ORIGINAL ARTICLE DOI: https://doi.org/10.52206/jsmc.2023.13.4.797 OPEN ACCESS

To Determine the Effectiveness of Conservative Treatment Versus Appendectomy in the Management of Acute Uncomplicated Appendicitis.

Mian Anwer Zeb,[1] Muhammad Usman,[1] Farooq Khan,[2] Siyab Ahmad,[1] Liaqat Ali,[1] Adnan Badar[2]

ABSTRACT

Background: The vermiform appendix is considered to be a vestigial organ by the most. Its importance in surgery results only from its tendency for inflammation that results in a clinical syndrome known as acute appendicitis. It is the most common indication for emergency abdominal surgery in patients with acute abdomen with a crude annual incidence of 26 per 10,000 populations.
Objectives: To determine the effectiveness of Conservative Treatment Versus appendectomy in the management of Acute Uncomplicated Appendicitis.
Material and Methods: This randomized control trial was conducted in Department of General Surgery Saidu Group of Teaching Hospital Saidu sharif, from 1st January 2022 to 31st December 2022. A total of 96 cases were enrolled, that were divided into two groups. Informed written consent was taken from each patient. Patients in Group A were subjected to non-operative management with antibiotics while patients in Group B were subjected to appendectomy. Patients in both groups were evaluated for various parameters such as age, gender, pre- and post-operative duration of pain (group B), Alvarado score. Post stratification chi-square test was applied keeping P Value < 0.05 as significant.
Results: Mean and SD for Age, Duration of Stay, Pre & Post Treatment Abdominal Score and Pre and Post Treatment Alvarado Score in Group A was recorded as 35±10.60, 3.0±0.24, 7.0±0.49, 3.0±0.20, 9.0±0.41 and 3.0±1.62 respectively. In the same manner, Mean and SD for Group B was 35±12.53, 5.0±0.41, 7.0±0.35, 3.0±0.35, 3.0±0.20, 9.0±0.41, and 2.5±1.5, respectively. Success rate in Group A was 26 (52%) whereas in Group B it was 36 (72%) patients.
Conclusion: Conservative treatment can be applied safely in the majority of cases of the first attack of uncomplicated acute appendicitis, therefore, avoiding appendectomy and its associated morbidity and mortality.
Keywords: Acute appendicitis, Alvarado Score, Antibiotic treatment, Acute uncomplicated appendicitis, Success rate.

This article may be cited as: Zeb MA, Usman M, Khan F, Ahmad S, Ali L, Badar A. To Determine the Effectiveness of Conservative Treatment Versus Appendectomy in the Management of Acute Uncomplicated Appendicitis. J Saidu Med Coll Swat 2024;14(1):19-23. DOI: https://doi.org/10.52206/jsmc.2023.13.4.797

INTRODUCTION

The majority of researches consider the vermiform appendix to be a vestigial organ, and the only reason it matters in surgery is because of its propensity for inflammation, which causes the clinical syndrome known as acute appendicitis and is one the leading causes of urgent abdominal surgery in people with acute abdomen with annual crude incidence is 26 per 10,000 individuals in general.[1] Appendicectomy has a life-time individual risk of 8.6 % for men and 6.7 % for women.[2]

Acute appendicitis has traditionally been diagnosed clinically based on the patient's medical history, physical examination, and Alvarado score; however, clinical diagnosis accuracy ranges from 70 to 85%.[3] Consequently, histopathology continues to be the gold-standard for determining acute appendicitis. As a result of non-surgical conditions that mimic appendicitis and the difficulty of diagnosing acute appendicitis early and accurately before surgery, negative appendectomies, which remove a healthy appendix in 1530% of cases, remain a mystery in an era accustomed to early and accurate preoperative diagnosis.[4,5] Such patients are a burden on the healthcare system, and streamlining the diagnostic process may aid in reducing the number of negative appendectomies." Even though appendectomy is thought to be a safe procedure, it still has associated risks, including a morbidity of 3.1% in cases of acute appendicitis and up to 47.2% in cases of perforation".[6] Appendicitis was successfully treated with only antibiotics 63% of the time. A perforated appendix, peritonitis, or an infection near the appendicectomy incision were 39% less likely to occur in those who received antibiotics as opposed to those who underwent surgery.[7] Still, 20% of those who received antibiotic treatment experienced a return of pain or other symptoms and required hospitalization again; some of these patients had serious infections.[8]

Reports state that immediate appendectomy can be avoided for at least 24 h without increasing morbidity if antibiotics are administered.[9] Other authors suggest that appendectomy may not be necessary for the majority of patients with acute uncomplicated appendicitis, as the condition resolves spontaneously without the need for a surgical procedure in many patients and in others may be treatable with antibiotics alone.[10] This approach has many advantages, including high success and low recurrence rates, reduced morbidity and mortality, less pain, shorter hospitalization and sick leave, and reduced costs. Moreover the creation and spread of antibiotic resistance will have a direct and long-lasting effect.

The aim of this study was to evaluate the effectiveness of conservative treatment in uncomplicated acute

1. Swat Medical College, Swat, Pakistan.
2. Saidu Medical College, Swat, Pakistan.

Correspondence: Dr. Mian Anwar Zeb
Swat Medical College, Swat, Pakistan.
Email: miananwarzeb@gmail.com

Received: July 06th, 2023 - 1st Revision: September 22nd 2023
2nd Revision: September 27th 2023 - 3rd Revision: January 14th 2024
4th Revision: January 17th 2024 - Accepted: January 17th, 2024

appendicitis using antibiotic as a first treatment plan and to assess the treatment failure.

MATERIAL AND METHODS

In this Randomized control trials a total of 96 patients (48 in each group) patients were enrolled through non probability convenient sampling after approval from the ethical approval committee. The study was conducted at Department of General Surgery, Saidu Group of Teaching Hospital Saidu sharif. The duration of study was one year; from 1st January 2022 to 31st December 2022. Patients of either gender, aged between 18 to 60 years presented with abdominal pain (VAS Pain Sore=4-7) (annex-1)[11] in right iliac fossa with vomiting, anorexia, and pyrexia (Alvarado Score >6) (annex-2)[12] for the last 48 hours were included in the study. Patients presented with symptoms of appendicitis with ultrasonographic findings showing evidence of phlegmonous or ruptured appendix, has recent trauma or abdominal surgery, presented with history of renal stones or chronic liver disease (HBs and HCV) and or other inflammatory diseases or having a palpable mass in RIF excluded from the study. Patients who were inadvertently identified during an ultrasonogram as having a history of amenorrhea, pregnancy, or another gynecological pathology and patients who did not experience improvement in the following day were deemed to have failed non-operative treatment, underwent appendectomy, and were then excluded from the study (Figure 01).

Operational Definitions

Uncomplicated Acute Appendicitis: A patient having pain in right iliac fossa (VAS Pain Score 4-7) with vomiting, anorexia, pyrexia(>99'F) tenderness and rebound tenderness in right iliac fossa (using Alvarado > 6) with WBC count.[11]

Complicated Acute Appendicitis: A patient having appendicitis, that show complications such as perforation, abscess, mass on clinical examination or radiological reports.[12]

Success rate: Successful conservative treatment was defined as being discharged from the hospital following the resolution of symptoms without the need for surgical intervention and no appendicitis during a follow-up of 6 months.[13]

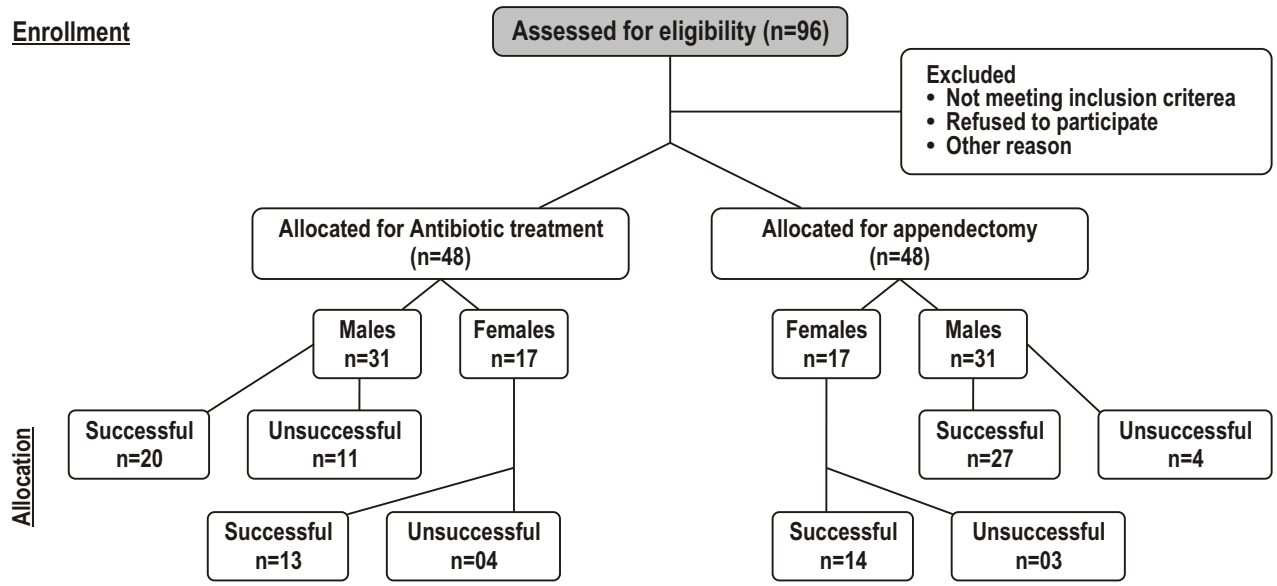


Figure 01. CONSORT Flow Chart

Data Collection Procedure

This randomized control trials were carried out after approval from the institution's research committee and ethical review board of Saidu group of teaching hospital, saidu sharif (IRB 201/STMC, dated: 12-03-2021). The study included all admitted patients as well as those from outpatient clinics who met the criteria for inclusion. Patients were informed of the study's aims and benefits, and a written informed consent was also obtained from them. After ascertaining made according to history, physical examination result, WBC count, and ultrasonographic findings showing evidence of non-ruptured appendicitis with an appendiceal diameter of 1.1 cm or less. A total of 96 sample size was calculated keeping 67%[14] success rate of non-operative strategy and 88%[13] in appendectomy with Power of Test 80% with level of Significance of 5% and margin of Error 3%. Patients were divided in to two groups of 48 by lottery technique. Patients in group A received intravenous antibiotics (cefotaxime 1 g twice daily and metronidazole infusion 500 mg/100 ml 3 times per day) for at least 24 h. Patients whose signs and symptomshad improved discharged home at the next morning and informed to continue with oral antibiotics (ciprofloxacin 500 mg twice a day and metronidazole 500 mg three times a day) for a total of 10 days. In

patients whose clinical condition had not improved and did not respond to conservative treatment or worsened were operated by appendectomy and were removed from the study. Follow-up at the end of treatment for six months was done.

All surgeries in Group B was done by the same surgeon having more than five years post fellowship experience under general anesthesia through standardized techniques with aseptic measures. Patients in both groups were again evaluated by the same post fellowship five-year experience consultants at 24hrs for complete resolution of symptoms and success rate was evaluated as per Alvarado score. All the information including name, age, gender, address, date of admission was noted in the predesigned proforma (Annex-C). To prevent confounders and bias in the study's findings, strict exclusion criteria were employed.

SPSS Version 22 was used for entering and analyzing data. Mean ± SD was calculated for continuous variables like age, duration of stay, pre and post treatment abdominal pain (VAS Pain Score) and pre and post treatment Alvarado score in both groups. Frequencies and percentages were calculated for categorical variable like gender and success rate. Both groups were compared for success rate through chi square test. Success rate in both groups was stratified among age and gender in order see effect modifications. The post-stratification chi-square test was used, with a P Value of less than 0.05 being considered significant.

RESULTS

This Randomized control study was conducted on 96 patients presented at the Department of General Surgery Saidu Teaching Hospital, Swat. Mean and SD for Age, Duration of Stay, Pre & Post Treatment Abdominal Score and Pre and Post Treatment Alvarado Score in both groups was recorded. (Table 01)

Table 01. Mean and S.D of Various Parameters in Both Groups

Contineous Variables	Mean & SD		P - value
	Group A (n=48)	Group B (n=48)	
Age	35±10.60	35±12.53	0.24
Duration of Stay	3.0±0.24	5.0±0.41	0.15
Pre-Treatment Abdominal Pain Score (Group A)	7.0±0.49	7.0±0.35	0.40
Post Treatment Abdominal Pain Score (Group A)	3.0±0.20	3.0±0.20	0.20
Pre-Treatment Alvarado Score (Group B)	9.0±0.41	9.0±0.41	0.4
Post Treatment Alvarado Score (Group B)	3.0±1.62	2.0±1.5	0.6

In age wise distribution, in Group A, 16 (33.33%) patients were recorded in 18-30 years age group, 19 (39.58%) patients were recorded in 31-45 years age group and 13 (27.08%) patients were recorded in 46-60 years age group.

In gender wise distribution, in Group A, 31 (64.58%) were noted as being male patients. whereas 17 (35.41%) patients were recorded as female patients. Similarly, in Group B, 31 (64.58%) were recorded as male patients whereas 17 (35.41%) patients were recorded as female patients. The success rate in Group A was 26 (52%) whereas in Group B, 36 (72%) patients experienced success rate (Figure 02).

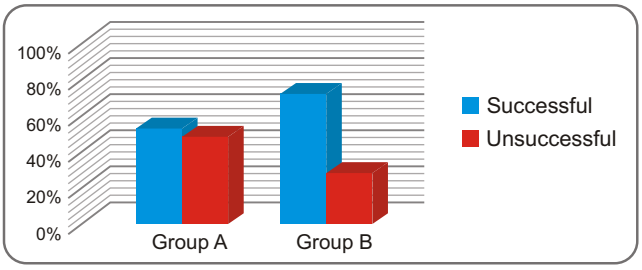


Figure 02. Success rate of both groups

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In gender wise distribution, in Group A, 31 (64.58%) were recorded as male patients whereas 17 (35.41%) patients were recorded as female patients. Similarly, in Group B, 31 (64.58%) were recorded as male patients whereas 17 (35.41%) patients were recorded as female patients. (Table 03).

DISCUSSION

Acute appendicitis is a clinical diagnosis based on patient's history, physical examination including Alvarado score, but the accuracy of clinical diagnosis ranges from 70-85%. Therefore histopathology remains the gold standard for confirming acute appendicitis. In an age accustomed to early and accurate pre-operative diagnosis acute appendicitis remains an enigmatic challenge, as it is complicated by non-surgical diseases that mimic appendicitis, and a decision to operate based on clinical suspicion alone

Table 02. Stratification of Success Rate with Respect to Age (n=96)

Age	Success Rate	Group. A (n=48)		Group. B (n=48)		P. Value
		Frequencies	Percentages	Frequencies	Percentages	
18-30 Years	Yes	13	27.08	15	31.25	0.285
	No	03	06.25	01	2.08	
31-45 Years	Yes	13	27.08	15	31.25	0.461
	No	06	12.50	04	8.33	
46-60 Years	Yes	07	14.58	11	22.91	0.089
	No	06	12.50	02	4.16	

Table 03. Stratification of Success Rate with Respect to Gender (n=96)

Age	Success Rate	Group. A (n=48)		Group. B (n=48)		P. Value
		Frequencies	Percentages	Frequencies	Percentages	
Male	Yes	20	41.66	27	56.25	0.037
	No	11	22.91	04	8.33	
Female	Yes	13	27.08	14	29.16	0.671
	No	04	8.33	03	6.25	

can lead to the removal of a normal appendix in 15-30% of cases i.e negative appendectomies. Such patients constitute as a burden on the health care system.[11]

Improving the diagnostic protocol may help in decreasing the rate of negative appendectomies. Although appendectomy is considered to be a safe operation it still has got associated complications; morbidity of 3.1% in acute appendicitis and up to 47.2% in cases where peritonitis and infection has occurred.[12]

Traditionally, any patient presenting with acute uncomplicated appendicitis is referred for urgent surgery. The greatest advance of antibiotic production allows for more conservative approach in management of such cases. Several recent randomized controlled trials suggest that therapy with antibiotics alone is a safe treatment option for appendicitis. Although antibiotic treatment may fail in some patients and there is a risk of recurrence, the surgically treated patients are subjected to the risks of operative morbidity and mortality.[13]

Antibiotics alone successfully treated appendicitis 63% of the time. People who received antibiotics instead of surgery were 39% less likely to develop complications such as peritonitis and infection around the appendectomy incision. On the other hand; about 20% of those treated with antibiotics had a return of pain or other symptoms and needed to go back the hospital; some of these had serious infections.[14]

In a study by Emad H, the success rate of non-operative strategy in the treatment of uncomplicated acute appendicitis was recorded as 93.3% which in comparison of our study was high. The success rate of non-operative strategy in our study was 26 (52%).[15]

In a study by Frazee RC, three hundred forty-five patients underwent appendectomy procedure for acute uncomplicated appendicitis during the same time frame. Three hundred five patients were managed as outpatients, with a success rate of 88% which as compared to our study were 36 (72%).[16]

In another study, treatment efficacy in antibiotic group was 67% and in appendectomy group it is 100% which as compared to our study was high. In our study it was in Group A, 26 (52%) success rate whereas in Group B, 36 (72%) patients experienced success rate.[17]

The majority of patients with uncomplicated acute appendicitis can be successfully treated by antibiotics instead of undergo appendectomy. This conservative approach results in early return to normal activity, and better quality of life measures. However; other factors like cost effectiveness and long term follow up (< one year) should be further investigated.

CONCLUSION

This study evaluated conservative treatment in uncomplicated acute appendicitis and was conducted in a single-based hospital for a period of one year. Conservative treatment can be applied safely in the majority of cases of the first attack of uncomplicated acute appendicitis, therefore, avoiding appendectomy and its associated morbidity and mortality. However, conservative treatment requires close monitoring and repeated re-evaluation of the clinical condition of the patients to recognize a failure in improvement of clinical status, which needs to be treated immediately by

surgery. Treatment failure on initial admission as well as the short-term recurrence after conservative treatment is low and acceptable.

Ethical Consideration
This study was approved by the ethical review board of Saidu Teaching Hospital, Swat, Pakistan.

Funding
There is no role of any funding agency in this study.

Conflict of Interest
Authors declared no conflict of interest

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DATA SHARING STATEMENT: The data that support the findings of this study are available on request from the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

AUTHORS' CONTRIBUTION
The following authors fullfill authorship criteria as per ICMJE guidelines;

Zeb MA, Usman M:	Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.
Khan F, Ahmad S:	Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.
Ali L:	Analysis and interpretation of data, drafting the manuscript, final approval, agreed to be accountable for all the work.
Babar A:	Analysis and interpretation of data, critical revision,final approval, agreed to be accountable for all the work.

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