



## EVALUATION OF MODIFIED ALVARADO SCORE AND ULTRASONOGRAPHY FOR THE DIAGNOSIS OF ACUTE APPENDICITIS

**Dr. Ashu Kapoor**

Associate Professor, Department Of General Surgery, RVRS Medical College, Bhilwara, Rajasthan.

**Dr. Suresh Tiwari\***

Associate Professor, Department Of General Surgery, RVRS Medical College, Bhilwara, Rajasthan. \*Corresponding Author

**ABSTRACT** **BACKGROUND:** Acute appendicitis is most common cause of pain abdomen. The diagnosis of which remain difficult in many cases. **METHODS:** A 100 consecutive patients suspected of acute appendicitis who were admitted in department of surgery, RVRS medical college Bhilwara, Rajasthan. They were prospectively evaluated using the modified Alvarado scoring (MAS) to determine whether or not they had acute appendicitis. The MAS was correlated with histopathological findings. **RESULTS:** USG(92.47%) were more sensitive than Modified alverdo score (83.47%). Specificity(100%) and positive predict value (100%)were same in both. **CONCLUSION:** The MAS should be combined with USG for the diagnosis of acute appendicitis. But nothing can replace careful evaluation by an experienced surgeon.

### KEYWORDS :

#### INTRODUCTION

Acute abdominal pain is a common complaint amongst emergency patients. Diagnosis of one of the most common pathologies behind acute abdominal pain, acute appendicitis, has radically changed over the last decades. Traditionally, the diagnosis of appendicitis was made solely based on clinical symptoms and signs, and later it included results of inflammatory laboratory variables such as leukocytes, neutrophils, and CRP. This practice in diagnosis led to a false positive diagnosis (negative appendectomy) rates in the range of 15-30%<sup>1-3</sup>

Acute appendicitis is the most common surgically correctable cause of abdominal pain, the diagnosis of which remains difficult in many instances. Some of the signs and symptoms can be subtle to both the clinician and the patient and may not be present in all instances. Arriving at the correct diagnosis is essential, however, a delay may allow progression to perforation and significantly increased morbidity and mortality. Incorrectly diagnosing a patient with appendicitis although not catastrophic often subjects the patient to an unnecessary operation<sup>4</sup>

The diagnosis of acute appendicitis is essentially clinical; however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15-30% cases. The premise that it is better to remove a normal appendix than to delay diagnosis doesn't stand up to close scrutiny, particularly in the elderly. A number of clinical and laboratory based scoring systems have been devised to assist diagnosis. The most commonly used is the Alvarado score and equally its modifications<sup>5</sup>

The aim of present study is to validate the user friendly pre-operative diagnostic method based on prospectively collected data from patients admitted for suspected appendicitis incorporating the modified Alvarado score.

#### MATERIAL AND METHODS

**Study design:** Hospital based prospective study.

**Study population:** patients presenting with pain in the right lower quadrant of Abdomen, lasting fewer than 7 days who after clinical examination will be provisionally diagnosed to have acute appendicitis.

**Sample size:** 100 patients reporting to the Surgery dept. within study duration and eligible as per inclusion criteria will be included in the study.

**Sampling Method:** Convenience sampling

#### Inclusion Criteria

Patients with provisional clinical diagnosis of acute appendicitis

#### Exclusion Criteria

1. Patients of age less than or equal to 12 years
2. Patients with generalised peritonitis due to appendicular

perforation

3. Patients with appendicular mass or abscess

#### Data Collection

An excel sheet was used for data collection and statistical analysis was done.

#### RESULTS

**Table 1. Overall Sensitivity and Specificity of Modified Alvarado Score.**

	HPE positive	HPE negative	Total
MAS positive	78	0	78
MAS negative	15	7	22
Total	93	7	100

78 (true positive) patients who had MAS 7 or more had appendicitis on histopathology while no patients (false positive) had a normal appendix; 15(false negative) patients with MAS less than 7 had appendicitis and 7(true negative) had a normal appendix removed.

Sensitivity -83.87%

Specificity- 100%

Positive predictive value-100%

Negative predictive value-31.82

**Table 2. Overall Sensitivity and Specificity of Ultrasonography.**

	HPE positive	HPE negative	Total
USG finding positive	86	0	86
USG finding negative	7	7	14
Total	93	7	100

Out of 93 patients who actually had appendicitis, 86(true positive) were positive on USG while 7 (false negative) were missed; while no patients (false positive) patients were positive on USG who had a normal appendix.

Sensitivity -92.47%

Specificity- 100%

Positive predictive value-100%

Negative predictive value-50.00%

**Table 3. comparison of diagnostic variables of MAS and USG**

	MAS	USG
Sensitivity	83.87%	92.47%
Specificity	100%	100%
Positive predict value	100%	100%
Negative predict value	31.82%	50%

USG(92.47%) were more sensitive than Modified alverdo score (83.47%). Specificity(100%) and positive predict value (100%)were same in both.

#### DISCUSSION

This study set out to establish the diagnostic accuracy of a protocol based on modified Alvarado score and ultrasonography in acute

appendicitis at sardar patel medical college hospital, Bikaner, Rajasthan.

Modified Alvarado score of 7 and above had a positive predictive value of 100%. In this study 78% of the patients who were predicted to have appendicitis by a high score had confirmed appendicitis on histopathology. This gave a crude negative appendicectomy rate of 12% that is in keeping with what Ongaro<sup>3</sup> found in his study in 2007 Year. A high Alvarado score was however unable to distinguish between appendicitis and other mimicking diagnosis in 5 cases. A systematic review by Ohle et al<sup>4</sup> found out that a high Alvarado score was less sensitive as a 'rule in' score than as a 'rule out' for those below 5.48. Our study suggests that a high Alvarado score is a useful tool to set aside patients for immediate appendicectomy without further diagnostics. This contrasts with a study by Saidi and Chavda<sup>5</sup> that suggested that the scoring system has no value over clinical acumen.

In our study out of 93 patients who actually had appendicitis, 86 (true positive) were positive on USG while 7 (false negative) were missed; while no patients (false positive) patients were positive on USG who had a normal appendix. The additional information by ultrasonography may be useful in reducing pre-operative delays due to diagnostic dilemmas. The utility of ultrasound has been advocated in many studies both as an adjunct to improve diagnosis in the equivocal cases and to determine who needs further imaging with a superior modality. In a study by Rasoul, et al<sup>6</sup> in Iran, ultrasonography had a PPV of 90.4% and a sensitivity of 55.4%. In our study Sensitivity -92.47%, Specificity- 100%, Positive predictive value-100% and Negative predictive value-50.00%.

Kimaro<sup>7</sup>, a diagnostic radiology resident in 2011 did a study on the correlation of ultrasonography as compared to clinical and surgical findings among patients in KNH. His study revealed sensitivity, specificity, PPV and NPV values of 92%, 58.3%, 95% and 47% respectively. Our study in comparison had values of Sensitivity - 92.47%, Specificity- 100%, Positive predictive value-100% and Negative predictive value-50.00% respectively. The sensitivities in both studies were comparable. In our study the ability to pick the true negatives was quite low. This may be explained in part by the different methodology used in the two studies. Kimaro<sup>7</sup> conducted the ultrasonography in all the patients in his series showed a negative appendicectomy rate of 10.7%. In our study the ultrasonography was done by the different ultrasonographers or radiology residents on call.

## CONCLUSION

The MAS should be combined with USG for the diagnosis of acute appendicitis. But nothing can replace careful evaluation by an experienced surgeon.

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