



Evaluation of Alvarado score in the Early Diagnosis of Acute Appendicitis: A Prospective Study

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Abstract

Acute appendicitis is a common surgical emergency condition with difficulty in accurate diagnosis. Alvarado scoring system is useful tool for early diagnosis.

Aim of this study: *This study is to evaluation of Alvarado score system in the early diagnosis of acute appendicitis: a prospective study.*

Materials and Methods: *All consecutive patients with diagnosis of acute appendicitis admitted and evaluated by scoring system described by Alvarado. Patient who had undergone surgery, the diagnosis of appendicitis was confirmed by histo-pathological examination and compared with previous clinical diagnosis on the basis of Alvarado score.*

Results: *Accuracy of diagnosis in male patients was more sensitive then female patient in child bearing age.*

Keywords: *Alvarado score, Acute appendicitis.*

Introduction

The clinical entity known as “acute abdomen” is documented in the literature since the time of Hippocrates. Acute appendicitis is the most common cause of acute abdomen^[1] which compels the patient to seek medical attention, however it is often diagnostic problem during the early stages of the disease. Failure to make an early diagnosis the primary reason for persistent rate of morbidity and mortality^[2-3]. perforation rate range from 4-45%^[4-5] and death rate range from 0.17-7.5%^[6-7]. The number of unnecessary laparotomies particularly in women may be as high as 45% the overall “negative

“appendicectomy rate ranges from 14-75%^[2,8,9]. Although aids exist to enhance diagnosis, there are either complex or not easily available when most needed scoring system described recently by Alvarado^[10] was designated to reduce the negative appendicectomy rates without increasing the morbidity and mortality^[11]. A negative appendicectomy rate of 20-40% is common in surgical literature and many surgeons would accept a negative appendicectomy rate of up to 30% as inevitable^[12]. This present study aims to evaluate usefulness of this scoring system in patients with a provisional diagnosis of acute appendicitis.

Materials and Method

All consecutive patients presenting to our hospital with abdominal pain suggestive of appendicitis were included in the study over a 2 years from July 2015 to August 2017. In addition to normal clinical assessment, these patients were scored as described by Alvarado.

During this period, 100 patients diagnosed or suspected to have appendicitis were evaluated. Patient with less than 15 years of age, with history of previous abdominal surgery and pregnant woman was not included in this study. All other patients with clinical diagnosis of appendicitis were included in this study. The scoring system was introduced as to support the diagnosis of acute appendicitis to prevent negative appendicectomy. The scoring system as described by Alvarado is based on three symptoms, three signs and two laboratory findings. [Table I]

SCORE

9-10- Certain to have appendicitis

7-8- Likelihood of appendicitis

5-6- Compatible with, but not diagnostic of appendicitis

Those patients with score of 5-6 were considered to have compatible with appendicitis but not convincing enough to undergo immediate surgery. These were marked for further review. Those with a score of 7-8 were likelihood of appendicitis and those with a score of 9-10 were certain to have acute appendicitis and undergo urgent surgery.

The Alvarado score can increase or decrease on reassessment. The laboratory finding of elevated white Blood Cell count was (10000-18000)/mm⁽⁵⁾. Data including age, sex, symptoms, physical signs, WBC count, differential count and intraoperative diagnosis were tabulated from clinical records.

Results

Of 100 patients hospitalized, maximum number of patients i.e. 58(58%) were in age group of 15-25 years.

The male to female ratio for overall patients was 2.1:1[Table II].

On clinical ground out of 100patients, 67(67%) patients were diagnosed to have acute appendicitis, 22(22%) chronic appendicitis and 11% were diagnosed as appendicular perforation [Table III].

We categorized the 100 patients into two groups: Men and Women .The results are summarized in table IV.

Patients with score > or = 7 in male group appendicitis was confirmed histologically in 47 out of 48 cases with sensitivity of 93% [true positives]. In the female group 20 out of 30 had histologically proven appendicitis with sensitivity rate of 67%. A final diagnosis was made in all women with gynaecological condition was predominant but had a normal appendix. Three women had ruptured ovarian cyst, four had inflammatory bowel disease and seven had pelvic inflammatory disease. Of those patients who underwent operative procedure with Alvarado score < 7, 14 were men and 8 were women.8 out of the14 men (sensitivity 67%) and 4 out of 8 women (sensitivity 50%) had appendicitis. No patient required surgery who had a score <5.

Table I. The Alvarado score

Symptoms	score
1. Migratory RIF pain	1
2. Anorexia	1
3. Nausea and vomiting	1
Signs	
1. Tenderness RIF	2
2. Rebound tenderness	1
3. Elevated temperature	1
Laboratory	
1. Leukocytosis	2
2. shift to left	1
TOTAL	10

Table II

Sex	Total (%)
Male	68(68%)
Female	32(32%)
Total	100(100%)

Table III

S.No	Types of appendicitis	TOTAL (%)
1	Acute appendicitis	67(67%)
2	Chronic appendicitis	22(22%)
3	Perforated appendicitis	11(11%)
	TOTAL	100(100%)

Table IV

groups	No. of patients	Score \geq 7	appendicitis	sensitivity
men	68	48	47	93%
women	32	30	20	67%
		Score<7		
men		14	8	67%
women		8	4	50%

Discussion

Alvarado score is simple to use and easy to apply since it depends only on history, clinical examination and basic laboratory examination. Our study illustrates that this simple scoring system in a patient of suspected of having acute appendicitis works extremely well in male or correct diagnosis. But in case of female in child bearing age groups result is below expectation. Even with score 7 or more, over 30% didn't have an inflamed appendix.

The results shows quite effective that the Alvarado score system carries a false- positive rate which varies with groups in which study was done. Those with low score were not operated on, conclusions on false-negatives have to be look for. All patients who had low scores were discharged and did not subsequently required appendicectomy for appendicitis.

Our finding are also supported by a previous study by Owen *et al*^[11] including 253 patients over a period of 12 months with similar outcome. However, female in child wearing age group negative appendicectomy rate were higher (33% versus 22%).

In addition, diagnostic laparoscopy, which can confirm the final diagnosis in female in child wearing age, is an important technique. It is now an essential core component of higher surgical training^[13] and, as such, should ideally be mastered at a basic training level. It allows appropriate gynaecological intervention should the need arise, and can be used in the accurate placement of the eventual incision for traditional appendicectomy in positive cases. The next step, laparoscopic removal of the appendix, is appropriate where expertise exists. Controversy still exists over the value of this, but a recent

review of the literature lends weight to this statement^[14].

There are many other scoring system like Fenyö-Lindberg score (FS), Lintula score (LS), Eskelinen score (ES), Teicher score (TS), and Christian score (CS) are used for diagnosis of appendicitis. The RIPASA score showed no advantages over the modified Alvarado score when applied to patients presenting with suspected acute appendicitis^[15].

In conclusion the Alvarado scoring system is effective in male and women in child bearing age groups but diagnostic laparoscopy is needed to minimize the negative appendectomy in women with high false negative rate. However the limitation of our study was exclusion of patients under 15 years of age and small sample size.

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