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Original Research Article

Evaluation of Modified Alvarado Score in the Diagnosis of Acute Appendicitis at SKMCH, Muzaffarpur, Bihar

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Conflict of interest: Nil

Abstract

Background: One of the most frequent emergency surgeries is an appendectomy. It is necessary to differentiate the diagnosis from other causes of discomfort in that area of the abdomen, such as right-sided salphingoophoritis and acute ureteric colic. These days, the preferred diagnostic techniques include contrast-enhanced CT scans and ultrasounds. The necessity for a trustworthy scoring system for the diagnosis of acute appendicitis is increased by the fact that, despite the availability of these facilities in urban regions, rural areas continue to struggle with delayed diagnosis and negative appendectomy. The modified Alvardo scoring system for the diagnosis of acute appendicitis will be assessed here.

Methods: 92 consecutive cases of suspected acute appendicitis that were admitted, examined, and treated between February 2025 and July 2025 are included in this observational cross-sectional hospital-based study at SKMCH, Muzaffarpur, Bihar. Each patient's modified Alvardo score is computed and compared to the histological results of the appendix that was operated on.

Results: According to the above study, the modified Alvardo score 7-9 has a high sensitivity of 93.10% for male and 77.78% for female. The modified Alvardo score of 7-9 showed an overall sensitivity of 83.63%.

Conclusions: We conclude that the modified Alvardo score of 7-9 is an effective diagnostic tool for male. However, it can be utilized as a diagnostic tool in addition to imaging investigations in females because of its lesser sensitivity and high percentage of negative appendectomy results.

Keywords: Alvardo score, acute appendicitis, Appendectomy.

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Introduction

Acute appendicitis is the most common surgically correctable cause of abdominal pain, the diagnosis of which remains difficult in many instances. Some of the signs and symptoms can be subtle to both the clinician and the patients and may not be present in all instances. Arriving at the correct diagnosis is essential, however delay may allow progression to perforation and significantly increased morbidity and mortality.

Incorrectly diagnosing the patient with appendicitis, although not catastrophic often subjects the patient to an unnecessary operation. [1,2] The diagnosis of acute appendicitis is essentially clinical; however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15 to 30% cases. The premise that it is better to remove a normal appendix than to delay diagnosis doesn't stand up to close scrutiny, particularly in the elderly. A number of clinical and laboratory based scoring systems have been devised to assist diagnosis. The most commonly used is Alvarado score and equally its modifications.[3] Modified Alvarado score consists of three symptoms, three signs and a laboratory finding as described by alvarado and later modified by Kalan et al.[4,5]

The objective of this study is to evaluate modified Alvardo score in diagnosis of acute appendicitis to reduce negative appendicectomy rate.

Material and Methods

This observational cross-sectional hospital-based study was conducted at Department of General Surgery, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from February 2025 to July 2025.All the patient attended in SKMCH with complaints of acute pain in right iliac fossa and umbilical region and treated with provisional diagnosis as acute appendicitis were included in the study.

A total of 92 consecutive cases of suspected acute appendicitis, who were admitted, investigated and treated during the above-mentioned period and met the inclusions criteria. Patients below 18 years, patients above 70 years, patient not giving consent for study, generalized peritonitis due to appendicular perforation, appendicular mass, and other disease mimicking acute appendicitis. Patients declared unfit for surgery by anaesthesiologist due to comorbidities were excluded.

All the patients who were provisionally diagnosed having acute appendicitis underwent ultrasonography of abdomen primarily to rule out other conditions mimicking acute appendicitis. Modified Alvardo score is calculated pre operatively on each of the 92 patients who were provisionally diagnosed having acute appendicitis. Patients with score from 7-9 were considered for appendectomy. Scores 0f 1-4 were treated conservatively. Scores between 5-6 were observed for 24 hours with intravenous antibiotics and reassessed after 24 hours. If score become ≥7 they are subjected to appendectomy, whereas with decreasing of the score, conservative management was continued. All the specimens of appendix were sent for histopathological confirmation of acute appendix in the department of pathology,

SKMCH. Final correlation was made to derive the results. All the data are compiled in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test was used for assessment of level of significance.

Ethical committee approval was taken from concerned authorities.

Results

Table 1 shows that 37% of the study participants were between the ages of 21 and 30. Table 1 makes it evident that the bulk of cases with scores between 1 and 4 belonged to the 21–30 age range, and scores between 5 and 6 also belonged to the 12 age group. In contrast, the bulk of patients with a score of 7–9 fell into the 10–20 age range.

Table 1: Age wise distribution of modified Alvarado score

Age (years)	No. of cases with score 1-4	No. of cases with score 5-6	No. of cases with score 7-9	Total	Percentage
10-20	3	6	20	29	32%
21-30	8	12	14	34	37%
31-40	6	4	10	20	21%
41-50	0	2	5	7	7%
>50	0	0	2	2	3%
Total	17	24	51	92	100%

A total of 24 patients received a score of 5–6 in Table 2. Due to clinical detoriation and significant clinical suspicion of acute appendicitis, eight of them underwent surgery. The remaining sixteen patients were monitored, treated conservatively, and released. Six of the nine patients with a score of 5–6 who underwent surgery were men, and two were women.

Table 2: Distribution of cases according to modified Alvarado score (5-6)

Category of cases	No. of cases operated	No. of cases with hp appendicitis	No. of cases without hp appendicitis	Proportion of true positive
Male (n=14)	6	4	2	67%
Female(n=10)	2	1	1	50%
Total(n=24)	8	5	3	62.5%

Table 3 shows that 47 of the 51 patients in the score group 7-9 had an appendectomy. There are 29 men and 18 women among these 47 patients. Acute appendicitis was present in 41 of the 47 cases in Table 3. Modified Alvardo score ≥7 has a sensitivity of 87.23%. Male sensitivity is 93.10%, whereas female sensitivity is 77.78%. Females had the highest rate of negative appendectomy (25%). It is 17.24% in men.

Table 3: Distribution of cases according to modified Alvarado score (7-9)

Category of cases	No. of cases operated	No. of cases with hp appendicitis	No. of cases without hp appendicitis	Proportion of true positive
Male (n=32)	29	27	2	93.1%
Female(n=19)	18	14	4	77.78%
Total(n=51)	47	41	6	87.23%

46 of the 55 cases in Table 4 that had surgery based on the modified Alvarado score had appendicitis in the histology report. Overall, sensitivity was 75% for women and 88.57% for men. Females had the highest rate of negative appendectomy (25%). It is 11.43% for male.

Table 4: Relation between modified Alvarado score (5-9) and positive appendicectomy rate

Category of cases	No. of cases operated	No. of cases with hp appendicitis	No. of cases without hp appendicitis	Proportion of true positive
Male (n=46)	35	31	4	88.57%
Female(n=29)	20	15	5	75%
Total(n=75)	55	46	9	83.63%

Discussion

The most frequent cause of acute abdominal pain in all age groups is acute appendicitis.[6]Laboratory results and physical examination can be used to make a diagnosis. Radiological techniques are used in suspected instances. Nevertheless, they are not affordable and unavailable in rural areas. Several scoring methods, including Lintula, Madan, Ohmann, Eskelinen, De Dombal, and Alvarado, were proposed to lower the cost and avoid diagnosing delays. These scoring systems are similar in that they were designed to be non-invasive, practical, and easy to use.[7]The Alvarado score aids in classifying individuals who require more testing, monitoring, or surgery.[4]The modified Alvardo score 7-9 has a high sensitivity of 93.10% in male with negative appendectomy rates of 17.24%, according to the aforementioned study. With a sensitivity of 77.78%, the negative appendectomy rate in females is about 25%.

Acute appendicitis sensitivity of 93.10% for males with a modified Alvardo score of 7-9 is in good agreement with research findings from Kalan et al. (reported sensitivity of 93%), Bhattacharjee et al. (reported sensitivity of 94.1%), and Ozsoy et al. (reported sensitivity of 80.1%).[5-9]The sensitivity for females with a modified Alvardo score of 7–9 is around 77.78%, which is consistent with the sensitivity reported by two previous studies: Bhattacharjee et al. (reported sensitivity of 71.9%) and Kalan et al. (reported sensitivity of 67%).The modified Alvardo score of 7-9 yielded an overall sensitivity of 83.63%, which is consistent with research by Kalan et al. (reported sensitivity of 83.7%) and Bhattacharjee et al. (reported sensitivity of 82.7%).Additionally, our study's findings are comparable to those of Talbot et al. and Vandakuri et al.[10,11]

Our study found that 46 of the 55 cases that had surgery based on the modified Alvarado score had appendicitis in the histology report. Overall, the sensitivity is 75% in women and 88.57% in male. Females had the highest rate of negative appendectomy (25%). It is 11.43% for male. This outcome closely resembles the research conducted by Jo et al.[5,12]

Conclusion

It is evident from the aforementioned research and analysis that the modified Alvardo score of 7–9 has a significant diagnostic value for acute appendicitis, particularly in males.

However, due to a variety of pathologies, including pelvic inflammatory disease, ruptured ectopic pregnancy, and other conditions that manifest as acute appendicitis, the sensitivity in females is lower than in males. Therefore, while the modified Alvardo score can be used to identify and treat instances of acute appendicitis in men, imaging is definitely necessary for a final diagnosis in women in order to prevent a negative appendectomy.

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