COMPARISON OF SENSITIVITY AND SPECIFICITY OF ALVARADO SCORE WITH MODIFIED ALVARADO SCORE IN PATIENTS WITH ACUTE APPENDICITIS: IN A TERTIARY CARE HOSPITAL RIMS, SRIKAKULAM

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ABSTRACT

BACKGROUND

Acute Appendicitis is one of the commonest surgical emergencies. Despite advancement in diagnostic technology, diagnosis of appendicitis is based on clinical suspicion leading sometimes to removal of normal appendix. Sometimes diagnosis is delayed till complications like perforation, mass formation leading to increased mortality and morbidity; various scoring systems have been evolved to make a diagnosis of appendicitis. Alvarado Scoring and Modified Alvarado Scoring system are widely used to identify the patients needing appendicectomy.

OBJECTIVES

The aim of the study was to evaluate and compare the diagnostic validity of the modified Alvarado Score with the Alvarado Score for the diagnosis of acute appendicitis.

MATERIALS AND METHODS

A retrospective study of 78 patients admitted with abdominal pain in Rt. iliac fossa suggestive of appendicitis from January 2015 to April 2016 was conducted. Data including clinical signs and symptoms and laboratory findings were recorded in Alvarado Score and Modified Alvarado Score in the record form.

INCLUSION CRITERIA

All patients of age more than 12 years and less than 70 years with acute abdominal pain in Right iliac fossa presumed to be of appendicular origin.

EXCLUSION CRITERIA

Patients with age less than 12 yrs. and more than 70 yrs. Patients with palpable mass on abdominal examination and with signs of peritonitis and patients who are not willing for surgery.

RESULTS

Out of the 78 hospitalised patients 71 patients had an appendicectomy, of these 2 did not have acute appendicitis. In 71 patients who underwent operation those with an Alvarado Score of 9 to 10 were almost certain to have appendicitis, had a sensitivity of 48% and specificity of 100%. Those with a score of 7-8 (which had a high likelihood of appendicitis had a sensitivity of 48% and specificity of 100%). For the modified Alvarado Score, those with a score of 9 to 10 had a sensitivity of 57.7% and specificity of 100%. Those with a score of 7-8 had a sensitivity of 98% and specificity of 90% respectively. The positive predictive values and accuracy of left shift were 94% and 61.4% in Alvarado Score. For extra sign (cough test, Rovsing's sign and rectal tenderness), the figures were 94.7% and 83.3% respectively.

CONCLUSION

In the diagnosis of acute appendicitis the Alvarado Score and Modified Alvarado Score are a fast, simple, reliable, non-invasive scoring system, repeatable and safe diagnostic modality without extra expenses and complications. This study showed that accuracy of Modified Alvarado Score was slightly higher than the Alvarado Score in diagnosing appendicitis.

KEYWORDS

Alvarado Score, Modified Alvarado Score, Appendicitis.

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INTRODUCTION

Acute appendicitis is the commonest surgical emergency⁽¹⁾ worldwide. Incidence is 1.17 per 1000 population and lifetime risk is 8.6% among males and 6.7% in females.⁽²⁾ The incidences are more in adolescents and young adults, but incidence of complications shows little variation in the age group.⁽³⁾

Classical signs and symptoms of acute appendicitis were first described by Reginald Heber Fitz in 1886.⁽⁴⁾ Typical cases

present with paraumbilical pain migrating to right iliac fossa, nausea, vomiting and fever. Variation in position of Appendix, age of patient, degree of inflammation makes the clinical presentation inconsistent.

Failure to make an early diagnosis may lead to the risk of perforation and complications. The complication rate in non-perforative appendicitis is 1%, but it is as high as 5% or more in young and elderly patients in whom the diagnosis is delayed.⁽⁴⁾ Various scoring systems have been evolved to make the diagnosis of acute appendicitis. Popular among them is Alvarado Score described in 1986.⁽⁵⁾

The classical Alvarado Score includes left shift of neutrophil maturation, which is not routinely done in laboratories. Kalam et al omitted left shift of neutrophil in modified Alvarado Score, which includes extra sign (eg. Cough test, Rovsing's signs and rectal tenderness) are helpful in minimising unnecessary appendectomy and is practical and reliable and easily done. Some studies demonstrated that extra sign had a sensitivity of 71% and specificity of 68%. The aim of the study is to compare the diagnostic validity of Alvarado Score to the Modified Alvarado Score.

MATERIALS AND METHODS

This is a retrospective study of 78 patients admitted with abdominal pain in right iliac fossa suggestive of acute appendicitis from January 2015 to April 2016 at Rajeev Gandhi Institute of Medical Sciences, Srikakulam, Andhra Pradesh.

Data including Age, Sex, Symptoms, Physical Signs and Laboratory findings such as white blood count and differential count were recorded in Alvarado and Modified Alvarado Score form (Table 1, 2).^{6,7} Table 1 and 2 test the eight specific indicators. Patients with a score of >9 are almost certain to have appendicitis and those with a score of 5-6 are compatible with but not diagnostic of appendicitis. Score of <4 are unlikely to have appendicitis.

		Score	Yes/No
Sympt	Migratory pain (Pain migrating from umbilicus to Rt iliac fossa)	1	
	Anorexia	1	
	Nausea/Vomiting	1	
Sign	Rt Lower quadrant pain	2	
	Rebound tenderness	1	
	Elevation of temperature	1	
Lab	Leucocytosis	2	
	Left Shift	1	
Total		10	

Table 1: Alvarado Score

		Score	Yes/No
Sympt	Migratory pain (Pain migrating from umbilicus to Rt iliac fossa)	1	
	Anorexia	1	
	Nausea/Vomiting	1	
Sign	Rt Lower quadrant pain	2	
	Rebound tenderness	1	
	Elevation of temperature	1	
	Extra sign (cough test)	1	
Lab	Rovsing's sign and rectal tenderness	1	
	Left Shift	2	
Total		11	

Table 2: Modified Alvarado Score

All patients were retrospectively evaluated and scored on the admission sheet. The Alvarado score and Modified Alvarado score played no role in the management of these patients. The diagnosis of acute appendicitis was made clinically by the surgical team (Residents and Specialists). The scores were subsequently correlated with the clinical, operative and histopathological finding.

RESULTS

Of the 78 patients admitted, 7 (8.5%) patients were kept for observation and treated conservatively. They were discharged with diagnosis of other than appendicitis. Of the 78 patients 71 patients (92%) had appendectomy, of these 2 patients (2.5%) did not have acute appendicitis, one of them showed signs of PID and the other one having UTI.

Of the 78 Patients who had Acute Appendicitis

Males	:	49 (63%)
Females	:	29 (37%)
Mean age in Males	:	25 (10 to 50 yrs.)
Females	:	19 (14 to 47 yrs.)

The pathological study in 71 patients who underwent appendectomy were analysed in Table 3. The total score of 78 patients who had acute abdominal pain suggestive of acute appendicitis were recorded in score form and are summarised in each score range (Table 4).

Patients with Score of 9-10 are Certain to have Appendicitis		
	Sensitivity	Specificity
Alvarado Scoring System	50%	100%
Modified Alvarado Scoring System	59%	100%

Pts. with a Score of 7 to 8		
	Sensitivity	Specificity
Alvarado Scoring System	90%	98%
Modified Alvarado Scoring System	98%	98%

The evaluation of Clinical and Laboratory findings in acute appendicitis were listed in (Table 5); a differential white cell count with a shift to the left and extra signs were useful indicators in acute appendicitis, as they have good predictive value (94.1%) and 94.7%. Extra signs showed greater sensitivity and accuracy than left shift. However, specificity of extra sign and left shift were poor, 50% and 60%.

Stage	No.	Percentage
Inflammation	34	48%
Suppurative	14	19.7%
Gangrenous	8	11.9%
Perforation	15	21.1%

Table 3: Pathological Stage of Acute Appendicitis

Range Score	Alvarado Score		Modified Alvarado	
	Appendicitis	Other Diseases	Appendicitis	Other Diseases
0-4	1	0	1	0
5-6	1	6	1	6
7-8	34	1	26	0
9-10	35	0	43	0

Table 4: The Last Total Score of 78 Patients who were Admitted with Acute Abdominal Pain Suggestive of Acute Appendicitis Alvarado, Modified Alvarado

Table 5: Alvarado Score, Modified Alvarado Score

	Sensitivity	Specialty	Predictive		Accuracy
			+ve	-ve	
Migration of Pain	76.9	50.0	0.94	0.17	74.6
Anorexia	86.5	70.0	0.96	0.37	86.8
Nausea, Vomiting	86.8	40.0	0.93	0.21	81.3
RLQ Pain	100	10.0	0.92	1	92.1
Rebound Tenderness	86.5	50.0	0.94	0.26	83.3
Elevation of Tempered >37.5	60.6	70.0	0.95	0.15	61.4
Leukocytosis	89.4	30.0	0.93	0.21	84.2
Left Shift *	61.5	60.0	0.94	0.13	61.4
Extra Sign *	86.5	50.0	0.94	0.26	83.3

Table 6: Evaluation of Clinical and Laboratory Finding in Acute Appendicitis

*Left Shift, Differential White Cell Count with shift to left (neutrophil more than normal range)

*Extra Sign - Cough test, Rovsing and Rectal tenderness

DISCUSSION

The clinical diagnosis of acute appendicitis continues to be difficult in some patients due to variable presentation of the disease and lack of reliable diagnostic test.

In the past few years, various scoring systems have been evolved to help in making the diagnosis of acute appendicitis. Alvarado scoring system is a simple scoring system, helps in diagnosing Appendicitis. It is devised by giving relative weight to specific clinical symptoms and signs and laboratory findings. Patients with scoring of 9 and 10 are almost certain to have appendicitis and to be operated. Patients with a

scoring 7-8 have a high likelihood of appendicitis, while a score 5 to 6 indicates probability of appendicitis but is not diagnostic of it. CT scoring is certainly appropriate to patients with Alvarado scoring of 5-6. With a scoring of 0 to 4 it is difficult to justify the expense, radiation exposure time and possible complications of CT scanning. It is extremely unlikely for these patients to have appendicitis.

In a prospective study of 215 adults and children in Cardiff, the use of Alvarado score decreased in unusually high false positive appendectomy rates of 44% to 14%.⁸ Fengo et al reported a sensitivity of 90.2% and specificity of 91.4% and others reported a sensitivity of 73%, specificity of 87% with a negative laboratory ratio of 17.5%.⁹ To be useful, a scoring system must be both sensitive as well as specific. Our study showed that modified Alvarado score is effective in making a diagnosis of acute appendicitis and is practicable. The extra signs were more accurate and alone by the attending clinician, whereas left shift is a laboratory finding. All patients suspected to be having appendicitis should be evaluated for extra sign, because anatomical variation in position of the inflamed appendix is misleading. Cough test and Rovsing's sign also indicates peritoneal irritation. The diagnosis of acute appendicitis is difficult in women, because of the presence of gynaecological disorders.

A pelvic examination is essential, which may reveal the missing information. A rectal examination does not appear to be a reliable element in the diagnosis of acute appendicitis, because of its low diagnostic weight.

However, there is no clinical scoring system that gives 100% certainty. We can use the diagnostic score as a guide to decide if the patient needs observation or surgery. Patients with score 5-6 can be observed and monitored every four to six hours. If the score increases, patients may need laparotomy. If it is difficult to ascertain, CT scan is needed in making diagnosis. Patients with score of 7 and above require surgery.

CONCLUSION

Ours is retrospective study and our results are similar to the other prospective studies.^(10,11,12) The modified Alvarado score and the Alvarado score are useful complimentary methods in the diagnosis of patients suspected to have acute appendicitis. The diagnostic value of the Modified Alvarado score is slightly higher than the Alvarado score in this study.

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