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Original Research Paper

General Surgery

A RANDOMISED CONTROL TRIAL TO ASCERTAIN IF POSTOPERATIVE ANTIBIOTICS ARE NECESSARY FOLLOWING LAPAROSCOPIC APPENDICECTOMY IN NONPERFORATED APPENDICITIS

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ABSTRACT

Background: The most frequent cause of severe abdominal discomfort is acute appendicitis. Prophylactic antibiotics should be used as directed to reduce the risk of postoperative surgical site infections (SSIs). There is no definitive recommendation, though, for how long to use antibiotics. There has only been one preoperative prophylactic dose several randomised control trials strongly suggest. Therefore, the goal of the study was to ascertain if postoperative antibiotics were necessary following laparoscopic appendix surgery for nonperforated appendicitis. **Methods:** A total of 52 nonperforated appendicitis patients were separated into two groups and underwent laparoscopic appendectomy. Patients in group B (n=26) received three postoperative doses of antibiotics in addition to the one preoperative dose given to group A's (n=26) patients. Regular investigations, such as Complete blood count, blood urea, serum creatinine, and other tests like an abdominal ultrasound were also carried out. After a laparoscopic appendicectomy, the surgical incision was examined to check for any evidence of postoperative SSI after 48, 72, and 7 days. **Results:** Group A had a mean age of 30.6± 10.5 years compared to group B's mean age of 30.7 ±9.5 years (p=0.75). Right iliac fossa pain was the initial complaint of every subject in the research. Grade III SSIs occurred in 0ne patient in group A (4%) and one patient in group B (4%) and were treated conservatively. The difference in the incidence of SSIs between the two groups was statistically negligible (p=1.000). **Conclusions:** After a laparoscopic appendicectomy, prophylactic postoperative doses of antibiotics offer no additional advantage over a single preoperative dosage in terms of preventing postoperative SSIs.

KEYWORDS : Laparoscopic appendicectomy, Nonperforated appendicitis, Prophylactic antibiotics, Surgical site infections

INTRODUCTION

Surgery is frequently required for appendicitis, an inflammation of the appendix. Appendicectomy was once thought to as the gold standard treatment for acute appendicitis. Later, the most common surgical procedure is laparoscopic appendicectomy. Following acute appendicitis, early surgical surgery improves the result.

The chance of developing an acute appendicitis was estimated to be 6.7% for women and 8.6% for men, with a peak incidence between the ages of 10 and 30 for both sexes. [2] An important contributing factor to postoperative surgical site infections (SSIs) after appendicitis removal is the pathological status of the vermiform appendix.[3,4]

SSIs are more common in patients with perforated or gangrenous appendicitis than in those with nonperforated appendicitis. [5] A randomised control experiment to ascertain if postoperative antibiotics are necessary for nonperforated appendicectomy who underwent laparoscopic appendicectomy.

Postoperative morbidities such pain, worry, annoyance, lengthened hospital stays, and monetary costs are primarily brought on by SSIs. [6] In addition to medicine, surgeons have made significant and ongoing efforts to prevent sepsis. Despite everything, postoperative wound infection continues to be a significant surgical limiting factor.

SSIs typically involve an intraabdominal space, an organ, superficial tissues, or deeper tissues along the surgical route. The prognosis of superficial incisional infections, which make up 60%–80% of all SSIs, is better than that of organ- or space-related SSIs. Antibiotic usage properly lowers the risk of postoperative SSI by 40% to 60%.[7] Guidelines for the selection of prophylactic antibiotics, delivery methods, and timing following emergency appendicectomies have been established by prospective clinical trials. However, regarding how long to use antibiotics, there are no set rules. .[8,9]

The preoperatively administered antibiotics reach acceptable serum and tissue levels and are crucial in the prevention of surgical site infections (SSIs), which occurs during the period of operation when bacterial contamination is at its highest. [10] Postoperative antibiotics' ability to lower SSIs in nonperforated cases remains controversial, nevertheless.[11]

For the majority of elective general surgical operations, a single-dose antibiotic prophylaxis has been suggested; however, in practise, this recommendation is not followed, and multiple-dose regimens are still in use at many institutions.[12]

In order to assess if postoperative antibiotics are necessary to reduce SSI following laparoscopic appendicitis surgery without perforation, this study was carried out.

METHOD

The present 1-year open label randomized control trial (RCT) was conducted at the Department of General Surgery from January 2021 to December 2021. A total of 52 patients admitted with nonperforated appendicitis at the hospital were studied.

Selection criteria

All patients with uncomplicated appendicitis between the ages of 18 and 50, of either sex, were considered eligible for the study. The study excluded patients with complicated appendicitis (gangrenous or perforated), additional comorbidities like diabetes, immunosuppression, cardiac, renal, or liver failure, allergies to cephalosporins, refusal to provide written consent, and those who had taken antibiotics elsewhere before enrolling. Each participant in the study was given information regarding the nature of the procedure, the necessary investigations, the suggested interventions, and any potential adverse effects before providing signed, informed consent.

Data collection

On a pre-made proforma, the demographic information, medical history, and specifics of the clinical examination of the patients were documented. Routine tests such as complete blood counts, blood urea, serum creatinine, and other tests such abdominal ultrasounds were also carried out.

The groups were randomly assigned using the opaque envelope approach. There were manufactured a total of 52 opaque envelopes with cards inside. In 26 of these envelopes,

a card referred to group A (the study group), and in the remaining 26, a card referred to group B. (control group). Patients were instructed to choose an envelope at random and based on the group listed on it.

Intervention

According to established protocols, patients in both groups received laparoscopic appendicectomy. Both groups utilised the same tools and suture materials. Both groups adhered to the fundamentals of surgery, including proper hemostasis and no undue strain on the tissues. Both groups received a single intravenous preoperative injection of 1 gm cefotaxime and 100 ml metronidazole at the time of induction of anaesthesia; however, group B also received three additional doses of the same antibiotics postoperatively at 8, 16, and 24 h from the time of the index surgery, whereas group A received no postoperative antibiotics.

According to the surgeon's recommendations, intravenous fluids, analgesics, and other supportive therapies were also administered. The surgical wound was examined for any indications of postoperative wound infection after 48, 72, and 7 days.

According to the Southampton scoring system, the scores at each dressing were tracked in a prepared table to evaluate wound infection (Grade 0-5).[13]

For grades 0, 1, and 2, wound recovery was considered typical. For grades 3 and 4, the degree of wound infection was characterised as minor, and for grades 4 and 5, as major.

Statistical analysis

The pooled data was examined using SPSS 20 (SPSS Inc, Chicago, IL). The mean length of hospital stay was compared using an unpaired t test, infection rates were compared using Fisher's exact test, and demographic data were compared using the chi-square test. Statistical significance was defined as P0.05 at a 95% confidence range.

RESULTS

The research subjects' demographics, extensive histories, and clinical traits are displayed (Table 1).

In terms of mean age, gender distribution, pain, fever, nausea/vomiting, McBurney's soreness, bowel sounds, total leukocyte count, ultrasonography, diagnosis, and histopathology report, there was no discernible difference between the two groups (p>0.05). An overview of the Southampton grading system for SSIs after 7, 48 hours, and day 7 (Table 2). No participants in the current research developed SSIs of grade 4 or 5. For grades 0, 1, and 2, wound healing was accepted as normal; however, patients with grade 3 were thought to have an infection at the site of the wound. Only 0ne (4%) patient in group A and group b, had grade 3 SSIs at 72 hours, and they were both treated conservatively with daily cleaning and dressing. Although group B's mean hospital stay was longer than group A's (3.14 ±0.45 days vs. 3.08 ±34 days; p = 0.45), there was no statistically significant difference between the two groups.

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

Findings	Group A, n=26	Group B, n=26	P value
Mean age	30.6± 10.5	30.7 ±9.5	0.7
Pain	26 (100%)	26 (100%)	1
Fever	07 (27%)	08 (31%)	0.5
Nausea/vomiting	16 (62%)	18 (69%)	0.5
Bowel sounds	26 (100%)	26 (100%)	1
Total leukocyte count			
6,000-11,000	12 (46%)	11 (42%)	0.6
>11,000	14 (54%)	15 (58%)	
Ultrasonography, inflamed appendix, probe tenderness	04 (15%)	06 (23%)	0.3
Diagnosis			
Acute appendicitis	21 (81%)	22 (85%)	0.3
Chronic appendicitis	03 (12%)	01 (4%)	
Recurrent appendicitis	02 (8%)	02 (8%)	
Sub-acute appendicitis	01 (4%)	01 (4%)	
Histopathology report			
Acute appendicitis	21 (81%)	23 (88%)	0.4
Chronic appendicitis	05 (19%)	03 (12%)	

Table 2: Summary of Southampton scoring.

Duration	Group N	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4 and 5	P value
48 h	Group A	22 (85%)	3 (12%)	2 (8%)	0	0	0.1
	Group B	25 (96%)	1 (2%)	1 (4%)	0	0	
72 h	Group A	22 (85%)	1 (2%)	2 (8%)	1 (4%)	0	1.0
	Group B	22 (85%)	1 (4%)	2 (8%)	1 (4%)	0	
7th day	Group A	25 (96%)	1 (2%)	0	0	0	1.0
	Group B	25 (96%)	1 (2%)	0	0	0	

DISCUSSION

SSI after surgical intervention is a frightening hindrance that neither the patient nor the surgeon ever seek for.[14] SSIs, which make about 15% of all nosocomial infections, typically arise when endogenous flora are translocated to an area that is typically sterile. Perioperative care, host defences, bacterial inoculum and virulence, and intraoperative management are some of the factors that can affect the development of SSIs.[15]

Furthermore, SSIs have a significant effect on financial stress. According to a prospective study by Davey et al, when a surgical site becomes infected, hospital costs for the patient rise.[16]

According to Daskalakis et al systematic's evaluation, preoperative treatment is sufficient for all patients with nonperforated appendicitis, and postoperative antibiotic therapy is not advised.[17] In contrast, postoperative broad-spectrum antibiotics are advised in cases of perforated appendicitis. The use of antibiotics in patients with uncomplicated appendicitis is superior to the use of a placebo in reducing postoperative complications, according to a systematic review by Andersen et al. The review, however, came to the conclusion that no specific recommendations can be made regarding the duration of antibiotic use.[18]

However, because they are at a higher risk of developing infectious complications, individuals with severe appendicitis must continue receiving a complete antibiotic regimen. The therapeutic advantages and disadvantages of administering postoperative antibiotics combined with proper preoperative antibiotic prophylaxis have collectively only been shown in a small number of trials.[19] These prophylactic antibiotics' main goal is to reduce the frequency of postoperative SSIs.[20] Broad-spectrum antibiotics should not be used redundantly, and they should not be used for longer than is recommended. These procedures could increase the likelihood of negative outcomes and encourage the emergence of resistant strains, which would increase morbidity and mortality.[21]

Most of the patients in both groups were between the ages of 21 and 30. In comparison to group B, group A had a higher

mean age (30.6 ±10.5) years vs. 30.7±9.5; p = 0.75). These results were consistent with the literature, which indicates that individuals with a mean age of 31.3 years are more likely to have appendicitis. According to related investigations by Luckmann et al. and Anderson et al., nonperforated appendicitis was associated with ageing as opposed to perforated appendicitis. [22,23] According to the literature, McCurney's tenderness, which is the most significant sign that predicts appendicitis, was present on examination in all patients in both groups in the right iliac fossa.[24]

White blood cell counts can vary, although mild leukocytosis, which ranges from 10,000 to 18,000 cells/mm3, is typically observed in patients with acute, uncomplicated appendicitis.[25] Similar to the previous study, 54% of patients in group A and 58% of patients in group B experienced leucocytosis; however, the difference between the groups was not statistically insignificant (p=0.68).

The study's findings showed that prophylactic postoperative doses of antibiotics offered no advantages over a single preoperative dose and had no discernible impact on the likelihood of developing surgical site infections (SSIs) after appendicectomies. However, maintaining asepsis, using good surgical technique, and providing adequate postoperative care are also important factors in lowering the likelihood of postoperative SSIs, which in turn lowers morbidity. Accordingly, an RCT conducted by Mui et al. found that in patients having surgery for uncomplicated appendicitis, a single dosage of perioperative antibiotic is sufficient for preventing infective wound sequelae. [26] Additionally, they came to the conclusion that protracted antibiotic administration is both expensive and useless. There aren't many studies in the literature that have also found that one preventive antibiotic treatment is sufficient to stop infectious complications after an appendectomy for nonperforated appendicitis.[27-30]

CONCLUSION

Overall, the study's findings indicate that a single preoperative dose of the prophylactic antibiotics cefotaxime and metronidazole given at the time of induction is sufficient to lower the risk of postoperative SSIs and that additional postoperative doses have no statistically significant advantages. These results, meanwhile, are only applicable to one procedure, laparoscopic appendicectomy.

To ascertain the precise requirement for postoperative prophylactic antibiotics to decrease SSIs, additional trials on a bigger scale with many other abdominal procedures are needed.

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