated appendicitis was seen in 250 (83.3%) patients. 200 of them underwent non-surgical while 50 were operated for persisting symptoms and clinical illness. Complicated appendicitis was found in 50 (16.6%) cases which were further operated and were excluded. Out of 50 surgically managed cases 40 had a history of prolonged conservative management elsewhere while 10 patients did not show any clinical relief even after a conservative management of a mean 5 days. The mean duration of stay in the non-surgical group was 2.7 days as compared to a longer mean duration of 8 days in the operative group. The mean duration to full feeds was longer in operative group (6 days) As compared to the non-surgical group (2.5 days). Recurrent appendicitis leading to surgical management was seen in 30/250 (12%) patients.

Conclusion: So, finally from this study we concluded that non-surgical management lessens the operative costs and post-operative morbidity , hospital stay and its complications. a conservative management must be the first line of treatment for uncomplicated appendcitis.

Keywords: *acute appendicitis, lanz incision, non-surgical management, complications.*

1. INTRODUCTION

Appendicitis most common abdominal surgical emergency in children with a lifetime risk of 8%. [1,2]. it accounts for over 11% of paediatric emergency room visits [3]. For almost two centuries appendicitis has been recognized as a medical problem with a surgical solution.[4]. Currently the appendix can be removed with a minimally invasive approach, low anaesthetic and surgical risk, and swift hospital discharge.

Recent research increasingly supports the use of antibiotics as a viable approach for managing uncomplicated appendicitis. Over the past ten years, numerous systematic reviews and meta-analyses have compared conservative treatment with antibiotics to surgical intervention for acute appendicitis. While appendectomy is still considered the definitive treatment, findings suggest that antibiotics offer a safe and effective non-surgical alternative in selected cases.

The practice of treating acute appendicitis with surgery has recently been challenged due to controversy about it being a progressive disease and suggesting two disease entities of acute appendicitis; a mild inflammation that can settle spontaneously or with antibiotics and a more severe inflammation that can progress to gangrene and perforation, proposing the potential of developing different guidelines for the treatment of acute appendicitis depending on its form [3].

Currently, the widely accepted treatment for an appendicular lump is the Ochsner-Sherren regimen, standardized by Ochsner and practiced for decades as the primary approach. However, this conservative method may not be effective in all cases, occasionally requiring prompt surgical intervention. The purpose of this study was to compare early appendectomy with initial conservative management followed by interval appendectomy in patients presenting with an appendicular mass, aiming to identify a more effective strategy for managing complicated appendicitis.

Despite these advances, surgery and anaesthesia have associated risks including postoperative infection, bleeding, hernia and organ injury among others. Surgical management has been the mainstay of treatment over the years, however Non operative management (NOMA) has gained momentum in recent years. [5] In an effort to standardize emergency general surgery (EGS) disease processes, the American Association for the Surgery of Trauma (AAST) developed a grading system for the uniform assignment of anatomic severity to a variety of EGS diseases [6].

Figure no- 1 and 2 Severity of appendicitis

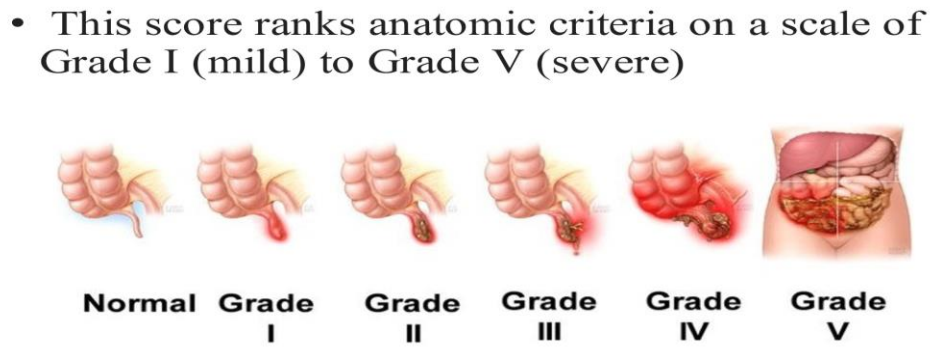


Figure- 2 complicated vs uncomplicated appendicitis

Uncomplicated Acute Appendicitis	
Grade 0	Macroscopically normal/histological endoappendicitis
Grade I	Inflamed appendix (hyperemia, edema ± fibrin)
Complicated Acute Appendicitis	
Grade II	Necrosis (a) Segmental (b) Involving the base
Grade III	Perforated–inflammatory tumor (a) With phlegmon (b) With <5 cm abscess (c) With >5 cm abscess
Grade IV	Perforated with diffuse peritonitis

Aims:

To compare the outcomes in the children undergoing non-surgical management of uncomplicated appendicitis vs surgical management.

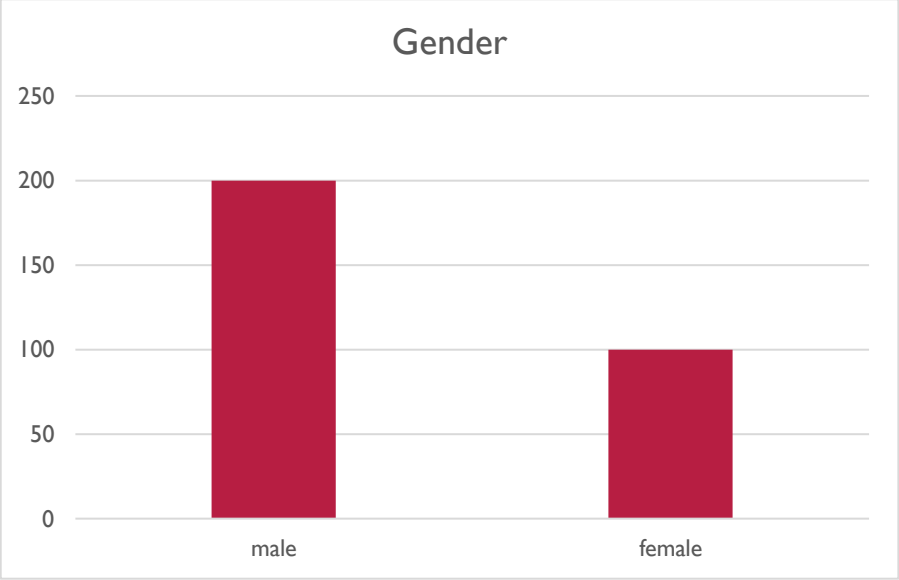
Materials and methods- this is a prospective observational study done over a period of 3 years (January 2022-January 2025) in SMS Medical college, Jaipur were studied. Data of all chidren [less than 18 years of age] admitted for acute appedicitis (complicated/uncompliacted) over a period of 3 years viz. diagnosis, mode of management i.e. surgical or conservative, post operative course/complications and duration of stay were reviewed. The diagnosis was made based on clinical examination and is confirmed by radiological investigations (ultrasonography and contrast-enhanced computed tomography (CT). 1st line of antibiotics –Monocef, metrogyl, amikacin (IV) was given. Patients who had already been discharged from the outpatient clinic were contacted by telephone, in order to obtain updated information of all cases.

Sampling- A total of 300 children (200 male / 100 female) were admitted for acute appendicitis over 3 years i.e. January 2022-January 2025. The data were analyzed for relative and absolute frequency and compared by the chi-squared test with Fischer's correction, when necessary. Continuous variables were summarized by measures of central tendency and compared by Student's t-test, or by non-parametric test when with non-normal distribution. SPSS16.0 statistical package was used. The study was designed according to the guidelines and norms regulating research involving human beings and approved by the Research Ethics Committee of the two participating centers.

2. RESULTS

A total of 300 children (200 male / 100 female) were admitted for acute appendicitis over 2 years i.e. January 2022-January 2024. [figure-3]

Figure no-3 gender distribution



mean age of pat6ients is 8year, ranges from 5months to 18year of age.

Uncomplicated appendicitis was seen in 250 (83.3%) patients. 200 of them underwent non-surgical while 50 were operated for persisting symptoms and clinical illness. Complicated appendicitis was found in 50 (16.6%) cases which were further operated and were excluded.

most common clinical feature is pain over right iliac fossa [92%], fever [90%], vomiting [84%] and leukocytosis [88%] of the patients. [Figure- 4]

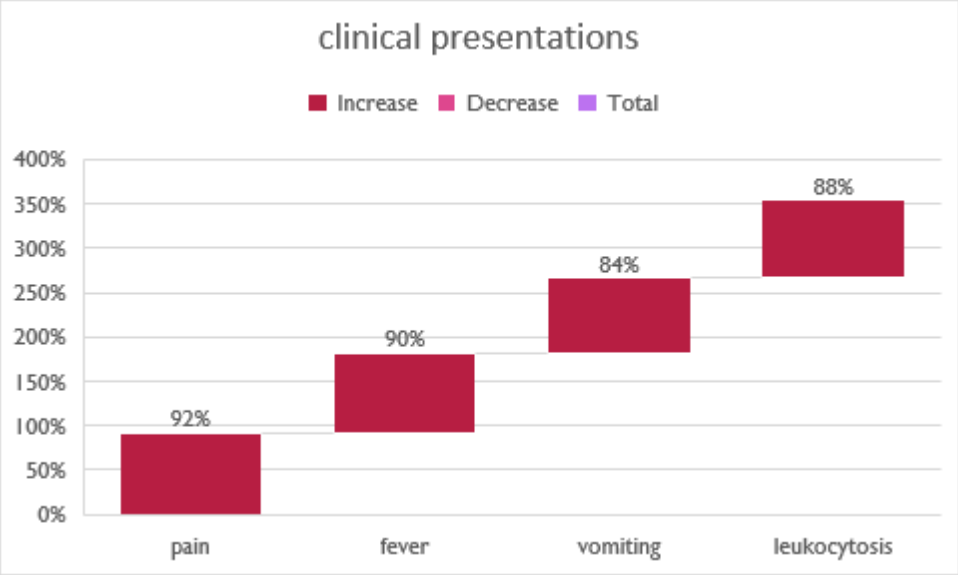
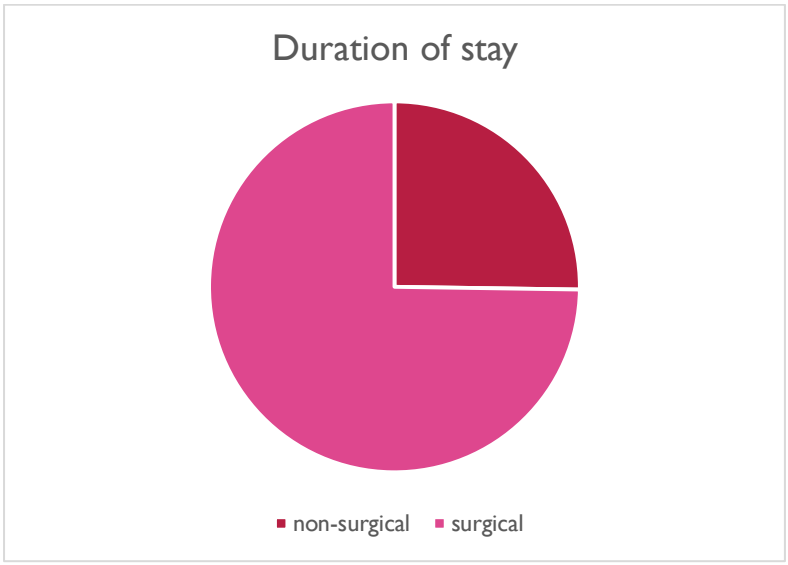


Figure- 4 clinical presentations

-Out of 50 surgically managed cases 40 had a history of prolonged conservative management elsewhere while 10 patients did not show any clinical relief even after a conservative management of a mean 5 days.

-The mean duration of stay in the non-surgical group was 2.7 days as compared to a longer mean duration of 8 days in the operative group. [figure-5]

Figure- 5 duration of stay



-The mean duration to full feeds was longer in operative group (6 days) As compared to the non-surgical group (2.5 days).

-Recurrent appendicitis leading to surgical management was seen in 30/250 (12%) patients.

3. DISCUSSION

this is a prospective observational study done over a period of 3 years (January 2022-January 2025) in SMS Medical college, Jaipur were studied. Data of all chidren [less than 18 years of age] admitted for acute appedicitis (complicated/uncompliacted) over a period of 3 years. In the recent years, several studies have been exploring the alternative of treating acute uncomplicated appendicitis in children conservatively. A feasibility trial done in the UK where they randomized children with suspected acute uncomplicated appendicitis based on clinical presentation while abstaining from doing any radiological assessment of the symptoms showed that treating acute uncomplicated appendicitis in children conservatively seem to be safe and feasible, which, in its turn, can pave the way for future RCTs. Despite the researchers'

effort to include only children with uncomplicated appendicitis, 30% of the children allocated to receive appendectomy had complicated appendicitis, which suggests that differentiating between uncomplicated and complicated appendicitis based only on clinical assessment is suboptimal. Of the 11 children initially randomized to receive non-operative treatment, 41% had not undergone appendectomy by the end of the follow-up period. 24% of those randomized to non-operative treatment presented with recurrent appendicitis of which six children underwent appendectomy, four had histologically confirmed simple acute appendicitis while two had perforated appendicitis. One child presented with an appendix mass at the time of recurrence and was treated with antibiotics followed by interval appendectomy. They also showed that patients were able to be recruited outside of working hours keeping in mind that they held training sessions for medical personnel about the study and noticed that the recruitment rate increased after these sessions. This is of importance to any future RCTs in children because it can help increase awareness about the recent literature challenging the widespread dogma of surgery being the gold standard in the treatment of acute appendicitis and help lift sensitive questions regarding safety and child health [16].

Negative appendectomy is a frequent finding in most series of paediatric appendectomy and suggests that an unnecessary operation has been performed. A benefit of a non-operative approach would be to avoid an unnecessary operation, although at the cost of an unnecessary course of antibiotics. Complications of treatment are important when evaluating treatment efficacy. Our definition of complications has been designed to capture the failure of non-operative treatment as well as complications requiring general anaesthesia in either treatment group. General anaesthesia has been selected as a marker of the impact of the complication on the patient as per the widely used Clavien-Dindo classification of surgical complications. Finally, we have included recurrent appendicitis in our primary outcome. If the rate of recurrent appendicitis is high then the benefit of initial non-operative treatment is less. If an appendectomy is going to be required for recurrence, then it may as well be performed at first presentation. As the primary motivation of non-operative treatment is to avoid an operation and general anaesthesia, we felt the components of the primary outcome should reflect this motivation and therefore be centred around general anaesthesia. Other complications not requiring a general anaesthetic are extremely important to capture and are therefore included as a specific secondary outcome measure (ie, complications not resulting in general anaesthesia classified according to the Clavien-Dindo Scale). In addition, the resource utilisation aspect of these complications will be captured in the economic analysis.

Currently diagnosis of acute appendicitis in participating centres results in a false positive rate of 4%–6%, that is, a 4%–6% rate of negative appendectomy. Thus, some of those recovering from non-operative management of suspected acute appendicitis will likely be those false positives who did not have acute appendicitis in the first place, in addition to children with antibiotic-responsive acute appendicitis. As no pathological specimen is taken from those who recover effectively with non-operative treatment, we will not accurately know how many of these patients actually had appendicitis. It would not be ethically acceptable to undertake additional tests (eg, CT, laparoscopic biopsy) in order to determine whether these patients actually had appendicitis or not, but we believe that not operating on patients who do not have acute appendicitis is one of the potential benefits of non-operative management.

An additional challenge is how to define efficacy in an RCT such as this. We have selected a non-inferiority design since we wish to evaluate whether non-operative treatment is as effective, but not necessarily more effective, than the current standard of care (appendectomy). If non-operative treatment is as effective as appendectomy, the potential benefits include avoiding surgery and its inherent risks, avoiding general anaesthesia, a potential shorter recovery time, and reduced costs to the institution and the healthcare system. Similar trials in adults have used comparative designs. To determine the efficacy of non-operative treatment we will compare how inferior it is to appendectomy. The non-inferiority margin we are willing to accept will in part determine its efficacy.

There is no accepted guidance regarding the magnitude of a non-inferiority margin for surgical trials. A previous similar study in adults comparing surgery with non-operative treatment for acute appendicitis in adults used a non-inferiority margin of 10%, which has been criticised by some as being too narrow. A Cochrane review of appendectomy versus antibiotic treatment for acute appendicitis proposed a non-inferiority margin of 20% on the basis that non-operative treatment may be marginally less effective but be more patient friendly, thereby justifying a wider non-inferiority margin. We believe that avoidance of an abdominal operation and general anaesthesia provides enough benefit to the patient to justify this wider non-inferiority margin of 20%. A recently reported RCT in adults used a 24% non-inferiority margin. It was felt by the trial investigators that setting a non-inferiority margin of more than 20% would be too wide, as negative appendectomy is included in the appendectomy group so that a wider margin would be too ‘generous’ to the non-operative group. In addition, even if the treatment failure rate of non-operative treatment falls outside the non-inferiority limits, the trial will usefully inform the discussion between surgeons, patients and their parents, and non-operative treatment might still be regarded as a viable treatment option, although with a lower success rate.

This study goes in line with the findings of another pilot RCT, being the first of its kind, showing that treating acute uncomplicated appendicitis in children conservatively is attainable without concerns for safety as 92% of patients treated with antibiotics had initial resolution of symptoms. Recurrence of acute appendicitis during follow-up occurred in one patient, 5%. Overall, 62% of patients had not undergone an appendectomy during the initial 1-year follow-up period. The cohort was re-assessed in a 5-year follow-up study showing that at 5-year follow-up 46% of children treated for acute appendicitis had undergone an appendectomy although acute appendicitis was histologically confirmed in only 17%.

Interestingly, none of the children previously treated conservatively represented with complicated appendicitis. It is worth mentioning that the authors used both clinical assessment and radiological imaging; ultrasound or computed tomography, in making the diagnosis of uncomplicated acute appendicitis to include patients [17, 18].

A recent meta-analysis analysed 21 studies with heterogenous methodology, including only 1 RCT, the pilot RCT by Svensson et al. It was reported that non-operative treatment of uncomplicated acute appendicitis in children is safe and efficient. 92% of the patients had resolution of symptoms during initial hospital stay. After discharge 16% of patients proceeded to appendectomy due to recurrent appendicitis or recurrent abdominal pain with normal appendix. It also showed that hospital stay and complications rate were similar in patients treated conservatively and those undergoing an appendectomy [19].

In another systematic review and meta-analysis done by Kessler et al., the results favored appendectomy over conservative treatment regarding efficacy and showed reduced treatment efficacy and increased re-admission rate in patients treated conservatively. Outcomes, including less complications and lower re-admission rate as well as increased efficacy. Outcomes in patients who did not have an appendicolith were superior to those with an appendicolith suggesting that the presence of an appendicolith could compromise conservative treatment outcomes [20].

The included studies comparing conservative treatment to surgical treatment of acute uncomplicated appendicitis in adults and children concluded that both surgery and antibiotic therapy can be regarded as primary management with the possibility of the patient being involved in the discussion and in deciding the treatment of choice. The study reported that conservative treatment had lower efficacy (8% treatment failure rate within 24–48, and an additional 20% might need a second hospitalization for recurrent appendicitis) than immediate surgery but that it was a safe option that did not increase the risk of perforation rate neither resulted in increased complications post-surgery [13].

Malik et al. documented perforated appendix, loculated collection of pus, appendicular abscess in eight, seven, and four patients, respectively, in the early surgery group whereas these cases were nil in the interval appendectomy group [21]. Patel et al. in their study found that 56% of patients had appendicular phlegmon while gangrenous appendix and appendicular abscess with perforation of the appendix was seen in 26% and 18% of patients, respectively [22]. Early surgery prevents the need for re-hospitalization, is safe, saves time, is less expensive and promotes an early return to work [21].

4. CONCLUSIONS

Non-surgical management of uncomplicated acute appendicitis has shown both safety and efficacy across multiple studies and has demonstrated significant cost savings and limited disability time without increasing morbidity. The current data suggest that an initial trial of nonoperative management is safe and efficacious, does not increase the risk of complicated appendicitis, and overall is associated with fewer surgical complications, fewer disability days, and lower healthcare costs.

Limitations of study- short sample size, single center study

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