



ACUTE APPENDICITIS; EFFICACY OF COMPLETE CLINICAL EVALUATION AND MODIFIED ALVARADO SCORING SYSTEM IN DIAGNOSE

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ABSTRACT... Objectives: The objective of this study was to compare the efficacy of Clinical Evaluation and modified Alvarado scoring system in diagnosing acute appendicitis. **Study Design:** Cross sectional study. **Place and Duration of Study:** This study was conducted at Surgical Unit III of Civil Hospital Karachi from May 2010 to October 2010. **Methodology:** This study consisted of eighty patients. Patients were divided in two groups. Group A for complete clinical evaluation comprising of 40 patients and Group B for modified Alvarado scoring system comprising of 40 patients. Inclusion criteria were all patients presenting with RIF pain, nausea, vomiting, fever and/or anorexia, diagnosed as having acute appendicitis preoperatively and undergoing emergency appendectomy during this period, age >12 years and both gender. Exclusion criteria included not willing for surgery, General anesthesia problem, pregnant female patients and those who did not give written consent. **Results:** A total of 80 patients were included in the study, placed alternatively into two groups of 40 patients each with majority being male (n = 61, 76.3%). The mean age was 22.46 years. The positive predictive value for patients of Group A was 92.5% while for Group B was 77.5%. When diagnostic accuracy was compared on the basis of Gender for the two groups, the positive predictive value for male patients of Group A and B was 90.09% and 89.28% respectively, but for females the positive predictive value of Group A and B was 100% and 50% respectively. **Conclusion:** We conclude that modified Alvarado score can be used safely and effectively in diagnosing acute appendicitis in adult males especially as the score increases from seven to nine.

Key words: Acute appendicitis, clinical diagnosis, modified Alvarado score.

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INTRODUCTION

With a lifetime cumulative incidence of 8.6% and 6.7% for men and women, respectively, appendicitis is the most frequent abdominal emergency.¹ surgical teaching has advocated early appendectomy.² The diagnosis of acute appendicitis is mostly made on clinical grounds. Typically, a patient presents with pain in RIF which starts initially in paraumbilical region and then shifts to RIF. The pain is colicky in nature, followed by nausea and vomiting, and associated with anorexia and pyrexia. Muscle guarding, rebound tenderness and cough sign in the RIF present important signs in the clinical diagnosis of acute appendicitis.³

However, despite more than a hundred years of experience, accurate diagnosis still evades the surgeon and avoiding perforation and subse-

quent complications must be weighed against removal of a normal appendix in patients with other causes of abdominal pain.⁴

Subsequent complications basically occur due to delayed or even missed diagnosis.⁵ Even after a few hours, gangrenous appendicitis with impending perforation can develop⁵ thereby increasing morbidity and mortality. At the other extreme, significant clinical and financial costs are incurred by patients undergoing negative appendectomy during treatment of presumed appendicitis. These facts have to be considered when evaluating system level interventions to improve the management of appendicitis.⁶ In general, it is accepted that unnecessary surgery should be avoided⁷ as surgery in itself is associated with its own morbidity and mortality.

Diagnosis of acute appendicitis can become a cause of great confusion for the attending surgeon.⁸ The main reason for this is its protean manifestations, which may simulate almost any other acute abdominal illness and in turn may be mimicked by a variety of other conditions.⁹

Several studies in the past have advocated a structured data form for better assessment of acute appendicitis^{8,10} so that diagnosis of acute appendicitis is not delayed due to doctor's inexperience or lack of necessary investigations while other studies have annulled their value and have concluded that a complete clinical evaluation is superior to these structured data forms.^{11,12,13} The modified Alvarado scoring system is one such structured data form that combines a few signs and symptoms of patients along with only one laboratory investigation to allow quicker diagnosis of acute appendicitis. Alvarado in 1986 proposed his scoring system to diagnose acute appendicitis on the basis of certain clinical parameters.¹⁴ This was later modified by Kalan et al who excluded one of the parameters, DLC, and thus created the modified Alvarado score.¹⁵ Its usefulness in reducing the rate of negative appendectomies has been established and refuted in different studies.¹⁴

The aim of this study was to compare the efficacy of complete clinical evaluation, based on traditional clinical methods including complete clinical history and physical examination, with that of the modified Alvarado's scoring system in the diagnosis of acute appendicitis in order to find out if such a score should be used for early diagnosis of acute appendicitis, and hence not only avoid the significant mortality and morbidity associated with delay, but also avoid unnecessary operations and its associated clinical and financial burden.

MATERIAL & METHODS

This study was conducted at Surgical Unit III of Civil Hospital Karachi from May 2010 to October 2010. All patients presenting with right iliac fossa pain, nausea, vomiting, fever and/or anorexia, diagnosed as having acute appendicitis preoperatively and undergoing emergency appen-

dectomy during this period. These patients were divided into Group A: Those patients diagnosed with acute appendicitis on the basis of complete clinical evaluation by consultant. Group B: Those patients diagnosed with acute appendicitis on the basis of Modified Alvarado Scoring System. All patients presenting with pain in right iliac fossa, nausea, vomiting, fever and/or anorexia and having final diagnosis of acute appendicitis above the age of 12 years, who were aware of the study and gave written consent to participate in the study were included in this study. Those who were unfit for general anesthesia, those who did not give written consent and pregnant female patients were excluded from the study.

For Group A, a complete clinical evaluation based on the traditional history and physical examination was performed and reviewed by the consultant on call, the Performa being filled while the patient evaluation was ongoing. For Group B, all 7 parameters of modified Alvarado scoring system were assessed and recorded to reach a final diagnosis of acute appendicitis. Investigations were carried out in both groups. In Group A, they were only done for anesthesia purposes and did not have influence on diagnosis while for Group B only leukocytosis was considered as it is part of the modified Alvarado score. All these patients underwent emergency appendectomy on the basis of above evaluations and their final diagnosis was confirmed by histo pathological report, the results of which were recorded when the patient came for his/her follow up.

RESULTS

Out of the 80 patients, the majority was found to be male (Fig-1). For all patients, the mean age was found to be 22.46 ± 9.38 years, Most of the patients were between 13 to 20 years of age (Fig-2).

For patients of Group A, who underwent diagnosis by complete clinical evaluation, 37 (92.5%) patients were found to have acute appendicitis on histopathological diagnosis. For Group B, evaluated by modified Alvarado score, 31 (77.5%) patients were found to have a positive diagnosis (Ta-

ble-I). The positive predictive values for complete clinical evaluation and modified Alvarado score were thus 92.5% and 77.5% respectively.

When the patients were segregated on the basis of gender, the efficacy of diagnosis in males was almost similar. However for female patients, it was found that in Group A, all of them (n = 7) were correctly diagnosed with acute appendicitis while in Group B six out of 12 (50%) had been misdiagnosed. When calculated separately, the positive predictive values for male patients of Group A and B were 90.90% and 89.28% respectively, but for females the values were 100% and 50% respectively.

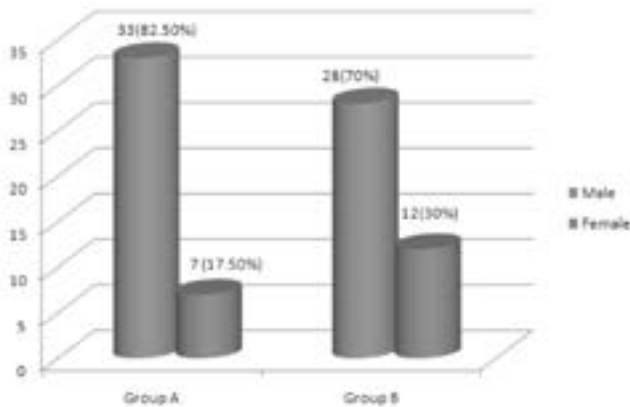


Fig-1.

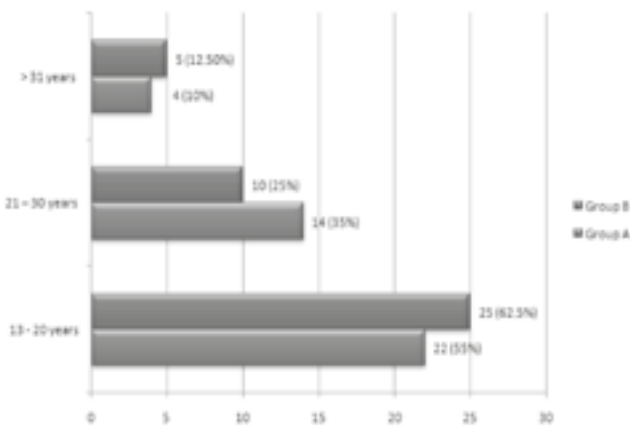


Fig-2. Age Distributions.

DISCUSSION

Civil Hospital is the second largest Government Hospital in Karachi serving a large area of the City. It was not until recently that CHK was provid-

	Acute Appendicitis f (%)*	Not Acute Appendicitis F (%)*
Total cases (n* = 80)	68 (85%)	12 (15%)
Group A (n* = 40)	37 (92.5%)	3 (7.50%)
Group B (n* = 40)	31 (77.5%)	9 (22.50%)

Table-I. Efficacy of diagnosis of complete clinical evaluation (Group A) and modified Alvarado score (Group B) using histopathology as gold standard

*f = Frequency **% = Percentage

*n = Number of patients

Positive Predictive Value Group A – 92.50%

Positive Predictive Value Group B – 77.50%

ed with 24-hour ultrasound and CT scan facilities. However, the use of these to augment diagnostic accuracy is hampered by operator dependency, lack of experienced reporting and their cost-effectiveness.^{15,16} Thus for the most part surgeons working at CHK have to rely on their clinical acumen to reach a final diagnosis in cases of acute abdomen, a situation not so dissimilar to many surgeons working around the world.¹⁷

The diagnosis of acute appendicitis is essentially a clinical one^{18,19}, but the ideal situation of a detailed clinical evaluation by an experienced clinician²⁰ is not always possible and therefore methods such as scoring systems have been found to be a great help to the less experienced in achieving a quicker and more efficient diagnosis.

This study demonstrates that the use of one such scoring system, the modified Alvarado score, can be of help in increasing diagnostic efficacy of acute appendicitis if applied under certain conditions. An explanation of this success may be the fact that the use of a scoring system submits the clinician to greater discipline in making the diagnosis.²⁰ Another reason is that this score, based on only a few clinical variables, is not only simple in its application, but also cheap and quick to apply.²¹ Many studies and papers²² have been published in the past identifying exactly what clinical and/or laboratory parameters are more predictive in the diagnosis of acute appendicitis.

Anderson RE in his meta-analysis of clinical and laboratory diagnosis of appendicitis²³ also singled out the classic history of migration of pain from mid-abdomen to RIF as having the most diagnostic yield in the history. However, this important symptom is present in only 50% of patients.

Despite the above results, the efficacy of modified Alvarado score in our study was found to be 77.5%, which was much lesser than that of the complete clinical evaluation (92.5%). Studies validating the role of the score in diagnosis of acute appendicitis quote figures ranging from 76% to 89%. At the same time, clinical diagnosis has also been found to be superior to this score.²⁴ In order to evaluate this further; we segregated the patients on the basis of gender. This demonstrated that while the efficacy of diagnosis was almost similar for male patients in both groups (90.90% for Group A and 89.28% for Group B), there was a large difference when it came to female patients. The complete clinical evaluation diagnosed all female patients in its group correctly, but the modified Alvarado score correctly diagnosed only half of its female patients. This was found to be the most important factor causing the decreased overall efficacy of the modified Alvarado score. It can therefore be deduced that when applied to male patients, the score can produce results comparable to a complete clinical evaluation. Experts²⁵ have indeed stated that the score is an effective diagnostic tool especially in male patients. Kalan et al²⁶, inventor of the score, himself concluded in his study that the presence of a high score was an easy and satisfactory aid in early diagnosis of appendicitis in children and men.

Therefore, the findings of our study are in keeping with the hypothesis of the study. Difference in efficacy was found between the two studied groups, but this difference was identified to be for only female patients. Finally, when diagnostic accuracy of Group B was evaluated on the basis of score attained by patients, we found that as the score increased from 7-9, the number of patients decreased, but diagnostic accuracy increased. This is also consistent with the literature stating that with higher scores above 7, the efficacy of modi-

fied Alvarado score increases.²⁷

CONCLUSION

The modified Alvarado score can be used safely and effectively in diagnosing acute appendicitis in adult males especially as the score increases from seven to nine. In adult females on the other hand reliance on the score alone can lead to misdiagnosis while a complete clinical evaluation by a consultant can be essentially enough to reach an acceptable level of diagnostic accuracy.

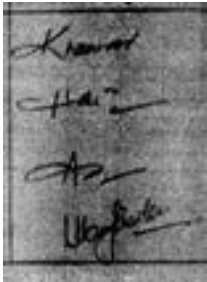
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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Dr. Hamaid Ahmed	Statistical expertise, Critical revision of the article for important intellectual content	
3	Dr. Muhammad Jawed	Drafting of the article	
4	Dr. Ubadullah Shaikh	Critical revision of the article for important intellectual content	