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Evaluation of Ripasa Scoring System in Acute Appendicitis

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Abstract

Background: RIPASA score was created to take the role of the previous, less accurate scoring method used in Asian populations to diagnose acute appendicitis. The goal of the current study was to assess the RIPASA score's accuracy when applied to our patients in the Indian community by contrasting it with histopathology.

Methods: By applying the RIPASA scores to 134 patients who had right iliac fossa discomfort and had visited emergency at a tertiary care teaching hospital in South India. Appendicectomy decisions were made solely using clinical judgement. The gold standard in histopathology and RIPASA scores were correlated. Using SPSS version 20, the ROC curve analysis, sensitivity, specificity, positive and negative predictive values, and diagnostic accuracy for RIPASA was computed.

Results: We observed that the sensitivity of the RIPASA scoring system was 91.5 percent, and that it had an even higher specificity of 93.8 percent in patients who had appendicectomies. A 91.8 percent accuracy rate was achieved.

Conclusions: In comparison to other scoring systems, the RIPASA score in the Indian population could be used to diagnose acute appendicitis with higher sensitivity and diagnostic accuracy.

Keywords: Acute appendicitis, RIPASA scoring, Alvarado scoring.

Introduction

Appendectomy continues to be the most common emergency procedures in abdominal surgery. Overall, in males, the individual risk of acute appendicitis with appendectomy is 8.6%, while females have a risk of 6.7% [1]. Only 50% of patients had the typical clinical presentation of acute appendicitis, making it difficult for the patient to decide whether to explore [2]. Due to the presence of gynaecological and urinary illnesses that can present with a similar clinical picture, diagnosing acute appendicitis can be challenging, particularly in patients who are young children, elderly patients, and females in the reproductive age range [3]. High percentages of unsuccessful appendectomy may result from the decision to intervene quickly in cases of acute appendicitis with unusual symptoms (20%-40%) [4].

Ultrasound or computed tomography imaging can boost the accuracy of the diagnosis, but any delay in getting the imaging will raise the risk of complications, morbidity, and fatality [5]. While CT is the most sensitive and specific in detecting the ailment, its availability for

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every patient is limited, especially in nations with low resources. Ultrasound is operator dependent and frequently misses or overdiagnoses the condition [6].

In an effort to increase diagnosis accuracy, decrease the rate of appendectomy failures, and address the problem of delayed diagnosis, numerous grading systems have been devised. Alvarado, Eskelinen, Samuel, Lindberg, Ohmann, Tzanakis, Fanyo, and others are included in this [7]. Alvarado scoring systems (1986), which are practical and simple to use and include 8 predictive parameters, have the highest sensitivity and specificity when used on the Western population. They are the most well-known and widely used scoring system [8].Alvarado scoring systems have been proven to achieve a sensitivity ranging from 50 to 59 percent and a specificity ranging from 23 to 94 percent when used to Indian people. This was a rather low result, and was related to several things like food and environmental influences [3,9].

The Raja Isteri Pengiran Anak Saleha (RIPAS) hospital in Brunei, where doctors devised the RIPASA scoring system in 2010, contains other factors than Alvarado, such as gender, age, and pain duration. These factors have been demonstrated to influence the accuracy of the diagnosis of acute appendicitis and are thought to perform better in Asian settings than the Alvarado scoring system [10].

In the western population, there are numerous studies available on the reliability of RIPASA scoring systems when used with patients who are complaining of acute appendicitis, but there are few studies available in other populations. In order to compare the RIPASA scoring system with histopathology and assess its reliability as a tool for diagnosing acute appendicitis in the Indian population, the authors performed this prospective study.

Materials &methods

This study was carried out as a prospective study and conducted at Government Medical College, Thiruvananthapuram, during the period from March 2017 to March 2018. All adult patients, presented to the emergency department with right iliac fossa (RIF) pain, clinical diagnosed to have acute appendicitis and offered emergency appendectomy were included. Patients with abdominal distension, pregnant women, patients with masses in the right iliac fossa, patients with urolithiasis histories, peritonitis patients, and patients with pelvic inflammatory disease (PID) patients were excluded from the study. All patients were given a clinical history, underwent a physical examination, and underwent preoperative tests such CBC and urine analysis as well as, if necessary, radiographic study.

All patients were assessed, and a specially created Performa was filled out for each one of them. This was done solely for the purpose of the study and contained all variables based on RIPASA score, but it did not contain the actual scores or guidelines, so the scores did not influence the surgeon's decision to perform an appendectomy. Instead, the decision was made based entirely on the surgeon's own clinical judgement after taking into account all of the clinical, laboratory, and radiological findings. All of the patients underwent emergency appendectomy, and once the surgical results were documented, the specimen was sent for histopathological analysis. The grading method was compared with the histopathology reports of the excised appendix, which were the gold standard for confirming a diagnosis of acute appendicitis.

RIPASA scoring system were calculated for each patient. According to RIPASA score system the scores generated were: age (less than 40years is 1 point; greater than 40 years is 0.5 point), gender (male is 1 point ; female is 0.5 point), RIF pain (0.5 point), migration of pain to RIF (0.5 point),nausea & vomiting (1 point), anorexia (1 point), duration of symptoms (less than 48 hours is 1 point; more than 48 hours is 0.5 point), RIF tenderness (1 point), guarding (2 point), rebound tenderness (1 point) Rovsings sign (2 point), fever (1 point), raised white cell count (1 point), negative urinalysis (1point). Maximum score was 15 points and minimum score was 2 points(3). All study participants gave their informed consent after

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receiving ethical approval from the hospital's ethical committee. By omitting names and other identifying information from the Performa, patient confidentiality was preserved. Each patient's RIPASA score will be calculated and compared with the HPR after the 14 diagnostic factors included in the RIPASA scoring system were entered into the proforma beforehand.
A Prospective study was conducted without any sampling, as consecutive cases meeting eligibility criteria will be included in the study till sample size met. Sample size calculated by DTE formulae, which is used to find out sample size in diagnostic test evaluation. Where n= 1.96*1.96 Sn=sensitivity P=prevalence D = 20%P. For a sensitivity of 88.4 and a sample size of 134, the aforementioned calculation yields. Specificity in the aforementioned study was 66.7 percent. The study subjects provided informed consent. Excel sheets were used to enter the data, which was then analysed using the right statistical tools. All qualitative and quantitative characteristics are expressed as a proportion and as mean and standard deviation, respectively. When using an appropriate significance test, such as the Chi-Square test, a P value of less than 0.05 will be regarded as significant. Calculations were made for the test's sensitivity, specificity, positive predictive value, negative predictive value, and likelihood ratio.

Results

In our study of 134 patients,84(62.7%) patients were males and 50(37.3%) were females. Patients in the same group were primarily younger people. According to the age distribution, 107 patients (79.9%) were under the age of 39, and 27 patients (20.1%) were beyond the age of 39. 72 patients (or 53.7% of the total) presented as soon as their symptoms began, while 62 patients (or 46.3%) presented beyond 48 hours. **(Table1)**
Right Iliac Fossa (RIF) pain was present in all patients (100%); 59 (44%) of these patients experienced pain migration; 71 (53%) experienced anorexia; 85 (63%) experienced nausea and vomiting; and 103 (76.9%) experienced fever. **(Table 2)**. The most frequent sign elicited was tenderness in RIF and associated guarding for 71 patients (53%) followed by the Rovsings sign for 85 patients (63.4%) and rebound tenderness for 110 patients (82.1%). **(Table 3)**. According to CBC results, 126 patients (94 percent) had increased total counts, while 8 patients (six percent) had normal total counts. **(Table 4)**
Based on the criteria, the RIPASA score was calculated, and it was discovered that 109 (81.3%) of the patients had a score of higher than 7.5, which was regarded as significant. **(Table5)**. The same patients' histopathology reports (HPRs) were examined, and it was discovered that 118 (88.1%) of them exhibited appendicitis-like symptoms whereas 16 (11.9%) did not **(Table 6)**. Out of 109 individuals with a RIPASA score more than 7.5, 108 had appendicitis, and only one had a negative HPR, according to the comparison between the two variables. Ten patients out of the 25 who had a score of less than 7.5 had appendicitis, and 15 did not **(Table7)**. A sensitivity of 91.5 percent and a specificity of 93.8 percent were obtained from the diagnostic test examination. Its accuracy was 91.8 percent, and its positive prediction value was 99.1%. **(Table 8).**

Duration of pain	Count	Percentage
>=48 Hours	62	46.3%
<48 Hours	72	53.7%
Table 1: Distribution of the study population according to duration of pain		

Symptoms	Count	Percentage
RIF pain	134	100.0%
Migration of pain	59	44.0%
Anorexia	71	53.0%

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Nausea and vomiting	85	63.4%
Fever	103	76.9%

Table 2: Distribution of the study population according to symptoms

Signs	Count	Percentage
RIF tenderness	133	99.3%
RIF guarding	71	53.0%
Rovsings sign	85	63.4%
Rebound	110	82.1%

Table 3: Distribution of the study population according to signs

Raised TC	Count	Percentage
Absent	8	6.0%
Present	126	94.0%

Table 4: Distribution of the study population according to raised TC

RIPASA Score	Count	Percentage
>=7.5	109	81.3%
<7.5	25	18.7%

Table 5: Distribution of the study population according to RIPASA Score

HPR	Count	Percentage
Positive	118	88.1%
Negative	16	11.9%

Table 6: Distribution of the study population according to HPR

RIPASA Score	HPR		
	Positive	Negative	Total
>=7.5	108	1	109
<7.5	10	15	25
Total	118	16	134

Table 7: Diagnostic test evaluation RIPASA score in predicting acute appendicitis

Sensitivity	91.5%
Specificity	93.8%
False Negative	8.5%
False positive	6.3%
Positive Predictive value	99.1%
Negative Predictive value	60.0%
Positive Likelihood ratio	14.6
Negative Likelihood ratio	0.1
Accuracy	91.8%

Table 8: Diagnostic test evaluation RIPASA score in predicting acute appendicitis

Discussion

Because of the difficulties with accurate diagnosis and appendectomy delays, acute appendicitis can be difficult for surgeons to treat. The risk of appendicular perforation or an inflammatory tumour in the appendix may rise if an appendectomy is postponed.

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Additionally, the rate of negative appendectomies ranges from 20 to 30 percent [11]. When the appendix is surgically removed based solely on the patient's signs and symptoms, up to 40% of the time the appendix is removed normally (a negative appendectomy). Abdominal adhesions, in particular, have been linked to an increased risk of surgical complications following the removal of a healthy appendix [12]. Several diagnostic tests, including computed tomography (CT) and ultrasonography, can be used to boost diagnosis accuracy and decrease the likelihood of unsuccessful appendectomy, albeit these can raise total healthcare expenditures. Various diagnostic grading systems have also been created. The Alvarado score and the modified Alvarado score are the two most widely used grading scales [13,14].

When applied to Western populations, these scoring systems have strong sensitivity and specificity, but they are less sensitive and specific when applied to Asian groups. With superior sensitivity and specificity than the Alvarado scores, particularly in Asian populations, a new scoring system called RIPASA was created [2,15,16]. The RIPASA score is a straightforward quantitative scoring system that is simple to apply. Easily obtained by taking a thorough history, performing a clinical examination, and carrying out two straightforward procedures, this has fourteen parameters. As a result, a quick diagnosis can be established without having to wait for the results of all the investigations, and in terms of lowering healthcare costs, they can assist to cut down on pointless hospital stays and pricey radiological tests [17].

We still require a scoring method for the Indian population that has respectable sensitivity, specificity, and a low rate of appendectomy. As a result, in our study, we evaluated the diagnostic utility of the RIPASA scoring system for the diagnosis of acute appendicitis and examined the negative appendectomy rate for the aforementioned method in a tertiary care teaching hospital in South India. The gender distribution in the current study was skewed toward men. This study's prospective design was identical to that of Chong et al, and the study's predominant gender was male (62 percent) [17]. Based on the surgeon's assessment, 134 patients underwent emergency appendectomy in the hospital. Out of these, 118 (88.1%) cases had acute appendicitis verified by histology. Based only on clinical judgement, this showed a negative appendectomy rate of 11.9%. Based on the information gathered in the Performa, all of the patients were assessed in accordance with the scoring methodology. We picked a score of 7.5 in the RIPASA scoring system since Chong et al. showed it to be the cut-off value with the best area under the curve in their prospective analysis of Asian patients [2].

In comparison to earlier studies, this study's findings show that the RIPASA scoring system has a high specificity and positive predictive value. 91.8 percent of individuals with acute appendicitis were accurately identified and classified in the high probability group using the RIPASA score. (RIPASA rating > 7.5). Its specificity of 93.8% surpasses that of other research, and its positive predictive value of 99.1% is close to the work by Nanjundaiah N et al. (2014) using the RIPASA score with HPR[16]. Its significance as a diagnostic tool is suggested by its better specificity and positive predictive value. The clinical history, physical examination, and two straightforward blood tests are just a few of the straightforward characteristics that make up the RIPASA score, which is an effective tool for diagnosing acute appendicitis. As a result, the operating surgeon can quickly decide whether to perform surgery on a patient with RIF pain if their RIPASA score is >7.5, while patients with a score of 7 can either be monitored in the unit ward or released with an early clinic review visit. By employing the RIPASA score, unnecessary and costly radiological investigations can be avoided, lowering health care costs.

There were certain limitations to our study which includes single institutional study, limited sample size, medical records, surgical registrar on duty Contrast CT of abdomen. The accuracy of the clinical record was crucial to the validity of this prospective trial. The

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surgical specialist registrar on duty used his or her clinical judgement to determine that our sample population had acute appendicitis. In addition, various diagnostic techniques (such as abdominal ultrasonography or CT) were applied to a subset of patients in our emergency medicine division. As a result, our study's rate of unsuccessful appendectomy was higher than that of other studies.

Conclusion

In summary, we found that the RIPASA score, which now has a substantially better specificity of 93.8 percent, is an excellent diagnostic scoring system for acute appendicitis. We can evaluate the requirements of the RIPASA score by taking a detailed history, doing a clinical examination, and carrying out investigations. Using the RIPASA score to diagnose acute appendicitis can also help minimize unnecessary admissions and costly imaging tests.

Declaration

Funding

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Ethical approval

The study was approved by the Institutional Research Ethics Committee, Government Medical College, Thiruvananthapuram.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Data availability statement

Data will be made available on request.

Consent to participate

Written Informed Consent was obtained from all patients before initiating the study.

Contributors

All authors contributed to the design and interpretation of the study and to further drafts. Author contribution statement:

1. First Author: Conceived and designed the experiments; Performed the experiments.
2. Second Author: Analyzed and interpreted the data; Contributed materials, analysis tools and data.
3. Third Author: Performed the experiments; Analyzed and interpreted the data.
4. Fourth & Corresponding Author*: Conceived and designed the experiments; Contributed materials, analyzed tools and data; Wrote the paper.

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