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Original Research Article

Comparison of Alvarado and RIPASA Scoring Systems in Diagnosis of Acute Appendicitis and Correlation with Intraoperative and Histopathological Findings

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Abstract:

Background and Objectives: The field of diagnostics is one of the most studied in relation to appendicitis. The purpose of these investigations was to identify the best sensitive test for the diagnosis of acute appendicitis. To help with the early diagnosis of acute appendicitis, the Modified Alvarado scoring system (MASS) and the RIPASA scoring system are evaluated in this study to determine which scoring system is more relevant and applicable.

Methods: This is a cross-sectional, comparative study conducted at RNT Medical College & MBGH, Udaipur for a period of 2017 to 2019. The first 100 patients who presented to the Surgery OPD and Emergency Department with RIF pain were included in the study. Relevant history, examination and laboratory investigations were done. Patients were scored according to both Modified Alvarado Scoring System (MASS) and RIPASA Scoring, and both were documented in the proforma.

Results: In the present study, patients of age group 5-50 years were included, with the mean age being 24.86 years**.** RIPASA was statistically superior to MASS in terms of Sensitivity (85.11% v/s 63.38%) and in terms of Diagnostic Accuracy (84% v/s 65%)Histopathologically 6% patients had normal appendix and 94% had acute appendicitis. 100% patients had non-perforated appendix.

Conclusion: It is found that the RIPASA score is more specific, more sensitive, and more accurate in diagnosing acute appendicitis than the Modified Alvarado score. Additionally, RIPASA lowers the quantity of "missed appendicitis" instances. Therefore, when compared to MASS, RIPASA is a more accurate grading system both clinically and statistically for the diagnosis of acute appendicitis.

Keywords: RIPASA, MASS, Appendicitis, Diagnostic Accuracy, Perforated Appendix.

Introduction

Acute appendicitis is one of the commonest causes for acute abdomen in any general surgical practice [1,2]. From the time that it was first described by Reginald Heber Fitz in 1886 [3], it has remained a topic of serial research works for various factors ranging from its aetiology, to its management options.

Over the years various types of investigations including laboratory and radiological, have been studied in detail with the aid of trials. These were conducted in the hope of finding the most sensitive test for diagnosing acute appendicitis. But in spite of the vast advances in the field of medicine, it has been time and again opined by various clinicians and authors that appendicitis is one condition whose diagnosis relies mainly upon the clinical features. So much has been stressed about the various methods of diagnosis, only because the same is extremely important. Appendicitis, which if caught early and managed appropriately can be the most uneventful surgery, while the other end of the spectrum is also true, that when missed, appendicitis can turn into a disease with great morbidity and mortality. Hence, having understood the importance for early and right diagnosis, and having understood that clinical evaluation provides the best and most accurate diagnostic modality for appendicitis; many clinical scoring systems have been developed over the years [4]. This has aided the clinician to a large extent in coming to the right diagnosis and providing early management.

Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score is a fairly newer scoring system developed in 2008, where a study was done in RIPAS Hospital, Brunnei Darssalem [5,6], to find a more favorable scoring system than Alvarado and

Modified Alvarado as these were found to have poor sensitivity and specificity in Middle Eastern and Asian population. Following the development of it, a Randomised control trial was also done at the same hospital comparing the RIPASA and Alvarado scoring systems and proving the superiority of the former over the latter. In the present study, RIPASA and Modified Alvarado scoring systems (MASS) are compared among the local population in the subcontinent of India, to find out which scoring system is more relevant and applicable, in order to aid early diagnosis of acute appendicitis.

Materials and Methods

This is a cross-sectional, comparative study conducted at RNT Medical College & MBGH, Udaipur for a period of 2017 to 2019. The first 100 patients who presented to the Surgery OPD and Emergency Department with RIF pain were included in the study.

Relevant history, examination and laboratory investigations were done. Patients were scored according to both Modified Alvarado Scoring System (MASS) and RIPASA Scoring, and both were documented in the proforma. In both groups after final scoring, patients were categorized into 4 groups:

Category	RIPASA	MASS
D (Definite)	>12	>8
HP (High Probability)	7.5-12	6-7
LP (Low Probability)	5-7.5	5-6
U (Unlikely)	<5	<5

All patients presenting with Right Iliac Fossa (RIF) pain with tentative diagnosis of acute appendicitis that will be taken for surgery.

Exclusion criteria:

- Critically ill patients
- Pregnancy
- Known case of Tuberculosis
- Age group <5 and >50 years

After this, the management of the patient was carried out according to the individual unit protocol.

Final diagnosis confirmation got from either Intra-operative finding, or Post-operative HPE report, an analysis was done comparing both RIPASA and MASS.

Results

Table 1: Age wise distribution of patients in the study

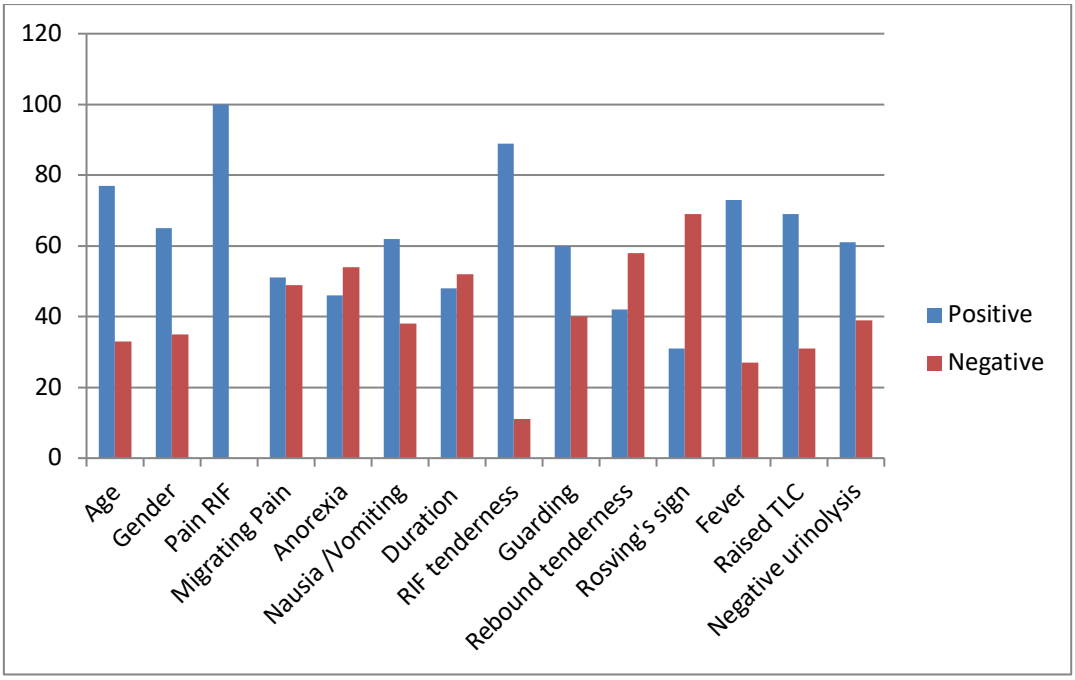
Age Group Of Patients	%
5-15	13
15-25	45
25-35	17
35-45	11
45-50	14
Total	100

In the present study, patients of age group 5-50 years were included, with the mean age being 24.86 years. The maximum number of patients belonged to the 2nd and 3rd decades.

Table 2: Showing Gender Distribution in The study

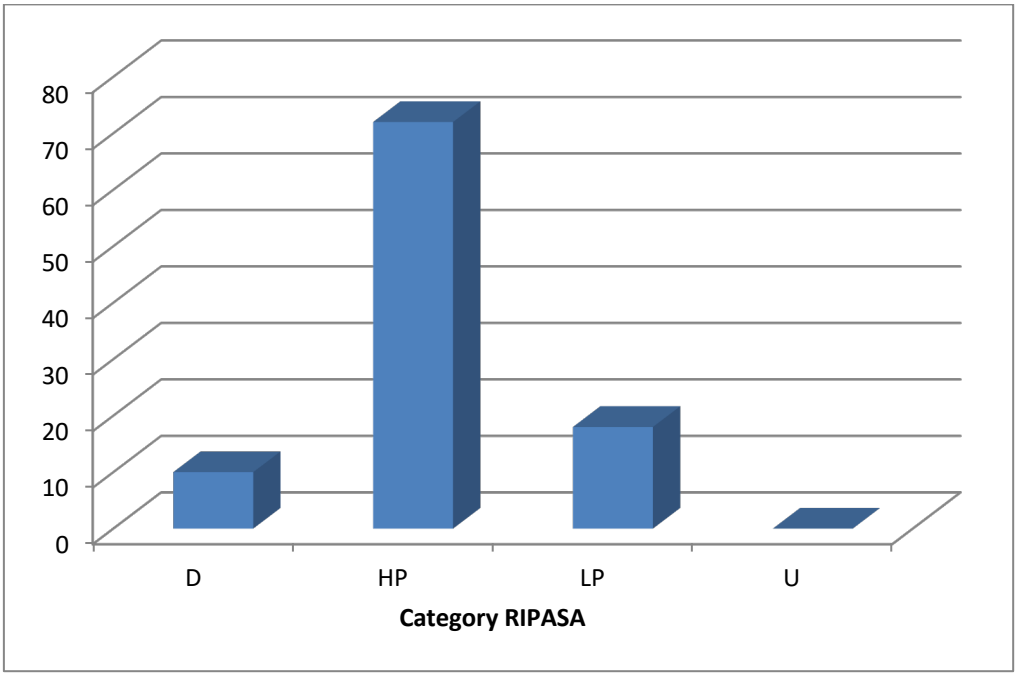
Gender	No. Of Patients	%
Male	65	65
Female	35	35
Total	100	100

Both sexes were affected with a male preponderance (65% males and 35% females).



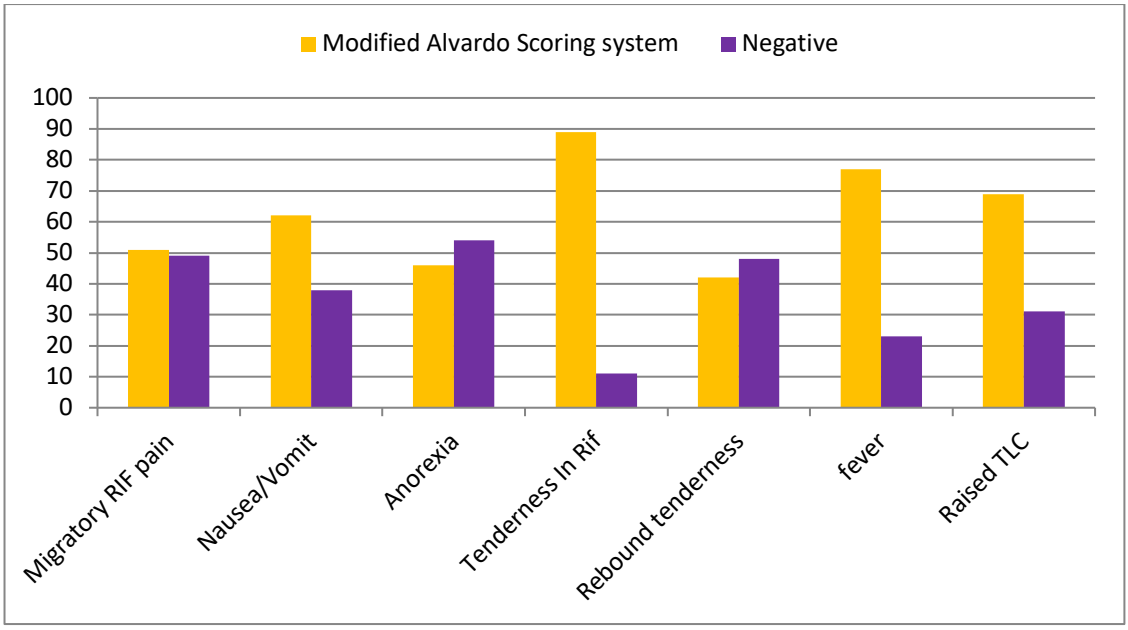
Graph 1: Showing RIPASA scoring system

77% belonged to the age group below 40 years, and 23% above. Gender differentiation was 65% male and 35% female. 48% presented within 48 hours of onset of symptoms and 52% after. 100% of the patients had RIF pain, as was the inclusion criteria of the study.89% of them had RIF tenderness, 61% had a negative urinalysis, 77% had fever and 69% had a raised TLC. 62% of the patients had nausea or vomiting.



Graph 2: Showing Category in Final score in RIPASA

Finally, out of the total score, the patients were categorized under 4 categories. 10% of the patients had a score of >12 and were categorized as D, 72% with a score of 7.5-12 fell under the category HP, 18% had a score of 5-7.5 and were categorized as LP and 0% with a score <5 were termed U.



Graph 3: Showing Parameters of MASS

89%, 77%, 69% and 62% had RIF tenderness, fever, raised TLC and nausea/vomiting respectively. 51% patients had migratory pain and 46% anorexia and about 42% had rebound tenderness.

Table 3: Comparison between RIPASA and MASS

PARAMETER	RIPASA	MASS
Sensitivity	85.11%	63.38%
Specificity	66.67%	83.33%
Positive Predictive Value	97.56%	98.36%
Negative Predictive Value	22.22%	12.82%
Diagnostic Accuracy	84.00%	65.00%

RIPASA was statistically superior to MASS in terms of Sensitivity (85.11% v/s 63.38%) and in terms of Diagnostic Accuracy (84% v/s 65%).

Table 4: Histopathological finding of appendix

Histopathological finding	Patients	%
Normal appendix	6	6
Acute appendicitis	94	94
Chronic appendicitis	0	0
Suppurative appendicitis	0	0

Histopathologically 6% patients had normal appendix and 94% had acute appendicitis.

Table 5: Intraoperative finding of appendix

Intra operative findings	Patients	%
Non-perforated appendix	100	100
Perforated appendix	0	0

100% patients had non-perforated appendix.

Discussion

From the time the concept of clinical scoring systems have been introduced, multiple studies have been done in search of the most sensitive, specific and diagnostically accurate clinical score to aid in the diagnosis of acute appendicitis. In the present study conducted on 100 patients (n=100), RIPASA and MASS were compared, and final diagnosis was analysed in relation /intra-operative findings/ post-operative HPE reports. It was found that RIPASA had 85.11%and MASS had sensitivity (63.38%), specificity was in RIPASA (66.67%) as compared to MASS (83.33%). Also the Positive predictive value of RIPASA (97.56%) was and MASS (98.36%). The negative predictive value of RIPASA and MASS were (22.22% and 12.82% respectively). The diagnostic accuracy was also higher in RIPASA than MASS (84% and 65% respectively).

Bond et al prospectively studied 187 patients with suspected appendicitis and found Alvarado score to

have a sensitivity and specificity of 90% and 72% respectively. [7]

Hsiao et al conducted a retrospective study and found sensitivity and specificity for an Alvarado Score ≥7 were 60% and 61% respectively. [8]

RIPASA, during its development by Chong et al, was found to have a sensitivity and specificity of 88% and 67% respectively [5,6]. But few studies have been done consecutively, showing better results.

Butt MQ et al conducted a cross sectional study on 267 patients and found RIPASA score to have a sensitivity and specificity of 96.7% and 93% respectively. Its Positive predictive value was 98% and negative predictive value was 95%. Hence they concluded that RIPASA was a useful tool in diagnosis of appendicitis. [9]

Erdem et al studied 113 patients in a tertiary care centre and compared four clinical scoring systems- Alvarado, Eskelinen, Ohmann and RIPASA. They found a sensitivity level of 81%, 80.5%, 83.1% and 83% for each respectively. They concluded that Ohmann and RIPASA scores were the most specific in diagnosis of acute appendicitis. [10]

During the operative procedure direct observation of appendix was recorded as 'perforated Appendix' and 'non- perforated appendix'. In present study, in 94% cases it was acute appendicitis. In 6% case the appendix was normal.

Histopathological findings were grouped in to two categories – appendicitis and no appendicitis. Case having normal appendix was 6, grouped in to 'no appendicitis' group while remaining 94 cases with various types of appendicitis were grouped under 'appendicitis'.

Jones RP at found that out of 96 cases, 76.04% were confirmed as acute appendicitis by histopathological examination while remaining 23.94 samples were normal appendix. [11] In a study by Regar MK et al histopathologically 95 patients were in appendicitis group and 5 patients were in no appendicitis group [12]. These studies were comparable with present study. Hence in the present study, comparatively RIPASA seems to be better than MASS clinically as well as statistically.

Conclusion

The current study finds that the RIPASA score has a greater diagnostic accuracy, sensitivity, and specificity than the Modified Alvarado score when diagnosing acute appendicitis. In most circumstances, it provides a clearer classification for the clinician to manage patients with RIF pain. Additionally, RIPASA lowers the quantity of "missed appendicitis" instances. Therefore, when compared to MASS, RIPASA is a more accurate grading system both clinically and statistically for the diagnosis of acute appendicitis.

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