



A STUDY TO DETERMINE THE NEED FOR POSTOPERATIVE ANTIBIOTICS AFTER LAPAROSCOPIC APPENDICECTOMY IN CASES OF NON-PERFORATED APPENDICITIS

Dr. Anil Rathod

Assistant Professor, Department of Gen. Surgery, Maharashtra Institute of Medical Education and Research, Talegaon General Hospital

Conflicts of Interest: Nil

Corresponding author: Dr. Anil Rathod

ABSTRACT

Background: Acute appendicitis is one of the most common surgical emergencies worldwide, often necessitating an appendicectomy, which can be performed via an open or laparoscopic approach. The laparoscopic appendicectomy has gained popularity due to its minimally invasive nature, offering benefits such as reduced postoperative pain, shorter hospital stays, and quicker return to normal activities. In cases of non-perforated appendicitis, where the appendix has not ruptured, the risk of postoperative complications like surgical site infections (SSIs) is generally lower compared to perforated cases. Approximately 30% of appendectomies are for complicated acute appendicitis (CAA). With laparoscopy, the main post-operative complication is deep abscesses (12% of cases of CAA, versus 4% for open surgery)

Aim: The aim of this study is to determine whether the routine administration of postoperative antibiotics is necessary in preventing postoperative complications in patients with non-perforated appendicitis who undergo laparoscopic appendicectomy.

Material and Method:

A total of 120 patients with non-perforated appendicitis undergoing laparoscopic appendicectomy divided into two groups. Group B (n=60) patients received single dose of preoperative antibiotic and group A (n=60) patients received preoperative dose, as well as three postoperative doses of antibiotics. patient demographics, comorbidities, preoperative antibiotic use, and operative details. Incidence of SSIs, other complications, hospital stay, readmission, and antibiotic-related adverse effects. Following laparoscopic appendicectomy, surgical wound was inspected after 48 h, 72 h, and on day 7 to look for any signs of postoperative SSI. Group B patients received a single dose of preoperative antibiotics and group A patients received the same regimen, in addition, antibiotics were administered 24 hours postoperatively. Patients of both groups were followed-up for 30 days to assess the postoperative infectious complications.

Results: The mean age in group A was 22.24 ± 6.29 years compared to 25.32 ± 6.55 years in group B. No significant difference was observed between the two groups regarding mean age, gender distribution, pain, fever, nausea/vomiting, Mc Burney's tenderness, bowel sounds, total leukocyte count, ultra-sonography, diagnosis, and histopathology report. The difference between both the groups for incidence of SSIs was statistically insignificant. Both groups comprised 120 patients, as well both groups were compared in baseline characteristics. Statistically, there was no significant difference in rates of SSIs between both groups.

Conclusion: Single dose of preoperative antibiotics was sufficient in reducing SSIs after appendectomy for NPA. Depending on the results, the study could either support the continued use of postoperative antibiotics or suggest that they may be unnecessary in non-perforated appendicitis cases, potentially leading to changes in clinical practice guidelines. This study would provide

valuable evidence to guide the management of postoperative care in laparoscopic appendicectomy for non-perforated appendicitis.

Keywords: Laparoscopic appendicectomy, Non-perforated appendicitis, Prophylactic antibiotics, surgical site infection.

INTRODUCTION:

Appendicitis, the inflammation of the appendix, is a common surgical emergency, with a lifetime risk of approximately 7-8%. The standard treatment for appendicitis, particularly when the appendix is not perforated, is an appendicectomy, with laparoscopic appendicectomy being preferred due to its minimally invasive nature. Laparoscopic appendicectomy is associated with reduced postoperative pain, shorter hospital stays, and quicker recovery compared to open surgery.⁽¹⁻⁵⁾ Antibiotics play a crucial role in the management of appendicitis, particularly in preventing postoperative complications like surgical site infections (SSIs). Preoperative antibiotics are widely accepted as standard care, significantly reducing the risk of SSIs. However, the necessity of postoperative antibiotics, particularly in cases of non-perforated appendicitis, is less clear.^(6,7)

The routine use of antibiotics after appendicectomy has been influenced by historical concerns over postoperative infections, especially in the pre-antibiotic era when such infections were common and often severe. Over time, as antibiotics became widely available, their use became a standard part of peri-operative care, including in cases of non-perforated appendicitis where the risk of infection is inherently lower.⁽⁸⁾ Traditionally, antibiotics are administered preoperatively to prevent infection, and in many institutions, this practice extends into the postoperative period as a precautionary measure. However, the routine use of postoperative antibiotics, particularly in cases of non-perforated appendicitis, is increasingly being questioned. The rationale for this approach is rooted in the desire to minimize the risk of SSIs and other infections, but the necessity and efficacy of postoperative antibiotics in these specific cases remain a subject of debate.^(9,10)

Modern guidelines and practices vary significantly regarding the use of postoperative antibiotics. Some guidelines, like those from the World Society of Emergency Surgery (WSES), recommend against the routine use of postoperative antibiotics in cases of non-perforated appendicitis, citing a lack of evidence for their benefit. On the other hand, some surgeons continue to administer postoperative antibiotics as a precaution, especially in high-risk patients or when there is concern about the adequacy of the appendicectomy or potential contamination during surgery.^(11,12,13) The growing concern over antibiotic resistance has led to increased focus on antibiotic stewardship, emphasizing the need to use antibiotics judiciously. The routine use of postoperative antibiotics in cases where they may not be necessary contributes to the development of antibiotic resistance, a global public health concern. This has prompted a re-evaluation of many long-standing practices, including the use of antibiotics in postoperative care.⁽¹⁵⁾ The potential benefits of reducing antibiotic use, such as minimizing antibiotic resistance and avoiding unnecessary side effects must be weighed against the risk of SSIs and other complications. However, further high-quality randomized controlled trials are needed to confirm these findings and provide more definitive guidance for clinical practice.⁽¹⁶⁻¹⁷⁾

The findings of this study have the potential to influence clinical practice guidelines by providing evidence-based recommendations on the use of postoperative antibiotics in non-perforated appendicitis. If it is found that postoperative antibiotics do not offer significant benefits, this could lead to a change in current practices, promoting better antibiotic stewardship, reducing healthcare costs, and minimizing the risk of adverse drug reactions in patients. The study will contribute to the ongoing efforts to optimize surgical care and improve patient outcomes in the management of acute appendicitis.⁽¹⁸⁾ However, the role of

postoperative antibiotics in reducing the SSI's in non-perforated cases is still conflicting.⁽¹⁹⁾ A single-dose antibiotic prophylaxis has been recommended for majority of the elective general surgical procedures; however, in reality, this practice is not followed and multiple-dose regimens are still in use at many centers.⁽²⁰⁾

Material and Methods

A total of 120 patients with non-perforated appendicitis undergoing laparoscopic appendectomy divided into two groups. Group B (n=60) patients received single dose of preoperative antibiotic and group A (n=60) patients received preoperative dose, as well as three postoperative doses of antibiotics. The present study was carried out at in the Department of General Surgery. A randomized clinical trial was conducted in the Department of Surgery. All patients admitted with acute appendicitis undergoing emergency open appendectomy were considered eligible for this study. Informed consent, both in English as well as vernacular language, was taken from all the participants included in the study.

Inclusion Criteria:

- Adult patients aged 18-65 years.
- Diagnosis of non-perforated appendicitis confirmed by clinical assessment, imaging (ultrasound or CT scan), or intra-operative findings.
- Patients undergoing laparoscopic appendectomy.

Exclusion Criteria:

- Patients with perforated, gangrenous, or complicated appendicitis.
- Patients with immunosuppressive conditions (e.g., HIV, cancer, chronic steroid use).
- Patients with a history of allergic reactions to the antibiotics under study.
- Patients who receive antibiotics postoperatively for other indications.
- Patients who had received antibiotics within 72 hours of admission or who were pregnant or immune-compromised, subjects with diabetes, heart failure, anemia and those patients found to have complicated appendicitis (gangrenous, perforated, appendicular mass or abscess) or normal appendix were excluded.

After discharge, the patients who lost to follow-up in the outpatient surgical department were also excluded from the study.

Randomization

Participants will be randomly assigned to one of two groups using a computer-generated randomization sequence:

Group A (Intervention Group): Will receive a standard postoperative antibiotic regimen.

Group B (Control Group): Will not receive postoperative antibiotics.

Intervention

Group A: Patients will receive a single dose of a broad-spectrum antibiotic (e.g., ceftriaxone 1g IV) immediately postoperatively, followed by a course of oral antibiotics (e.g., amoxicillin-clavulanate) for 5 days.

Group B: Patients will receive no postoperative antibiotics.

Surgical Procedure

All patients will undergo a standardized laparoscopic appendectomy performed by experienced surgeons. Preoperative antibiotics (e.g., cefazolin) will be administered to all patients within 60 minutes before the incision, following the hospital's standard protocol.

Follow-up and Data Collection

Follow-up Period: Patients will be followed up for 30 days postoperatively.

Data Collection:

Preoperative Data: Patient demographics, medical history, preoperative imaging findings, and intra-operative findings.

Intraoperative Data: Duration of surgery, operative findings, and any intra-operative complications.

Postoperative Data: Incidence of SSIs (classified as superficial, deep, or organ/space), other postoperative complications (e.g., intra-abdominal abscess, wound dehiscence), length of hospital stay, readmissions, and any adverse reactions to antibiotics.

Statistical analyses

The data were collected and analyzed by SPSS Version 20. We used the mean and standard deviation for descriptive analysis and to analyze

the data we used x2 test and Fisher's exact test, OR or PR with 95%. A p-value of <0.05 was considered as statistically Significant.

Result:-

Table 1: Demographic, detailed history and clinical characteristics of the study population

Findings	Group A, n=60	Group B, n=60
Mean age	22.24±6.29	25.32±6.55
Pain	60 (100%)	60 (100%)
Fever	16 (26.6%)	15 (30%)
Nausea/vomiting	35 (58.3%)	38 (63.3%)
Bowel sounds	60 (100%)	60 (100%)
Total leukocyte count		
6,000-11,000	28	22
0.688 >11,000	23	32
Ultrasonography, inflamed appendix, probe tenderness	9	12
Diagnosis		
Acute appendicitis	51	53
Chronic appendicitis	8	3
Recurrent appendicitis	5	4
Sub-acute appendicitis	3	2
Histopathology report		
Acute appendicitis	52	55
Chronic appendicitis	11	8

The demographics, detailed history, and clinical characteristics of the study patients are showed (Table 1). No significant difference was observed between the two groups regarding mean age, gender distribution, pain, fever, nausea/vomiting, Mc Burney's tenderness, bowel sounds, total leukocyte count, ultra-sonography, diagnosis, and histopathology report

Table 2: Show the Summary of Southampton scoring.

Duration	Group N	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4 and 5
48 h	Group A	51 (85%)	8 (13.3%)	2 (3.3%)	0	0
	Group B	57 (95%)	2 (3.3%)	1 (1.6%)	0	0
72 h	Group A	51 (85%)	2 (3.3%)	4 (6.6%)	3 (5%)	0
	Group B	52 (86.6%)	2 (3.3%)	3 (5%)	3(5%)	0
7th day	Group A	58 (96.6%)	2 (3.3%)	0	0	0
	Group B	59 (98.3%)	1 (1.6%)	0	0	0

Southampton scoring system of SSI's after 7, 48 h, and day 7 is summarized (Table 2). None of the patients in present study had grade 4 or 5 SSIs. Wound healing was taken as normal for grades 0, 1 and 2 whereas the patients with grade 3 were considered as having wound infection.

Discussion

This study aimed to determine the necessity of postoperative antibiotics in patients undergoing

laparoscopic appendicectomy for non-perforated appendicitis. The findings suggest that there is no significant difference in the incidence of surgical site infections (SSIs) and other postoperative complications between patients who received postoperative antibiotics and those who did not. This indicates that the routine use of postoperative antibiotics may not be necessary in such cases, aligning with current trends toward more judicious use of antibiotics.⁽²¹⁾ The results of this study are

consistent with previous research indicating that postoperative antibiotics may not provide additional benefits in preventing SSIs in non-perforated appendicitis. For instance, Andersen et al. (2005) and the meta-analysis by Hussain et al. (2017) both found no significant reduction in postoperative infections with the use of antibiotics in similar patient populations. These studies, like the present one, suggest that the risk of SSIs in non-perforated appendicitis is inherently low, and the routine administration of antibiotics may not be justified.⁽¹⁾ In addition, SSIs have a high impact on financial burden. A prospective study conducted by Davey et al, also reported an increase in hospital expenditures on a patient when a surgical site becomes infected.⁽²²⁾ A systematic review by Daskalakis et al, concluded that all patients with non-perforated appendicitis, preoperative treatment is sufficient whereas the use of postoperative antibiotic treatment is not recommended.⁽²³⁾ Whereas, in case of perforated appendicitis, postoperative broad spectrum antibiotics are recommended. Similarly, a systematic review by Andersen et al, have shown that the use of antibiotics in patients with uncomplicated appendicitis is superior to placebo in reducing postoperative complications; however, concluded that no specific recommendations can be made regarding the duration of antibiotic use.⁽¹⁾ However, for patients with complicated appendicitis, comprehensive antibiotic regime is to be continued, as they have quite high risk of infective complications. Altogether, only a very few studies have demonstrated the clinical benefits and disadvantages of giving postoperative antibiotics along with adequate preoperative antibiotics prophylaxis.⁽¹⁾ The main aim of these prophylactic antibiotics is to lessen the occurrence of postoperative SSIs.⁽²⁴⁾

In 1995, Liberman et al. reported a high rate of wound infection (11.1%) among the patients who had received only preoperative cefoxitin compared to the patients who were given both pre- and postoperative cefoxitin (1.9%).⁽²⁵⁾ Mui et al. conducted a randomized trial on 269 patients to define the optimum duration of prophylactic antibiotics in NPA.⁽⁶⁾ They found no significant difference in the wound infection rate between three study groups. They concluded that single dose of preoperative

antibiotics could adequately prevent the postoperative infectious complications.⁽⁶⁾ Le et al. compared the patients of NPA who received a single dose of preoperative antibiotics with those who were given postoperative antibiotics in addition to preoperative prophylaxis.⁽⁷⁾

For these reasons, the benefits and side effects of antibiotics therapy have to be evaluated carefully. Besides, our results are further strengthened by the recent studies showing that the long-term antibiotic use even in patients with complicated appendicitis does not reduce the postoperative infectious complications.⁽²⁶⁾ Conducting multicenter studies with larger, more diverse patient populations could improve the generalizability of the results and provide more robust evidence for or against the routine use of postoperative antibiotics in non-perforated appendicitis. Future studies should also investigate long-term outcomes beyond the 30-day postoperative period, including any late-onset infections or complications.⁽²⁷⁾ Research could focus on identifying specific subgroups of patients who might benefit from postoperative antibiotics, such as those with specific comorbidities or intra-operative findings

Conclusion:

This study contributes to the growing body of evidence suggesting that postoperative antibiotics may not be necessary in patients undergoing laparoscopic appendectomy for non-perforated appendicitis. By challenging the routine use of antibiotics in these cases, the study supports efforts to optimize antibiotic stewardship, improve patient safety, and reduce healthcare costs. However, further research, particularly in more diverse settings, is needed to confirm these findings and refine clinical guidelines accordingly. Further studies on a larger scale with various other abdominal surgeries are required to determine the actual need for postoperative prophylactic antibiotics to reduce the SSIs.

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