



**ORIGINAL RESEARCH PAPER**

**General Surgery**

**NON OPERATIVE MANAGEMENT OF ACUTE APPENDICITIS- A PROSPECTIVE STUDY.**

**KEY WORDS:** Uncomplicated Acute Appendicitis, Non-operative Treatment, Antibiotic.

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**ABSTRACT**

**BACKGROUND:** Right lower quadrant abdominal pain is a common cause of Emergency department admission. Acute appendicitis is one of the commonest diagnosis in this setting. The natural history of acute appendicitis non-operatively treated with antibiotics remains unclear. In this prospective study, operative and non-operative management of acute appendicitis were evaluated regarding their safety and cost effectiveness.

**AIMS AND OBJECTIVE:** The purpose of this study was to assess the feasibility, initial safety and efficacy, early and late success rate of non-operative treatment of confirmed acute uncomplicated appendicitis and to monitor the long-term follow-up of non-operated patients.

**METHODS AND MATERIALS:** Selected Acute Appendicitis patients were enrolled in this prospective comparative study (Conservative or non-operative vs operative or surgical treatment). Conservative treatment was based on a brief gut rest (partial or complete) and antibiotic therapy (Initially parenteral and then followed up with oral antibiotic). 105 patients of AA were selected for study, as per inclusion criteria. They were offered the options of conservative and surgical treatment. 52 patients opted for and complied with conservative treatment; rest (53) declined and opted for surgery, so were operated (Laparoscopic/Open) and taken as controls. Enrolment in study was done from March 2015 to February 2017 and they were further followed up for a period of 2 plus years. Secondary outcomes include hospital length of stay and cost, days of missed works and return to normal activity at home; and these were compared in both the groups (conservative vs. operative).

**RESULT:** In non-operative group (52 patients), 4 patients (7.69 %) failed to respond satisfactorily and managed by appendectomy. 2 patients (3.85 %) developed appendicular lump in the course and they were also operated with interval appendicectomy, so 6 patients were considered as early failures (11.54%) with early success rate of 88.46%. Four patients experienced recurrent attacks of acute appendicitis (AA); in them, repeat conservative approach was not tried and they were managed with appendectomy. This brought down the Late success rate to 80.76%. In appendectomy group, 2 patients complained of persistent discomfort in right lower abdomen, five patients developed wound or port site infection and one patient developed incisional hernia. In non-operative group, hospital stays were shorter with lesser hospital costs and days of missed work and also statistically significant as compared to appendectomy group.

**CONCLUSION:** This study confirms the feasibility, safety and optimum success rate of non-operative treatment of early AA in selected patients.

**INTRODUCTION:**

Appendicitis remains the most common intra-abdominal surgical emergency, with an annual incidence of 250,000 Patients in the U.S, 50,000 patients in U.K and a life time risk of 8%. [1, 2]. Recent advances have permitted surgeons to re-evaluate every step of their traditional surgical practice aiming to treat patients with lesser invasive and even conservative methods that established its place in certain conditions such as peptic ulcer diathesis, anal fissure and low moderate grades of solid intra-abdominal organs injuries [3, 4]. The vast majority of the cases are managed by appendectomy, underpinned by the dogma that uncompl icated appendicitis inevitably progresses to abscess formation, gangrene and perforation. However more routine use of imaging has improved diagnostic accuracy and identification of the majority of patients with uncomplicated appendicitis at admission [5]. Surgical treatment of Acute Appendicitis (AA) was golden standard since Mac Burney's description of this condition. This surgical approach was valid, successful and life saving for more than 125 years. However, this approach has its own morbidities such as wound complications, intra-abdominal adhesions resulting in imminent intestinal obstruction and up to 10% of normal appendectomies. On the other hand, immunological functions of the appendix are well documented, as permanent loss of this organ is linked with increased incidence of colon, lymphoid tissue and breast malignancies in append ectomized patients [6,7]. Now a days, there is a general

consensus that AA is of wide spectrum severity and in modern surgery, there are good reasons to change our routine practice in this specific field. Therefore, non-operative treatment of uncomplicated AA emerges as a possible alternate management that will provide safe recovery of patients with an intact appendix [8-14].

**AIMS AND OBJECTIVE:**

- 1) The purpose of this study was to assess the feasibility, initial safety and efficacy, early and late success rate of non-operative treatment of criteria based acute uncomplicated appendicitis and to monitor the long-term follow-up of non-operated patients.

**MATERIAL AND METHODS:**

This prospective study was performed with patients presented to our Department of General Surgery, I.Q City medical College and Hospital, Durgapur, West Bengal, between March 2015 to February 2017, with abdominal pain, who were diagnosed with AA on the basis of physical examination and laboratory findings and confirmed with radiological study (ultrasonography with or without computerized tomography). This non-operative treatment was based on nil by mouth for 24 to 48 hours, intravenous (I.V) fluid replacement, IV antibiotic therapy, (Ceftriaxone with Sulbactam 1.5 gm bid and metronidazole 500 mg tid) for minimum of 48 hours and when the oral fluids and semisolid diet were well tolerated, the patients were discharged with

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oral antibiotics (Ciprofloxacin 500 mg + Tinidazole 600 mg combination bid), which was continued for 8 days.

Clinical worsening such as increased pain, tenderness, progressive systemic signs of sepsis or no resolution of fever and continued nausea and vomiting by 48 hours of parenteral therapy were considered as evidences of failure and surgical option was considered. Patients who changed their decisions in between for operative treatment were managed with standard open or laparoscopic appendectomy and considered as controls.

**ALVARADO SCORING:**

The Alvarado score is a clinical scoring system used in the diagnosis of Appendicitis. The score has 6 clinical items and 2 laboratory measurements with a total 10 points. It was introduced in 1986.

Feature	Score
Migration of pain	1
Anorexia	1
Nausea	1
Tenderness in right lower quadrant	2
Rebound pain	1
Elevated temperature	1
Leucocytosis	2
Shift of white blood cell count to the left	1
<b>Total</b>	<b>10</b>

**INCLUSION CRITERIA:**

Patients with uncomplicated AA who met inclusion criteria were offered to enrol in the study.

**CRITERIA OF SELECTING PATIENTSWERE:**

1. Age group 12 to 60 years (Extremes of age group are well documented to be at higher risks for complicated appendicitis) [19-20].
2. Early presentation of patients (<48 hours of abdominal pain).
3. Physical findings localized to lower abdomen.
4. Mild fever ( $\leq 38^{\circ}\text{C}$  or  $100.4^{\circ}\text{F}$ ).
5. Leucocytes  $\leq 17,000$ , CRP  $\leq 80$  mg/L.
6. USG/CT findings with appendix diameter  $\leq 0.8$  cm, no faecolith and no signs of perforated appendicitis or significant peri-appendicitis (no phlegmon, abscess or fluid collection or lump formation).

**EXCLUSION CRITERIA:**

- 1) Extremes of age groups (outside 12-60 year age range).
- 2) Included symptoms greater than 48 hours.
- 3) Presence or suspicion of abscess, perforated appendicitis or spreading peritonitis clinically or on imaging.
- 4) Appendicular lumps.
- 5) Recurrent attacks.
- 6) Patients clinically suspected, but not confirmed to have appendicitis radiologically.
- 7) Co-morbidities like diabetes or any Immuno-compromised state.
- 8) Patients coming from far out village areas with travel distance of more than 5 hours to reach hospital. Secondary outcomes include hospital length of stay, total hospital charge, days of missed works and return to normal activity at home of patients treated non-operatively in comparison in appendectomy group. This study was done after the clearance from the institutional ethical committee.

**STATISTICAL ANALYSIS:**

Variables were described with means and standard deviations or medians and compared between treatment groups using t-test or Mann-Whitney U test. The chi-square test was used for analysing nominal parameters. P value  $< 0.05$  was considered significant. Data were analysed using SPSS Statistics version 23.

**RESULT:**

Diagnosis of the AA was based primarily on clinical and laboratory examination and confirmed radiologically. Patient with clinical features of AA with Alvarado score 5-10 were

further evaluated with USG/CECT abdomen, if not done already. Diagnosis was confirmed by USG alone in 89 (80.90 %) patients. Remaining 21, which were inconclusive/ equivocal on USG were confirmed with CECT abdomen. Abdominal CT examination was required for additional information about appendix and other abdominal pathologies in 32 out of 105 patients.

In non-operative group (52 patients) there were 32 males (61.54%) and 20 females (38.46%) patients. In operative group, there were 30 males (56.60%) and 23 females (43.39%). In both the groups, the age of the patients ranged from 13 to 60 years with median of 33.06 years. 18-49 years age group accounted for majority of the patients (n=70, 66%). The most frequent symptom of the patients was acute abdominal pain (n= 105, 100%) followed by nausea and vomiting (n = 83, 79.04%). The interval between onset of pain and admission ranged from 4 hours to 36 hours with mean of 17.17 hours. Most frequent physical examination finding was right iliac fossa tenderness (n= 101, 96.19%) followed by muscular guarding (n=51, 48.57%) and rebound tenderness (n=14, 13.33%). Laboratory examination revealed blood leucocytes cells ranged from 2200 u/L to 18000 u/L with mean of 11,290 u/L and C-reactive protein (CRP) value ranged from 30.0 to 45.0 mg/L with mean of 37.5 mg/L. On radiological examination the appendix diameter ranges from 6.1 mm to 8 mm with mean of 7.3 mm.

In the conservative group, 42 out of 52 (80.76%) patients with uncomplicated AA were successfully treated with antibiotics alone. 4 (7.69 %) patients failed to respond to this treatment and managed by early appendectomy with one post-operative wound infection. 2 patients (3.85 %) developed appendicular lump during treatment process and they were also operated by interval appendectomy. So, 6 patients were taken as early failures (11.54 %) Early success rate (30 days) was 88.46%. The mean follow-up period was 30 months. Four patients suffered recurrent attacks (Late success rate 80.76%), i.e. total failure rate 19.23 %. Symptoms after the initial attack and the duration between the two attacks were 3, 5, 7 & 10 months with mean of 6.25 months. Hospital stay in conservative group ranged from 3 to 6 days, with median of 4.5 days. While in operative group, hospital stay ranged from 5-9 days with median of 6.9 days. Return to join duty or work days lost in conservative group ranged from 8 to 15 days with median of 11 days. While in operative group, work days lost ranged from 18 days to 60 days, with median of 35 days.

In appendectomy group, 2 patients complained of persistent discomfort in right lower abdomen, five patients developed wound or port site infection and one patient developed incisional hernia.

**DISCUSSION:**

Acute inflammation of the appendix is of a wide spectrum in severity and its outcome varies according to many risk factors such as age, luminal obstruction and immune defence mechanism of the patient. Although appendectomy is curative but carries up to 10% peri & post-operative complications. Some are as follows:

1. Intra-peritoneal adhesions with persistent discomfort, pain or obstruction
2. Incisional hernia
3. Accidental gut injuries
4. Failure to identify or perform complete appendectomy
5. Wound or Port site infections
6. Premature labour in pregnant patients
7. Deep vein thrombosis
8. Respiratory tract infection
9. Urinary tract infection
10. Stump appendicitis
11. Unindicated appendectomy
12. Hypertrophic scar or keloid

Various studies have shown that non-operative treatment of uncomplicated cases of AA is a good alternative in management of considerable portion of patients [8-17]. Additionally, other studies have shown that presence of faecolith and appendix diameter greater than 1.0 cm are main predictive factors that might be associated with higher failure rate of this non-operative treatment [18,19]. Therefore, stratification of the patient with AA based on clinical, laboratory and radiological findings allow for the identification of the patients with uncomplicated appendicitis who can be managed by antibiotics based conservative approach alone with higher success rate and lower recurrence and complication rate. There are certain arguments against non-operative treatment of AA. One of these is possibility of the failure of this treatment and recurrence of the disease which is reported as up to 30%, with apprehended increased complication rates. Although even these can be managed surgically with ease, if carefully explained or observed, without increasing significant morbidity. However, this requires facility for easy and early access to medical care. Meanwhile, in our opinion the best approach is to be selective and to stratify the patients based on clinical, laboratory and modern radiological facilities taking in to consideration of risk factors of each particular patient and health care facilities of each region independently. Health education and counselling to develop reasonably well awareness of the patients about this disease, easy access to health care organization, early presentation of the patients, availability of diagnostic facilities (USG/CT) and treatment with effective antibiotics are encouraging factors for application and high success rate of this conservative non-operative approach for AA especially in developed countries.

**CONCLUSION:**

This study confirms the feasibility, safety and optimum success rate of non-operative treatment of early uncomplicated AA in selected patients with shorter days to resume normal life activities and lesser days of missed work as compared to appendectomy group. Furthermore, it avoids many surgical emergency operations and their sequelae. We found that overall, success rate of non-operative management of patients with uncomplicated appendicitis in the immediate term was 88.46 %, which reduced to 80.76% at 2 years, but still significant with no operation and anaesthesia related complications. The risk thereafter is yet unknown and requires further follow up. In addition, we found that non-operative management was associated with less pain in the first week after treatment and a quicker return to work with reduced medical expenses.

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