VALIDATION OF RIPASA SCORE FOR THE DIAGNOSIS OF ACUTE APPENDICITIS

General Surgery

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ABSTRACT

Introduction and Objectives: Appendicitis is one of the commonest disease faced by surgeons. Alvarado scoring system is one of the most commonly used scoring tool which incorporates symptoms, signs and laboratory investigations to reach the diagnosis1. Objective of this study was to determine the usefulness of RIPASA score for the diagnosis of acute appendicitis using histopathology as a gold standard.

Materials and Methods: In this prospective study over 9 months, 100 cases of acute pain in right iliac fossa, admitted in a tertiary teaching institute, from February 2017 to October 2017 were studied.

Exclusion Criterion: Patients with appendicular lump, Pregnancy.

Results: The sensitivity of RIPASA score in diagnosing acute appendicitis at cutoff value of 7.5 is 98.80%, the specificity is 87.5%, positive predictive value is 97.64%, negative predictive value is 93.30% and false positive rate is 12.5%. Area under the curve (AUC) is 0.914 in ROC with 95% confidence interval and p value <0.05 and is considered statistically significant. ROC analysis was done to depict the cut off with maximum sensitivity and specificity & was found to be 7.5.

Conclusion: On correlating RIPASA score with the histopathological report, the sensitivity and specificity of RIPASA score in diagnosing acute appendicitis at cut off 7.5, is 98.8% and 87.5% which is also comparatively better than other routinely used scoring systems.

KEYWORDS

Acute appendicitis, RIPASA score, ALVORADO score, Histopathology report

INTRODUCTION

Appendectomy is one of the commonest surgery done by general surgeons. If the diagnosis is made at an early stage of attack, particularly in the absence of localized mass, appendix should be removed urgently, a thought shared by most of the surgeons. The diagnosis of acute appendicitis is based purely on clinical history and examination combined with laboratory investigations such as elevated white cell count. The diagnosis of acute appendicitis may be difficult in patients who present with atypical signs and symptoms on physical examination. A delay in performing an appendicectomy in order to improve its diagnostic accuracy increases the risk of appendicular perforation and sepsis, which in turn increases morbidity and mortality. The opposite is also true, where with reduced diagnostic accuracy, the negative or unnecessary appendicectomy rate is increased. Diagnostic accuracy can be further improved through the use of ultrasonography or computed tomography imaging. However, ultrasonography is subjective and operator dependent, and CT scan is costly and not readily available[2].

Alvarado scoring system is one of the most commonly used scoring tool which incorporates symptoms, signs and laboratory investigations to reach the diagnosis. The reported sensitivity and specificity for the Alvarado and the modified Alvarado scores range from 53%–88% and 75%–80%, respectively. However, these scoring systems were developed in western countries, and several studies have reported very low sensitivity and specificity when these scores are applied to a population with a completely different ethnic origin and diet. Another scoring system, RIPASA score has been claimed to have better outcomes in Asian settings. In 2010 a new scoring system was developed at Department of Surgery, Raja isteri pengiran anak saleha Hospital, Brunei Darussalam and named after hospitals name, with calculated sensitivity and specificity of 88.46% (95% confidence interval 83.94%–92.08%) and 66.67% (95% Confidence interval 52.08%–79.24%), respectively. RIPASA score is the new scoring system developed for the diagnosis of acute appendicitis based on clinic-pathological parameters. Objective of this study was to determine the usefulness of RIPASA score for the diagnosis of acute appendicitis using histopathology as a gold standard. Details of RIPASA score are as follows:

Parameter	Score
Sex: Male	1.0
Female	0.5
Age: <39.9 years	1.0
>40.0 years	0.5
RIF pain	0.5
Migration of RLQ pain	0.5
Anorexia	1.0
Nausea and vomiting	1.0
Duration of symptoms: <48 hours	1.0
>48 hours	0.5
RIF tenderness	1.0
RIF guarding	2.0
Rebound tenderness	1.0
Rovsing's sign	2.0
Fever	1.0
Raised WBC	1.0
Negative urinalysis	1.0
Foreign NRIC	1.0

Foreign national record of identity card (NRIC) which is specific to the local population where the system was developed. For this study, all the patients will be given score 0 since the parameter is for local population of the country where score was developed.

RIPASA Score is a 17.5 score with cut-off of 7.5 for diagnosing acute appendicitis.

<5.0 probability of acute appendicitis is unlikely
5.0-7.0 low probability of acute appendicitis
7.5-11.5 probability of acute appendicitis is high
>12 definite acute appendicitis

MATERIALS AND METHODS

RIPASA score in every clinically diagnosed case of appendicitis and study its correlation with the histopathology.

Confirmation of acute appendicitis as the final diagnosis is obtained from a histopathological analysis of the resected appendix.

Cases are assessed with respect to the different criterions as follows:-
1. Clinical presentation- pain in abdomen, fever, vomiting, tenderness, rebound tenderness.
2. Routine hematological and biochemical investigations- CBC, urinanalysis.
3. Radiological investigations-USG.
4. Histopathological report.

End of the study is considered when the sample size of the study is fulfilled i.e. 100 or the duration of the study with follow-up is finished as per the sampling period.

RESULTS
Result of study is tabulated as follows and statistical parameters at cut off value 7.5 are calculated.

RIPASA ScoreRIPASA Score	Histopathology proven appendicitis	Histopathology normal appendix	Total
Score > 7.5	83	2	85
Score < 7.5	0	14	15
Total	84	16	100

a - 83 b – 2 c – 1 d – 14
- Sensitivity = a/a+c = 83/84 = 98.80%
- Specificity = d/b+d = 14/16 = 87.5%
- Positive predictive value = a/a+b = 83/85 = 97.64%
- Negative predictive value = d/c+d = 14/15 = 93.30%
- False positive rate = b/b+d = 2/16 = 12.5%

In this prospective study over 9 months, 100 cases of acute RIF pain admitted in a tertiary teaching institute are studied and the results are as follows:
- Appendicitis can occur at any age but in this study the most common age group affected is 18-30 years.
- It is more common in males (65%) as compared to females (35%).
- The most common presenting symptom is right iliac fossa pain which was found in all (100%) the patients followed by nausea / vomiting (89%), fever (65%), and anorexia(63%).
- Tenderness in right iliac fossa is an important sign and is present in 99% of the patients in this study. While rebound tenderness is present in 84%, guarding in right iliac fossa in 77% and rovsing sign is present in 11% patients in this study.
- 70% patients presented within 48 hours of symptom onset.
- 76% patients showed raised WBC counts and 62% patients showed negative urinanalysis.
- 84 patients had histopathologically proven acute appendicitis and 16 patients did not have acute appendicitis on histopathology.
- The optimal cutoff threshold found on ROC analysis is 7.5.
- The sensitivity of RIPASA score in diagnosing acute appendicitis at cutoff value of 7.5 is 98.80%, the specificity is 87.5%, positive predictive value is 97.64%, negative predictive value is 93.30% and false positive rate is 12.5%.
- Area under the curve (AUC) is 0.914 in ROC with 95% confidence interval and p value <0.05 and is considered statistically significant.
- ROC analysis was done to depict the cut off with maximum sensitivity and specificity and was found to be at 7.5.

DISCUSSION
For the diagnosis of appendicitis, history, clinical examination and laboratory findings can be sufficient for cases with classical presentation. In atypical presentation, USG of abdomen and pelvis, CT abdomen and laparoscopy are supplementary methods for diagnosis. Various scoring systems have been developed to aid in diagnosis of acute appendicitis of which ALVARADO is the most commonly used scoring system. However, the sensitivity and specificity of ALVARADO scoring system was found to be low when applied in the asian settings. Therefore a new scoring system, RIPASA score has been developed which is found to have better sensitivity and specificity in asian population. RIPASA score is based on demographic parameters, clinical presentation and laboratory parameters. Histopathology is considered as gold standard for correlation.

In this study, it is seen that the acute appendicitis is common in all age groups but most commonly seen in age group of 18-30 years, as compared to the previous study by Chong et al[3], which showed mean age group 24-30 years, study by Abdullah et al[4] which showed mean age group 20-40 years, study by Walid et al[5] which showed mean age group 12-32 years. The results of this study are comparable with the previous study suggesting that acute appendicitis is more common in young age group.

In this study, it is seen that Acute appendicitis is more commonly seen in males (65%). Results of previous studies by Chong et al[6] showed male preponderance (57.69%), study by Walid et al[5] showed female preponderance (71.7%), study by Abdullah et al[4] showed male preponderance (52.9%), study by Butt mq et al[7] showed male preponderance (58.4%). The results are comparable with the study by Chong et al which was the study carried out to formulate RIPASA score and with most of the other studies.

We have found out in this study that RIF pain was present in all the patients while other symptoms as nausea vomiting in 89% and anorexia in 63% and fever in 65% patients. Study by Abdullah et al[4] showed comparable results. In their study 99.3% patients had acute RIF pain, 81% patients had nausea and vomiting, 79% patients had anorexia and 53% patients had fever. In this study, majority of the patients (99%) were found to have RIF tenderness, RIF guarding in 77%, rebound tenderness in 84% and rovsing sign in 11% of patients.

In this study, the sensitivity and specificity achieved at cutoff value of 7.5, are 98.80% and 87.5% respectively, with positive and negative predictive value of 97.64% and 93.30%. This is comparable with the previous studies carried out in the country of origin by Chong et al[6] (sensitivity 88%, specificity 67%, positive predictive value 93%, negative predictive value 53%). The negative appendectomy rate in this study is 12.5% compared to 6.9% in the previous study.

The sensitivity and specificity of ALVARADO score in asian settings is 82.8% and 56% respectively as per study by Abdullah et al[4].

The RIPASA score is easy to apply since it is based on demographic and clinicopathological parameters and it has shown good sensitivity and specificity.

CONCLUSION
RIPASA score is a highly sensitive and specific score for diagnosis of acute appendicitis with histopathology as gold standard. The sensitivity and specificity of RIPASA score in diagnosing acute appendicitis at cut off 7.5, is 98.8% and 87.5%. The positive predictive value of RIPASA score in diagnosing acute appendicitis is 97.64% and negative predictive value is 93.30%. The negative appendectomy rate is 12.5%. The area under the curve is 0.914 with 95% confidence interval and p value <0.05 which is statistically significant.

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