



Application of Alvarado Scoring System in Diagnosis of Acute Appendicitis

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Abstract

This is a prospective study to assess the accuracy of the Alvarado Scoring System in predicting acute appendicitis in our set up. 100 consecutive patients with suspected acute appendicitis were included in the study. They were given specific scores according to variables of Alvarado scoring system and then divided into 3 groups. Group A included patients with score of 7 or more and they underwent surgery, Group B included patients with score of 5-6 and they were admitted for observation and Group C included patients with score of 4 or less and they were discharged after symptomatic treatment. Patients from group B with increased symptom intensity (score 7 or more) in re-evaluation underwent surgery. Diagnosis was confirmed by histopathological examination. Reliability of scoring system was assessed by calculating negative appendectomy rate and positive predictive value. Out of a total of 100 patients 74 underwent surgery and appendicitis was confirmed by histopathological examination in 62 patients, thus giving negative appendectomy rate of 16.21% and positive predictive value of 83.79%. Alvarado Scoring System is a simple, easy and reliable tool in the diagnosis of acute appendicitis

Keywords

Acute Appendicitis, Alvarado Score, Appendectomy

Introduction

Acute Appendicitis is the most common abdominal emergency in both developed and developing countries(1,2). Approximately 6% of the population will suffer from acute appendicitis during their life time (3, 4). Diagnosis of acute appendicitis is difficult & its complications more in young children & the elderly(5). Acute appendicitis is a clinical diagnosis and no laboratory or radiological tests are 100% accurate(6). Delay in diagnosis and management may increase the morbidity & costs. Lots of efforts have been directed toward early diagnosis and treatment of acute appendicitis. A number of scoring systems have been used for aiding in early diagnosis of acute appendicitis and its prompt management. Scoring systems are valuable and valid instruments for discriminating between acute appendicitis and non specific abdominal pain (7). One of the scoring systems is the Alvarado Scoring System which is purely based on history, clinical examination and few laboratory

tests and is very easy to apply (8). This study was conducted to evaluate the usefulness of this scoring system.

Material & Methods

This prospective study was conducted on 100 consecutive patients admitted in one surgical unit of Govt. Medical College, Jammu with the clinical diagnosis of acute appendicitis between Dec. 2006 to June 2007. Patients of any age group and both sexes presenting to emergency department with symptoms of acute appendicitis were included in the study. Patients presenting with urological, gynecological or other surgical problems including patients with mass in right iliac fossa were excluded from this study. All the patients were admitted. Baseline investigations, Hb, TLC, DLC, RFT, Urine Examination, X-ray Chest, X-ray KUB and ECG were done. A Proforma containing general information about the patient plus eight variables based on the Alvarado scoring system (Table-1) was filled.

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**Table -1 : Alvarado Scoring System**

Symptoms	Score
Migratory right iliac fossa pain	1
Nausea/Vomiting	1
Anorexia	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory Findings	
Leucocytosis	2
Shift to the left of neutrophils	1
Total	10

Sum of all scores were calculated for each patient and based on the scores patients were divided into three groups.

Group A with an aggregate score of 7-10 also called as the emergency group. These patients were prepared and underwent appendectomy. **Group B** with an aggregate score of 5-6 also called as the observation group. These patients after admission were kept under observation for 24 hrs with frequent re-evaluation and re-application of the Alvarado Scoring System. Condition of some of the patients improved as shown by decrease in score and therefore they were discharged with the instructions that they should come back if symptoms persist or increase in intensity. Condition of some deteriorated shown by increase in score. Once score became more than 7, they were operated. **Group C** with an aggregate score of 1-4 also called as the discharge home group. These patients after initial symptomatic treatment were discharged and sent home with the instructions to report back if symptoms persist or condition becomes worse. All patients with an Alvarado score of 7 or more were operated. The diagnosis of acute appendicitis was confirmed by operative findings and histopathological examination of appendectomy specimen. Finally, the reliability of Alvarado Scoring System was assessed by calculating negative appendectomy rate and positive predictive value.

Results

There were 55 Male and 45 Female patients. The range of age was 8-52 years with a mean age of 22.6 years and median age of 25 years. The frequency distribution of the patients according to Alvarado

Table:2 Frequency Distribution of Patients

Score	No. of patients	(% age)
1	-	
2	-	
3	5	5%
4	9	9%
5	11	11%
6	15	15%
7	17	17%
8	16	16%
9	14	14%
10	13	13%

Table:3 Application of Score

Management	Results (% age)	Mean Score
Surgery	60 (60%)	8.38
Observation	26 (26%)	5.57
Discharge	14 (14%)	3.64

Table:4 Operative Findings & histopathological Examination

Findings	No. of patients	% age
Inflamed appendix		
Acute appendicitis	47	63.50%
Perforated appendix	9	12.2%
Gangrenous appendix	6	8.10
Normal appendix		
Ruptured ovarian cyst	2	2.7%
Meckel's diverticulitis	2	2.7 %
Salpingitis	3	4.1%
No pathology found	5	6.7%
Total	74	

scoring system is given in Table 2. The mean scores for the discharge home group, observation group and surgery group were 3.64, 5.57 and 8.38 respectively.

Group A: We had 14 patients with Alvarado score of 1-4. Among them 8 (57.1%) were male and 6 (42.9%) were female. All of them were discharged after initial assessment and symptomatic treatment. 4 patients came back with increased severity of symptoms and score of 7 or more within



48 hours. They were admitted and all of them underwent appendectomy. Operative findings and subsequent histopathological reports showed that 3 of the 4 patients had inflamed appendix and the remaining one patient had normal appendix.

Group B: 26 patients had score of 5-6, all were admitted for observation and periodic re-evaluation. Among them 11 were male (42.3%) and 15 were female (57.7%). 16 patients ended with a score of 6 or less after 24 hrs and therefore were discharged. Only 10 patients had increased severity of symptoms with Alvarado Score 7 or more on re-evaluation within 24 hrs. Appendectomy was done in them. Operative findings and histopathological reports confirmed that 8 patients had inflamed appendix and the remaining 2 had normal appendix. **Group C:** 60 patients had score of 7 or more. All were admitted and underwent appendectomy. There were 36 males (60%) and 24 female patients (40%). Operative findings and histopathological reports showed that 51 patients had inflamed appendix and 9 patients had normal appendix.

Discussion

Early and accurate diagnosis of acute appendicitis is required to reduce the morbidity and mortality associated with delayed diagnosis and its complications. In addition to significant morbidity and mortality, negative appendectomy is also responsible for loss of precious staff hours and financial resources. These days the diagnosis of acute appendicitis is clinical. Different diagnostic aids have appeared recently and among these laparoscopy and ultrasonography have shown good results but they also have limitations and drawbacks. A no. of clinical scoring systems have been used as complimentary aid in diagnosis of acute appendicitis. Initial assessment can be improved by use of a clinical scoring system. Alvarado Scoring System is one of the many scoring systems available today. It is based on history, physical examination and few laboratory tests. It is a simple, easy to apply and cheap complimentary aid for supporting the diagnosis of acute appendicitis. In our study 74 patients were operated. The negative appendectomy rate was 16.21%. It is comparable with the results of other studies which report a negative appendectomy rate of 14.3%(9), 15.6%(10), 16%,(11) 16.1%(12) and 17.5%(7). Positive productive value of Alvarado scoring system in diagnosis of acute appendectomy in our study was 83.79%. It is comparable with the literature which reports a positive predicative value of 82.7%(13), 83.5%(10), 85.3%(14), 87.4%(15) and 87.5%(16). Thus

our study shows that application of Alvarado scoring system provides high degree of positive predictive value and therefore high diagnostic accuracy.

Conclusion

This study showed that in diagnosis of acute appendicitis, Alvarado Scoring System has a high diagnostic value (83.79%). Alvarado scoring System is a non-invasive, safe diagnostic procedure which is simple, fast, reliable and repeatable.

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