

ORIGINAL ARTICLE**Evaluation of Right Iliac Fossa Pain with Reference to Alvarado Score – Can We Prevent Unnecessary Appendicectomies?**P. D. Gurav¹*, N. N. Hombalkar¹, Priya Dhandore¹, Mohd. Hamid¹¹Department of Surgery, Govt. Medical College, Miraj and Padmabhusan Vasantdada Patil Government Hospital, Sangli - 416416 (Maharashtra), India**Abstract:**

Background: Appendicectomy for acute appendicitis is the most common surgical cause of emergency laparotomy throughout the world. Acute appendicitis is a clinical diagnosis; the accuracy of clinical examination has been reported from 71 to 97% and varies greatly depending upon the experience of the examiner. The treatment being surgical, negative appendicectomy rates are high. **Aim and Objective:** Present study was conducted to evaluate Alvarado Scoring system for diagnosis of acute appendicitis and its co-relation by histopathology. **Material and Methods:** Prospective study of consecutive patients admitted with suspected acute appendicitis during the period of July 2011 to December 2012 was undertaken. Alvarado Score of each patient was calculated. Out of 130, 95 patients had histologically proven acute appendicitis. Reliability of scoring system was assessed by calculating positive predictive value and negative appendicectomy rate. **Results and Conclusion:** The positive predictive value was 88.37% and negative appendicectomy rate was 11.63% (with respect to Alvarado score ≥ 7). Alvarado Scoring system is easy, simple, cheap, useful tool in pre-operative diagnosis of acute appendicitis.

Keyword: Alvarado scoring, acute appendicitis, histopathology

Introduction:

Acute appendicitis is traditionally understood

to be a clinical diagnosis. In a lifetime 8.6% males and 6.7% females can be expected to develop acute appendicitis [1]. Routine history and physical examination still remain the most practical diagnostic modalities. In spite of advances in diagnostic modalities the percentage of negative appendicectomies reported in various series ranges from 10 to 44% with its associated morbidity of around 10% [2, 3]. In order to reduce the negative appendicectomy rate various scoring systems have been developed for supporting the diagnosis of acute appendicitis [4]. Alvarado Scoring system is one of them and is based on history, clinical examination and few laboratory tests and easy to apply [5] (Table 1).

Table 1: Showing Alvarado Scoring System

	Score
Symptoms	
1. Migrating right iliac fossa pain	1
2. Anorexia	1
3. Nausea/Vomiting	1
Sign	
1. Tenderness over right iliac fossa pain	2
2. Rebound tenderness over right iliac fossa pain	1
3. Fever	1
Laboratory Investigations	
1. Leucocytosis	2
2. Shift to left of neutrophils	1
Total	10

The aim of study was to evaluate the reliability of Alvarado scoring system for diagnosis of acute appendicitis and its usefulness in preventing negative appendicectomies.

Patients and Methods:

This prospective study was conducted in the Department of General Surgery of Government Medical College, Miraj and PVPGH, Sangli from July 2011 to December 2012 on patients presenting with acute right iliac fossa pain with clinical diagnosis of acute appendicitis. The study approved from Institutional Ethics Committee. All patients presenting with right iliac fossa pain in the age group of 15 to 50 years were included in this study. Written informed consent taken from all the patients and their relatives. Patients with previous history of abdominal or inguinal surgery, patients with appendicular lump and patients who were not willing for surgery were excluded from study. A proforma containing general and clinical infor-

mation about the patients and eight variables of Alvarado score was filled and Alvarado score was calculated. The diagnosis of acute appendicitis was made clinically and the decision for appendicectomy was taken. Though all patients were scored using Alvarado score, it had no implication on decision of surgery. Subsequently, the score of each patient was correlated with histopathological report. And finally we tried to find out the negative appendicectomy rate, positive predictive value, sensitivity and specificity in order to assess the reliability of Alvarado scoring system.

Results:

A total 130 patients were included in the study, which comprised of 71 male patients and 59 female patients; the male to female ratio was 1.20:1. 78.3% patients were in the age group of 15 to 30 years. Highest number of patients (43.8%) were in the second decade that is from 15 to 20 years (Fig. 1).

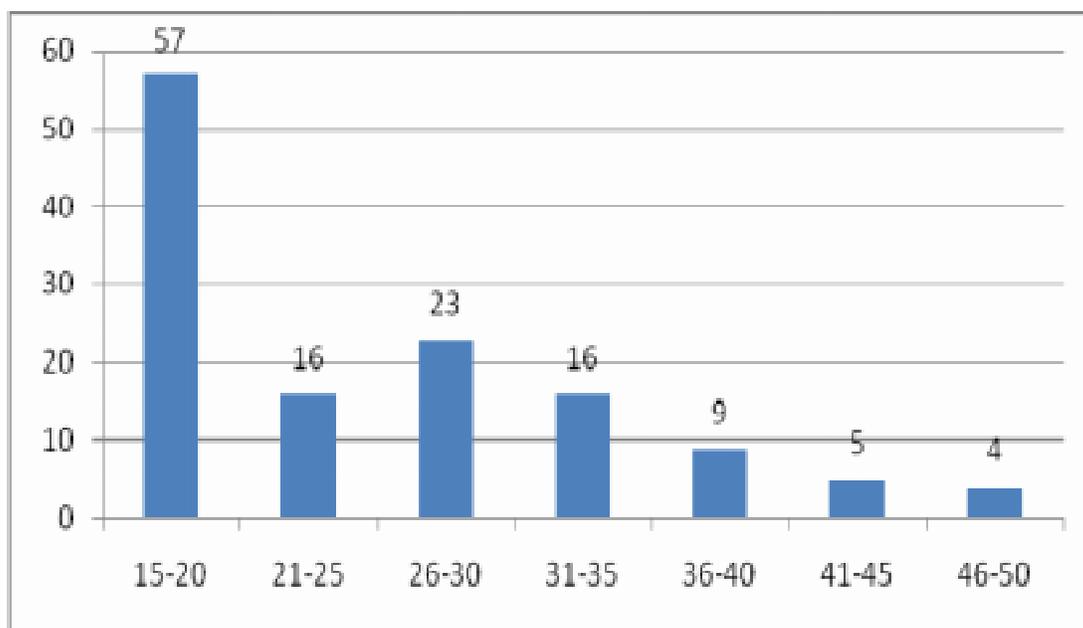


Fig. 1: Showing age distribution of patients presenting with right iliac fossa pain

The most common presentation was pain in right iliac fossa and most common presenting sign was tenderness in right illac fossa. These were present in all the patients. The second most common presenting complaint was nausea and vomiting (94%) followed by anorexia in 87% of patients.

For the study, the patients were divided in three groups; viz Alavardo score of 1-4, 5-6, and 7-10, Six patients had score of 1-4, 38 patients had score of 5-6 and the remaining 86 patients had a score of 7-10. Histopathological examination of specimens confirmed acute appendicitis in 95 patient (73%), out of which 55 were males (57.89%) and 40 were females

(42.11%). In patients with Alvarado score of 7-10, over 80% i.e. 44 out of 47(93.6%) of male patients and 32 out of 39(82.05%) of female patients had acute appendicitis. With score of 5-6, 50% i.e. 11 out of 22 of male patients and 8 out of 16 female patients had acute appendicitis. With Alvarado score of 1-4, there were 2 male and 4 female patients, none had acute appendicitis (Table 2).

The positive predictive value of Alvarado score was calculated for a score of <7 and ≥ 7 . In males positive predictive value was 45.84% and 93.61% when score was <7 and ≥ 7 respectively whereas in females it was 40% and 82.05% when score was <7 and ≥ 7 respectively. The

Table 2: Showing Results of Alvarado Score in Reference with Sex, Histopathological Report

Alvarado Score	Acute Appendicitis		Non Acute Appendicitis		Other Findings	
	M	F	M	F	M	F
1-4	0	0	2	4	0	0
5-6	11 (50%)	8 (50%)	11 (50%)	8 (50%)	1	4
7-10	44 (93.61%)	32 (82.05%)	3 (6.39%)	7 (17.95%)	2	8
Total	55 (77.46%)	40 (67.80%)	16 (22.53%)	19 (32.20%)	3	12

[Various other findings were: Mesenteric lymphadenitis, Simple Ovarian Cyst, Poly Cystic Ovary, Ruptured Corpus Luteal Cyst, Right Ovarian Hemorrhagic Cyst]

Table 3: Showing Positive Predictive Value of Alvarado Score

	Number of patients	Appendicitis	Positive Predictive Value
Alvarado score < 7			
Male	24	11	45.84%
Female	20	8	40.00%
Total	44	19	43.19%
Alvarado score ≥ 7			
Male	47	44	93.61%
Female	39	32	82.05%
Total	86	76	88.37%

overall positive predictive value was 43.19% and 88.37% with Alvarado score of <7 and ≥ 7 respectively. (Table 3) The sensitivity of Alvarado score was found to be 20% and 80% with respect to score of <7 and ≥ 7 where as specificity was 28.57% and 71.43% when score was <7 and ≥ 7 respectively (Table 4)

The negative appendicectomy rate in male patient with Alvarado score <7 and ≥ 7 was 54.16% and 6.39% respectively, whereas in female patient it was 60% and 17.90% with the Alvarado score of <7 and ≥ 7 respectively. The overall negative appendicectomy rate for the Alvarado score of <7 was 56.82%, while it was 11.62% when the score was ≥ 7 . The overall negative appendicectomy rate for male patients was 22.53%, while for the female patients it

was 32.20% (Table 5), thus the overall negative appendicectomy rate in the present study was 26.92%.

In the present study the accuracy for Alvarado score ≥ 7 for diagnosis of acute appendicitis was 77.7%, where as it was 22.31% when the score is <7 .

Discussion:

Decision making in cases of acute appendicitis poses a clinical challenge in developing countries where advanced radiological investigations do not appear cost effective, so clinical parameters remain mainstay of diagnosis, but misdiagnosis and negative appendicectomy still do occur at quite a high rate [6]. It is the surgeon who has to decide the best management in a

Table 4: Showing Sensitivity & Specificity of Alvarado score

Alvarado Score	Acute Appendicitis	Non Acute Appendicitis	Total
<7	19	25	44
≥ 7	76	10	86
Total	95	35	
Sensitivity (%)	20.00	28.57	
Specificity (%)	80.00	71.43	

Table 5: Showing Correlation of Alvarado Score with Sex and Histopathology report with respect to negative appendicectomy

Alvarado Score	Total No. of pts	HPR		Male			Female			NEG APP%	
		N	P	N	P	T	N	P	T	Male	Female
< 7	44	25	19	13	11	24	12	8	20	54.16	60
≥ 7	86	10	76	3	44	47	7	32	39	6.39	17.90
Total	130	35	95	16	55	71	19	40	59	22.53	32.20

[PTS–Patients, HPR–Histopathology Report, N–Negative for acute appendicitis (non acute appendicitis), P–Positive for acute appendicitis, T–Total, NEG–Negative, APP–Appendicectomy]

cost effective manner. The decision to operate or not is very important as surgical intervention in acute appendicitis is not without the risk of morbidity and mortality, a negative appendectomy has a mortality and morbidity of around 10% [7]. Various scoring systems have been used to aid the diagnosis of acute appendicitis and bring down the negative appendectomy rates. In 1986 Alvarado has published 8 predictive factors, which he has found to be useful in making the diagnosis of acute appendicitis [5]. Since then there have been various studies, trying to validate the utility and efficacy of this simple scoring system. The results of our study are comparable with relevant literature. Our study shows positive predictive value of 88.3% for score ≥ 7 which are comparable with literature report of 87.4% [8], 83.5% [9], 85.3% [10].

We had a negative appendectomy rate of 26.92% (males-22.53% and female-32.20%), it is higher than other studies of 15.6% [9], 14.3% [11], 16.1% [12], 17.5% [13]. This could be because of the study design, that all patients have been operated irrespective of their Alvarado score, as per routine practice. Lone et al [14] have shown in their study that sensitivity in the same score has been more in males than in female patients. Lower values in female patients could have been due to presence of disease in genital system i.e. ovaries; fallopian tubes etc. mimicking presentation of acute appendicitis.

Conclusion:

Alvarado score is a simple to use and easy to apply test since it relies on history, clinical examinations and basic laboratory investigations. Alvarado score of ≥ 7 virtually confirms

diagnosis of acute appendicitis and early operation is indicated to avoid complication like perforation. Any patient with the score range of 5 to 6 is required admission and reevaluation and monitoring for possible deterioration of clinical condition and earliest possible intervention whenever required. The likelihood of acute appendicitis is high if the total Alvarado score is high; the positive predictive value reaches almost 100% when score is 9 or 10. Alvarado score can significantly reduce the negative appendectomy rate. The negative appendectomy rate in males has been less than females. This is probably due to the pelvic inflammatory disease in females in the reproductive age group. In females additional investigations may be required to confirm the diagnosis, which is supported by other workers [15, 16]. The application of Alvarado scoring system definitely improves diagnostic accuracy and possibly reduces the complication rates, due to acute appendicitis.

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