PRACTICALITY OF MODIFIED ALVARADO SCORE IN THE DIAGNOSIS OF ACUTE APPENDICITIS

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ABSTRACT
Objective: *To to evaluate the practicality of Modified Alvarado Scoring System (MASS) in the diagnosis of acute appendicitis in our set up.*
Design & Duration: *Prospective, quasi-experimental study from July 2005 to December 2005.*
Setting: *Surgical Unit II, Rawalpindi General Hospital, Rawalpindi.*
Patients: *All patients, aged 15 years or above, who were operated for Acute Appendicitis during the study period.*
Methodology: *All patients were evaluated using the Modified Alvarado Score (MAS) once decision of surgery has been made by a consultant surgeon. The MAS was correlated with the operative and histopathological findings.*
Results: *Out of the total 82 patients, 49 were male (60%) and 33 female (40%). Their age range was from 15 to 60 years with peak incidence in the 2nd and 3rd decade of life. The overall sensitivity of MAS was 89%. There were 4% negative appendicectomies with MAS between 6-9, 12% with MAS between 4-5 and 50% where MAS was <4.*
Conclusion: *MASS cannot be fully relied upon to make the decision to operate in acute appendicitis, and that the decision remains clinical.*

KEY WORDS: *Acute Appendicitis, Appendicectomy, Scoring Systems, Modified Alvarado Score*

INTRODUCTION

Acute appendicitis is one of the commonest surgical emergencies. Approximately 6% of the population will suffer from acute appendicitis during their life time[1,2]. Despite common occurrence its diagnosis still present a challenge to the clinical judgment of surgeons[3,4]. It can progress to perforation[5], which is associated with a higher morbidity. The risk of mortality in uncomplicated appendicitis is less than 1% but it rises to as high as 5% in cases of perforation[6]. Hence, most surgeons are inclined to operate when the diagnosis is probable rather than wait until it is certain; a clinical decision to operate leads to the removal of a normal appendix in 15% to 30% of cases[7].

It has been claimed that diagnostic aids can dramatically reduce the number of appendectomies in patients without appendicitis, the number of perforations, and the time spent in hospital. The methods advocated include laparoscopy[8], scoring systems[9,10], computer programs[11], ultrasonography[12,13], computed tomography[14] and magnetic resonance imaging[15].

Alvarado in 1986 proposed his scoring system to diagnose acute appendicitis on the basis of certain clinical parameters and investigations[16]. Alvarado suggested operation for patients having a score of 7 or above out of 10. Later it was modified by Kalan et al who excluded DLC, so that the total score became 9[17]. Its usefulness in reducing the rate of negative appendicectomies has been established and refuted in different studies[18-20].

The current study was undertaken to assess the practicality of the Modified Alvarado Scoring System (MASS) in our setup. In this study the decision to operate was based on clinical judgment and the score was calculated for all patients; which was later correlated with operative and histopathological findings.

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Variables	Clinical Feature	Score
Symptoms	Migratory Pain to RIF	1
	Anorexia	1
	Nausea/Vomiting	1
Signs	Tenderness RIF	2
	Rebound tenderness RIF	1
	Temperature elevation	1
Labs.	Leucocytosis (>10,000x10^9/L)	2
Total		9

Table I. Modified Alvarado Score

PATIENTS & METHODS

This prospective quasi-experimental study was carried out on patients, aged 15 years and above, who presented to Surgical Unit II at Rawalpindi General Hospital from July to December 2005, and were diagnosed as suffering from acute appendicitis by a consultant surgeon and 4th year resident trainee on the basis of their clinical acumen. Patients with a mass in right iliac fossa were excluded from the study.

All patients were admitted through the emergency dept. and their investigations done including hemoglobin level, total leukocyte count, urine analysis and X-ray chest. ECG, renal and hepatic profile, and ultrasound abdomen were done wherever indicated. A performa containing the general information of the patient and the Modified Alvarado Score (Table I) was filled by the resident on call and the MAS calculated.

All patients were later operated and final diagnosis of acute appendicitis was based on operative findings and histopathology reports. These findings were then correlated with their corresponding pre-operative score and the sensitivity of the scoring system assessed by calculating the negative appendectomy rate.

Table III. Signs of Acute Appendicitsis

Sign	No.	%
Tenderness	72	87.80
Rebound Tenderness	54	65.85
Pointing Sign	30	36.59
Cough Sign	35	42.68

Symptom	No.	%
Pain Right Iliac Fossa	70	85.37
Shifting of Pain	40	48.78
Anorexia	60	73.17
Vomiting	38	46.34
Fever	35	42.68

Table II. Symptoms of Acute Appendicitis

RESULTS

Out of the total 82 patients, 49 (60%) were male and 33 (40%) female, with a male to female ratio of 1:0.67. Their ages ranged from 15 to 60 years, with maximum (60) patients in the 2nd and 3rd decade of life; mean age being 22 years. Clinical symptoms and signs of the patients are depicted in Table II and III respectively. Forty seven (57.32%) patients had a total leucocyte count of >10,000x10^9/L and 35(42.69%)<10,000x10^9/L.

Nine patients, five females and four males, out of 82 had negative appendicectomies. The operative findings of all these patients were correlated with their Modified Alvarado Score as shown in Table IV. The overall sensitivity of the scoring system was 89%.

In the first group, score 6-9, there were two cases of negative appendicectomies; both were ovarian cysts. In the second group, score 4-5, there were three negative appendicectomies; one case was that of a ruptured Graffian follicle, one of Meckels Diverticulitis and one of mesenteric lymphadenitis. In the third group, score <4, there were four negative appendectomies; no other pathology was found.

DISCUSSION

Acute appendicitis, being a common condition, still presents a clinical dilemma. Negative appendicectomy

Table IV. Correlation of MAS with Op. Findings

MAS	No.	-ve App.	Sensitivity
6-9	48	2	96%
4-5	26	3	88%
1-3	8	4	50%

rates have been a concern for the surgeon for as long as appendicitis has been considered a surgical disease. On the other extreme delaying the treatment for the sake of diagnosis results in increased morbidity and mortality. The surgeons should weigh the risks posed by early operation against the risks that might be encountered with delay in diagnosis, especially at extremes of age. To counter this problem, certain diagnostic aids have been used, like ultrasonography, computed tomography scan and laparoscopy[15]. Still the diagnosis is based on the clinical acumen of the surgeon which in turn depends on his or hers experience. At present many scoring systems have been advocated like the Ramirez[4], Teicher[9] and Ohmann[10]. However, Alvarado and the Modified Alvarado scoring system[16,17] are in common usage.

The results of our study are comparable with those of other authors in the literature. The overall sensitivity of MAS was 89% in our study. Other investigators have found a similar diagnostic accuracy[9,11,17]. The negative appendicectomy rate in our study was 10.97% (male 8.16%, female 15.15%), which is comparable with that of Arian et al (10.3%)[19]. In a recent study from Abbottabad, Khan et al[21] reported a higher rate of negative appendicectomies with the Alvarado scoring (15.6%). The removal of some normal appendices is bound to lower the rate of perforation and consequently mortality. Literature shows that if the negative appendicectomy rate is less than 10-15%, then the surgeon is operating on too few patients, thus increasing the risk of complications[10]. Some centers have reduced their negative appendicectomy rates to even less than 10% by having regular audit of appendicectomies[3].

Our study revealed that Modified Alvarado scoring is more helpful in male patients, as negative appendicectomy rates in them are lower than in the females. Hence in females additional investigations may be required to confirm the diagnosis of acute appendicitis. The literature also supports this observation[20-22].

Among the nine patients who underwent negative appendicectomy five had associated pathology. Thus removal of a normal appendix in these patients also lowered the morbidity as the real pathology was also dealth with. The remaining four with no pathology were cases having a MAS score of <4. This again is in accordance with the current literature[16-20].

All studies available on Alvarado and Modified Alvarado scoring system recommend that patients with a score of <4 should not be operated. However, in our study four cases with proven acute appendicitis had a MAS of <4, including one male patients wo had a retrocaecal gangrenous appendix. It is possibile that the retrocaecal position of the appendix might have reduced the sensitivity of the Alvarado scoring. This particular point has never been assessed in any study including ours.

CONCLUSION

In the light of our study, it can be safely concluded that acute appendicitis remains a clinical diagnosis. Good clinical acumen and experience of the consulting surgeon is the mainstay of diagnosis. Scoring systems can be used by junior residents for initial assessment and admission of the patients who come with features suggestive of acute appendicitis. However, final decision to operate cannot be based on Alvarado score only.

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