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CLINICAL STUDY OF CORRELATION BETWEEN MODIFIED ALVARADO SCORING SYSTEM (MASS) AND ACUTE APPENDICITIS

Surgery

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ABSTRACT

BACKGROUND: Decision-making in patients with acute appendicitis poses a diagnostic challenge worldwide, despite much advancement in surgery. The Modified Alvarado Scoring System (MASS) has been reported to be a cheap and quick diagnostic tool in patients with acute appendicitis.

AIM OF THE STUDY: The purpose of this study was to evaluate the diagnostic value of Modified Alvarado Scoring System in patients with acute appendicitis in our setting.

MATERIALS AND METHODS:A cross-sectional study involving all patients suspected to have acute appendicitis at KAPV Govt. Medical College Trichy over a six-month period between January 2017 and july 2017 was conducted. They were evaluated on admission using the MASS to determine whether they had acute appendicitis or not. All patients underwent appendicectomy according to the hospital protocol. The decision to operate was the prerogative of the surgeon or surgical resident based on overall clinical judgment and not the MASS. Factors were tabulated and analyzed statistically

RESULTS:A total number of 85 patients were studied. Their ages ranged from nine to 65 years. There were 51 (60%) males and 34 (40%) females (M: F = 1.5:1). All patients in this study underwent appendicectomy. The perforation rate was 9.4%. Histopathological examination confirmed appendicitis in 67 patients (78.8%) and the remaining 18 patients had normal appendix giving a negative appendicectomy rate of 21.17%. The sensitivity and specificity of MASS in this study were 91.1% and 83.3% respectively. The Positive Predictive Value and Negative Predictive Value were 95.3% and 71.42% respectively.

CONCLUSION: The study shows that use of MASS in patients suspected to have acute appendicitis provides a high degree of diagnostic accuracy and subsequently reduces negative appendicectomy and complication rates. However, additional investigations may be required to confirm the diagnosis in case of atypical presentation.

KEYWORDS

Acute Appendicitis,MASS,HPE,USG

BACKGROUND

Acute appendicitis is one of the most common causes of abdominal surgical emergencies with a lifetime prevalence of approximately 1 in 7 worldwide.(1) It has been estimated that approximately 6% of the population will suffer from acute appendicitis during their lifetime; therefore, much effort has been directed toward early diagnosis and intervention(2,3).

Early diagnosis and prompt operative intervention is the key for successful management of acute appendicitis. However, the picture of acute appendicitis may not be classical, and in such situations, a policy of early intervention to avoid perforation may lead to high negative appendicectomy rates [4,5]. Difficulties in diagnosis arise in very young, elderly patients and females of reproductive age because they are more likely to have an atypical presentation, and many other conditions may mimic acute appendicitis in these patients [6]. In such cases, clinical examination should be complemented with diagnostic imaging such as Ultrasound scan to exclude diseases other than appendicitis.

A negative appendicectomy rate of 20-40% has been reported in literature and many surgeons advocate early surgical intervention for the treatment of acute appendicitis to avoid perforation, accepting a negative appendicectomy rate of about 15-20% [7].

Removing normal appendix is an economic burden on both patients and health resources. Misdiagnosis and delay in surgery can lead to complications like perforation and finally peritonitis [8].

Many scoring systems for the diagnosis of acute appendicitis have been tried, but most of these are complex and not feasible in emergency setting [9]. The MASS has been shown by recent studies to be easy, simple and cheap diagnostic tool for supporting the diagnosis of acute appendicitis especially for junior surgeons [9,10].

AIM

The aim of the study is to assess the diagnostic value of MASS in patients with acute appendicitis at KAPV Govt. Medical College, Trichy.

MATERIALS AND METHODS

Studyplace: Mahatma gandhi memorial govt hospital and KAPV govt medical college Trichy

Duration of study:6months(jan 2017-july 2017)

Study design: cross sectional study

Inclusion criteria:1)All patients with a clinical diagnosis of acute appendicitis and underwent appendicectomy
2)Both sexes

Exclusion criteria:1) Mass in the right iliac fossa
2)Patients in whom histopathological reports not available

Methods:
Ethical approval to conduct the study was obtained.

All patients included in the study were initially seen by the Senior Surgical Resident or Admitting Surgeon who made the decision to operate. Then they were scored according to the variables of MASS (Table (Table1)1) and then divided them into two groups. Group I included patients with MASS of seven and above (patients likely to have acute appendicitis) and Group II were patients with MASS below seven (patients unlikely to have acute appendicitis). But this did not influence the management of the patient and the decision to operate was not based on MASS but the clinical impression by the clinician taking charge of the patient. Abdominal ultrasound was performed in case of atypical presentation. All patients underwent emergency appendicectomy and all appendices removed at operation were sent for histopathology. The diagnosis of acute appendicitis was confirmed by histopathological examination. Data was collected using a coded, pre-tested questionnaire and analyzed using SPSS statistical software version 11.5. The MASS groups were cross-tabulated against

histology, the gold standard. Then, the sensitivity, specificity, accuracy, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were determined

Table 1**Modified Alvarado Scoring System (MASS)**

Symptoms	Score
Migratory right iliac fossa pain	1
Nausea / vomiting	1
Anorexia	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory findings	
Leucocytosis	2
Total	9

RESULTS

A total of 85 patients were enrolled in the study. Their ages ranged from nine to 65 years. There were 51 (60%) males and 34 (40%) females (M: F = 1.5:1). The duration of illness of the study population ranged from 1 day to 23 days.The MASS of the study population ranged from 3 to 9. (Mean 6.78 ±1.51). The median and the mode were 7.00 and 8.00 respectively. In this study, 64 patients (75.2%) had a MASS of seven and above and the remaining 21 patients (24.7%) had MASS below seven.

Operative findings: All patients in this study underwent appendectomy. Of these, inflamed appendix was the most common operative findings affecting 60 patients (70.6%). Eight patients (9.4%) had perforated appendices, Four patients (4.7%) had gangrenous appendices and three patients (3.5%) had appendicular abscess. None of these appendicular complications was missed by MASS.(Table 2)

Operative Findings	Frequency	Percentage
Inflamed appendix	60	70.58%
Gangrenous appendix	4	4.7%
Perforated appendix	8	9.4%
Normal	10	11.76%
Appendicular abscess	3	3.5%
Total	85	

Table 2: Operative findings

Histological findings: Histological examination confirmed appendicitis in 67 patients (78.8%). The remaining 18 patients were found to have normal appendix giving a negative appendicectomy rate of21.7%

Histological Findings	Frequency	Percentage
Normal appendix	18	21.1%
Acute appendix	50	58.8%
Suppurative appendicitis	12	14.1%
Chronic nonspecific appendicitis	5	5.8%

Table 3:Histological findings

Mass versus histological findings: The sensitivity and specificity of MASS in this study was 91.1% and 83.3% respectively. The PPV was 95.3% and NPV was 71.42% (Table 4)

MASS	Histological Findings		Total
	Appendicitis	No appendicitis	
≥ 7	61	3	64
≤ 7	6	15	21
Total	67	18	85

Table 4 MASS versus histological findings

Mass versus histological findings in different age groups:MASS showed high sensitivity (97.7%) and specificity (100%) in adult (16-60 years) than in children (93.3% / 85.7%) and geriatric (50.0% / 33.3%) age groups (Table 5)

MASS	Appendicitis (Age in years)			No Appendicitis			Total
	0-15	16-60	> 60	0-15	16-60	> 60	
≥ 7	14	43	4	1	0	2	64
< 7	1	1	4	5	9	1	21
Total	15	44	8	6	9	3	85

Table5: MASS versus histological findings in different age groups

Simple versus complex appendicitis in different age groups:
Simple appendicitis was more common in all age groups, whereas children aged (0-15) had significant higher perforation rate compared to other age groups. (Table 6)

Age group (in years)	Simple appendicitis	Complex appendicitis	Total
0-15	9 (60%)	6 (40%)	15
16-60	41 (93.2%)	3 (6.9%)	44
> 60	5 (62.5%)	3 (37.5%)	8
Total	55	12	67

Table6: Simple versus complex appendicitis in different age groups

DISCUSSION:

The use of MASS in the diagnosis of acute appendicitis has been reported to improve the diagnostic accuracy and consequently reduces negative appendicectomy and complication rates [9,10]. This study was conducted to evaluate the diagnostic value of Modified Alvarado Scoring System in patients with acute appendicitis in our setting.The age distribution in our study ranged from 9 to 65 which was similar to other studies [9-11].There is male preponderence in this study, In this study, the duration of illness in majority of patients was four days and majority of patients reported to the hospital and seen by the admitting doctor in more than 24 hours after the onset of illness. This observation concurs with other reports [11,12]. Delayed presentation may also be due to misdiagnosis or fear of surgery as a result they are treated conservatively with analgesics and antibiotics to mask the symptoms. Delayed presentation is associated with increased morbidity due to appendiceal perforations and peritonitis.The rate of perforation in our study was 9.4%, which is comparable to other reported rates [13] .

In our study, the perforation of appendices occurred mostly in patients with MASS ≥ seven and in the children aged 0-15 years and in geriatric age group Therefore, a more aggressive approach should be used in patients with high scores and in advanced age individuals and children.The overall negative appendicectomy rate (21.2%) in our study. The reason for high negative appendicectomy rate in our series may be due to appendicectomies that were done to patients who presented with other conditions mimicking acute appendicitis. Our figures for negative appendicectomy rate in the present study were found to be slightly higher in females than in males.

This is because misdiagnosis may have occurred in females of reproductive age group where other pelvic diseases could make diagnosis difficult. In such cases, MASS should be complemented with diagnostic procedure like laparoscopy or imaging such as Ultrasound scan to minimize the rate of negative appendectomy [6]. However, a large population based study suggested that the rate of negative appendicectomy (15-20%) has not declined for 15 years despite the increasing use of such tests .The present study has shown that MASS provides high degree of sensitivity, specificity, PPV, NPV and accuracy in the diagnosis of acute appendicitis, which is in agreement with findings reported by others [7]

CONCLUSION AND RECOMMENDATIONS

The present study has shown that MASS provides high degree of sensitivity, specificity, PPV, NPV and accuracy in the diagnosis of acute appendicitis and has found to be more helpful in patients by showing lower negative appendicectomy rate It is therefore recommended that:-

- MASS can be used to improve the diagnostic accuracy of acute appendicitis and subsequently reduce negative appendicectomy and complication rates.
- The use of MASS in the diagnosis of acute appendicitis in female patients should be supplemented by additional investigations like abdominal ultra sound or laparoscopy
- A MASS score above 7 should indicate appendectomy without the need for further imaging

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