

Diagnostic Accuracy Of Ripasa Versus Alvarado Scoring Systems In Acute Appendicitis.

Ashok S. Gajbhiye, Sarita Durge, Mayur Bandawar,
Ayyappa Sai Kumar Kolasani

Abstract

Acute appendicitis is still a major surgical emergency in India. The risk of appendicular perforation increases when an appendectomy is delayed and may lead to sepsis. In an attempt to enhance diagnostic accuracy and decrease negative appendectomy rates, many of scoring systems are used. Alvarado scoring system which is commonly used is less accurate and hence RIPASA scoring system is now being used in diagnosis of acute appendicitis. In our study we have compared both the scoring systems in diagnosis of acute appendicitis. 101 patients who were hospitalised with Right Iliac Fossa pain during a period of 2018 to 2023. Patients were evaluated using the Alvarado and RIPASA scoring systems. Histopathological reports collected and scores of patients were compared. Results: With ALVARADO scoring system, Sensitivity was 62.64% with a cut off 6 and specificity of 70%, PPV of 95%, NPV of 17.07% and Accuracy was 63.37%.and with RIPASA scoring system, Sensitivity was 72.53%, specificity of 60%, PPV of 94.29%, NPV of 19.35% and Accuracy was 71.29%. Conclusions: RIPASA scoring system was a precise, appropriate and specific scoring system for the diagnosis of acute appendicitis than ALVARADO scoring system.

Keywords: Appendicitis, RIPASA, ALVARADO.

Date of Submission: 14-04-2025

Date of Acceptance: 24-04-2025

I. Introduction

Acute appendicitis is the most common clinical diagnosis in patients presenting with pain in right ileac fossa. Inflammatory conditions of pelvis and other gynaecological conditions may present with the similar complaints. 1 in 7 patients presenting with right iliac fossa pain are diagnosed of acute appendicitis. Diagnosis is confirmed on histopathology and using radiological imaging studies. This approach results in false diagnosis and negative appendectomy rate as high as 15-20 % as reported by the author [1,2,3,4].

In addition to clinical assessment, various scoring systems have been developed to aid in the diagnosis of acute appendicitis. Among these, the Alvarado scoring system remains one of the most widely used tools due to its simplicity and ease of application in clinical settings as suggested by [4,5,6]. More recently, the RIPASA (Raja Isteri Pengiran Anak Saleha Appendicitis) scoring system has emerged as a promising diagnostic tool, particularly noted for its higher sensitivity in detecting acute appendicitis when compared to conventional methods[7]. A key limitation of the Alvarado scoring system is that it does not take into account certain patient factors such as age, gender, and duration of symptoms variables which may play a crucial role in the diagnosis of acute appendicitis. In contrast, the RIPASA scoring system incorporates a broader range of clinical parameters, enhancing its diagnostic accuracy and sensitivity as reported by[8]. As per above differences, the present study was undertaken to perform a comparative evaluation of the Alvarado and RIPASA scoring systems in diagnosing acute appendicitis, aiming to determine which scoring method provides superior diagnostic reliability.

II. Material And Methods:

Present prospective comparative study was conducted at tertiary centre at Maharashtra, over a period of five years from July 2018 to July 2023. A total of 101 patients presenting with right lower abdominal pain and suspected acute appendicitis were included in the study. Ethical clearance was obtained prior to commencement of the study from the Institutional Ethical Committee. Patients aged below 12 years were excluded from the study. All included patients underwent thorough clinical evaluation and relevant imaging investigations. The Alvarado scoring system and the RIPASA scoring system were applied to each patient to assess the probability of acute appendicitis. In this study, a cut-off score of more than 6 was considered significant for the diagnosis of acute appendicitis using the Alvarado scoring system, whereas a score of more than 7.5 was taken as the threshold in the RIPASA scoring system. The Alvarado scoring system comprises eight parameters, each assigned a score ranging from 1 to 2. In comparison, the RIPASA scoring system

consists of 18 parameters with individual scores ranging from 0.5 to 2. All patients who were diagnosed with acute appendicitis based on clinical findings, imaging, and scoring systems underwent appendectomy. The excised appendices were sent for histopathological examination, which was considered the gold standard for diagnosis. The results of both scoring systems were then compared with the histopathology reports. Statistical analysis was performed to evaluate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and overall diagnostic accuracy of both scoring systems. The chi-square test was applied for statistical comparison of the data.

III. Results:

The present study was designed as a prospective comparative analysis involving 101 patients admitted with right iliac fossa pain over a period extending from July 2018 to July 2023. All patients included in the study were assessed using both the Alvarado and RIPASA scoring systems for the diagnosis of acute appendicitis. The mean age of the study population was 29.4 years with a standard deviation of 5.8 years. Of the total patients, 60 were male and 40 were female, reflecting an approximate male-to-female ratio of 3:2. In terms of surgical management, the majority of patients underwent open appendectomy, accounting for 82 cases (81.2%), while laparoscopic appendectomy was performed in 19 patients (18.8%). On evaluating the diagnostic performance of the Alvarado scoring system, using a cut-off score of 6, the sensitivity was found to be 62.64%, with a specificity of 70%. The positive predictive value (PPV) was 95%, the negative predictive value (NPV) was 17.07%, and the overall diagnostic accuracy was calculated as 63.37%. In comparison, the RIPASA scoring system, using a cut-off score of 7.5, demonstrated a higher sensitivity of 72.53% and a specificity of 60%. The PPV was 94.29%, the NPV was 19.35%, and the overall accuracy was 71.29%. Thus, when compared to the Alvarado scoring system, the RIPASA scoring system exhibited superior sensitivity and diagnostic accuracy in diagnosing cases of acute appendicitis.

Table 1: RIPASA Scoring System

Demography	Score
Male	1
Age <39.9 years	1
Age >40 years	0.5
Symptoms	
RIGHT ILIAC FOSSA pain	0.5
Pain migration to RIGHT ILIAC FOSSA	0.5
Anorexia	1
Nausea & vomiting	1
Duration of symptoms <48 hrs.	1
Duration of symptoms >48 hrs.	0.5
Signs	
RIGHT ILIAC FOSSA tenderness	1
Guarding	2
Rebound tenderness	1
Rovsing sign	2
Fever >37° C <39° C	1
Investigation	
Raised WBC counts	1
Negative urine analysis	1
Additional score	
Non-Asian	1
Total score	17.5

RIF: Right Iliac Fossa; WBC: White Blood Cell.

Table 2: Alvarado Scoring System

Symptoms	
Migratory right iliac fossa pain	1
Anorexia	1
Nausea/Vomiting	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory findings	
Leucocytosis	2
Shift to Left (Neutrophilia)	1
Total	10

Figure 1:

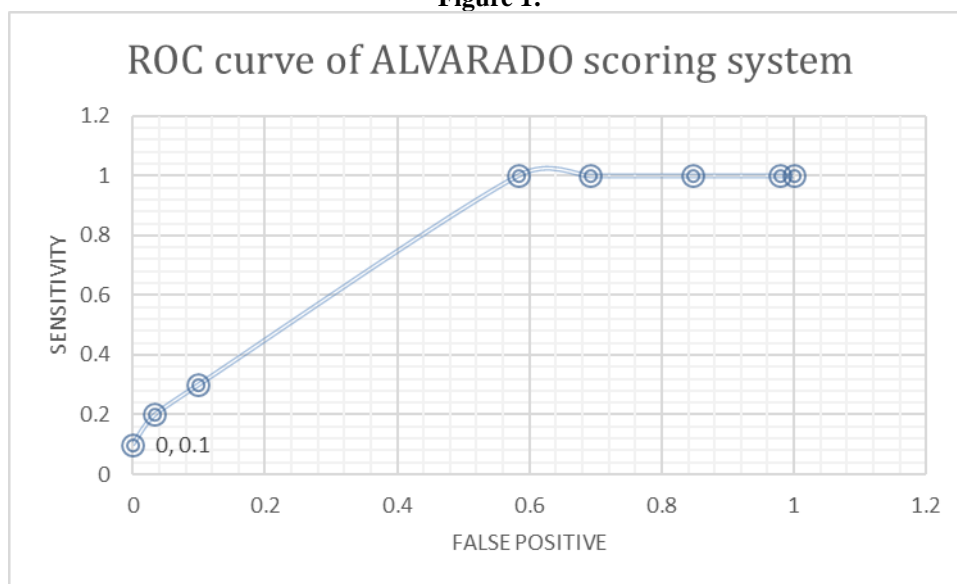
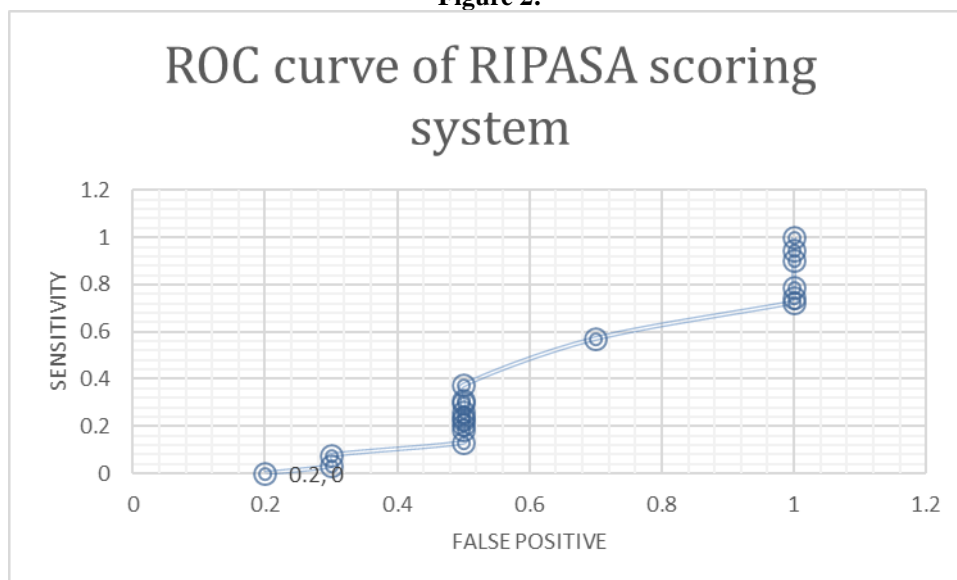


Figure 2:



IV. Discussion:

Present prospective comparative study was conducted over a period of five year from July 2022 to July 2023 at tertiary hospital and included 101 patients admitted with right iliac fossa pain. The mean age of the study population was 29.4 years with a standard deviation of 5.8 years. These findings are in close agreement with a study conducted by Ankur Jain et al[9] where the mean age of participants was reported as 34.4 years. In the present study, for the Alvarado scoring system with a cut-off score of 6, the sensitivity was 62.64%, specificity was 70%, positive predictive value (PPV) was 95%, negative predictive value (NPV) was 1.707%, and diagnostic accuracy was 63.37%. These results are comparable to the findings of Ankur Jain et al[9] who reported a sensitivity of 52.08%, specificity of 80%, PPV of 92.59%, NPV of 25.81%, and overall accuracy of 56.9% for the Alvarado score. With the application of the RIPASA scoring system in the present study, using a cut-off score of 7.5, the sensitivity was found to be 72.53%, specificity 60%, PPV 94.29%, NPV 19.35%, and diagnostic accuracy was 71.29%. These observations are consistent with the results of Favara G et al[10] who also demonstrated superior sensitivity and diagnostic accuracy of the RIPASA scoring system for acute appendicitis compared to the Alvarado score. Similarly, in a study conducted by Sanjive JG et al[11], the RIPASA scoring system correctly diagnosed 97.1% of patients with acute appendicitis, whereas the Alvarado scoring system correctly diagnosed only 52.85% of cases. According to their findings, the RIPASA score demonstrated a sensitivity of 97.14%, specificity of 60%, and overall diagnostic accuracy of 94.67%, while the

Alvarado score showed an accuracy of only 52.67%. Their study strongly supported the superior diagnostic capability of the RIPASA scoring system ($p < 0.001$). The higher sensitivity and accuracy of the RIPASA scoring system over the Alvarado scoring system has also been supported by other studies [11, 12]. For instance, it has been suggested that RIPASA scoring should be considered a preferred method in the diagnosis of acute appendicitis due to its inclusion of more clinical variables such as age, gender and duration of symptoms, which are not accounted for in the Alvarado scoring system. In another study [13] the RIPASA score at an optimal cut-off point of 7.5 showed a sensitivity of 94.1% and specificity of 33.3%, while the Alvarado score demonstrated a lower sensitivity of 30.9% and specificity of 6% at a cut-off point of 7. However, lowering the cut-off score for Alvarado to 6 resulted in a better sensitivity and specificity. The accuracy of the RIPASA score was reported to be 63.31%, which was still higher than that of the Alvarado score. Further, a study by Nanjundiah et al. [14] reported that at a cut-off score of >7.5 for the RIPASA system, sensitivity was 96.2%, specificity was 90.5%, PPV was 98.9%, and NPV was 73.1%. Similarly, Chong CF et al [7] found that, with the same cut-off score, the RIPASA system demonstrated a sensitivity of 98%, specificity of 81.3%, PPV of 85.3%, NPV of 97.4% and an overall diagnostic accuracy of 91.8%. As per the findings of these previous studies, the present study also supports the RIPASA scoring system, it is due to inclusion of additional clinical parameters provides better sensitivity, specificity and diagnostic accuracy in predicting acute appendicitis when compared to the Alvarado scoring system.

V. Conclusion:

The RIPASA scoring system demonstrated higher sensitivity and diagnostic accuracy compared to the Alvarado scoring system. This led to a reduced rate of negative appendectomies. The RIPASA scoring system proves to be a reliable and effective tool in the evaluation of patients with suspected acute appendicitis. Its application in clinical practice may aid in improving diagnostic accuracy and serve as a more cost-effective approach in managing cases of acute appendicitis. Acute appendicitis may be diagnosed with high accuracy using the RIPASA Scoring System, which also helps cut down on needless hospitalizations and radiological examinations.

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