

Using modified Alvarado score in conservative treatment of acute appendicitis

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Abstract

Background and objectives: Acute appendicitis is the most common and challenging surgical emergencies. The diagnosis is still based on the clinical examination. The modified alvarado score system is a safe diagnostic modality without extra expense and complications. Efficacy of antibiotic treatment was often considered as a bridge to surgery in selected patients with acute appendicitis aided by using of Modified Alvarado scoring system. **Methods:** A prospective clinical trial comparing antibiotics with appendectomy, a total of 424 consecutive patients were enrolled, according to Modified Alvarado Scoring System were divided into three groups: Group A: score between 8-10 (emergency surgery group), Group B: score between 5-7 (conservative group): these patients were subjected to repeated clinical examinations for 24 hours. Group C: score between 1-4, the choice of antibiotic regimen was made by using an intravenous injection of (ceftriaxon 1g x2 and metronidazo 1500mg x 3). **Results:** out of 424 patients, 206(48.6%) female and 218(51.4%) male. 156(36.8%) patients group A, 148 (34.9%) group B, histopathology confirmed appendicitis in 128(82%). patients nine (5.8%) patient in group A revisiting hospital due to complications. Mean hospital stay in group A was lesser than group B. The antibiotic response rate was 91.3%, In group A 12(7.7%) patients had wound infection, while in group B and C seven (4.7%) had complications. Out Of 13 patients in the antibiotic group, nine (6%) underwent appendectomy during the initial hospitalization. **Conclusions:** Modified Alvarado Scoring System as a diagnostic tool, can be used safely for conservative treatment of patients with acute uncomplicated appendicitis by giving antibiotics only.

Keywords: Alvarado Score; Appendicitis

Introduction

Acute appendicitis is one of the most common surgical cases approximately 7% of the population will be seen in casualties with variable presentations and mostly between the age 10-30 years, if neglected or not managed properly can lead to morbidity and mortality¹⁻³. Classical signs and symptoms of acute appendicitis were first reported by Fitz in 1886, accurate diagnosis and management are evident in 80% of cases that reduces the risk of perforation and infectious complications. but in the rest are difficult due to the lack of parallelism and anatomical positions of appendix Less than 1% are the complication rate in non-perforated appendicitis while it increased to 5% or more in the young and elderly patients in whom diagnosis are delayed. Alvarado scoring system was used in 1986 and has been applied in adult surgical patients^{4,5}. Previously rate of removal normal appendix (negative appendectomy) was 15% to 30% of cases. The rationale was to decrease appendiceal rupture rates⁶⁻⁸. According to the Alvarado Scoring System, which consists of right lower quadrant tenderness, rebound tenderness, migrating pain, nausea and/or vomiting, anorexia, fever, leukocytosis and a left shift in the leukocyte count, patients who get a score of 7 to 10 should undergo appendectomy, and patients with a score of 5 or 6 are candidates for a CT scan for the diagnosis. Taking into consideration that counting the white blood cell (WBC) differentials is not routine in many laboratories, the Modified Alvarado Scoring System (MASS) was developed by omitting the left shift of leukocytosis from the Alvarado Scale^{6,7}. Most

hospitals in Erbil do not count the neutrophils, and also the CT scans are not available. Therefore, we decided to evaluate the diagnostic value of the MASS in our setting. Using MASS which is: fast, simple, reliable, noninvasive, repeatable and safe diagnostic modality without extra expense and complications. Multiple studies declare that accuracy of the MASS was slightly greater than the Alvarado score in the diagnosis of acute appendicitis⁴. Most important step in appendicitis is to operate early to prevent perforation, which increases the risk of postoperative complications to 39%, as compared with 8% for simple appendicitis. Also, operation for a normal appendix carries a post-operative complication rate of 4-15%, recently studies demonstrate that treatment with antibiotics alone may suffice in the cases of mild non-perforated acute appendicitis, the dilemma facing the surgeon is the identification of those patients with mild appendicitis who may benefit from conservative treatment. As the gold standard in diagnosis of acute appendicitis is histopathology⁹. Generally, after all operations, postoperative complications happened like: wound infections, intra-abdominal abscesses, ileus and, in the longer term, adhesions. With this in mind, worthily reminding the mainstay of treatment for other intra-abdominal inflammatory processes, such

as diverticulitis, consists initially of conservative management with antibiotics², traditionally, the main treatment for acute appendicitis is appendectomy¹⁰. Multiple studies confirming possible conservative treatment of appendicitis, with or without interval appendectomy^{3,11-13}. At the end of the 20th century the role for treating appendicitis changed towards a more conservative approach with repeated clinical and laboratory examinations, which achieved by active observation, resulting in decreasing number of negative appendectomies without an increased perforation incidence¹⁴⁻¹⁷. The rates of negative appendectomies and appendix perforations vary in different studies. In a report from Sweden the mean negative appendectomy rate was 30% from 1969-1990 and the mean perforation rate was 15%¹⁸. Recently, antibiotic treatment was often regarded as a bridge to operation in patients with suspected appendicitis alone but no clear indications for appendectomy such as signs of perforation or peritonitis. However, the treatment of the large majority with uncomplicated appendicitis need repeated examinations and evaluations^{19, 20}. The main conflict for surgeon is choosing those patients with mild appendicitis who may benefit from conservative treatment²¹. The aim of this study is to explore the efficacy of antibiotic therapy as single treatment for acute appendicitis in selected patients, aided by using of MASS.

Patients and Methods

A prospective clinical trial comparing antibiotics with appendectomy as treatment of acute appendicitis, over a two year period (January 2015- December 2016), a total of 424 consecutive patients were enrolled in our study. Patients admitted to the emergency Hospitals in Erbil with a clinical diagnosis of suspected acute appendicitis, patients of all ages and both sexes presenting to the emergency room with pain in the lower right quadrant of the abdomen were included in the study. Patients with signs of urological, gynecological and surgical procedures other than appendicitis, particularly patients with right iliac fossa mass, appendiceal abscesses, and evidence of generalized peritonitis in the examination were excluded from the study. The prospective studies were approved by the regional Committee of Ethics in the College of Medicine-Hawler Medical University. The Modified Alvarado Scoring System (MASS) criteria were fulfilled for each patient, components were shown in table 1; were regarded an elevated temperature of 37.5 °C or more, and leukocytosis (>10,000 WBCs). Right lower quadrant tenderness and leukocytosis had two scores, and the others had one score, ultrasonography was done for all patients, and it was carried out by radiology residents.

Table (1): Modified Alvarado Score Form.

Content	Details	No.
Symptoms	Migratory of pain	1
	Anorexia	1
	Nausea/ vomiting	1
	RLQ pain	2
	Rebound tenderness	1
Sign:	Elevation temp	1
	Extrasign (cough test)	
	Rovsing sign rectal tenderness)	1
Lab:	: Leukocytosis	2
	Total score	10

By MASS the patients were divided into three groups:

Group A: A score between 8-10 (emergency surgery): these patients were prepared and all underwent an emergency appendectomy, the diagnosis of acute appendicitis was confirmed by the operative findings and the histopathological evaluation of the specimen appendectomy.

Group B: A score between 5-7 (conservative group): these patients were admitted and subjected to repeated clinical examinations and kept under observation for 24 hours with frequent reassessment of the clinical data. The condition of some patients has improved within an hour, as represented by a decrease in the score and – therefore – they came out with instructions that they should return if symptoms persist or increased in intensity, were released and sent home with instructions to return if symptoms persisted or their condition worsened.

Group C: A score between 1-4 (observation group): these patients, after being given initial symptomatic treatment was discharged from hospital and contacted if not responding to treatment.

The reliability of the MASS was assessed by calculating the percentage of negative appendectomy rate in Group A, and the outcome of group B treated with the antibiotics. The antibiotics were given

at admission as intravenous therapy for at least 24 hours, initially, patients received intravenous fluids and were not allowed oral intake. Group B patients were then discharged to continue with oral antibiotics for a total antibiotic treatment period of 10 days, if their clinical status had improved after 12-24 hours. Intravenous antibiotic therapy could be prolonged if the clinical condition did not improve clear-cut. Appendectomy was performed if patients deteriorated clinically or continued to show no sign of improvement according to the responsibility of the surgeon in charge. The choice of antibiotic regimen was made by using an intravenous injection of (ceftriaxone 1gx2 and metronidazole 500mg.x3). Oral antibiotics were the same for discharge. Group B patient outcomes were assessed during their hospital stay (days 0, 1, 2) and then by telephone interviews after 10 days, 3 months, and 1 year. Patients were instructed to contact the researcher in the event they experienced any post-intervention problems. Data were collected using a pretested questionnaire and analyzed using SPSS version 16 (SPSS Inc., Chicago, IL, USA). $p \leq 0.05$ was considered significant in two-tailed tests.

Results

A total of 424 patients were enrolled in this study. 206 were female (48.6%) and 218 were male (51.4%), The ratio of women to men was 1:1.1, The average age was 23.5 years (range 10-64 years). Most patients were younger. 156 (36.8%) patients belonged group A, subjected to appendectomy. 148 (34.9%) were belong group B and the Remaining 120 (28.3%) patients were belong group C. The specimen of appendix

in group A sent for histopathology examination confirmed acute appendicitis in 128 patients (82%), which shown in Figure 1. In majority of the surgical appendectomized patients 87 (68%) the appendix was inflamed, 14 (11%) gangrenous appendix was observed, while inflamed appendix with faecolith and perforated appendix were observed in six (5%) and 15 (16%) numbers of cases respectively which shown in Figure 2.

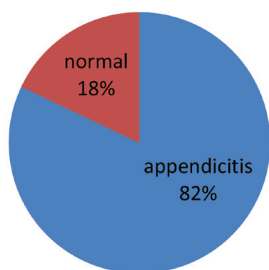


Figure (1): Histopathological result in group A.

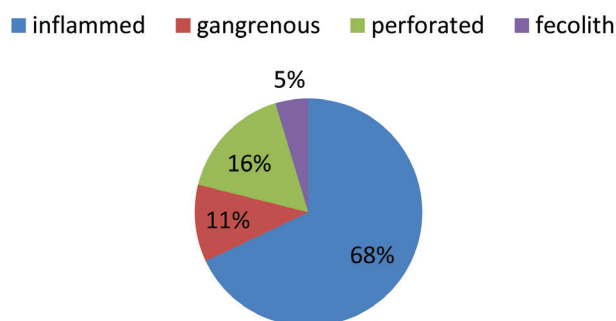


Figure (2): Type of histopathological results in Appendicitis.

Nine (5.8%) patient in group A revisiting hospital due to complications, five case for wound infection, three cases for paralytic ileus, one for chest infection. while in group B and C 28 and eight cases respectively visiting causalities due to pain and allergy to drugs. Mean hospital stay in group A

and B was shown in Table 2. The length of hospital stay (primary hospitalization) was statistically not significant shorter ($P < .06$) in the surgical group (1.5 ± 0.7) than in the antibiotic-treated group (2.4 ± 1.2).

Table (2): Patients demography (n =424).

Groups demography	Group A Patient (%)	Group B Patient (%)	Group C Patient (%)
Gender / total	156(36.8)	148(34.9)	120(28.3)
Male	88(56.4)	81(54.7)	49(40.83)
Female	68(43.58)	67(45.27)	71(59.16)
Mean age \pm SD (yr.)	25 \pm 12.6	22 \pm 11.8	24 \pm 11.4
Mean hospital stay \pm SD ;rang (days)	1.5 \pm 0.7	2.4 \pm 1.2	1.3 \pm 0.5
Complications	12(7.69)	7(4.7)	3(2.5)
Re visiting hospital	9(5.76)	28(18.91)	8(6.66)
Operation	0(0)	13(8.7)	1(0.8)

The antibiotic response rate (recovery without surgery) was 91.3% (148/135) Thirteen patients (8.7%) in group B whom experienced recurrent appendicitis within 1-year follow up. In group A 12(7.7%) patients developed complications in form of wound infection in eight (5%) patients, three (2%) paralytic ileus and onepatients with chest infection while in group B and C seven (4.7%) and three (2.5%) patients developed complications in form of antibiotics side effects (diarrhea and allergy). Out Of 13 patients in the antibiotic group, nine (6%) underwent appendectomy during the initial hospitalization. the rest four (2.7%) during the period of follow up. 6/9 patient had

complicated acute appendicitis at surgery and 3/9 had uncomplicated appendicitis. Of the six (4%) patients with complicated acute appendicitis, there were four (2.7%) with perforated appendicitis. Of these one patient had an appendicolith not visible on ultrasound, one presented with severe gangrene of the inflamed appendix. Among patients who treated with antibiotics, 28/148 (19%) patients were readmitted with recurrence of symptoms and allergy to the antibiotics. In this group, 7/28 patients had allergy and 13/28 (9%) had appendectomy and eight (5.4%) patients were treated successfully with another course of antibiotics.

Discussion

Acute appendicitis still regarded a common surgical emergency condition, and poses significant diagnostic challenge to the clinical judgment of young trainee surgeons who are often the first ones to diagnose it. It is highly desirable not to miss a diagnosis as the condition has a potential for significant complications. Also it is equally important to avoid unnecessary surgery for an otherwise normal appendix. In 1986, Alvarado introduced a scoring system in order to help clinical diagnosis of acute appendicitis and also reduce the rate of negative appendectomies⁶. Epidemiological studies have shown that appendicitis is more common in the age 10-20 years group and Males were more frequently affected than females, there was a slight male preponderance, in our study the ratio was (1.1:1). And more frequent involvement of young individuals (23.5 years)^{6, 7, 22, 23}. The rate of negative appendectomy was 18%. It was comparable with the published literature where up to 40% rate of negative appendectomies is reported²³. Previously, over 50% of all emergency appendectomies were done on normal or mildly inflamed appendix. This figure rises to 60%, if we consider females alone. This high percentage is not unique to our study², as high rate of negative appendectomy was reported from many studies, these patients would definitely benefit from conservative treatment with observation and antibiotics, if we can identify them preoperatively. Acute appendicitis was confirmed in 128 (82%) of the patients, while in other study it was 75.8%, because we use MASS in our study². Alvarado suggested that patients with scores of 7 or higher should be operated on while we made the group of surgery to start from 8 and more⁷. In this study, none of the patients with perforated appendix had an Alvarado score of less than 7. This means that patient with score between 5-7 may safely be kept under observation followed by serial reevaluation with Alvarado scoring and the decision to operate or not may be changed accordingly²³. They reported that patients with an Alvarado score ≤ 4 (Alvarado group 1) did not have appendicitis that required surgical treatment²⁴. A number of authors have recently proposed that acute appendicitis may be managed conservatively with antibiotics^{2,10}. It is worth considering that other intra-abdominal inflammatory processes are managed conservatively and that the current management of acute appendicitis is based mainly on tradition rather than evidence¹⁰. There is variation in the incidence of post-operative infection for non-perforated appendicitis; ranging from 0 to 11.7% these discrepancies could be attributed to differences in the number of patients, type of antibiotics used follow-up duration and definition of wound infection. In our study, wound infection rate was 5% which is consistent with previous studies²⁶. A combined single dose of metronidazole and

ceftriaxone preoperatively appear to be sufficient to prevent surgical site infections in patients with uncomplicated appendicitis. We recommend that preoperative antibiotic prophylaxis be administered to all patients undergoing appendectomy⁸. Meta-analysis of complications showed a relative risk reduction of 4.7% in the antibiotic treatment group compared with the appendectomy group 7.7%. We found that antibiotics are a safe initial treatment, with a significant reduction in the risk of complications compared with appendectomy. We found no significant differences in either length of stay or incidence of complicated appendicitis. Antibiotic treatment was associated with a 91% success rate and a reduced risk of complications, while in other study it was 63% we return back this success to MASS. And About 9% of patients who were treated with antibiotics had appendectomy while in others is 20%, and of these only about 6(4%) while in other study one in five had complicated appendicitis¹⁹. The diagnostic accuracy of Alvarado score in our study was higher. It has been reported that mortality rate after appendectomy was less than 1%. The merit of our study was that there was no mortality which mimics other study²⁴. Clinical diagnostic accuracy was (82%) comparing to other study was 85%²⁵. On application of Alvarado score, the diagnostic sensitivity increased in our study. Therefore, proper evaluation of patients presenting with acute abdomen with suspicion of acute appendicitis include thorough clinical history, physical examination and Alvarado scoring. These are particularly important in very young patients, elderly patients and females of reproductive age group²⁶. Consequently, this review was undertaken to assess the role of antibiotics versus appendectomy in the management of acute appendicitis. Following a review of the literature, we raised a number of issues. First, it has been demonstrated that acute appendicitis may be managed conservatively with antibiotics as a bridge to definitive surgery. However, the current evidence does not support the sole use of antibiotics as an alternative treatment modality to appendectomy in the management of acute appendicitis.

Conclusions

Using Modified Alvarado Scoring System as a diagnostic tool for dividing cases of acute appendicitis to conservative and operative group was showed that: antibiotics can be used safely as a primary conservative treatment in patients presenting with acute uncomplicated appendicitis. A conservative group with antibiotic was not associated with an increased perforation rate, and no any significant differences seen in the length of stay compared with surgery group.

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