

Modified Alvarado score: A Tool for Acute Appendicitis

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ABSTRACT

Background: Surgical emergency is observed in case of acute appendicitis. So there is need of valid and accurate diagnostic tool for early evaluation. Aim: Our aim was to assess the validity of Modified Alvarado Scoring System (MASS) in diagnosing acute appendicitis. **Materials and methods:** This prospective study was conducted at ..with the inclusion of 100 patients suspected with acute appendicitis. They were evaluated based on MASS. **Result:** We found that the sensitivity of MASS was 85% and specificity was 11% along with PPV of 85% and NPV of 4.7%. **Conclusion:** MASS can be used to diagnose acute appendicitis accurately and is very useful as it is simple and noninvasive.

Keywords: Acute appendicitis, Alvarado score, surgery, emergency.

INTRODUCTION

One of the common surgical emergencies is acute appendicitis. It can be easily diagnosed with proper treatment when classical symptoms are presented.^[1] But it does not happen all the times. Rather these symptoms are visible only in half of the patients with attack of acute appendicitis.^[2] It has become a clinical challenge to accurately and timely diagnose acute appendicitis leading to significant increase of morbidity and hospital stays.^[3]

The signs of appendicitis were first described by Fitz in 1886.^[4] The diagnosis is mainly clinical based on usually dependent on patient history, examination and laboratory investigations in some cases. Imaging modalities may not be useful until some complications are visible. The definitive diagnosis could have done only after histopathological analysis of removed appendix.^[5] Diagnostic delay results in significant morbidity. Therefore, a number of scoring systems are formulated to have early diagnostic approach. These scoring systems can differentiate acute appendicitis from nonspecific abdominal pain.^[6] Alvarado scoring system is commonly used in this regard.^[7] Therefore in this study, we evaluated the validity of MASS in the investigation of acute appendicitis.

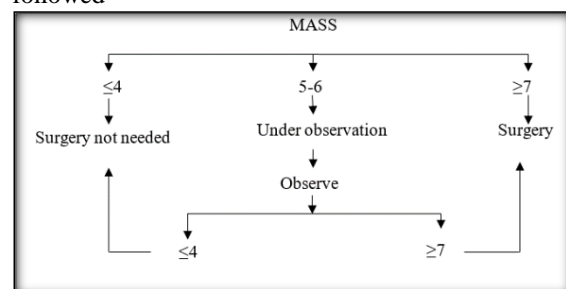
MATERIALS AND METHODS

This study was planned at National Institute of

Medical sciences, Jaipur, Rajasthan, from 25 November to 30 December. 100 patients with suspected diagnosis of acute appendicitis were included. The age of patients ranged from 15-70 years. Patients included were hemodynamically stable and were assessed using MASS. The scoring criteria is as follows:

Symptoms	Score
Migrating pain (right iliac fossa)	1
Nausea/vomiting	1
Anorexia	1
Signs	
Temperature increase	1
Rebound tenderness	1
Tenderness (right iliac fossa)	2
Laboratory findings	
Leucocytosis	2
Total	9

The following chart shows the schematic process followed



RESULTS

Table 1: Patient distribution based on MASS

Score	Number	Percentage (%)
<4	7	7
5-6	80	80
>7	13	13
Total	100	100

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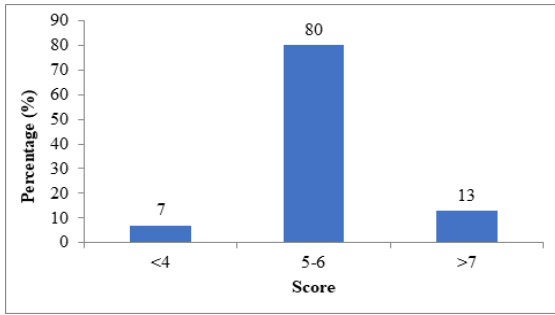


Figure 1: Patient distribution based on MASS

In [Table 1 & Figure 1] patient distribution is shown depending upon the modified Alvarado score. % of patients had score less than 4, while 80% had score between 5-6 and 13% of patients had score of more than 7.

Table 2: Distribution of patients with MASS between 5-6.

Score	Number (%)
Increased to 7	8 (8%)
Decreased to 4	5 (5%)

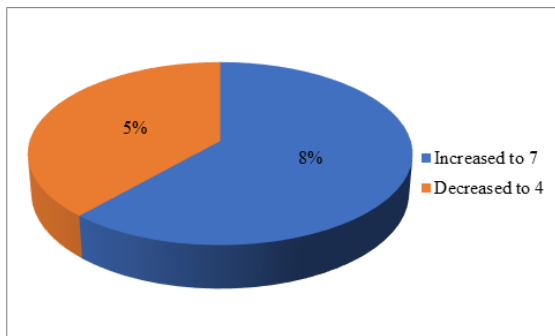


Figure 2: Distribution of patients with MASS between 5-6

Table 3: Distribution of patients based on need of surgery

Appendicectomy	Number (%)
Yes	89 (89%)
No	11 (11%)

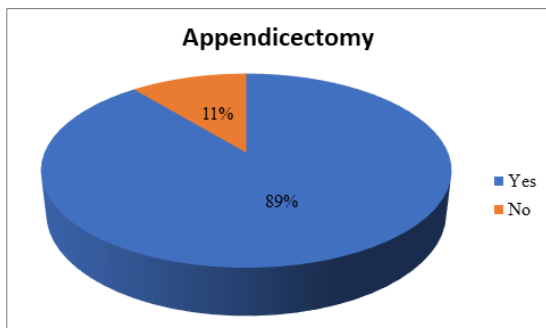


Figure 3: Distribution of patients based on need of surgery

In [Table 2 & Figure 2] distribution of patients under observation whose score either decreased to 4 or increased to 7 is shown. We found that 8% of the patients under observation had the score increased to

7 and they were subjected to the surgical removal of the appendix while the score decreased to 4 in 5% of the patients and were not subjected to surgery. In [Table 3 & Figure 3] distribution of patients based on application of surgical procedure is shown. We found that 89% of the patients underwent appendicectomy and 11% of the patients did not require surgery.

Table 4: Sensitivity and specificity of MASS

	Appendicitis	Normal	Total
Positive	85	4	89
Negative	4	7	11
Total	89	11	100

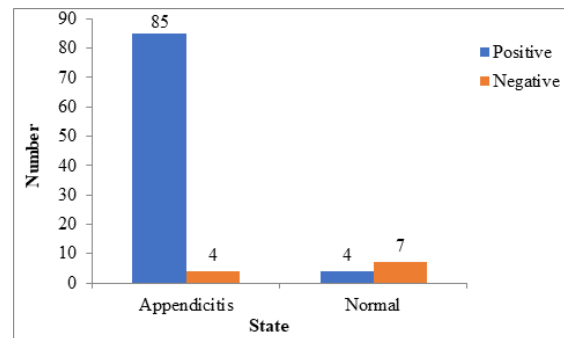


Figure 4: Sensitivity and specificity of MASS

In [Table 4 and Figure 4], distribution of patients having normal appendix and with appendicitis is shown. From the [Table 4], sensitivity, specificity, PPV and NPV of MASS were calculated as follows:
 Sensitivity = $85 * 100 / 100 = 85\%$
 Specificity = $11 * 100 / 100 = 11\%$
 PPV (Positive predictive value) = 85%
 NPV (Negative predictive value) = $4 * 100 / 85 = 4.7\%$
 MAR (Missed appendicitis rate) = $4 * 100 / 100 = 4\%$
 Sensitivity of MASS was observed to be 85% while specificity was 11%

DISCUSSION

Scoring systems such as MASS have provided very useful assistance in diagnosis and management of acute appendicitis. In this study 13% of patients had score of >7, 80% had between 5-6 and 7% had <4. The sensitivity and specificity of MASS observed were 85% and 11% respectively while PPV and NPV were 85% and 4.7% respectively. MASS has now gained wide acceptance as it is noninvasive and simple method to evaluate surgical emergencies of acute appendicitis. Previous studies have also supported the findings of our study in relation to validity of MASS to be used clinically for the improved diagnosis of acute appendicitis.^[8-12]

CONCLUSION

With no necessity of special equipment's, MAS has proved itself as an useful tool to evaluate acute appendicitis.

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