RIPASA Score; Its Sensitivity, Specificity in Diagnosing Suspected Acute Appendicitis

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ABSTRACT

Background: Among acute emergencies, the most commonly occurring one is Acute appendicitis. Scoring systems have been developed such as Alvarado and Modified Alvarado Scores. RIPASA Score has a higher sensitivity in the Asian population set. Thus, came about the plan of our examination to try things out with this new score and to check whether it undoubtedly performs well to the undertaking.

Objectives To determine the sensitivity, specificity of the 16-point RIPASA scoring system in diagnosing suspected acute appendicitis and its validation in correlation with histopathology.

Material and Methods: The study was carried out in Khyber Teaching Hospital Peshawar Pakistan from January 2018 to June 2018, Department of General Surgery. A total of 322 patients were included in the study. In ED, resident surgeons filled in the RIPASA Score proforma by taking a detailed history and doing a physical examination, and running labs along with ultrasonography. The decision to perform appendectomy was solely taken by the senior registrar which was the final decision and the sample was sent for H/P later on.

Results: Of the 322, patients who went through the surgery for acute appendicitis, 188 (58.4%) were male and 134 (41.6%) were female, 284 (88.2%) had positive histopathology reports and 38 (11.8%) had a negative report. The sensitivity of the RIPASA Score at a cut-off value of 8.0 was 97.98%, with the specificity of 77%, and Positive Predictive value of 97.52%, and a Negative Predictive Value of 86.3%.

Conclusion: The clinical implication of RIPASA score is found to be more beneficial than the traditional Alvarado scoring system, thus could bring the complications rates of appendectomy to significantly lower figures.

Keywords: Acute Appendicitis, Alvarado Score, RIPASA Score, Asian Population, Sensitivity, Specificity

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INTRODUCTION

Initially, appendicitis was reported in ancient texts from the Byzantine and Egyptian periods¹. It is also the most frequently performed surgical procedure². Moreover, among abdominal pain differentials, acute appendicitis accounts for one of the most commonly occurring emergency surgical diagnoses which require appendectomy on an urgent basis³. With the present incidence of acute appendicitis, the enigma of diagnosis of acute appendicitis still needs to be solved by the resident surgeons and several aiding scoring systems (including Alvarado, Modified Alvarado, and RIPASA) have been developed based on the signs and symptoms of the patients presenting in the emergency department along with the supporting laboratories^{4,5}. The importance of

these scoring systems cannot be overlooked as the consequences of acute appendicitis can eventually lead to more grim complications such as perforation, peritonitis, and sepsis which can cause death^{6,7}. Due to limited time in decision making, the doctor on duty is always under stress to come up with the correct diagnosis of acute appendicitis, that's why these scoring systems are quite essential in supplementing the decision making^{8,9}. Looking at the sensitivity and specificity of the scoring systems in the Asian population; Alvarado (53% and 75%), Modified Alvarado (88% and 80%), 14-point RIPASA (93% and 87%), and 15-point RIPASA (96% and 93%), it can be observed that Alvarado score has a higher negative rate in this population¹⁰. Since there is emerging competition as we ll as need to develop more and better scoring systems to diagnose acute appendicitis with more accuracy¹¹, RIPASA scoring system can be a time tested tool for our set of population. Furthermore, RIPASA scoring system has been attributed to outdo the conventional Alvarado scoring system since it was developed in the Asian population.¹² This study is to check whether 16-point RIPASA (table 1) is the right choice of the scoring system for our doctors in Khyber Teaching Hospital.

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MATERIALS & METHODS

The study was based on patients presenting to the emergency room of Khyber teaching hospital Peshawar and subsequently referred to surgical emergency for evaluation. The Research proposal was put forward through the hospital ethical review board and post-approval (diary no.322-2/ADR/KMC dated 20/12/2017), the first cases started in the January of 2018 till June of 2018, six months, and an adequate sample of 322 patients in total was collected. All patients above 11 years diagnosed with a case of acute appendicitis clinically with laboratory and imaging evidence were included in the study. History was

taken from patients and examined by Postgraduate Trainees who did Full blood count, serum amylase, Urine R/E, and Ultrasonography, and present the patient to the on-call registrars and note down the clinical and laboratory parameters on the proforma, the senior registrar then decided whether to operate or not and in case of operation the resected appendix was sent to histopathology and result noted down in the same case profile.,data entered into SPSS 20.0 for Statistical Analysis. Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score is explained in table 1.

Table 1. Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) Score

Parameter	Score
Sex	
Male	1.0
Female	0.5
Age	
<39.9 years	1.0
>40 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
Duration of Symptoms > 48 hours	0.5
Signs	
RIF tenderness	1.0
RIF Guarding	2.0
Rebound tenderness	1.0
Rovsing's Sign	2.0
Fever	1.0
Investigations	
Raised WBC	1.0
Negative Urinalysis	1.0
Additional Score	
Foreign NRIC	1.0

RIF- Right Iliac Fossa; RLQ- Right Lower Quadrant; WBC- White Blood Cell; NRIC- National Registration Identity Card

RESULTS

Of the 322, patients who went through the surgery for acute appendicitis, 188 (58.4%) were male and 134 (41.6%) were female. Further subdivision in age groups of 11-25, 26-40 and 41-55 were 145 (45.1%), 126 (39.1%) and 51 (15.8%). The average mean was calculated to be 28.578 years with a standard deviation of ± 11.655 years. The standard error in mean turned out to be 17.944 years and the 95% confidence interval based on the sample size was 28.578 ± 1.273 years. Fig 1. 284(88.2%) had a positive histopathology report and 38 (11.8%) had a Negative report, fig 2, with a resultant negative appendectomy rate of 11.8% well below the average. Age group distribution of negative and positive appendectomy is given in the graph in Figure 1. 33(10.2%) had a perforated appendix and 13(4.0%) had post-op wound infection. The sensitivity of RIPASA Score at a cut-off value of 8.0 was 97.98%, with a specificity of 77%, and Positive Predictive value of 97.52%, and a Negative Predictive Value of 86.3%. The sensitivity of the RIPASA Score (8.0 cut off) for the 11-25 years age group was 97.78% and specificity of 77.78%. Furthermore, for the age group 26-40 years, the sensitivity was found to be 98.70%, with a specificity of 77.97%. Whereas, the last age group, 41-55 years, had RIPASA sensitivity of 96.67% and specificity of 70%.

Compared to Alvarado's Score, the sensitivity and specificity of 53% and 75% found, respectively.

Figure 1
Total number of appendectomies in different age groups

Figure 2
Number of appendectomies (positive & negative) in different age groups

DISCUSSION

Acute appendicitis is a noteworthy careful conundrum and is a standout amongst the frequently admitted cases to the surgical ward. Because of its expanded rate, an ED doctor should be taking care of business to accurately diagnose acute appendicitis, however, being the best isn't sufficient in high capacity ED department in a remarkable tertiary care hospital of the district⁸. Quick response is required to bypass any danger of perforation, peritonitis, and sepsis. Whether to operate or not is a problem everlastingly confronting a specialist. And thus, would result in unnecessary surgery for negative appendectomy case¹⁰. As an indicative assistance modality, for example, Ultrasound and CT scans can be utilized to help in the demonstrative procedure^{11,12}. Ultrasound, being user-dependent, have a low sensitivity and specificity threshold¹⁴. Even though with 96% sensitivity, CT Scan opens the patient to ionizing radiation and imposes huge expense^{13,14}. Both ultrasound and CT Scan are not perfect modalities in the diagnostic procedure particularly in emergency settings as is if there should be an occurrence of acute appendicitis and are for the most part costly or unfortunately inaccessible in developing countries¹⁵. The Alvarado scoring system was devised to aid in diagnosing acute appendicitis, and it brought about the nearly ideal result, diminishing the number of negative appendectomies radically¹⁶. First presented in 1986, the Alvarado scoring system immediately picked up prominence among the surgical fraternity and turned into a convenient device to have an imminent state in the administration plan of the patient, yet this scoring system likewise had a high false-positive

rate, especially in females of kid bearing age. A further adjustment (exclusion of shift to the left of neutrophils)¹⁷ was later on made in the form of Modified Alvarado score in 1994, this further improved sensitivity and diminished the false-positive rate; the detailed sensitivity and specificity of these scoring system were 53%-88% and 75%-80% individually^{18,19}. While these scoring systems happened to be utilized all around the globe, after some time in surgical setups of Asia, it was seen that Alvarado just as Modified Alvarado was inadequate with the end goal of precisely diagnosing acute appendicitis with reduced sensitivity and specificity^{20,21}. To enhance diagnostic accuracy, it was stated in a retrospective analysis in 2010 by the Department of Surgery, Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital in Brunei Darussalam that a novel scoring system could handle different ethnic groups with different diet²².

So was presented RIPASA scoring system for Asian populace with better sensitivity and specificity for recognition of acute appendicitis with sensitivity 96.2% and specificity 90.5% and the sensitivity and specificity of Alvarado score were 58.9% and 85.7% respectively in comparison with RIPASA^{4,5,22,23}. This should be emphasized that the RIPASA scoring system has been embraced and tried now in various regions of Pakistan and had demonstrated promising outcomes, in Kohat Butt et al has demonstrated that RIPASA Score had 96.7% sensitivity, 93.0% specificity, and 95.1% accuracy in diagnosis^{4,23}. Furthermore, our research study confirmed the results reported by Butt et al showing the same rates of sensitivity and specificity. Moreover, PPV, NPV, FP, and FN rates came out to be similar to results published by Butt et al.

Our results showed the male predominance of acute appendicitis with 188 (58.4%) males while the rest (134 or 41.6%) females, with a ratio of 1.40 to 1 (Table 1.2). Among the age group distribution, the high-risk group turned out to be the young adults (Age 11-25) with 45.03% (145) reported cases. These findings were consistent with the unhealthy diet regime that is widespread in this age group, resulting in the enhanced occurrence of acute appendicitis. Likewise, the majority of false positives were reported among females, either married or of child-bearing age, with a normal appendix. Further diagnosis found

the primary causes of the complaints to be ovarian torsion/cyst, ectopic pregnancy^{9,11}. Moreover, patients in the age group 40-55 (mostly diabetic and female) had the majority of false positives¹¹ hence further complicating the typical case scenario which should be looked into in more depth with the help of available tools of investigation. With a threshold value of 8.0 out of 16, the sensitivity of our RIPASA score was 97.98% and specificity 77%. Furthermore, 97.52% PPV, 86.3% NPV was derived, hence making this scoring system more reliable for surgeons.

CONCLUSION

In conclusion, our study showed that the specificity and sensitivity of the RIPASA scoring system are in concordance with the relevant studies done. This scoring system has helped us in the last year and improved our confidence in our diagnosis and treatment plan for acute appendicitis

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

- Khattak IA:** Concept and design of study, Collection of data, statistical analysis
Mabood W: Writing of manuscript, critical review of manuscript
Naeem M, Ali S: Analysis and interpretation of data, statistical analysis
Khattak MAK: Data collection, bibliography

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.