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ACCURACY OF ALVARADO SCORE IN THE DIAGNOSIS OF ACUTE APPENDICITIS

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ABSTRACT

Aims and Objective: 1. To determine the accuracy of ultrasound in the diagnosis of acute appendicitis. 2. To compare the ultrasound diagnosis with intra operative diagnosis. **Materials and Methods**: Study was conducted in tertiary care hospital of north Karnataka. Duration of study was three years from January 2014 to December 2017. Hundred cases of clinically diagnosed acute appendicitis patients were studied and compared with data from literature. Hundred consecutive patients which presented to our surgical team with acute appendicitis were assessed prospectively using Alvarado score. They were given specific scores according to the variable and divided into two groups, group one (score >7) and group two (score <7). All patients were operated irrespective of score, if clinical diagnosis of acute appendicitis was made. Postoperatively, diagnosis was confirmed by histopathology report. Validity of scoring system was assessed by calculating sensitivity, specificity and positive predictive value. **Results:** Total 100 patients were included in the study, which included 65 males and 35 females, at score >7, appendicitis was confirmed in 53cases out of 54 patients, while at scores <7 appendicitis was confirmed in 38 cases out of 46 patients. The sensitivity was 58.2%, specificity was 88.9% and positive predictive value was 98.1%. **Conclusion:** The sensitivity was 58.2%, specificity was 88.9% and positive predictive value was 98.1%. Alvarado score being a less Sensitive test should not be used as an initial screening test in the diagnosis of acute appendicitis. Alvarado score being more specific test can be used as a definitive test in the diagnosis of acute appendicitis.

KEYWORDS: Acute Appendicitis, Alvarado score, Accuracy.

INTRODUCTION

Over a hundred years have passed since Mc Burney reported his study on acute appendicitis in eight patients with emphasis on early appendicectomy.[1] It is common surgical condition with lifetime prevalence of 7-8%.[2] A million of people annually comes to accident and emergency or worldwide hospitals. Although abdominal surgeons have been encountering the acute appendicitis for more than 100 years, prompt diagnosis is elusive in order to reduce morbidity and to avoid serious complication.[3] Although patients with acute appendicitis often present with a characteristic symptoms and physical findings, atypical presentation are common and accurate identification of patient who required immediate surgery as opposed to those who will benefit from active observation is not always easy. Many times age and gender confounds the clinical picture, like in premenopausal female diagnostic considerations are broader, even in elderly patient diagnosis is a challenge, because of delay in seeking medical care or difficulty in obtaining a proper medical history and a need of accurate physical examination.[3] Delay in diagnosis and treatment of appendicitis are associated with increased rate of morbidity and mortality. So to avoid this problem surgeons have a traditional approach for early intervention even in the absence of definitive diagnosis.[4]

Negative appendicectomy rate of 15-40% has been reported in literature and many surgeons would accept this rate as inevitable.[5,6] Differential diagnosis and management of patient presenting with right iliac fossa pain is a continuing surgical challenge. Imaging modalities might improve diagnostic accuracy; however their use has not been shown to improve the outcome in acute appendicitis when compared to clinical judgement.[7,8]

Several scoring systems have been devised to increase the sensitivity and specificity in diagnosis of acute appendicitis. They help to reduce the rate of negative appendicectomy.[9,10]

Alvarado score in this context is a simple, easy to apply, a cheap tool and an effective mean of stratifying patients according to the risk of acute appendicitis. It is based on history, clinical examination, and few laboratory investigations, which helps to reduce negative appendicectomy rate and improved patient quality of care.[11]

MATERIALS AND METHODS

SOURCE OF DATA

'Accuracy of alvarado score in the diagnosis of acute appendicitis' is a prospective hospital based study. This study was conducted in tertiary care center of north Karnataka from 1st January 2014 to 31st December 2017. Hundred cases of clinically diagnosed acute appendicitis patients were studied. One hundred patients were included in the study after taking informed consent. Patients with the diagnosis of acute appendicitis were admitted in the ward and their Alvarado score (Table-I) were calculated. A score of >7 was indicating acute appendicitis and a score below this level meant normal appendix but the decision to undergo surgery was purely on clinical grounds. Patients were operated by conventional method of appendicectomy. Diagnosis was confirmed by histopathology findings, which reveals in early acute appendicitis scant neutrophil exudation throughout the mucosa, sub mucosa and muscularis, Congestion of subserosal vessels, perivascular neutrophil emigration. The Alvarado score was correlated with the histopathological findings of the removed appendix (Table-II). All data was analysed by SPSS version 10.

INCLUSION CRITERIA

1. Age more than 14 years.
2. Patients admitted after 1st January 2014 and before 31st December 2017.
3. Clinically and ultrasonographically confirmed cases of acute appendicitis.
4. Patients in whom surgical management has been done.
5. Patients in whom histopathological confirmation has been done.

EXCLUSION CRITERIA

1. Age less than 14 Years.
2. Patients admitted before 1st January 2014 and after 31st December 2017.
3. Clinically and ultrasonographically non confirmed cases of acute appendicitis.
4. Patients in whom Conservative management has been done.
5. Patients in whom in histopathological confirmation could not be done.

Table 1: Alvardo Scoring System Used.

VARIABLES	CLINICAL FEATURES	SCORE
SYMPTOMS	Right iliac fossa pain	1
	Anorexia	1
	Nausea and vomiting	1

SIGNS	Right iliac fossa tenderness Rebound tenderness Elevated temperature	2 1 1
LABORATORY FINDINGS	Leukocytosis Shift to left	2 1
TOTAL SCORE		10

RESULTS

Table 2: Alvardo Score And Histopathology Crosstabulation.

Alvarado score	Histopathologically inflamed cases	Histopathologically non inflamed cases
3	0	1
4	0	3
5	14	1
6	24	3
7	12	1
8	16	0
9	20	0
10	5	0

Total one hundred patients were included in the study, which included 65% male and 35% female. Mean age of the patient was 24.80 ± 9 years. Most of them were in 14-20 years age group i.e. 43%.

There were 54 patients with Alvarado score >7 and 46 patients with score <7. Peroperative observation revealed that 97% of patients had acutely inflamed appendix. On histopathological confirmation 98.1% of patients had acutely inflamed appendix with Alvarado score >7, while 83% with score <7.

Table 3: Statistical Analysis.

ALVARDO SCORE	Histopathologically positive patients	Histopahologically Negative patients
Score more than 7	53True positive [TP]	1 false positive [FP]
Score less than 7	38 False Negative[FN]	8 True Negative[TN]

SENSITIVITY

Sensitivity = TP/(TP+FN) X 100= 53/(53+38) X 100=58.2%.

SPECIFICITY

Specificity = TN/(TN+FP) X 100= 8/(8+1) X 100=88.9%.

POSITIVE PREDICTIVE VALUE

Positive predictive value = TP/(TP+FP) X 100 = 53/(53+1) X 100=98.1%.

NEGATIVE PREDICTIVE VALUE

Negative predictive value = TN/(TN+FN) X 100= 8/(38+8) X 100=17.4%.

The sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 58.2%, 88.9%, 98.1%, 17.4% and 61% respectively. (Table-III).

DISCUSSION

Alvarado score is a simple non-invasive diagnostic procedure, which is reliable, safe, repeatable and economical, easy and can be used, in emergency setting, without expensive and complicated supportive diagnostic tools.[13,14] Several studies validated the Alvarado score but on the other hand many studies recommend taking cut-off point at 4 or 6.[15,16] In this study, 98% of patients with Alvarado score >7 have evidence of acute appendicitis on histopathology with positive predictive value of 98.1% and sensitivity of 58% which is comparable to study conducted by Ahmed et al[17] giving sensitivity of 53.8%. It clearly indicates that high score may be used as an aid in deciding the need for immediate appendectomy especially for junior surgeons. Matija et al[13] study documented 100% positive predictive value of score >7 in the diagnosis of acute appendicitis in females. Hizbullah et al[12] study documented positive predictive value of 85% at score >7. But in another study conducted by Ikramullah et al[11] positive predictive value was found to be 83.5% in adults. Another study conducted by Pruekprasert et al[18] reported sensitivity of >7 score of 79% while those who were operated upon based on surgeons clinical experience the sensitivity was found to be 96% while in our study 91% sensitivity was seen on the basis of clinical experience irrespective of score.

In our study negative appendicectomy at score >7 was 1.8% i.e. only one patient with >7 had non-inflamed appendix which is comparable to Matija et al[13] study who revealed no case of removal of normal appendix at score >7, while Ikramullah et al[11] reported it 15.6%. In another study conducted by Khalid et al[19] negative appendicectomy rate was 11%. In our study, very low negative appendicectomy rate at score >7 could be due to referred patients who were treated in primary care hospitals initially and then referred with high suspicion of acute appendicitis after 1-2 days of onset of symptoms.

The only case in our study, who had normal appendix at score >7 was a female. Literature support this observation that in female additional investigations are needed to support diagnosis, as Michael et al[20] combined the Alvarado score with selective laparoscopy in adult female to increase the diagnostic accuracy and to avoid negative appendicectomy. In his study it was 0% at score >7. However, Ajaz et al[21] reported the use of Alvarado score with positive predictive value at score of >7 of 80% as it had a very high negative appendicectomy rate in female giving sensitivity of 61% in female. However in our study population, those who had score <7 but proceeded to surgery purely on the basis of surgeon's decision have evidence of acute appendicitis on histopathology in 82% with negative appendectomy rate of 17%. Most of these patients fall at score >5 while all those at score 3 or 4 have normal appendix. Ajaz et al[21] reported the positive predictive value 66.6% in case of score <7, but another study conducted by Arsalan et al[15] gives figures of negative appendicectomy of 5% at score >4 with positive predictive value of 94%. However, in our study increased number of histopathological diagnosis of acute appendicitis, at score <7 may be due to the fact that Pakistan Institute of Medical Sciences is a tertiary care Centre, where patients are generally referred from different centers' and it is a common routine practice in our setup that antibiotics are used injudiciously and these drugs may alter the disease process and clinical presentation leads to low Alvarado score.

CONCLUSION

The sensitivity was 58.2%, specificity was 88.9% and positive predictive value was 98.1%. Alvarado score being a less Sensitive test should not be used as an initial screening test in the diagnosis of acute appendicitis. Alvarado score being more specific test can be used as a definitive test in the diagnosis of acute appendicitis.

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ETHICAL APPROVAL

Ethical Approval Taken From Ethical Comitte.

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