

Evaluation Of Alvarado Score In Acute Appendicitis: A Prospective Study

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Abstract

Background: Acute appendicitis is a common cause of abdominal pain for which a prompt diagnosis is rewarded by a marked decrease in morbidity and mortality. Right iliac fossa pain is the hallmark of acute appendicitis until proven otherwise. Decision making in a cases of acute appendicitis may be difficult, especially for junior surgeons. Hence we aimed at analyzing the Alvarado Score in patients with right iliac fossa pain.

Methods: A prospective study involving 231 patients with right iliac fossa pain were included in the study, with patients from 16-65 years of age (mean-26.3). Patients were categorized into 2 groups: Group I, Alvarado Score \geq 7 (118 patients) and Group II, Alvarado Score \leq 6 (113 patients).

Results: 103 patients in Group 1 underwent surgery and 101 had acute appendicitis. In Group II, 24 patients underwent delayed surgery where 6 patients had appendicitis on histological examination. Ultrasonography diagnosed acute appendicitis in 110 patients out of which 107 had appendicitis, proven histologically. Three patients were over diagnosed to have appendicitis by ultrasonography. Negative appendicectomies were seen more in females than in males (6:2). The Alvarado score had an overall sensitivity of 88.8% and specificity of 75%.

Conclusion: The diagnostic accuracy of Alvarado score is found to be helpful in the diagnosis and management of acute appendicitis. Diagnosis of acute appendicitis is virtually confirmed with a score of 7-10 especially in males and they should undergo appendicectomy. Diagnostic laparoscopy is advised to minimize the unacceptable high false negative rate in women. Patients with score 5-6 must be admitted and scored frequently. Score 1-4 can be discharged unless otherwise indicated.

INTRODUCTION

Acute Appendicitis is a common cause of abdominal pain for which a prompt diagnosis is rewarded by a marked decrease in morbidity and mortality¹. Routine history and physical examination both remain the most effective and practical diagnostic modalities². In order to reduce the negative appendicectomy rates various scoring systems have been developing for supporting the diagnosis of acute appendicitis³. One such scoring system was Alvarado score, which was based on sophisticated statistical analysis of symptoms, signs and laboratory data⁴.

The aim of this study is to analyze the Alvarado score in relation to the diagnosis and management of acute appendicitis and also to assess the accuracy of ultrasonography (USG) in the diagnosis and compare it with the Alvarado score.

Figure 1

Table 1: Interpretation of the Alvarado score

Characteristics	Score
M = migration of pain to the RLQ	1
A = anorexia	1
N = nausea and vomiting	1
T = tenderness in RLQ	2
R = rebound pain	1
E = elevated temperature	1
L = leukocytosis	2
S = shift of WBC to the left	1
Total	10

Score 1-4: Acute appendicitis, very unlikely, keep under

observation. Score 5-6: Acute appendicitis, may be, for regular observation. Score 7-8: Acute appendicitis, probable, operate. Score 9-10: Acute appendicitis, definite, operate

PATIENTS & METHODS

This prospective study was carried out from January 2004 to October 2005 in the Department of Surgery of a tertiary referral centre in South India. 231 patients suspected of acute appendicitis were included in the study.

Alvarado scoring was done for all patients presenting with right abdominal pain and they were classified into 2 groups: Group I – Clinically typical (Alvarado score 7), Group II – Clinically doubtful (Alvarado score 6).

RESULTS

During the twenty two month period, 231 patients were admitted with suspected acute appendicitis. The patients were also subjected randomly to graded compression USG of the abdomen. The mean age was 26.3. There was slight male preponderance.

All patients were categorized into 2 groups according to the Alvarado scoring, i.e., score ≥ 7 & ≤ 6 . Out of 118 patients, 103 patients of Group I underwent surgery and all patients were diagnosed to have histologically proved appendicitis, out of which 99 patients had a positive USG. 17 patients had normal USG but 4 were subjected for surgery either because of their symptoms aggravated or developed fever or the leukocyte count increased on repeating (rescoring was >7) and all these patients histologically were proved to have appendicitis (Table 2). Remaining 14 patients underwent USG and re-evaluation and were found to have other pathology and were managed conservatively or referred for necessary treatment to other specialities.

Figure 2

Table 2: Patients according to Alvarado Score

Characteristics	Group I Alv Score ≥ 7 (n = 118)	Group II Alv Score ≤ 6 (n = 113)
Age in years	16 - 72	16 - 59
Male	85 (72%)	56 (49.5%)
Female	33 (28%)	57 (50.5%)
Ultrasound positive	93	15
Ultrasound negative	25	98
Histopathology positive	101	18
Histopathology negative	2	6

113 patients were categorized in Group two (Alvarado score ≥ 6). 18 patients later underwent surgery either because of same or increasing score. All 18 patients underwent ultrasonography out of which 15 were positive for acute appendicitis and were operated, 3 patients had normal

ultrasonography reports and were operated as they failed to settle. All 18 patients later diagnosed to have histologically proved acute appendicitis (Table 2).

Remaining 95 patients underwent ultrasound abdomen and re-scoring after 12 hours. Patients with a ultrasound diagnosis other than appendicitis were managed accordingly and those patients with normal scan were re-evaluated (rescoring) and with clinical improvement in signs and symptoms were discharged with advise to follow up. The ultrasonography diagnosed acute appendicitis in 114 patients out of which all 113 had histologically proved acute appendicitis and one patient refused from surgery (Table 3).

Figure 3

Table 3: Patients according to Alvarado Score

Alvarado Score	USG	Histology	No of patients n = 127
≥ 7	Appendicitis	Appendicitis	94
≥ 7	Normal	Appendicitis	6
≥ 7	Appendicitis	Normal	1
≥ 7	Normal	Normal	1
≤ 6	Appendicitis	Appendicitis	13
≤ 6	Normal	Appendicitis	5
≤ 6	Appendicitis	Normal	2
≤ 6	Normal	Normal	4

118 patients had Alvarado score ≥ 7 and 104 were histologically diagnosed to have appendicitis. The Alvarado score was ≤ 6 in 113 patients, but 18 had histologically proved appendicitis.

The diagnostic accuracy of Alvarado score >7 for appendicitis was 88.2%, where as the diagnostic accuracy for ultrasonography was 95.2%. However the diagnostic accuracy of Alvarado score < 6 is only 16% and ultrasonography with the same score 83.3%.

DISCUSSION

Acute Appendicitis is the most common acute surgical condition of the abdomen. Over past 100 years, the morbidity and mortality rates related to this condition have markedly decreased. This is because of the recognition of deleterious effects of appendiceal perforation. Thus an aggressive surgical treatment strategy involving early operation with acceptance of a high negative appendicectomy rate of 15% to 30% is universal. Although the negative appendicectomy has negligible mortality, it has associated morbidity rate of 10%.

Alvarado score is an objective assessment of right lower quadrant pain. The score indicated ≥ 7 indicates high probability of acute appendicitis. Practically speaking, it is

equivalent to one's degree of clinical suspicion. Therefore this scoring system was used to reach the clinical diagnosis. It was considered that use of the scoring system to make the clinical diagnosis would allow uniformity as more than one senior surgical resident were involved in making the decision. Other studies have shown that Alvarado score has accuracy of 88%.

The present study revealed Alvarado score ≥ 7 were found to have accuracy of 88.2%. But in patients with score ≤ 6 observations lead to correct diagnosis in 18 patients and none of them had perforated appendicitis. This means patients with score ≤ 6 should be observed and the decision to operate should be changed accordingly. Thus Alvarado score is a practical, reliable and easy to score. It can be helpful for safe and accurate decision making in patients with acute appendicitis. It can also categorize the patients for observation.

Various diagnostic aids have been used to increase the diagnostic accuracy of acute appendicitis but still the clinical diagnosis is superior. In this study ultrasonography was used to see whether the diagnosis if acute appendicitis could be improved. Even in group II where the patients had equivocal diagnosis, ultrasonography missed acute appendicitis in three patients.

For patients with typical clinical presentation, ultrasonography has no advantage over the Alvarado score. Moreover, the additional information given by ultrasonography did not improve the diagnostic accuracy in cases of negative or equivocal Alvarado Score. Therefore, ultrasound is unnecessary in diagnosis of acute appendicitis when one's degree of clinical suspicion is high. There are various studies with have considered Alvarado scoring in acute appendicitis. Our study matches most of them (Table 4).

Figure 4

Table 4: Comparison with other studies

Authors	Year	No of Patients	Accuracy
T.D Owen et al	1992	215	78%
M.Y.P Chan	2001	148	77%
M.I Seleem	2002	125	72%
B.E Nabulsi	2003	125	84%
Present Study	2005	231	82%

CONCLUSION

In patients with RIF pain, Alvarado score is found to be helpful in the diagnosis and management of acute appendicitis. Diagnosis of acute appendicitis is virtually confirmed with score 7-10 especially in males and should undergo appendectomy. Patients with score 5-6 must be admitted and scored frequently. Score 1-4 can be discharged unless otherwise indicated.

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