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Original Article

Conservative Treatment Versus Surgical Management of Uncomplicated Acute Appendicitis in Adult

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Abstract

Background

Acute appendicitis remains the common surgical condition and appendicectomy remains the mainstay of treatment for over 130 years. Possibility of non-surgical treatment has been proposed since the middle of the 20th century. An increasing amount of evidence supports the use of antibiotics as conservative treatment instead of surgery for treating patients with uncomplicated acute appendicitis.

Objectives

To compare conservative treatmentwith appendicectomy in the management of uncomplicated acute appendicitis in adult confirmed by clinical findings and investigations.

Methods

Ahospital based prospective type of comparative observational study was conducted over a period of three years from 1st January 2020 to31st December 2022 in the Department of Surgery, Dhaka National Medical College Hospital. Total 224 patients of acute appendicitisdiagnosed with history taking, clinical examination, laboratory profile, ultrasonography proven in surgery department of Dhaka National Medical College Hospital were included. Total study population were divided into two groups randomly, one was surgically treated and another one was treated conservatively.Patient treated with conservative treatment received intravenous Ceftriaxone (1 gm/12 hourly) and Metronidazole (500mg/ 8 hourly) for 3 days followed by 7 days of oral Cefixime (400 mg twice daily) and oral metronidazole (500 mg 3 times per day) for 2 days. Patients randomized to the surgical treatment group were assigned to undergo standard open appendicectomy by grid iron incision. The primary end point for the surgical intervention was the successful completion of an appendicectomy and the primary end point for conservative treatment group was discharge from the hospital without the need for surgery.

Results

In this study, the maximum number of patients 80 (35.71%) was between18-25year age group.Out of 224 cases 126 (56.23%) cases were male and 96 (42.85%) were female. Male and female ratio was 1.3:1. Large numbers of respondents 99 (44.19%) werestudents followed by housewife 48 (21.42%). Leukocyte count (Mean±SD) in surgically treated groupwas 12.7× 109/L and conservative treatment group was12.3× 109/L. Alvarado score was 6-7, which was same in bothgroups. Per-operatively, no collection was seen in right iliac fossa in 86 (76.78%) and serous and purulent collection found in 15 (13.39%) and 11 (9.82%) cases respectively. Only 15 (13.39%) patients had greater omentum present around the appendix, rest 97 (86.60%) patients don't have greater omentum around the appendix. During operation, 81 (72.32%) appendixes found severely inflamed, 3 (2.67%) were gangrenous and 2 (1.78%) were perforated. Although 8 (6.77%) patients had macroscopically normal appendix. Per-operatively, we found appendiceal lumen was obstructed in only 26 (23.21%) patients. Outcome of the acute appendicitis patient were, median hospitalstay

more in conservative treatment group 4.1 days in comparison to surgically treated group 3.4 days. Treatment failed 31 (27.67%) patients were treated by appendicectomy.Among 31 patients, appendix of all 31 (100%) patients were severely inflamed and 25 (80.64%) patients lumen found obstructed with fecalith. Greater omentum found fixed with appendix in 26 (83.87%) patients and serous and purulent collection found in 20 (64.51%) and 11 (35.48%) patients respectively. Readmission required due to recurrent appendicitis occurred in 9 (8.03%) patients in conservative treatment group, who was then treated by appendicectomy, where surgically treated group required no readmission. One third of recurrences appeared within 30 days and two-thirds between 3 and 6 months after hospital discharge. Surgical site infection occurred in 29 (25.89%) patients. Treatment efficacy was 72.32% for conservative treatment.

Conclusions

The current evidence does not support the routine use of antibiotics as the mainstay of treatment of uncomplicated acute appendicitis because of recurrence and appendicectomy remains the current gold standard.

Keywords

Acute appendicitis, Conservative treatment, Complicated appendicitis, Uncomplicated appendicitis, Ultrasonography.

Introduction

Acute appendicitis is inflammation of the vermiform appendix and remains the most common cause of the acute abdomen in young adults. The mainstay of treatment is appendicectomyand consequently, this is one of the most commonly performed operation in acute abdomen.[1] More than 3000000 appendicectomies are performed annually in the United States.[2] Lifetime risk of developing appendicitis is approximately 7%. Most frequently occurs in 2nd & 3rd decades of life. Mortality is 0.2 deaths per 100000.[3] Appendicectomy is generally well tolerated. As it is a major surgical intervention and can be associated with serious postoperative morbidity.[4,5] It has been thought that acute appendicitis invariably progresses to perforation. This line of thinking underlies the belief that emergency appendicectomy is required when the diagnosis is appendicitis. Fitz's and McBurney's publication predated the availability of antibiotics by 40 years showed, in the absence of antibiotics, appendicectomy saved lives by reducing the risk of severe pelvic infection when appendicitis waspresent.[6,7] However, appendicitis can be notoriously difficult to diagnose, and there exists a negative appendicectomy rate of 10%–20% despite the use of preoperative computed tomography (CT).[8]

Diagnosis of acute appendicitis is mainly clinical and the Alvarado score is a numerical scoring system ranging from 1 to 10 that assesses symptoms, signs, temperature and blood results to help in diagnosis of acute appendicitis.[9] Pathologically, acute appendicitis is divided into two type, acute catarrhal variety and acute obstructive variety. Obstruction of appendiceal lumen seems to be essential for the development of complicated appendicitis (gangrene and perforation). Lumen of appendix can be occluded by fecalith, tumor or intestinal parasites (Oxyuris vermicularis). In many cases, the appendix lumen is patent despite the presence of mucosal inflammation and lymphoid hyperplasia. Continued lymphoid hyperplasia, mucus secretion and inflammatory exudation increases intra luminal pressure and causes obstruction. Resolution can be occurred at this point either spontaneously or in response to antibiotic therapy (these refers to acute catarrhal variety of appendicitis).[10]

Early postoperative complications of appendicectomy includes wound infections, intra-abdominal abscesses, ileus, fecal fistula andlate complication is adhesions.The mainstay of treatment for other intra-abdominal inflammatory processes, such as diverticulitis, consists initially of conservative management with antibiotics.[11] In view of the potential morbidity associated with an

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open appendicectomy, is there a role for conservative management with antibiotics? A number of reports exist regarding possible conservative management of appendicitis, with or without interval appendicectomy, and many pediatric centers practice this approach in patients with uncomplicated appendicitis.[12-14]

Conservative management of acute appendicitis includes nothing per oral for certain period, intra venous fluid and electrolytes administration, broad spectrum antibiotics, analgesics, antiulcerant.[15] Even though appendicectomy has been the mainstay treatment for appendicitis, relatively soon after antibiotics were available, Coldrey reported treating 471 patients with acute appendicitis with antibiotic therapy in 1956. Mortality was low (0.2%) and recurrent appendicitis occurred in only 14.4% of patients.[16] Consequently, the aim of this study was to evaluate the current role of conservative treatment with antibiotics versus surgical management of acute appendicitis (appendicectomy) and to assess if appendicectomy remains the gold standard of care.

Materials & Methods

Ahospital based prospective type of comparative observational studywas conducted over a period of three years from 1stJanuary 2020 to 31st December 2022 in the Department of Surgery, Dhaka National Medical College Hospital after obtaining requisite consent from the patients. The populations of this study included male and female patients ranging from 18-70 years. Total 224 patients diagnosed as acute appendicitisby history taking, clinical examination and investigationslike complete blood count, ultrasonography of whole abdomen (sensitivity 81% and specificity 88%), plain x-ray KUB region, urine routine microscopic examination etc. Being a resource-limited country, none of the patients underwent a CT scan abdomen for the diagnosis of uncomplicated acute appendicitis, following the hospital policies. Conservative treatment offered randomly selected uncomplicated acute appendicitis patients. Theywere given Inj. Ceftriaxone 1gm intra venous 12 hourly,Inj. Metronidazole 500mg intra venous 8 hourly for 3 days then oral Cefixime 400mg 12 hourly of 7 days and oral Metronidazole 400mg 8 hourly for 2 days. A six-hourly recording of; temperature, blood pressure, pulse rate, respiratory rate, and the local abdominal sign was done. Patients who improved were discharged. Failureof treatment judged by- progression of abdominal pain, raising of fever, increasing pulse rate, lack of overall improvement in 24 hours after hospital admission. Conservative treatment failed patients were surgically operated by open appendicectomy. All surgically treated patients were operated via grid iron incision. Both groups of patients wereevaluated during follow up with a questionnaireat 3 and 6 months. Patients with repeated disease symptoms, like persistent pain in the right iliac fossa, leukocytosis, and anorexia, and ultrasound findings of an inflamed appendix on a follow-up visit or in an emergency within six months after successfully managing conservatively, were labeled recurrent appendicitis.The effectiveness of conservative treatment was defined as clinical resolution of all symptoms without the need for surgical intervention, along with tolerating oral diet and no recurrence within six months of follow-up.Patients with complicated appendicitis, which was defined as the presence of perforation, abscess, or suspicion of a tumor on the ultrasound scan, were excluded. Other exclusion criteria were pregnancy (pregnant patient directly operated due fear of serious complication), patient who are unable to cooperate and provide informed consent, the presence of serious systemic illness and patient with total white blood cell count more than 14.5× 10^9/L (more the WBC count more the inflammation and more chance of complicated appendicitis). The collected data were entered into the computer and analyzed by using SPSS (version 20.1).

Results

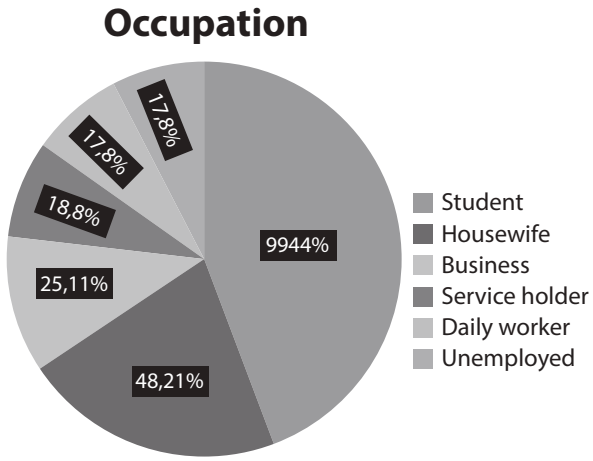
A total 224 cases of suspected uncomplicated acute appendicitis patient were enrolled for this study. Patients were divided into two comparative groups. After detailed examination and investigations, demographic features, per operative findings were correlated and outcome was observed.

Table-I: Age and sex distribution of the patients (n=224)

Age (years)	frequency				Total	
	Male		Female			
	n=126	% of gender	n=96	% of gender	n=224	% of total population
18-25	46	36.50%	34	35.41%	80	35.71%
26-33	34	26.98%	29	30.20%	63	28.12%
34-41	20	15.87%	13	13.54%	33	14.73%
42-49	11	8.73%	10	10.41%	21	9.37%
50-57	09	7.14%	08	8.33%	17	7.58%
58-65	04	3.17%	03	3.12%	07	3.12%
>65	02	1.58%	01	1.04%	03	1.33%

Maximum number of patients were male 126 (56.25%) and maximum patients were in age group between 18–25 years (35.71%) among them male was 46 (36.50%) and female 34 (34.69%).

Figure-I: Distribution of the patients according to occupation category (n=224)



Large number of patients were student 99 (44.19%) followed by housewife 48 (21.42%).

Table-II: Baseline characteristics of the acute appendicitis patients (N=224)

Baseline characteristics	Surgically treated group (n=112)	Conservative treatment group (n=112)
Leukocyte countD) (Mean±S	12.7× 109/L	12.3× 109/L
Alvarado score	6-7	6-7

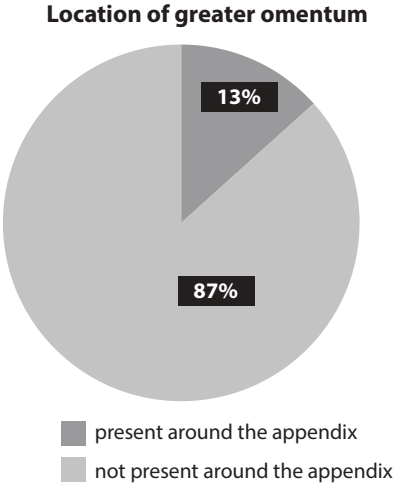
Leukocyte count (Mean±SD) in surgically treated groupwas 12.7× 109/L and conservative treatment group was 12.3× 109/L. Alvarado score was 6-7, which was same in bothgroups.

Table-III: Peroperatively presence of collection in right illiac fossa in surgically treated group(n=112)

	Nil		Serous		Purulent	
Presence of collection at right iliac fossa	n	%	n	%	n	%
	86	76.78%	15	13.39	11	9.82

No collection was found in right illiac fossa in 86 (76.78%) patients indicating uncomplicated appendicitis and 11 (9.82%) patients had purulent collection which indicated complicated appendicitis.

Figure-II: Per operatively location of greater omentum in surgically treated group (n=112)



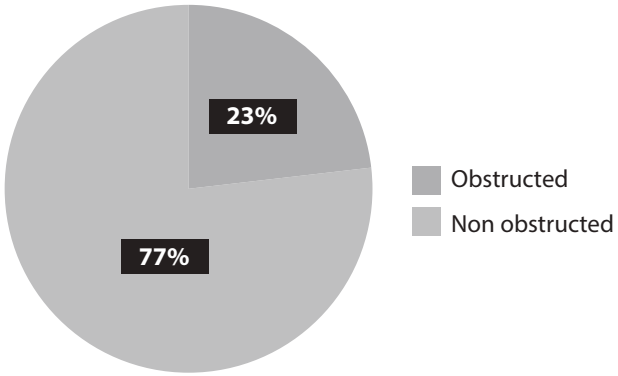
In 97 (86.60%) patients greater omentum wasn't found around the appendix.

Table-IV: Per operatively gross appearance of appendix in surgically treated group (n=112)

	normal		Minimally inflamed		Severely Inflamed		Gangrenous		perforated	
Gross appearance of the appendix	n	%	n	%	n	%	n	%	n	%
	8	6.77	18	16.07%	81	72.32%	3	2.67%	2	1.78%

Severely inflamed appendix found in 81 (72.32%) patients and gangrenous and perforated appendix found in 3 (2.67%) and 2 (1.78%) respectively. Although 8 (6.77%) patients had macroscopically normal appendix.

Figure-III: Per operatively condition of lumen of appendix in surgically treated group (n=112)



In 86 (76.78%) patients, lumen of appendix was not found obstructed.

Table-V: Outcome of the acute appendicitis patients (N=224)

Outcome	Surgically treated group (n=112)	Conservative treatment receiving group (n=112)
Median hospitalstay (Day)	3.4	4.1
Surgical site infection	29 (25.89%)	NA
Intestinal obstruction	1(0.89%)	0(00)
Ileus	5(4.46%)	NA
Treatment failure/conversion	NA	31(27.67%)
Readmission	0(00)	9(8.03%)

Median hospital stay was more in conservative treatment receiving group 4.1 day than surgical treatment group. Significant surgical site infection found in 29 (25.89%) patients after operation. Other post-operative complications were seen but conservative treatment failed in 31 (27.67%) patients who need conversion to appendicectomy.

Discussion

The treatment of uncomplicated acute appendicitis is under active research with non-operative management proving safeand cost-efficient.[17,18] Similarly spontaneous resolutionwith symptomatic treatment has also been seen inuncomplicated acute appendicitis.[19] There is also significant morbidity associated with an appendicectomy.[1] As such, it is important to determine whether appendicectomy remains the gold standard for treating acute appendicitis.In our study, maximum number of patients were male 56.25% and 35.71% patients were in between 18-25 years age group. We found 46 (36.50%) male and 34 (34.69%) female were within 18-25 years. Male female ratio in our study was 1.3:1. With the increasing age male female ratio was decreased. In a study at Ontario shows, among 65675 cases of acute appendicitis, 58% of the patients were male. The age-specific incidence of acute appendicitis followed a similar pattern for males and females, but males had higher rates in all age groups. Female: Male age-adjusted rate ratio was 1:1.4.[20] Large number of patients 99 (44.19%) were student, followed by housewife 48 (21.42%) found in our study.Baseline total white blood cell (WBC) median count was 12.7× 109/L in surgical group and 12.3× 109/L in conservative treatment group. More the WBC count, there is more chance of complicated appendicitis. A study showed, Mean WBC counts in acute appendicitis were 14.5 +/- 7.3 x109/L, gangrenous 17.1 +/- 3.9 x 109/L and perforated appendicitis 17.9 +/- 2.1 x 109/L. This reflected apersistently higher WBC count inthe complicated (gangrenous, perforated) appendicitis compared with acuteappendicitis ($p < 0.05$).[21] The increase in leucocyte count was an early marker of appendiceal inflammation, whereas the CRP value increased markedly only after appendiceal perforation or abscess formation.[22] That why cut off value of total WBC count in our study was 14.5 x 109/L. Patient with more than 14.5 x 109/ L were excluded from this study.

Per operative features includes presence of collection in right iliac fossa, location of greater omentum, gross appearance of appendix macroscopically and occlusion of lumen of appendix. No collection was found in 86 (76.78%) patients and serous and purulent collection found in 15 (13.39%) and 11 (9.82%) cases respectively. Usually, purulent collection found in complicated appendicitis. Only 15 (13.39%) patients had greater omentum present around appendix, rest 97 (86.60%) patients don't have greater omentum around the appendix. We know greater omentum known as the abdominal policeman and presence of greater omentum near the appendix and fixed with appendix, mesoappendix indicates complicated appendicitis.[23] During operation 81 (72.32%) appendix found severely inflamed, 3 (2.67%) were gangrenous and 2 (1.78%) were perforated. Although 8 (6.77%) patients had macroscopically normal appendixappendix (7.5%), gangrenous appendix (3.5%) and appendicular lump (1.5%).[24] Obstruction of lumen of appendix seems to be responsible for complicated appendicitis. Per operatively, lumen of appendix found obstructed in 26 (23.21%) patients. Other 86 (76.78%) patients had patent appendiceal lumen. A study on importance of fecalith in aetiology of acute appendicitis showed, number of cases with fecalith was 261 (36,1%).[25] In case of uncomplicated appendicitis, presence of fecalith is less than complicated appendicitis. Appendicitis in pregnancy period is serious and usually present as a complicated appendicitis.. A study in Nepal showed, the most common per operative finding was acutely inflamed appendix (84%) followed by perforated.

A study related to appendicitis with pregnancy revealed, operation done within 24 hours of symptom onset in 19 of 54 (35%) instances of proven appendicitis. Perforation occurred in 23 of 54 patients (43%), all of whom had symptoms exceeding 24 hours ($p<0.0005$).

Five instances of perinatal death and one cases of extreme perinatal morbidity were associated with negative laparotomies.[26] That's why we excluded pregnant patient with appendicitis from this study. The APPAC trial is the largest multicenter, open-label, noninferiority RCT of antibiotic treatment for appendicitis conducted to date.[17] When the trial was designed, it was assumed that there would be sufficient benefits from avoiding surgery and that a 24% failure rate in the antibiotic group would be acceptable, which is nearly similar to our treatment failure rate 27.67%.Conservative treatment failed patients were treated by appendicectomy. Appendix of all 31 (100%) patients were severely inflamed and 25 (80.64%) patients lumen found obstructed with fecalith. Greater omentum found fixed with appendix in 26 (83.87%) patients and serous and purulent collection found in 20 (64.51%) and 11 (35.48%) patients respectively. Dozens of studies have shown that presence of an fecalith is associated with both an increased risk of antibiotic failure and recurrence,[27-29] which is consistent with this study.

A number of authors have recently proposed that acute appendicitis may be managed conservatively with antibiotics.[9,11,30,31] From this study, patient required less hospital stay in comparison to conservatively treated group. A majority of articles documented similar hospital stay with both treatment methods. Some, however, reported that the length of hospital stay in the conservative treatment group was longer than that of the surgery group,[32,33] which is consistent with our study. But surgical site infection found in 29 (25.89%) patients.A study showed, incidence of surgical site infection of 7.0 per 100 appendectomies (95% prediction interval: 1.0–17.6), varying from 0 to 37.4 per 100 appendectomies.[34] In general, the complications in the antimicrobial therapy group were lower than those in the surgical group.

Comparing treatment success between the conservative treatment and surgical groups, the complication-free cure rate is more objective. we found the primary treatment efficacy was 72.32% for conservative group initially, which is consistent with the previous study.[35,36] However, we found that after 6month follow-up of conservatively treated group, efficacy decreased to 64.28% mainly due to recurrences.On the otherhand, in surgical group 75% patient was discharged uneventfully and 25% patient developed surgical site infection (which was managed by only dressing) and other minor complicationsand none of them came to us with complain within 6 months of follow up time.In comparison with surgical, the cure rate of the conservative treatment group is significantly lower, suggesting that it may not be the optimum treatment for uncomplicated acute appendicitis only considering of recurrence.

Conclusions

Acute appendicitis is the most common cause of the acute abdomen in young adults, and whereas conservative management may have a role as a bridge to surgery, the mainstay of treatment is currently operative. Treating conservatively of uncomplicated appendicitis is still debatable because the risk of recurrence. Research poor country like us needs further big scale study on this topic with long term follow-up.

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