International Surgery Journal
Rao KR et al. Int Surg J. 2021 Mar;8(3):944-948
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20210931

Original Research Article

A comparative study on RIPASA and modified Alvarado score in the diagnosis of acute appendicitis in tertiary care hospital

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Received: 21 January 2021
Revised: 15 February 2021
Accepted: 16 February 2021

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ABSTRACT

Background: Acute Appendicitis is common surgical emergencies with a lifetime prevalence of approximately 1 in 7. Despite advances in diagnosis and treatment; acute Appendicitis is still associated with morbidity (10%) and mortality (1-5 %). Presentations of acute Appendicitis can mimic various acute medical and surgical conditions, and the diagnosis is predominantly a clinical one-different scoring systems used for aiding in early diagnosis of Acute Appendicitis and its prompt management. Alvarado score and RIPASA score are the most popular ones. So we retrospectively applied and compared Alvarado and RIPASA score in the diagnosis of acute Appendicitis in Indian population.
Methods: In this study, we compared RIPASA score and Alvarado scoring system retrospectively by applying to 74 patients. This study period from November 2018 to March 2020. Both scores were calculated for patients presented with right iliac fossa pain. Sensitivity, specificity, positive predictive value (PPV), negative predictive (NPV), diagnostic accuracy for RIPASA and Alvarado system was calculated.
Results: The sensitivity and specificity of the Alvarado score were 85.07% and 57.14% respectively. The sensitivity & specificity of RIPASA score were 91.04% and 71.42% respectively. Accuracy of the Alvarado scoring system is 82.44% and for RIPASA scoring system is 89.18%. The results show that the RIPASA scoring system is a better diagnostic tool for the diagnosis of Acute Appendicitis.
Conclusions: RIPASA scoring system is simple, accurate, convenient, and more specific scoring system than the modified Alvarado scoring system for the Indian population.

Keywords: Accuracy, Acute appendicitis, Alvarado score, Modified, RIPASA score, Sensitivity

INTRODUCTION

The common cause of acute abdomen is the acute Appendicitis; it mostly requires surgery and is diagnosed usually by clinical history, physical examination, and laboratory tests.[3,4]

A differential diagnosis must include virtually every acute pain within the abdomen. Ectopic pregnancy is one of the differential diagnosis associated with an urgent intervention. Acute Appendicitis is associated with very high morbidity, mortality. These are increased with diagnostic delay. Abdominal ultrasonography (USG) and computed tomography (CT) are the advanced radiological imaging methods used for making a quick and accurate diagnosis.[5,6]

Several clinical systems developed to aid in the diagnosis of Acute Appendicitis. Different scoring systems are used for early diagnosis and used inappropriate management. These scoring systems use the clinical history, physical examination, laboratory findings and other parameters.

For the diagnosis of Acute Appendicitis, the RIPASA and Modified Alvarado score are diagnostic scoring systems developed. With significant sensitivity, specificity and diagnostic Accuracy. Modified Alvarado score was given by Kalan et al. in 1994, and it contains nine points.[5] The RIPASA scoring system contains more parameters than modified Alvarado score, and RIPASA score contains certain parameters such as age, gender, duration of symptoms. It is a new diagnostic scoring system developed for the diagnose Acute Appendicitis.

Sensitivity, specificity and diagnostic accuracy are higher when compared to Alvarado Score, particularly in Asian population.[6] In the global context, there are very few studies on comparison of RIPASA score and modified Alvarado score.[9-11] Hence this study conducted at GSL general hospital, to compare the RIPASA score and the modified Alvarado score in the diagnosis of Acute Appendicitis.

METHODS

The present study was a retrospective; institution-based observational study, conducted among 74 patients including males and females undergoing emergency appendicectomy in Department of General Surgery, GSL General Hospital, those are admitted in the study period November 2018-March 2020.

Patients with Right iliac fossa pain, with suspicion of acute Appendicitis and undergoing emergency surgery were considered for this study. Patients with an appendicular lump, evidence of acute confusing state, dementia, generalized peritonitis, septic shock, gynaecological and urological diseases were excluded from this study.

Inclusion criteria

Both male and female patient >10 years and patients came with pain in the right iliac region.

Exclusion criteria

Patient coming to the hospital with pain abdomen along with distension of Abdomen, Pregnant females, any mass per abdomen, Patient with the previous history of any pelvic inflammatory disease, Patient not willing for surgery.

Statistical analysis

Following statistical methods are applied in the present study. Descriptive and inferential statistical analysis, Student 't' test (two-tailed, independent), Levens test, Chi-square test/Fischer Exact test

Sensitivity, specificity, PPV, NPV, accuracy are computed, to find the diagnostic properties of RIPASA Score and Alvarado score, correlating to HPE reports.

Statistical software

The Statistical software, namely SPSS 18.0, used for Data analysis and Microsoft Word and Excel, used to generate graphs, tables. A total of 74 patients qualified for the study. All the 74 patients were scored as per Alvarado and RIPASA scoring system; Alvarado score contained seven parameters, whereas RIPASA Score contained 18 parameters.

Then depending on the clinical history and investigations, RIPASA scoring system and Modified Alvarado Score System has been administered with corroboration of Histopathological examination report.

Ripasa score[14]

It contains 18 parameters,
Score <5: unlikely to be Appendicitis,
Score 5-7.5: low probability to be Appendicitis,
Score 7.5-12: high probability to be Appendicitis,
Score 12- Definite appendicitis

Modified Alvarado score[14]

Score <5: unlikely to be Appendicitis,
Score 6-7: low probability to be Appendicitis,
Score 7-8: high probability to be Appendicitis,
Score more than 8: Definite Appendicitis

Sensitivity (true positive rate), specificity (test result will be negative when the disease is not present), PPV (the probability that the disease is present), Negative Predictive Value (disease is not present when the test is negative) of the scoring system will be estimated by comparing the threshold level of the score with surgical findings and histopathology findings.

RESULTS

The age distribution in the study sample involved up to 60 years of age; the majority belonged to 21-30 years age group.

Table 1: Distribution of patients with respect to age group.

Age in years	No. of patients	Percentage
10-20	27	36.50
21-30	28	37.80
31-40	11	14.90
41-50	5	6.80
51-60	3	4.10

Out of 74 patients included in the study, the majority of the patients in the study group were males (70.3%), and female were 29.7%

Table 2: Distribution of patient with respect to gender.

Gender	No of patients	Percentage
Male	52	70.30
Female	22	29.70
Total	74	100

The subject was scored according to RIPASA system and was categorized into high probability group and low probability group. If the score was more than or equal to 7.5 and if the score was less than 7.5 respectively. Most of the patients scored equal to or more than 7.5 (85.14%) 63 patients

Table 3: Distribution of patients with respect to RIPASA score.

RIPASA score	No. of patients	Percentage
>/7.5	63	85.14
<7.5	11	14.86
Total	74	100

The subjects were also scored according to Alvarado system, 81.18% of the study population (60 patients) were categorized as the high probability of acute appendicitis. And whereas 85.14% according to RIPASA system.

Table 4: Distribution of patients with respect to Alvarado score.

Modified Alvarado score	No of patients	Percentage
>7	60	81.08
<7	14	18.92
Total	74	100

Diagnosis of patients was confirmed by HPE, 67 patients (90.55%) were confirmed as acute Appendicitis; seven patients to be negative for acute Appendicitis in HPE, resulting in 9.5%negative appendectomy rate.

Table 5: Distribution of patients based on HPE report.

HPE report	No of patients	Percentage
Positive	67	90.55
Negative	7	9.50
Total	74	100

Among 67 patients whose HPE report was positive for Appendicitis, 63 patients had RIPASA score of ≥7.5, and 11 patients are below 7.5.

Table 6: Comparison of RIPASA score and HPE report.

RIPASA	HPE report		Total
	Positive	**Negative**	
>7.5	61	2	63
<7.5	6	5	11
Total	67	7	74

Among 67 patients whose HPE report was positive for Appendicitis, 61 patients had modified Alvarado score ≥7, and 14 patients below 7.

Table 7: Comparison of Alvarado score and HPE report.

Modified Alvarado Score	HPE report		Total
	Positive	**Negative**	
>7	57	3	61
<7	10	4	14
Total	67	7	73

Table 8 showed a comparison of RIPASA Scoring system and modified Alvarado score.

Table 8: Correlation of RIPASA score, MASS and histopathology reports.

	RIPASA	MASS
True positive	61	57
False positive	2	3
False negative	6	10
True negative	5	4

RIPASA score in the present study had a sensitivity of 91.04%, the specificity of 71.42%, positive predictive value 96.82%, negative predictive value 45.45%, diagnostic Accuracy 89.14%.

Whereas the modified Alvarado score had a sensitivity of 85.07%, the specificity of 57.14%, the positive predictive value of 95%, a negative predictive value of 28.57%, diagnostic accuracy of 82.44%.

DISCUSSION

Acute Appendicitis is one of the common surgical emergency, the evaluation of acute appendicitis is based on history and clinical examination findings, and to reaching the diagnosis of acute Appendicitis these are the most important.[1]

Quick and accurate diagnosis of acute appendicitis can be difficult despite all the techniques.[2] Late or incorrect diagnosis leads to the aggravation of the inflammation, resulting in appendicular perforation, peritonitis, intra-abdominal abscess, and sepsis, with an increase in morbidity and mortality.

The diagnosis in children and also in the elderly may be difficult due to atypical clinical features and reproductive age group females due to a wide range of differential diagnoses.[12]

The use of advanced radiological imaging techniques such as CT now become necessary in these cases. CT is an expensive radiological procedure raising the cost of healthcare, and patients are exposed to radiation. CT scans lead to unnecessary appendectomies in early low-grade Appendicitis can be resolved spontaneously with antibiotic therapy.[9] Sometimes the diagnosis can only be made based on the intra-operative macroscopic appearance of the appendix and the histopathological examination.[6]

Correctly diagnosing acute Appendicitis has been experienced some problems in almost all surgical outpatient departments many scoring systems have been developed to diagnose appendicitis including Alvarado, modified Alvarado, Appendicitis inflammatory response score, Ohmann score, and Lintula score.

However, all these scoring systems produced different results in different ethnic groups, and there came a need arose to devise new systems. RIPASA score developed in 2010 and started to be used more widely thereafter, is an inexpensive, very easy to use and highly reliable quantitative scoring system, make a correct and early diagnosis of and significantly reduce the negative appendectomy rate.

RIPASA score is simple and easy to use, and most of the included parameters can easily be obtained from history and examination; it also included urine analysis, and it can be easily performed. This study compared sensitivity and specificity between RIPASA score and Alvarado Scoring System. Sensitivity is the proportion of actual positives which is correctly identified that is the percentage of people who are correctly having the condition. The RIPASA score was considerably better than the Alvarado score in diagnosing appendicitis.

Using the RIPASA score, 91.04% of patients who actually had acute Appendicitis were correctly diagnosed and placed in the high probability group (RIPASA score more than 7.5), compared to only 85.07% when using the Alvarado score. Again, the diagnostic Accuracy of RIPASA was 89.18%, and Alvarado Score was 82.44% indicating that the RIPASA score is a better diagnostic tool.

Chong et al, RIPASA score sensitivity 98% specificity 81.32%, diagnostic accuracy 91.83, modified Alvarado score sensitivity 68.32%, specificity 87.9% and diagnostic accuracy 86.5%.[4] Erdem et al, RIPASA Score sensitivity 100%, specificity 28%, diagnostic accuracy 77%, modified Alvarado score sensitivity 82% and specificity 75%, diagnostic accuracy 80%.[13]

Present study RIPASA score sensitivity 91.04%, specificity 71.42%, diagnostic accuracy 89.18% modified Alvarado score, sensitivity 85.07% and specificity 57.14% diagnostic accuracy 82.44%. In this study, most of the patients with catarrhal stage appendicitis a RIPASA score of ≥7.5. The rest of the patients in this group had a more advanced stage. RIPASA score 12 and over had suppurative-or gangrenous-stage.

RIPASA scores higher than 7.5 was found that histopathological examinations of most of the patients had acute appendicitis. For patients with a RIPASA score of 7.5 and over CT scan is not necessary. This type of practice will fully justify the validity of the existence of a RIPASA scoring system. It will be useful to physicians, particularly those working in primary care hospitals where CT scan not available.

Limitations

In this study, we studied only above ten years of patients, and those are present to the hospital before one week. We excluded abdominal distention and abdominal mass cases and high-risk patients and elderly patients.

CONCLUSION

The RIPASA score is a simple system to diagnose acute appendicitis with high sensitivity and specificity. RIPASA score is a better diagnostic scoring system compared to the Alvarado score, particularly in the Indian population. We were making a correct and prompt diagnosis of acute Appendicitis using RIPASA score, which is easily obtained using clinical and laboratory data, without a need for unwanted admissions and expensive imaging like CT scan.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Rao KR, Harika DNS, Narayana SV, Kumar KSV, Yadav CPK, Kiran SHU, et al. A comparative study on RIPASA and modified Alvarado score in the diagnosis of acute appendicitis in tertiary care hospital. Int Surg J 2021;8:944-8.