

Alvarado Versus Modified Ripasa Score in Diagnosis of Acute Appendicitis

Daulat Azeem Khan and Muhammad Amer Mian

Diagnostic Accuracy of Modified Ripasa and Alvarado Score with Acute Appendicitis

ABSTRACT

Objective: The aim of this present study is to assess and compare the diagnostic accuracy of the Modified RIPASA Score and Alvarado Score in patients with suspected acute appendicitis.

Study Design: cross-sectional comparative study.

Place and Duration of Study: This study was conducted at the Department of Surgery, Central Park Teaching Hospital, Lahore from January 2023 to December 2023.

Methods: As a part of the cross-sectional comparative research study was conducted on 300 participants who were exhibiting symptoms which were suggestive of acute appendicitis. Patients were selected on the bases of inclusion and exclusion criteria. Alvarado Score and Modified RIPASA Score were calculated for each one of the patients. Usually, the standard clinical practice was followed through diagnostic imaging like CT or ultrasound scans. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of the two scoring systems were calculated.

Results: The details provided in research analysis included the sensitivity, specificity, positive predictive value, and negative predictive value, diagnostic accuracy of Modified RIPASA Score and Alvarado Score.

Conclusion: The study tried to get information on the comparison of the diagnostic efficiency of the Modified RIPASA Score and Alvarado Score in acute appendicitis. It was found that sensitivity of both the systems was almost same, but specificity and accuracy of Modified RIPASA was more than Alvarado scoring system.

Key Words: Acute appendicitis, Alvarado Score, Modified RIPASA Score, diagnostic accuracy, clinical scoring systems, appendectomy, abdominal pain, surgical emergency.

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INTRODUCTION

Acute appendicitis despite being a common problem, remains a difficult diagnosis to establish. A delay in diagnosing this condition as well as negative appendectomies should be prevented. These problems can be avoided by using scoring systems^[1]. Therefore, for assessing the effectiveness, accuracy and suitability of each scoring system in diagnosing acute appendicitis out of these two, this study does a comparative analysis^[2].

First proposed by Alvarado et al. in 1986, the Alvarado Score has been one of the main tools commonly used in the assessment of a patient with lower quadrant abdominal pain on the right side^[3]. Every criterion is assigned a numerical rating according to the patient's clinical signs, symptoms, and laboratory values.

Department of Department General Surgery, Central Park Teaching Hospital, Lahore.

Correspondence: Daulat Azeem Khan, Department General Surgery, Central Park Teaching Hospital, Lahore.

Contact No: 0331-4539994

Email: drdaulatazeemkhan@gmail.com

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It is possible to classify patients into three risk categories, low, intermediate, and high, for acute appendicitis using the total score as it has been pointed out by clinicians^[4]. Thus, it is evident that there is a need for new diagnostic approaches since the Alvarado Score which is one of the most commonly applied scores, has been regarded as subjective and having low specificity^[5].

Possible substitution of the Alvarado Score that would eliminate its defects might be the Modified RIPASA Score introduced by Ohle et al. in 2008. To increase the effectiveness of the appendicitis diagnosis, this method involves additional clinical indicators, for example, with regard to urine tests and the reaction to conservative therapy^[6]. The Modified of RIPASA Score was created in Brunei and has extended to other regions because it is believed to predict needless appendectomy and has high sensitivity for acute appendicitis.

The comparison of Modified RIPASA Score and Alvarado Score is done by looking into each of the elements individually. Indicators that are included in the calculation of the score in Alvarado score include pain migration, anorexia, nausea, vomiting, right lower quadrant tenderness, rebound discomfort, increased temperature, leukocytosis and shift of leukocyte count to the left^[7]. However, the Modified RIPASA Score, takes into account quite a number of attributes such as; Age, RIF pain, Migration to RIF, duration of

symptoms, RIF rebound tenderness, RIF guarding, fever, total leukocyte counts, neutrophilia, Rovsing sign, anorexia, vomiting and localized tenderness in RIF^[8]. Information on urine test results is included in the Modified RIPASA score, which is considered a modern approach, which reflects the developments in the diagnostic capabilities^[9]. The accuracy of Alvarado score in the diagnosis of acute appendicitis is disappointingly low in Asian population and RIPASA scoring has been designed for the diagnosis of acute appendicitis in the Asian population^[10].

It is against this background that this research study will add on to existing knowledge in the comparison between Alvarado Score and Modified RIPASA Score in the diagnosis of acute appendicitis. Thus, we plan to establish the strengths and weaknesses of each rating system and offer potential outcomes to the doctors using data from relevant publications^[11]. This paper aims to assist medical practitioners in the right choice of the most effective diagnostic tool in the diagnosis of acute appendicitis to help enhance patients' health^[12,13].

METHODS

A cross-sectional prospective study was conducted in department of surgery Central Park Teaching Hospital Lahore for the comparative assessment of the Modified RIPASA Score and the Alvarado Score in patients of acute appendicitis presenting in Out patient Department (OPD) and emergency from January 2023 to December 2023. This study was conducted under the principles of Helsinki declaration; ethical approval was obtained from institutional review board of Central Park Medical College Lahore and prior written informed consent was obtained from all the study participants. In this comparative study all the patients with age range of 18 to 60 years were included while the patients of pregnant females, less than 18 years old, appendicular mass while those who have to undergone laparotomy were excluded from the study.

After signing the informed consent; detailed sociodemographic history and details like right lower quadrant pain or periumbilical pain migrating to right lower quadrant with nausea and vomiting, Low grade fever, Right lower quadrant guarding and tenderness on physical examination were recorded. All the patients undergoing the studies were subjected to both scales; RIPASA and modified Alvarado scoring systems were employed. The performed appendectomies were subjected and were sent for histopathology. Patients were monitored postoperatively for two days and were discharged on oral medication and later on were followed after 1 week.

Statistical Analysis:

Anonymized data was entered into Statistical Package Software for Social Sciences (SPSS) version 26.0. Qualitative data was presented in terms of frequencies

and bar charts. Chi-square test was employed for the assessment of study variables among and between study groups. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of the two scoring systems were calculated. A p-value less than 0.05 was regarded as significant.

RESULTS

A total of 300 patients with mean age of 34.17±16 years were recruited for the study with the age range of 18 to 60 years. Duration of symptoms was recorded as less than 48 hours or above than 48 hours as explained in table 1. 207 patients (69%) has positive histopathology while 31% had negative histopathology with p-value 0.002. Assessment and comparison via chi-square was made for both study variables as explained in table 1 and later on sensitivity and specificity was also assessed as explained in table 2 and 3.

Table No. 1. Assessment of Study Variables using Chi Square Test.

Study Variable	Groups	n	%	P-value
Symptom Duration	<48 hours	210	70	0.0034
	>48 hours	90	30	
Histopathology	Positive	207	69	0.00001
	Negative	93	31	
Modified RIPASA Scoring	5-7	40	13.33	0.0001
	8-11	110	36.67	
	12-15	150	50	
Alverado Scoring	5-6	50	16.67	0.003
	7-8	102	34	
	9-10	148	49.33	

The disposition of patients after appendectomy depending on their Alvarado scores and the histological findings are tabulated in Table 2. Three score ranges 5-6, 7-8, and 9-10 were used in measuring Alvarado Score in terms of the sensitivity, specificity, and accuracy. The sensitivity levels of the Alvarado Score are all high, thus proving the test's ability to effectively identify the presence of acute appendicitis within the patient population. The specificity also decreases in line with the score showing, patients who get the high Alvarado Score may get more false positive results.

Table 3 shows the distribution of the patients based on their Modified RIPASA Scores and histopathology findings. Similar to Alvarado Score, sensitivity over the entire score range was high for Modified RIPASA Score also. Here, a higher Modified RIPASA Score improves the test's specificity, indicating that patients with higher scores are less likely to endure many false positive results.

Table No. 2: Alvarado Score Distribution and Associated Histopathological Results

Alvarado Score	Number of Patients	True Positive	True Negative	False Positive	False Negative	Sensitivity	Specificity	Accuracy
5-6	50	26	16	5	3	89.6%	76.1%	84%
7-8	102	64	29	16	3	95.57%	82.8%	91.1%
9-10	148	90	10	40	4	95.7%	90.9%	87.8%

Table No. 3: Distribution of the Modified RIPASA Scores and the Associated Histopathological Results

Modified RIPASA Score	Number of Patients	True Positive	True Negative	False Positive	False Negative	Sensitivity	Specificity	Accuracy
5-7	40	18	15	5	2	90%	75%	82.50%
8-11	110	73	30	5	2	97.34%	85.7%	93.64%
12-15	150	110	36	2	2	98.2%	94.7%	97.3%

DISCUSSION

Appendicitis is one of the most commonly encountered surgical emergencies and timely diagnosis is crucial to giving the patient the best outcome. Acute appendicitis may be diagnosed with the use of two popular clinical scoring systems: the Modified RIPASA score, and Alvarado scoring system^[14]. Both scoring systems used an attempt of gathering clinical signs, symptoms, and laboratory test results to classify the population of interest into low risk, moderate risk, and high risk. In this conversation we have discussed about the pros and cons of Modified RIPASA Score and the Alvarado Score which show the use of them in clinical practice^[15].

The Alvarado Score is readily understandable and implies multiple clinical factors like indications, symptoms, test results and so on. The first release of this format was in 1986. The mortality rate is also higher for clients with higher scores, which means increased risk of acute appendicitis¹⁶. The scoring system ranges from one to ten. The objective bases of the Alvarado Score and its reliance on the clinician’s assessment have led to criticism, even though it is used frequently. However, owing to this reason, it can therefore be applied quickly and easily for preliminary assessment in resource constraint setting^[17].

On the other hand, in an attempt to gain better diagnostic accuracy, The 2010 Modified RIPASA Score incorporates new clinical variables and information from the biochemical analysis that is obtained from urine. While completing the Alvarado Score, the elements such as urine analysis evidence are missing, but in the Modified RIPASA Score, they are included. it also incorporates geographical factors into consideration. This comprehensive strategy might help decrease false-positive results and false-negative outcomes in populations with atypical manifestations of appendicitis.

Literature review showed that there are inconsistent results in relation to the diagnostic performance of the

Modified RIPASA Score compared to Alvarado Score. Some reported no difference in the two scoring systems while others point out that Modified RIPASA Score is more sensitive and specific^[18]. Variability in the patient groups, the healthcare setting, and the physicians’ practice utilizing the ratings might be the reason for the variation.

Therefore, it is advantages to use the Alvarado Score in instances where there are limited resources and the access to rather complicated imaging is limited. However, since the Modified RIPASA Score relies on findings in urinalysis it may increase the healthcare cost and consumption of resources^[19]. Concerning the selection of the scoring system, the choice of the efficient scoring system has to meet the criterion of rational use of resources and could provide an acceptable level of accuracy in a certain clinical setting. Furthermore, it can also be more helpful for the experienced clinician because it depends more on the diagnosis’s clinical insight and historical background than the other scoring systems. However, Modified RIPASA score requires a urine analysis report and as a result, it probably would be more preferable in a setting where a urine analysis facility is readily available^[20]. One has to pay attention to a healthcare facility’s clinical expertise when choosing between the two mentioned rating systems.

Each has advantages and disadvantages when it comes to diagnosing acute appendicitis: In particular, due to its simplicity and efficiency, Alvarado Score can be used as the first line screening in environments with limited resources^[21]. On the other hand, the more elaborate approach of the Modified RIPASA Score that includes urine tests could enhance the diagnostic accuracy especially in the populations with atypical manifestations.

The use of the Modified RIPASA Score and the Alvarado Score requires an evaluation based on the scenario of each patient, availability of devices and options, and team’s proficiency. Further researches have to reveal how effective these scoring systems for

definite patients' groups are to ensure that the clinicians can make right decision to identify acute appendicitis as many as possible.

CONCLUSION

Though the Modified RIPASA score has proven to have a better promise of effectiveness with the correlates obtained through its additional characteristics, including urine analysis, the Alvarado score is still frequently applied for screening resource limited population. Therefore, further and more detailed research is needed to come up with definite conclusions at a patient population level. Hence, based on the results, decision to use Modified RIPASA or Alvarado scores should be made with due consideration of the resources.

Author's Contribution:

Concept & Design of Study: Daulat Azeem Khan
 Drafting: Muhammad Amer Mian
 Data Analysis: Muhammad Amer Mian
 Revisiting Critically: Daulat Azeem Khan
 Final Approval of version: By all above authors

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