

Diagnostic Importance of Alvarado and RIPASA Score in Acute Appendicitis

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Abstract

Introduction: One of the most common surgical emergencies encountered in the day to day practice both in developed and developing countries in the world is acute appendicitis. The incidence may range from 13% to 77%. The diagnosis is purely based on clinical history, examination and ultrasonography. Many studies are available about the diagnostic methods used for acute appendicitis in western population. Only very few studies were seen about the accuracy of scoring system in Indian population.

Aim: To compare the accuracy of Alvarado and RIPASA score in diagnosing appendicitis.

Materials and Methods: This was a prospective study conducted at Melmaruvathur Adhiparashakthi Medical College and Hospital in the Department of Surgery from March 2014 to January 2015. About 105 patients with symptoms and signs of acute appendicitis were subjected to Alvarado and RIPASA scoring chart and taken for emergency appendectomy. The diagnostic accuracy of the scoring system was derived.

Results: In this study, 75% of patients were of <40 years of age and 57 (54.29%) patients were female. The most common presenting symptoms in our study were right iliac fossa pain (100%), and sign was rebound tenderness (100%). Histopathologically, about 81.8% of cases were diagnosed as appendicitis. According to Alvarado score <7 and RIPASA score <7.5 80 (76.19%) and 93 (88.57%) patients were diagnosed as appendicitis. The Alvarado score had increased specificity, positive predictive value, and positive likelihood ratio than RIPASA score. The sensitivity and negative predictive value were more for RIPASA score. According to Chi-square test, both Alvarado and RIPASA score was found to be statistically significant.

Conclusion: The best method to diagnose the acute appendicitis is by proper clinical examination. Both Alvarado and RIPASA score was statistically significant. But by using RIPASA score the mortality and morbidity due to appendicitis can be reduced.

Key words: Appendicitis, Alvarado score, RIPASA score

INTRODUCTION

One of the most common surgical emergencies encountered in the daily practice both in developed and developing countries in the world is acute appendicitis.¹ Acute appendicitis is a common cause of abdominal pain which needs prompt diagnosis and treatment. This may lead to marked increase in mortality and morbidity.² The incidence may range from 13% to 77% with an average of 50%.³ The

diagnosis is purely based on clinical history and examination combined with raised white cell count. Acute appendicitis is a common problem, but the diagnosis is quite difficult in women. Because the gynecological and genitourinary inflammatory condition may present with similar signs and symptoms. To improve its diagnostic accuracy usually, there is a delay in doing an appendectomy which may lead to appendicular perforation and sepsis. This may lead to a marked increase in the mortality and morbidity.⁴

The gold standard method for confirmation of diagnosis is by histopathology. However, ultrasound is available for diagnosis but it is operator dependent. Usually, it is over-diagnosed or under diagnosed.⁵ The next level is contrast computed tomography (CT) scan. The contrast CT scan has a high sensitivity and specificity but it is too costly and cannot be performed in routine.^{6,7} The cheaper,

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faster, and non-invasive diagnostic tool in diagnosing acute appendicitis is a clinical scoring system. Several scoring systems were developed, but the two common scoring systems are Alvarado system and RIPASA system. These two scoring systems are based on the clinical and laboratory evidence. The Alvarado scoring system was developed for people in the western countries, and the RIPASA score was developed for people in the South East Asian population.²

Many studies are available about the diagnostic methods used for acute appendicitis in western population. Only very few studies were seen about the accuracy of scoring system in Indian population. Hence, we carried a prospective study to compare the accuracy of Alvarado and RIPASA score in diagnosing appendicitis.

MATERIALS AND METHODS

This was a prospective study done at Melmaruvathur Adhiparashakthi Medical College and Hospital in the Department of Surgery from March 2014 to January 2015. About 105 patients irrespective of the age and sex who presented with following symptoms and signs and diagnosed as acute appendicitis were included in the study. The basic demographic data about the patient were collected. Inclusion criteria symptoms: (1) right iliac fossa pain, (2) anorexia, (3) nausea, and (4) vomiting. Clinical signs and laboratory investigations: (1) right iliac fossa tenderness, (2) rebound tenderness, (3) guarding, (4) Rovsing's sign, (5) fever (6) elevated white cell count, and (7) urine analysis normal. Then for all patients, the Alvarado and RIPASA scoring chart were done. All the patients were taken for emergency appendectomy, and the specimen was sent for histopathology examination. Finally, the histopathology reports were compared with the scoring system. Sensitivity, specificity, positive predictive value, negative predictive value, and the likelihood ratios for the scoring system were derived with respect to histopathology, as the gold standard for diagnostic confirmation.

RESULTS

In this study, 75% of patients were of <40 years of age. Out of 105 patients, 48 (45.71%) patients were male and 57 (54.29%) patients were female. Positive cases of acute appendicitis on histopathology were 86 (81.8%). The most common presenting symptoms in our study were right iliac fossa pain (100%) followed by anorexia (91.4%), nausea, vomiting (74.3%), and fever (33.33%) (Figure 1). The most common signs were rebound tenderness (100%) followed by guarding (57.14%) and Rovsing sign (49.52%) (Figure 2). About 87 (82.86%) patients had raised leukocyte count.

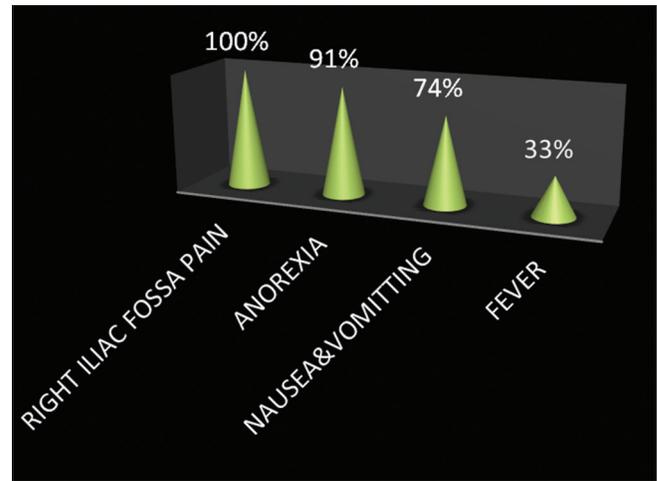


Figure 1: Presenting symptoms

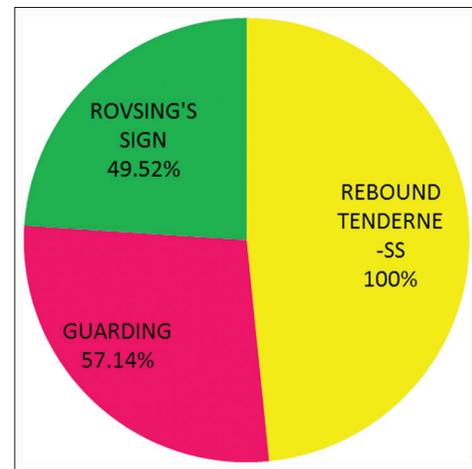


Figure 2: Presenting signs

According to Alvarado score <7, 80 (76.19%) patients were diagnosed as acute appendicitis. Out of these 80 patients, 70 patients were diagnosed as acute appendicitis by histopathology findings (Table 1). According to RIPASA score <7.5, 93 (88.57%) patients were diagnosed as appendicitis clinically, but only 80 patients were confirmed by histopathology report (Table 2). When the accuracy was calculated the Alvarado score had increased specificity, positive predictive value and positive likelihood ratio than RIPASA score. The sensitivity and negative predictive value were more for RIPASA score. According to Chi-square test, both Alvarado and RIPASA score were found to be statistically significant (Table 3).

DISCUSSION

Inflammation of the appendix is called as appendicitis. The lifetime prevalence rate for acute appendicitis is 1 in 7. In 1554, Fernel was the first person to give a description on acute appendicitis. The classical signs for

Table 1: Comparison of Alvarado score with histopathology report (n=105)

Alvarado score	HPE Appendicitis (n=86)	No Appendicitis (n=19)
Alvarado score ≥ 7 (n=80)	70	10
Alvarado score < 7 (n=25)	16	9

HPE: Histopathology examination

Table 2: Comparison of RIPASA score with histopathology report (n=105)

RIPASA score	HPE Appendicitis (n=86)	No Appendicitis (n=19)
RIPASA score ≥ 7 (n=80)	80	13
RIPASA score < 7 (n=25)	6	6

HPE: Histopathology examination

Table 3: Comparing the diagnostic accuracy of Alvarado and RIPASA score

Diagnostic accuracy	Alvarado score	RIPASA score
Sensitivity (%)	81.4	93.02
Specificity (%)	47.37	31.58
Positive predictive value (%)	87.5	86.02
Negative predictive value (%)	36	50
Positive likelihood ratio	1.55	1.36
Negative likelihood ratio	0.39	0.22
Diagnostic prevalence (%)	81.9	81.9
Chi-square value	7.0975	9.3052
P value	0.007719	0.002285
Statistical significance	Significant	Significant

diagnosing appendicitis were described by McBurney in 1889. Only contrast enhanced CT can give an accurate diagnosis with very high sensitivity and specificity for diagnosing, but this is time-consuming and not feasible in developing countries like ours. If there is any delay in diagnosing, that may lead to increased morbidity and mortality. To avoid this, a simple way of diagnosing appendicitis should be formed. Hence, this study was done to find the accuracy of Alvarado and RIPASA scoring system which is useful in diagnosing appendicitis as early as possible in daily life.

In this study, most of the patient (75%) belongs to the age group < 40 years. This was similar to the other studies.⁷⁻¹² Right iliac fossa pain and rebound tenderness were observed in all the patients in our study. This was consistent with the study done by Verma *et al.* and Samad *et al.*^{9,13} In a study done by Korner *et al.* and Karan *et al.*, nausea and vomiting was the only symptoms that were found to be statistically significant. But in our study right iliac fossa pain, nausea and vomiting were the two symptoms found to be statistically significant. Similar to their study, right iliac fossa tenderness was found to be statistically significant in our study.^{14,15}

In this study, the most common type of appendicitis reported by histopathology was periappendicitis which was consistent with other studies. The negative appendectomy rate (18.09%) was found to be slightly increased in this study. It was variable in other studies.^{7,9,10,13} The Alvarado score was found to have more sensitivity than specificity in our study as consistent with other studies. The positive predictive value was similar to other studies like 83.5%, 87.5%, 85.3%, 87.4%.¹⁶⁻¹⁹ In the present study, the negative predictive value was low for Alvarado score when compared to RIPASA score, but the positive predictive value was high. Positive likelihood ratio was also found to be higher than RIPASA score in our study. The Alvarado score was found to be statistically significant.

Similarly, the RIPASA score results were found to be statistically significant. The sensitivity was found to be more, than specificity in the present study. The present value was found to be similar to other studies.^{2,13,20} When compared the accuracy of Alvarado and RIPASA score, the sensitivity was found to be more but the specificity was found to be low for RIPASA than Alvarado score. The negative predictive value was more for RIPASA score than Alvarado score. But both were found to be statistically significant. This was similar to the other studies.^{2,13,20}

CONCLUSION

The best method to diagnose the acute appendicitis is by proper clinical examination. RIPASA score with a cut-off total score of ≥ 7 is a best non-invasive tool to diagnose acute appendicitis. However, the negative predictive value was found to be high. Both Alvarado and RIPASA score was statistically significant. But by using RIPASA score the mortality and morbidity due to appendicitis can be reduced.

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