

**IJCRR**

Vol 04 issue 21

Section: Healthcare

Category: Research

Received on: 14/09/12

Revised on: 21/09/12

Accepted on: 29/09/12

**A STUDY ON MODIFIED ALVARADO SCORING SYSTEM IN DIAGNOSING ACUTE APPENDICITIS**

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**ABSTRACT**

**Aim:** To study the role of Modified Alvarado scoring system in diagnosing acute appendicitis in clinical practice. **Materials and Methods:** A prospective study was conducted on 250 patients admitted with abdominal pain suggestive of acute appendicitis and were operated, from January 2008 to December 2009 in AVMC&H and MAPIMS. Both males and females patients from 8 years to 60 years of age were included.

Preoperative modified Alvarado score was used in all, and the results were compared with operative finding and biopsy. **Results:** 155 patients were identified to have score of 8 or more. 149 patients were confirmed by biopsy. 91 patients have score 5 -7 and 66 were confirmed by biopsy.

**Conclusion:** This scoring system is a reliable and diagnostic modality to increase the accuracy in diagnosing appendicitis.

**Keywords:** Alvarado. Scoring system. Acute appendicitis

**INTRODUCTION**

Acute appendicitis is one of the most common surgical emergency. Its lifetime prevalence is 1 in 7. its incidence is 1.5 to 1.9 / 1000 in male and female population. Surgery for acute appendicitis is the most frequent operation performed in all emergency.

The diagnosis of acute appendicitis is purely based on history, clinical examination and laboratory investigations. Negative appendectomy rate is 15 to 40% as per literatures. Delay in diagnosis definitely increases the morbidity, mortality and cost of treatment. Early diagnosis is a primary goal to prevent morbidity and mortality.(1)

Alvarado in 1986 introduced a criterion for the diagnosis of acute appendicitis which was later modified to accommodate additional parameters along with original Alvarado scoring system.( 2- 5).

The aim of the study is to evaluate the sensitivity of modified Alvarado scoring system in the diagnosis of acute appendicitis, to reduce the rate of negative appendectomy and to reduce the complications of acute appendicitis.

**MATERIALS AND METHODS**

A total number of 250 cases of clinically suspected acute appendicitis were studied from the period of January 2008 to December 2009 in AVMC&H in pondy and MAPIMS . Data including age , sex, symptoms, physical sighs and laboratory findings such as white blood cells total and differential count were recorded in modified Alvarado form. (Table 1). (6)

In addition, urine for routine examination was done for all cases. ultra sonogram of abdomen was performed when diagnosis was doubtful, especially in female patients to exclude gynecological diseases.

The score of each patient was correlated with the clinical, operative and histopathological findings.

## RESULTS

Age of the patients ranged from 7 years to 60 years with the majority of the patients in the third decade (46%) followed by second decade (25%). (Table 2).

Out of 250 patients, 155(62%) were males and 95 (38%) were female. clinically males were more susceptible than females. (Table 3).

All the specimen were sent to laboratory for histopathological examination. The reports showed features of acute appendicitis in 215 (86%) cases and 35 (14%) patients did not have acute appendicitis. (Table 4).

In this series, patients with score of 8- 10, 5 – 7, and 1- 4, had 96%, 72.5%, and 0% sensitivity respectively. (Table 5).

Patients with score 8 and above, the sensitivity is 98.04% in male and 92.45% in females.(table 6).

Patients with score less than 8, the sensitivity is 79.24% in male and 57.15 % in females and overall is 68.72.%. (Table 7).

## DISCUSSION

Results of this study shows acute appendicitis was most common in the 21 – 30 years(46%). Next most common group was 11 -20 (26%). All the studies have shown that appendicitis is more common in 10- 30 years of age .(7) Males more susceptible than females .(8)

A negative rate of appendicectomy of 20-40% is not unusual finding in literature (9) . Negative appendicectomy in this study is 15.75%, male (8.4%), females (23.1%). The percentage of normal appendicectomy in varies series varies from 8 to 33%. In this era many surgeons accept 15 to 20% negative appendicectomy (10) .

From this study it was found that the higher the score, more of its sensitivity. Patients with the Alvarado score ranges 8 -10, 5 – 7

and 1 – 4 have accuracy of 96%, 72.5% and 0% respectively. Fengo *et al* reported a sensitivity of 90.2% and others reported a sensitivity of 73% with negative laparotomy rate 17.5% .(11)

In this series, the sensitivity of the patients with the score 8 and above was 98.04% in males and 92.45% in females and combined sensitivity is 95.45% whereas the sensitivity with score less than 7 was 79.24% in males, 57.15% in females and combined sensitivity is 68.75%.

This study also reveals that scoring system was more helpful in male patients by showing high accuracy rate as compared to female patients.

Lower values in female patients were due to presence of diseases in genital system (i.e.) ovaries, salpinges (4, 12) . In females, additional investigations are required. Different literatures also support these observations (13).

However there are no signs , symptoms or laboratory test that are 100% reliable in the diagnosis of acute appendicitis. In this study modified Alvarado scoring system showed that the accuracy of the diagnosis was very dependable and acceptable in higher scores but patients with lower scores should be observed. Patients with score 8 to 10 are almost certain to have appendicitis and they should undergo operation immediately. Patients with a score 5 to 7 indicate probable appendicitis. they should be observed and evaluated every 4 to 6 hrs, if the score remains the same or increases after this, reevaluation is required and patients with the score of 4 or less are very unlikely but not impossible to have appendicitis and they can be discharged from hospital after giving initial conservative treatment.

## CONCLUSION

In the diagnosis of acute appendicitis, the modified Alvarado score is a fast, simple, reliable, noninvasive repeatable and safe

diagnostic modality without extra expense and complication. It can be very useful for junior doctors provided it is applied purposefully and objectively in patients. The application of this scoring system improves diagnostic accuracy and consequently reduces negative appendectomy and this reduces complication rates.

**Table 1: Modified alvarado score**

symptoms	Migratory rt. Iliac fossa pain	1
	Anorexia	1
	Nausea / vomiting	1
signs	1) Tenderness in rt. Iliac fossa	2
	2) rebound tenderness	1
	3) elevated temperature	1
	4) extra signs eg: cough test and or rovsing sign and or rectal tenderness	1
laboratory	leucocytosis	2
	Total score	10

Interpretation:

Score 1- 4: acute appendicitis very unlikely

Score five -7: acute appendicitis probable

Score eight -10: acute appendicitis definitive.

**Table 2**

Age Groups (yrs)	No of patients	Percentage
Up to 10	5	2%
11 - 20	65	26%
21 - 30	115	46%
31 - 40	35	14%
41 - 50	25	10%
51 - 60	05	2%
Total	250	100

**Table 3: Distribution of patients as per sex**

Sex	No. of patients	Percentage
Male	155	62%
Female	95	38%
Total	250	100%

**Table 4: Peroperative Findings**

Inflammation	128	60%
Suppuration	65	30%
Gangrenous	13	06%
Perforation	09	04%
Total	215	

**Table 5: Sensitivity of different score range**

Score	No. of Pt	Acute appendicitis	Normal appendix	sensitivity
8 -10	155	149	6	96%
5 - 7	91	66	25	72.5%
1 -4	04	00	04	00%

**Table 6: Sensitivity of modified alvarado score > 8**

Sex	No. of Pt	Acute appendicitis	Nornal appendix	sensitivity
Male	102	100	2	98.03%
Female	53	49	4	92.45%
Total	155	149	6	95.5%

**Table 7: Sensitivity of modified alvarado score <7**

Sex	No. of Pt	Acute appendicitis	Normal appendix	Sensitivity
Male	53	42	11	79.24%
Female	42	24	18	57.15%
Total	95	66	29	68.72%

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