EFFICACY OF MODIFIED ALVERADO SCORING SYSTEM IN THE DIAGNOSIS OF ACUTE APPENDICITIS

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SUMMARY

A prospective study was undertaken in the surgical unit of Hayatabad Medical Complex, Peshawar to test the efficacy of modified Alvarado Scoring System in the diagnosis of acute appendicitis. The study lasted for six months, between May 2001 and Oct. 2001. All those adult patients who were admitted with abdominal pain suggestive of acute appendicitis and were assigned a score according to modified Alvarado score were included in the study. Patients who were either not assigned a score or were under 12 years of age were not included in the study. Out of the 90 patients, the males were twice (n=60) as common as females (n=30). Age group most commonly affected was 21 to 30 yrs. The results revealed a positive predictive value of 88% in all and even more so in case of male patients. It is concluded that this scoring system is an effective tool in the diagnosis of acute appendicitis in adult especially male patients and is very helpful for the young doctor whose clinical judgment does not match that of a senior colleague.

INTRODUCTION

Acute appendicitis is the commonest general surgical emergency afflicting mankind and is the commonest surgical procedure performed the world over. It can lead to variable morbidity and mortality if the diagnosis and subsequent treatment is delayed. Diagnosis of acute appendicitis is basically a clinical one and probably will remain so. Although ultrasonography has been used to diagnosed acute appendicitis the results of this modality alone are no better than the clinical parameters.[1,2]

A Alvarado in 1986 devised a scoring system that assigns different numerical values to symptoms, signs and to some of the basic investigations, in patients who

present with abdominals pain with suspicion of acute appendicitis (Table-1). The original Alverado Scoring System (ASS) includes "a shift to the left" in the parameters, whereas in the modified this is omitted. This scoring system has been applied widely for the diagnosis of acute appendicitis with most studies reporting an efficacy of more than 80%.[3,4,5,6,7] Various other diagnostic modalities have also been sued as an aid in the diagnosis of acute appendicitis but the results are not consistent.

MATERIAL AND METHODS

This prospective study was undertaken in the surgical unit of Hayatabad Medical Complex, Peshawar over a period of six months form May 2001 to October, 2001. All those adult patients who presented with clinical findings suggestive of acute appendicitis and who were assigned a score according to modified ASS and later underwent appendicectomy were included in the study. Those patients in whom the score was not assigned, patients under the age of 12 and patients presenting with generalized, abdominal pain were not included in the study. Appendicectomy was performed via either a standard Grid Iron or Laz incision. The operative findings in terms of the status of appendix were compared with the predictive value of the assigned score to assess the efficacy scoring system.

ASS FOR DIAGNOSIS OF ACUTEAPPENDICITIS	
Features	Score (if present)
Migration of pain to RLQ	1
Anorexia	1
Nausea/Vomiting	1
Tenderness in the RLQ	2
Rebound tenderness	1
Temperature > 37.3°C	1
White Cell Count > 10,000/cu ml	1
RLQ=RIGHT LOWER QUADRANT	
ACTION <4 POINTS=EXCLUSION, 5-6 POINTS=MONITOR >7 POINTS=OPERATE	

TABLE-1

RESULTS

A total of 90 patients were included in this study. The age group most commonly affects was 21 to 30 years while the mean age was 27 years (range 13 to 57 years). Age and sex distribution is shown in Figure-1 and Figure-2 respectively. The percentage of positive parameters according to the MASS is shown in Table-2. Figure-3 shows the percentage of patients with a Modified Alverado Scoring System (MASS) of 7 or greater than 7 and those with a MAS of less than 7. Figure 3 shows that out of the 90 patients, 75 patients, had a score of 7 or more and should have undergone appendicectomy if the criteria was solely the score. The remaining 15 had a score of 5 or 6. None of the patients had a score of less than 5. The Figure-4 shows the operative findings in the patients and Figure-5 shows the breakdown of the appendicular pathology.

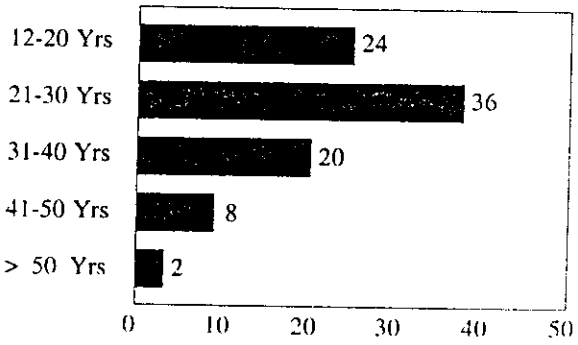

Fig. 1: Age Distribution

POSITIVE PARAMETERS

Finding	No. of Patients	Percentage
Migration of pain to the Right Lower Quadrant	80	89%
Anorexia	85	95%
Nausea/vomiting	90	100%
Tenderness Right Lower Quadrant	85	95%
Rebound Tenderness	7	8%
Temperature > 37.3°C	80	89%
White Cell Count > 10.000/cu ml	80	89%

TABLE-2

It is clear from the table that 76 patients were actually suffering form acute appendicitis. In the remaining 14 patients the findings were; Meckels diverticulitis (1 pt), ectopic gestation (2 pts), ovarian pathology (4 pts) and small bowel tuberculosis (2 pts). In all of these 14 patients appendicectomy was also performed and subsequently subjected to histopathology which confirmed no appendicular pathology.

Table-3 shows the correlation between the preoperative score and the operative findings. The table shows that out of 75 patients with a core of 7 or more 66 had

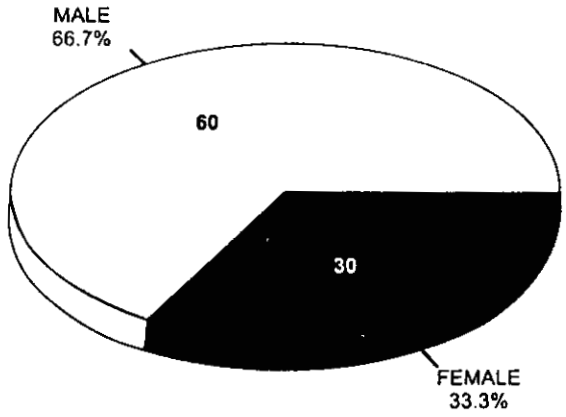

Fig. 2. Sex Distribution

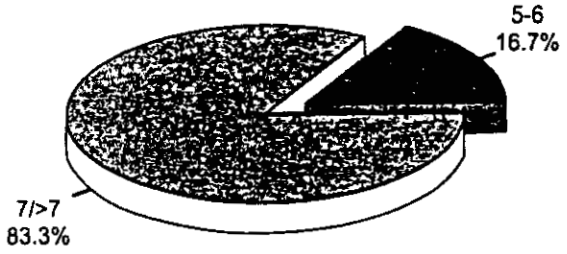

Fig. 3

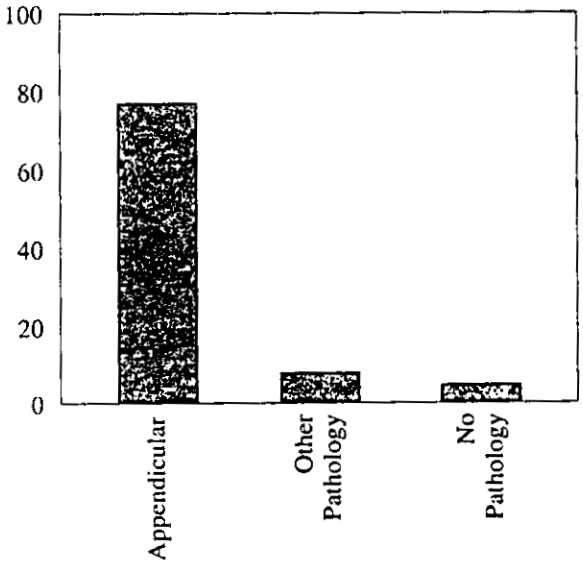

Fig. 4: Operative Findings

CORRELATION BETWEEN THE PRE-OP SCORE AND THE OPERATIVE FINDINGS

(The figures in brackets give the male and female numbers respectively)

		Alvarado Score >or=7	Alvarado Score 5 6	Total
Operative Pathology	Appendicular	66 (48,18)	10 (6,4)	76
	No/Other	9 (4,5)	5 (8,7)	14
Total		75 (52,23)	15 (8,7)	90

TABLE-3

inflamed appendix giving a positive predictive value of 88% as compared to 84% (76 out of 90 pts) on pure clinical grounds. The positive predictive value of the scoring system becomes even more significant when only the males are considered in the way that 48 out of 52 males having a score of 7 or more (giving a predictive value of 92%) were found to have acutely inflamed appendix. The lower predictive values in the females may be due to the presence of pelvic pathologies which mimic acute appendicitis. The patients with a score of 5 or 6 had a predictive value of only 67% which is in fact understandable, as this is the group which needs close monitoring till the clinical picture becomes obvious and appropriate steps then taken.

DISCUSSION

Acute appendicitis is the most common surgical emergency with a lifetime prevalence of one in seven. Acute appendicitis with protean manifestations may simulate almost any other cute abdominal illness and in turn may be mimicked by a variety of conditions. Progression of symptoms and sign is usual in contrast to the fluctuating course of some other diseases that lead to heavy morbidity and mortality. The diagnosis of acute appendicitis is basically a clinical one, the accuracy being directly proportional to the clinical experience of the clinician. The delay in the treatment can lead to variable morbidity and mortality. Various other diagnostic modalities have been used to aid in the diagnosis. These include conventional[2,8] and compression ultrasonography,[9] laparoscopy,[10] and a variety of scoring systems like **Lindberg, Fenyo, Christia, Ohman** and **Alverado Scoring System.**

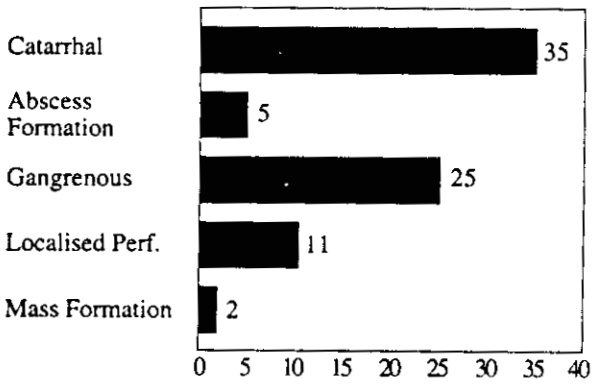

Fig. 5: Breakup of Appendicular Pathology

Although various studies have been done comparing these diagnostic aids[2] and the various combinations,[2,10] the most widely studied and practiced is ASS (Alverado Scoring System). ASS assigns a numerical value to the signs and symptoms. Practically speaking the Alvarado score is equivalent to one's degree of clinical suspicion. Many institutions, in addition, use ultrasonography as an aid in the diagnosis of acute appendicitis. However the impact of USS is unnecessary when one's degree of clinical suspicions is high. However the additional information provided by USS does improve diagnostic accuracy in the case of a negative or equivocal MAS.[2] On the other hand some investigators are of the opinion that USS is not superior to clinical examination and surgery is recommended even if USS findings are negative.[8] A Alverado in 1986 after conducting retrospective study of hospitalized patients with abdominal pain suggestive of acute appendicitis, devised a practical diagnostic score that could help in interpreting the confusing picture of acute appendictitis.[11] Since then this has been independently evaluated and commented upon by various authors.[5,6,7,12,13] In our study, the positive predictive the value of MAS worked out to be 88% compared to that of clinical diagnosis alone which was 84%. Accordingly the false positive rate for acute appendicitis on MAS was 12% as compared to 16% on clinical grounds. In one of the reported series the figures for positive predictive value and

false positive rate were found to be 88% and 7.2% respectively.[2] The high predictive rate in men (92% in our study) as compared to the females (78%), is also supported in the literature[5,7,13] which also show a high false rate in females and our study revealed the same. In one of the studies the accuracy of the various scores has been challenged and it states that "Evaluation of the score in our database resulted in poor performance for all of the these scoring systems. Further well designed large-scale trials are needed to investigate the clinical benefit of diagnostic scoring systems in acute appendicitis."[14] The high false positive rate in the females using the MAS is due to the presence of other pelvic pathologies. In has been mentioned that the MAS combined with the use of selective laprascopy in adult females can be used in the assessment of acute abdominal pain suggestive of appendicitis. The rate of negative appendicitis can thus be reduced to almost 0%.[9] The use of MAS in evaluating the children with the clinical suspicion of acute appendicitis has been debated. Although it has been shown to be satisfactory aid,[5] the overall sensitivity and specificity has been reported to be 76.2% and 78.8% respectively and it has been suggested that the current clinical practice is more accurate than the MAS in the diagnosis of acute appendicitis in children.[12] Although **Ohman** score has shown better accuracy rate than that of provisional clinical diagnosis,[15] this has not been widely practiced. Having discussed all this, importance of observation in a patient with intermediate initial probability of appendicitis should not be underestimated. This observation improve the ability to distinguish patients with appendicitis from those without appendicitis.[16]

In conclusion, it can be stated that the diagnostic scoring system as devised by A. alverado may be helpful when experienced investigators or additional diagnostic modalities are not available and this especially holds true in adult males. It may therefore be of value in the practical evaluation of patients with suspected acute appendicitis and be instrumental as a quality control tool and in clinical guidelines.

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