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A Comparative Study of RIPASA and ALVARADO Scoring Systems in the Diagnosis of Acute Appendicitis

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Abstract: ***Background: The objective of the study is to assess the RIPASA scoring system and the ALVARADO Scoring System for the diagnosis of Acute Appendicitis. Materials and methods: A prospective study was conducted on 60 patients aged between 18 to 60 years who presented with right iliac fossa pain clinically suspected to be acute appendicitis. Both the scores were calculated on all the patients. Depending on clinical judgment appendicectomy was done. Post operative histopathology report was correlated with the scores. A score of 7.5 is the optimal cut off threshold for RIPASA and 7 for Alvarado scoring system. Sensitivity, specificity, positive predictive value (PPV) and negative predictive (NPV) for RIPASA & Alvarado system was done. Results: The sensitivity and specificity of RIPASA score were 54.83% and 62.06% respectively. The sensitivity and specificity of Alvarado score were 58.9% and 85.7%. Conclusion: The present study concludes that, in the diagnosis of acute appendicitis, RIPASA score is more specific than Alvarado Score, and also has a higher Positive Predictive Value and Diagnostic Accuracy. RIPASA also reduces the number of "missed appendicitis" cases. Hence, RIPASA is clinically and statistically a better scoring system for the diagnosis of acute appendicitis than Alvarado score.***

Keywords: RIPASA, ALVARADO, acute appendicitis

1. Introduction

Acute appendicitis is one of the most common surgical emergencies. To lower the rate of negative appendicectomy, many methods have been developed to help in ambiguous circumstances. [1] Only contrast enhanced computed tomography offers excellent sensitivity and specificity for the correct diagnosis, thus the diagnosis is mostly clinical. [2, 3] However, problems like high cost and limited availability make it difficult to utilise, particularly in underdeveloped nations.

A number of scoring systems have been used for aiding in early diagnosis of acute appendicitis. These scores make use of clinical history, physical examination and laboratory findings.

Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) and ALVARADO scoring systems are most significant ones used in diagnosis of acute appendicitis. RIPASA is a novel scoring system which consists of fourteen factors and has greater diagnostic sensitivity, specificity, and accuracy than ALVARADO scoring system particularly when applied to south Asian population [8].

Not many studies have been conducted to compare RIPASA and ALVARADO scoring system in the diagnosis of acute appendicitis. Hence, we prospectively compared Alvarado and RIPASA score by applying them to the patients attending our hospital with right iliac fossa pain that could probably be acute appendicitis.

2. Materials and Methods

The study was conducted in Govt. Royapettah hospital & Govt. Kilpauk Medical College, India. Institutional ethical clearance was obtained priorly before the study was commensed. Informed consent was obtained from all patients. The study population included all the patients attending to the hospital with right iliac fossa pain during the period December 2021 to June 2021. Children below 15 years were excluded from the study. Pregnant women, patients with right iliac fossa mass and patients with previous history of urolithiasis and pelvic inflammatory disease were also excluded from the study. A total of 60 patients were selected for the study aged between 18 to 60 years. Both scoring systems were applied to all the patients.

RIPASA score contains 18 parameters whereas ALVARADO score contains 8 parameters respectively. Each Parameter in RIPASA is given 0.5 to 2.0 score whereas in ALVARADO each parameter is 1 to 2 score. Scoring charts were filled by the attending surgeon at the time of presentation. A score of 7 is taken as high probability of acute appendicitis for Alvarado scoring system and a score of 7.5 for RIPASA scoring system. The decision on appendicectomy was solely based on surgeon's clinical judgment after taking into consideration all the findings of clinical, laboratory and radiological investigation. RIPASA and Alvarado score was only done for the study purpose. Patients were monitored following admission, surgery and till discharge from the Hospital. Daily follow up included monitoring of vitals thrice a day, systemic examination once a day. Histopathology findings of the operated case were collected and correlated with either score. Scores were tabulated and compared by applying Chi - square

test using SPSS windows version 20.

The demographics of all 60 patients are shown in [Table 1]. The distribution of patients with individual scoring systems RIPASA, ALVARADO are shown in [Table 2]. Out of 60 patients of 51% were male patients and 41% were female patients and 59% of patients were in the 21 - 40 years age group. Out of the 60 patients operated, 76.6% were positive for appendicitis in histopathological report and 23.4% were negative.

Table 1: ALVARADO Scoring System

Feature	Score
Migratory pain	1
Anorexia	1
Nausea	1
Tenderness in RIF	2
Rebound tenderness	1
Elevated temperature	1
Leucocytosis	2
Shift of WBC count to left	1
TOTAL	**10**

Score <5 - appendicitis unlikely
Score 5 - 6 - low probability of appendicitis
Score 7 - 8 - high probability of appendicitis
Score >8 - Definitive appendicitis

Table 2: RIPASA Scoring System

Patient's Demographic	Score
Female	0.5
Male	1.0
Age< 39.9 years	1.0
Age> 40 years	0.5
SYMPTOMS	
RIF pain	0.5
Pain migration to RIF	0.5
Anorexia	1.0
Nausea & vomiting	1.0
Duration of symptoms < 48 hrs	1.0
Duration of symptoms > 48 hrs	0.5
SIGNS	
RIF tenderness	1.0
Guarding	2.0
Rebound tenderness	1.0
Rovsing's sign	2.0
Fever>37^0C, <39^0C	1.0
INVESTIGATIONS	
Raised WBC count	1.0
Negative urinalysis	1.0
ADDITIONAL SCORES	
Foreign NRIC	1.0

Score <5 – Unlikely to be appendicitis
5 - 7.5 – Low Probability to be appendicitis 7.5 - 12 – High Probability to be appendicitis
>12 – Definite appendicitis

Table 3: Demographics of 206 patients

Demography	No. of patients (%)
Gender	
Male	31 (51)
Female	29 (49)
Confirmed Histology for Acute Appendicitis	46 (76.6)
Negative Histology for Acute Appendicitis	14 (23.4)

Table 4: Showing distribution of patients in ALVARADO scoring system.

Interpretation of score	Frequency	Percentage
Very probable	35	67%
Probable	15	25%
Possible	5	8%
Total	60	100

Table 5: showing distribution of patients in RIPASA scoring system.

Interpretation of score	Frequency	Percentage
D	3	5%
HP	15	25%
LP	19	32%
U	23	38%
Total	60	100

3. Results

In this study, RIPASA scoring system Sensitivity is 54.83 %, and specificity is 62.06%. Positive Predictive Value (PPV) showed an estimate 60.71%. Negative predictive value is 56.25%, whereas ALVARADO scoring system Sensitivity is 58.06%, Specificity is 51.72%, Positive predictive value is 56.25%Negative predictive value is 53.57%. Sensitivity of both RIPASA and Alvarado score systems are comparable, but there seems to be a definite upgrade in specificity, positive predictive value, and to a certain amount in diagnostic accuracy in RIPASA scoring over Alvarado score system.

4. Discussion

Acute appendicitis is one of the most common surgical emergencies, with a lifetime prevalence rate of approximately one in seven [1]. Despite being a common problem, it remains a difficult diagnosis to establish, particularly among the young, the elderly and females of reproductive age, where a host of other genitourinary and gynecological inflammatory conditions can present with similar signs and symptoms that are of acute appendicitis [4]. 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, and this is generally reported to be approximately 20%–40% [5]. Several authors considered higher negative appendicectomy rates acceptable in order to minimize the incidence of perforation [6]. Diagnostic accuracy can be further improved through the use of ultrasonography or computed tomography imaging. However, such routine practice may inflate the cost of health care substantially. A recent study has suggested that such indiscriminate use of CT imaging may lead to early low - grade appendicitis going for emergency appendicectomies which would otherwise be resolved spontaneously by antibiotics therapy [7].

Hence, hosts of scoring system were derived in order to diagnose acute appendicitis. Alvarado scoring system is the most popular one. This scoring system had a very good sensitivity and specificity when applied to western population [8, 9]. Subsequently, when this scoring was applied to oriental populations, it showed relatively less

specificity and sensitivity to diagnose acute appendicitis [10, 11]. So, a new scoring system was devised called the RIPASA scoring system which was more extensive yet simple scoring system consisting of 17 fixed parameters and an additional parameter (NRIC) that is unique to Asian population. In this study as the sensitivities of both RIPASA and ALVARADO scores are comparable, Positive predictive value, Diagnostic accuracy of RIPASA scoring is higher than that of ALVARADO score. Hence RIPASA system is much better diagnostic tool for the diagnosis of acute appendicitis.

5. Conclusion

The present study concludes that, in the diagnosis of acute appendicitis, RIPASA score is more specific than Alvarado Score, and also has a higher Positive Predictive Value and Diagnostic Accuracy. RIPASA also reduces the number of "missed appendicitis" cases. Hence, RIPASA is clinically and statistically a better scoring system for the diagnosis of acute appendicitis, as compared to Alvarado score.

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