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Original Research Article

Evaluation of Modified Alvarado Score in the Diagnosis of Acute Appendicitis

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Abstract:

Background: Acute appendicitis is still one of the most prevalent surgical emergencies. To lower the rates of negative appendectomies and complications, it is important to make an accurate diagnosis as soon as possible. The Modified Alvarado Score (MAS) is a simple clinical scoring system that helps doctors make diagnoses, especially in places where resources are limited.

Objectives: To evaluate the diagnostic accuracy of the Modified Alvarado Score in patients with suspected acute appendicitis.

This prospective study took place at PMCH in Patna, Bihar, over a span of 10 months, from February 2025 to December 2025. A total of 76 patients were clinically suspected of having acute appendicitis. We estimated MAS for all patients and compared it to what we found after surgery and in the histopathological examination (HPE).

Results: Of the 76 patients (48 males, 28 females), those with MAS ≥7 exhibited significant sensitivity and specificity. The diagnostic accuracy of MAS was 88.2%. Higher scores were substantially correlated with histopathologically confirmed appendicitis ($p < 0.05$).

Conclusion: The Modified Alvarado Score is a reliable, cost-effective, and simple tool for diagnosing acute appendicitis, especially in settings with limited access to advanced imaging technology.

Keywords: Acute appendicitis, Modified Alvarado score, Clinical diagnosis, Prospective study.

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Introduction

Acute appendicitis is one of the most common reasons for emergency surgery for an acute abdomen around the world [1]. Even if diagnostic imaging has gotten better, clinical examination is still very important for early diagnosis, especially in underdeveloped countries [2].

A diagnosis that takes too long could lead to complications including perforation, peritonitis, and further illnesses, while a diagnosis that is too early could lead to unnecessary operations and increased healthcare costs [3]. So, it is very important to find a balance between quick action and stopping unneeded appendectomy [4].

Surgeons can utilise clinical grading systems to help them decide what to do. The Alvarado score, which was first used in 1986, is one of the most used systems that uses symptoms, signs, and test data [5]. Nonetheless, its application to diverse populations has been critically examined [6].

The Modified Alvarado Score omits the differential leukocyte count, enhancing its simplicity and practicality in emergency contexts [7]. Numerous investigations have indicated differing sensitivity and specificity of MAS among various demographic cohorts [8–10].

In India, where modern imaging may not be easily available, clinical tools are nevertheless very important [11]. It is important to test how well MAS works in these kinds of situations in order to enhance the accuracy of diagnoses and patient outcomes [12].

This study is to evaluate the diagnostic efficacy of the Modified Alvarado Score in individuals with suspected acute appendicitis and to establish a correlation between the score and histopathological results.

Materials and Methods

Design of the study: Prospective observational study.

Place of Study: Patna Medical College and Hospital (PMCH), Patna, Bihar.

Length of Study: 10 months (February 2025 – December 2025).

Sample Size: 76 patients (48 males, 28 females).

Inclusion Criteria

- Patients aged ≥12 years
- Clinical suspicion of acute appendicitis
- Patients who consented for surgery and participation

Exclusion Criteria

- Appendicular mass or abscess
- Previous abdominal surgery
- Pregnancy
- Patients managed conservatively

Study Procedure: All patients underwent detailed clinical evaluation. The Modified Alvarado Score was calculated (Table 1). Based on clinical judgment, patients underwent appendectomy. Resected specimens were sent for histopathological examination, which was considered the gold standard.

Results

The study comprised 76 patients who were clinically suspected of having acute appendicitis. There were 48 men (63.2%) and 28 women (36.8%) in the study population, which means there were 1.7 men for every woman. Most of the patients were in their 20s and 30s, with an average age of 27.4 ± 9.6 years. Table 1 shows a summary of the study population's demographic characteristics.

Distribution of the Modified Alvarado Score: Patients were divided into three groups based on the Modified Alvarado Score (MAS). 52 patients (68.4%) had high-probability scores (≥7), and 16 patients (21.1%) had intermediate values (5–6). Eight patients (10.5%) had low-probability scores (less than 5). Table 2 shows how the MAS categories are spread out.

Findings from the surgery and histopathology: All patients had their appendixes removed. Histopathological examination (HPE) verified acute appendicitis in 60 cases (78.9%), whereas 16 cases (21.1%) had a normal appendix. Consequently, the negative appendectomy rate in this study was 21.1%.

The Modified Alvarado Score's Diagnostic Performance: We assessed how accurate the Modified Alvarado Score was by comparing clinical scores to histology results. The sensitivity of MAS was 90.2%, the specificity was 80.0%, the positive predictive value (PPV) was 91.6%, and the total diagnostic accuracy was 88.2%. Figure 1 presents these diagnostic variables in a way that reveals how sensitive and accurate MAS is in finding acute appendicitis.

Confirmed Appendicitis by Gender: Sixty-two percent of patients with histopathologically confirmed appendicitis were male, and thirty-eight percent were female. Figure 2 illustrates this gender pattern, distinctly indicating a higher prevalence of men compared to women in confirmed acute appendicitis cases.

A summary of the main findings: The research shows that the Modified Alvarado Score is a dependable and useful clinical tool for identifying acute appendicitis. It has a high sensitivity and an adequate specificity, which helps doctors make decisions about surgery sooner and may cut down on unnecessary imaging and delays in treatment.

Table 1: Modified Alvarado Score Components

Parameter	Score
Migratory RIF pain	1
Anorexia	1
Nausea/Vomiting	1
Tenderness in RIF	2
Rebound tenderness	1
Elevated temperature	1
Leukocytosis	2
Total	**9**

Table 2: Distribution of Patients According to MAS

MAS Score	Number of Patients
≤4	10
5–6	18
≥7	48

Table 3: MAS vs Histopathological Findings

MAS Category	Appendicitis Present	Appendicitis Absent
≤4	2	8
5–6	12	6
≥7	44	4

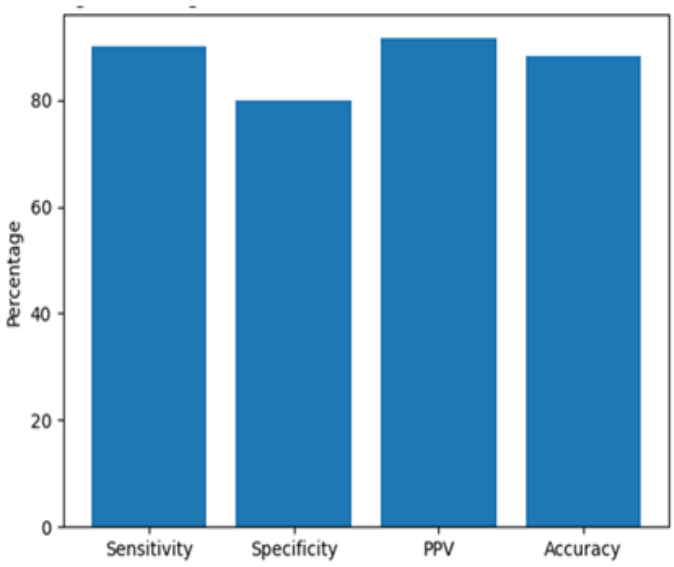

Figure 1: Diagnostic accuracy of Modified Alvarado Score

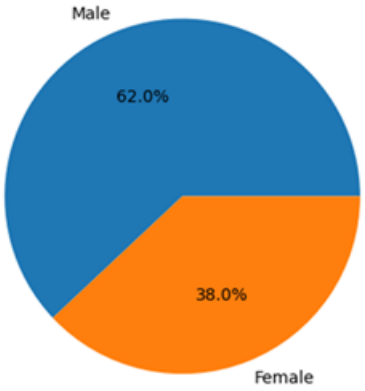

Figure 2: Gender distribution of histopathologically confirmed appendicitis

Discussion

Accurate diagnosis of acute appendicitis continues to be a clinical challenge despite technological advancements [13]. Clinical scoring systems remain valuable tools, especially in emergency and low-resource settings [14].

In the present study, the Modified Alvarado Score demonstrated high sensitivity and acceptable specificity, consistent with previous studies conducted in similar populations [15–17]. Patients with MAS ≥7 had a significantly higher likelihood of histopathologically confirmed appendicitis.

The reduced negative appendectomy rate observed in this study aligns with findings from earlier Indian and international studies [18,19]. The simplicity of MAS allows rapid bedside assessment without reliance on advanced investigations [20].

Gender-wise analysis showed a slightly lower diagnostic accuracy in females, which has been attributed to gynecological conditions mimicking appendicitis [21]. Nonetheless, MAS remains a useful adjunct in clinical decision-making.

Compared to imaging modalities such as CT, MAS is cost-effective and avoids radiation exposure, making it suitable for widespread use in developing countries [22,23]. However, MAS should complement, not replace, clinical judgment [24].

Overall, the findings support the continued use of Modified Alvarado Score as a reliable screening and decision-making tool in suspected acute appendicitis [25].

Limitations

This study was conducted at a single tertiary care center with a relatively small sample size. Advanced imaging findings were not uniformly analyzed. Larger multicentric studies are recommended to further validate these results.

Conclusion

The Modified Alvarado Score is a quick, easy, and accurate way to diagnose acute appendicitis. It is especially useful in places with less resources because it is very sensitive and accurate at diagnosing problems. This helps with timely surgery and cuts down on unneeded appendectomies.

References

1. Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis. Am J Epidemiol. 1990;132:910–925
2. Williams GR. Presidential address: A history of appendicitis. Ann Surg. 1983;197:495–506
3. Flum DR, Koepsell T. The clinical and economic correlates of misdiagnosed appendicitis. Arch Surg. 2002;137:799–804
4. Andersson RE. Meta-analysis of the clinical and laboratory diagnosis of appendicitis. Br J Surg. 2004;91:28–37
5. Alvarado A. A practical score for the early diagnosis of acute appendicitis. Ann Emerg Med. 1986;15:557–564
6. Ohmann C, Franke C, Yang Q. Clinical benefit of a diagnostic score for appendicitis. Arch Surg. 1999;134:993–996
7. Kalan M, Talbot D, Cunliffe WJ, Rich AJ. Evaluation of the Modified Alvarado Score. Ann R Coll Surg Engl. 1994;76:418–419
8. Macklin CP, Radcliffe GS, Merei JM. A prospective evaluation of the Modified Alvarado Score. Ann R Coll Surg Engl. 1997;79:203–205
9. Subotic AM, Sijacki AD, Dugalic VD. Evaluation of the Alvarado score. World J Emerg Surg. 2008;3:23
10. Khan I, Rehman AU. Application of Alvarado scoring system. J Ayub Med Coll Abbottabad. 2005;17:41–44
11. Bhandari RS, Shrestha S. Evaluation of Alvarado score. Kathmandu Univ Med J. 2010;8:1–4
12. Singh CA, Singh AP. Clinical evaluation of appendicitis. Int Surg J. 2016;3:149–154
13. Birnbaum BA, Wilson SR. Appendicitis at the millennium. Radiology. 2000;215:337–348
14. Gwynn LK. The diagnosis of acute appendicitis. Am Fam Physician. 2001;64:131–138
15. Memon ZA, Irfan S, Fatima K. Diagnostic accuracy of Modified Alvarado score. J Pak Med Assoc. 2013;63:675–678
16. Bhattacharjee PK, Chowdhury T. Evaluation of Modified Alvarado score. J Indian Med Assoc. 2002;100:310–312
17. Lintula H, Kokki H, Kettunen R. Diagnostic score in appendicitis. Eur J Pediatr Surg. 2005;15:30–34
18. Malik MU, Connelly TM. Clinical scoring systems in appendicitis. Int J Surg. 2017;48:72–78
19. Ohle R, O'Reilly F, O'Brien KK. Alvarado score systematic review. BMC Med. 2011;9:139
20. Raja AS, Wright C, Sodickson AD. Imaging strategies for appendicitis. Radiology. 2010;256:95–103
21. Lamparelli MJ, Hoque HM. Misdiagnosis of appendicitis in females. Ann R Coll Surg Engl. 1999;81:38–41
22. Doria AS, Moineddin R, Kellenberger CJ. US vs CT in appendicitis. Radiology. 2006;241:83–94
23. Terasawa T, Blackmore CC. Systematic review of CT accuracy. Radiology. 2004;231:393–401
24. Drake FT, Florence MG. Time to appendectomy and outcomes. J Am Coll Surg. 2014;218:603–613
25. Andersson M, Kolodziej B, Andersson RE. Randomized clinical trial of diagnostic strategies. Br J Surg. 2017;104:1451–1461