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To assess the role of RIPASA score in suspected cases of acute appendicitis with histopathological correlation and relevance to suburban Indian population: Single institutional study

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Abstract

Background: Acute appendicitis is one of the most common emergencies, especially among young surgeons, and usually these cases are operated on as an emergency, to prevent any morbidity that may arise, especially in children and the elderly. In this study, we compare the validity of the RIPASA score with the histopathology findings postoperatively as the gold standard for decision making in acute appendicitis.

Objective: To assess the validity of the RIPASA score in the diagnosis of acute appendicitis using post-operative histopathology as the gold standard.

Methodology: A prospective observational study was conducted in the department of General Surgery in a tertiary teaching hospital for one year, in patients presenting with right lower quadrant pain, subsequently operated on as acute appendicitis. One hundred Patients were divided into two groups: group A with a RIPASA score less than 7.5 and group B with a RIPASA score more than 7.5. The data were analysed with a chi-square test and binary logistic regression.

Results: This study comprises a total of 100 cases with a Male: Female sex ratio found to be 1.4:1. The mean age of found to be 28.93 ± 9.36 years. The sensitivity is 96.9%, the specificity of 81%, and the positive predictive value of 94% and negative predictive value of 84%, diagnostic accuracy of 95.14%. In this study, the rate of negative appendectomy was 15.7%.

Conclusion: The RIPASA score with a minimum value of 7.5 is considered an easy, dependable, and convenient diagnostic tool in cases of right lower quadrant pain with minimal cost to the patients and aids in reducing negative appendectomy procedures.

Keywords: RIPASA score, acute appendicitis, histopathology, young surgeons, morbidity

Introduction

Acute appendicitis is one of the most performed emergency surgical procedures, with the prevalence of approximately 8% worldwide, and accurate diagnosis in an emergency is always a difficult task for a surgeon, even with diagnostic aids, including imaging and laboratory investigations [1]. In emergency diagnosis is usually made by clinical history given by the patient, which may not always be reliable, clinical examination and relevant investigations [2]. A difficulty in diagnosis arises in approximately 20-33% of the cases in the presence of atypical presentation, situs inversus, women in the reproductive age group and children, where clinical features are inconclusive, physical examination and in the absence of symptoms and compatible laboratory abnormalities, especially in less than 24 hours [4]. Basic radiological imaging tools, such as ultrasonography, help narrow down to an accurate diagnosis and aid in decision-making. Despite all these facilities, the rate of negative appendectomy still happens due to reduced diagnostic accuracy [4]. Though many valid scoring systems have been developed that help the surgeon in the decision-making process, they also have their disadvantages [5]. The Raja Isteri Pengiran Anak Saleha appendicitis (RIPASA) score for Brunei has been tested and followed in many countries, including Pakistan, China, India, and Egypt. The present scoring system must recognise patients in need of immediate surgery while simultaneously helping avoid unnecessary surgery

RIPASA SCORE: The diagnosis of appendicitis was made clinically, with complete blood count and ultrasonography of the abdomen. Post emergency procedure specimen of appendices was

sent for histopathological examination. The parameters and the scores generated were age < 40 years = 1 point; more than 40 years = 0.5 point), gender (male = 1 point; female = 0.5 point), Right Iliac Fossa (RIF) pain (0.5 point), migration of pain to RIF (0.5 point), nausea and vomiting (1 point), anorexia (1 point), symptoms duration (< 48 hours = 1 point; > 48 hours = 0.5 point), RIF tenderness (1 point), abdominal guarding (2 points), with rebound tenderness (1 point), Rovsing's sign if positive (2 points), fever (1 point), raised white cell count (1 point), negative urinalysis (1 point) and other national registration (1 point). The optimal cut-off threshold score from the control was 7.5

Materials and Methods: A total of 100 patients of both sexes were included in this study. All adult patients were included in the study only with written informed consent, and minor children with their parents' approval. A relevant clinical history with detailed physical examination was done in all cases to arrive at a provisional diagnosis. All necessary data, including demographic details like age, sex, domicile, clinical findings, laboratory results and radiological investigations, were documented. RIPASA score was applied using the collected data to arrive at a provisional diagnosis of Appendicitis. These patients were grouped into group A with a RIPASA score of < 7.5 and group B with a RIPASA score > 7.5. The post-operative histopathology report of the specimen was obtained and correlated with the clinical diagnosis. RIPASA scores and the HPE reports were correlated postoperatively to calculate the Sensitivity, Specificity, positive predictive value PPV, negative predictive value NPV, diagnostic accuracy and negative appendectomy rates. This helps to prove the validity of RIPASA in the clinical diagnosis of appendicitis and its correlation with post-operative pathology reports

Data collection: All demographic data covering age, sex, domicile, and surgical procedures, especially in the abdomen. All clinical findings, laboratory, and radiological investigations were collected and correlated to confirm that our provisional diagnosis of acute appendicitis was confirmed or ruled out, applying the RIPASA Score along with it. Post-procedure histopathological examination of the Appendix specimen score is added for final confirmation of diagnosis. The positive predictive value (PPV) and negative predictive value (NPV) were used to calculate sensitivity and specificity, respectively, in confirming the diagnosis.

Statistical analysis

All data relevant to this study were tabulated and analysed in terms of percentages, using the chi-square test and binary logistic regression. Categorical variables were compared similarly using the chi-squared test for significance. Statistical analysis was done with SPSS VERSION 26.

Results

This study comprises a total of 100 cases. In which most of the study subjects were males, 72 (72%), and the patients were females, 28 (28%), with a sex ratio found to be 1.4:1. The study subjects' mean age was 30.93 ± 10.36 years. A maximum of 36 (36%) age 21- 30 years age group, followed by 25 (20.8%) in the age group of 31- 40 years. All 100 patients were divided into two groups. Patients with a RIPASA score less than 7.5 were kept in group B, while scores of more than 7.5 were named as group A. All these patients underwent the appendectomy surgical procedure, and specimens were sent for

histopathological examination. On examination, out of the total 100 patients who were operated 82 (82%) patients had acute appendicitis, and 18 patients with another diagnosis, like mesenteric adenitis, especially in the adolescent age group.

RIPASA was the scoring system in our study which has the maximum value of 15 and the lowest value of 3. The mean score of our 100 participants was 11.95 ± 0.877 . The maximum score of 15 noted in 16 patients, the lowest score observed was 11.50 in 17 participants. The most common score was 13. which was common in 40 patients, as shown in Table 1.

Table 1: Frequency of RIPASA Score (n=100)

| RIPASA Score | Frequency | Percentage |
|--------------|-----------|------------|
| 11 | 16 | 16 |
| 12 | 24 | 24 |
| 13 | 26 | 26 |
| 14 | 19 | 19 |
| 15 | 14 | 14 |

Diagnostic Parameters of RIPASA Scoring detecting Appendicitis and correlation with HPE shown in Table 2.

Table 2: Analysis diagnostic parameters for acute appendicitis: Histopathology vs RIPASA scoring.

| RIPASA Scoring | Sensitivity | Specificity | Positive Predictive Value | Negative Predictive Value | Diagnostic Accuracy |
|-------------------|-------------|-------------|---------------------------|---------------------------|---------------------|
| Yes +82 No -18 | 96.75% | 82.35% | 98.02% | 73.68% | 95.3% |

Discussion

The RIPASA score is used as a diagnostic aid for surgeons in arriving at an early decision in acute appendicitis, which is more common in the Asian subcontinent [6]. Its demographic, socio-economic details, symptoms, subjective and objective findings, laboratory, and imaging results form part of the RIPASA score to make a preoperative diagnosis of acute appendicitis. The score ranges between 1.5 to 16, with a minimum score of 7.5 points in predicting a high probability of appendicitis, in patients presenting with right lower quadrant pain [7]. The RIPASA score is found to have 89% sensitivity and 79% specificity, which is easy to do and economical for the patient. Our study was conducted in a group of 100 patients who presented with right lower quadrant pain with of than 24 hours duration, with a provisional diagnosis of acute appendicitis and emergency appendectomy was done in the study population. The RIPASA score was applied in all the patients, and clinical, laboratory, imaging and preoperative findings were correlated with HPE of the resected specimen of the appendix. Acute appendicitis is considered one of the common emergency surgical procedures globally. The accuracy of diagnosis based on clinical examination of acute appendicitis ranges between 65% to 80%. In Young females in their reproductive age group, other important differential diagnoses like ectopic pregnancy and twisted ovarian cyst are important, though they usually present with shock rarely noticed in appendicitis. In our study number of cases is 100, out of which 62% were male and 38% female. With a male to female ratio of 1.5:1, out of the total, only 16 (16%) were found to have a RIPASA score less than 7.5 and 84(84%) had a RIPASA score more than 7.5. The RIPASA score is found to have 88% sensitivity and 80% specificity, which is easy to do and economical for the patient. Chong et al. reported that 98.0% of patients of acute appendicitis were correctly diagnosed and were placed in the high probability

group (RIPASA score >7.5) [8] Our study findings compare with those of a study conducted by Amit Singh et al, in which right iliac fossa pain was found in 92% of cases, with tenderness in 84% of cases [9]. Many other scores, like the Alvarado and modified Alvarado, are also being used by surgeons; the RIPASA score consists of added criteria, making it more reliable in predicting the diagnosis [10]. The RIPASA score was applied in all the patients, and clinical, laboratory, imaging and preoperative findings were correlated with HPE of the resected specimen of the appendix. The accuracy of diagnosis based on clinical examination of acute appendicitis ranges between 65% to 80%. Similar findings were noted by the study conducted by Amit Singh et al, in which out of 200 cases, 122 were males and 78 were females, with a sex ratio of 1.56: 1 [11] Though there is no proven association of gender with appendicitis, a male predominance was seen in our study of 100 patients

Ahmed Ifikhar et al in their findings on similar score reported that more cases (98.57%) presented with pain, right lower quadrant examination, and tenderness in McBurney's point in a significant number of (88% of cases.) [12] In present study also RIPASA score in suspected acute appendicitis has showed sensitivity of around 89%, with specificity of 80%, and diagnostic reliability of 96.6%. In our findings, the rate of misdiagnosis was 17.5%, thus concurs with our present study. The present results are comparable with the study done by Chong et al 2010. Muhammad Qasim Butt et AL, have concluded that RIPASA score in cases of right lower quadrant pain, the diagnosis of acute appendicitis along with post operative biopsy results serves as a gold standard. It has a result of 96.7% Sensitivity, 93.0% specificity, 95.1% diagnostic accuracy, 94.8% positive predictive value and 95.54% negative predictive value with the RIPASA score. Similar findings were reported in the study conducted by Hassan Mumtaz et al in their study on RIPASA found that this Scoring had 98.02%.

Conclusion - RIPASA score is found to be an economical, easy to apply and non-invasive diagnostic investigation in diagnosing acute appendicitis especially in suburban population who are economically weak and daily wagers. It can be an effective complementary diagnostic tool, especially for budding surgeons in early making surgical decision making in equivocal presentation.

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