RETROSPECTIVE COMPARATIVE STUDY OF DIAGNOSTIC VALUE OF ALVARADO SCORE V/S RIPASA SCORE IN 50 CASES OF ACUTE APPENDICITIS

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ABSTRACT **AIMS & OBJECTIVES :** To compare ALVARADO SCORING SYSTEM and RIPASA SCORING SYSTEM in order to find out which is more reliable and better in diagnosing acute appendicitis. To apply the RIPASA scoring system and the Alvarado Scoring System for the diagnosis of Acute Appendicitis, and compare them with respect to:-
• Sensitivity
• Specificity
• Positive Predictive Value (PPV)
• Negative Predictive Value (NPV)
• Diagnostic Accuracy in comparison with the histopathological report

STUDY DESIGN : Cross-Sectional Comparative Study **SAMPLE SIZE :** 50 **DURATION :** June 2020 to June 2022 **INCLUSION CRITERIA :** All patients presenting with RIF pain and clinically suspected as acute appendicitis - umbilical/right iliac fossa pain, right iliac fossa tenderness, nausea, vomiting, fever and radiologically confirmed acute appendicitis are included in this study **EXCLUSION CRITERIA :** All patients with age <12 years and >65 years, pregnant females, patients presenting with generalised peritonitis, patients having palpable RIF lump on examination are excluded from this study. **CONCLUSION :** The present study concludes that in the diagnosis of acute appendicitis, RIPASA score is more sensitive than ALVARADO score and also has a higher diagnostic accuracy. This means that RIPASA scoring system is better as compared to ALVARADO scoring system to find out the true positive cases of acute appendicitis. RIPASA score also reduces the number of "missed appendicitis" cases. Hence, RIPASA scoring system is clinically and statistically a better scoring system for the diagnosis of acute appendicitis as compared to ALVARADO.

INTRODUCTION
ALVARADO SCORE
Alvarado score is a noninvasive, safe, diagnostic method, which is simple and repeatable. A score of 5 or 6 is compatible with the diagnosis of acute appendicitis. A score of 7 or 8 indicates a probable appendicitis, and a score of 9 or 10 indicates a very probable acute appendicitis. The original Alvarado score describes a possible total of 10 points, but some medical facilities are using a Modified Alvarado Score with a total of 9 points excluding neutrophilia. The high diagnostic value of the score has been confirmed in a number of studies across the world.

RIPASA SCORE
RIPASA score is a also noninvasive, diagnostic method, which is highly predictable and reliable.

Score interpretation suggests 4 management groups:
a) < 5 points (unlikely, patient observation)
b) 5-7 points (low probability, emergency room observation, abdominal ultrasound)
c) 7.5-11.5 points (high probability, surgical evaluation and preparation for appendectomy), and
d) > 12 points (appendicitis diagnosis, appendectomy).

Patients with acute, non-perforated appendicitis should undergo urgent appendicectomy. Expectant treatment was advocated by OCHSNER for appendiceal phlegmon. An abscess, if present, should be drained radiologically.

AIMS & OBJECTIVES
AIMS - To compare ALVARADO SCORING SYSTEM and RIPASA SCORING SYSTEM in order to find out which is more reliable and better in diagnosing acute appendicitis.

OBJECTIVES - To apply the RIPASA scoring system and the Alvarado Scoring System for the diagnosis of Acute Appendicitis, and compare them with respect to
• Sensitivity
• Specificity
• Positive Predictive Value (PPV)
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The Alvarado Score	
Signs	
Right lower quadrant tenderness	2
Elevated temperature (>99.1 F)	1
Rebound tenderness	1
Symptoms	
Anorexia	1
Nausea or vomiting	1
Migration of pain to right lower quadrant	1
Laboratory Values	
Leukocytosis (>10,000 WBC)	2
Left shift (>75% neutrophils)	1

Parameter		Score
Sex:	Male	1.0
	Female	0.5
Age:	<39.9 years	1.0
	>40.0 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
	>48 hours	0.5
RIF tenderness		1.0
RIF guarding		2.0
Rebound tenderness		1.0
Rovsing's sign		2.0
Fever		1.0
Raised WBC		1.0
Negative urinalysis		1.0
Foreign NRIC		1.0

MATERIALS AND METHODS
STUDY DESIGN : Cross-Sectional Comparative Study
SAMPLE SIZE : 50
DURATION : June 2020 to June 2022

INCLUSION CRITERIA : All patients presenting with RIF pain and clinically suspected as acute appendicitis - umbilical/right iliac fossa pain, right iliac fossa tenderness, nausea, vomiting, fever and radiologically confirmed acute appendicitis are included in this study

EXCLUSION CRITERIA : All patients with age <12 years and >65 years, pregnant females, patients presenting with generalised

peritonitis, patients having palpable RIF lump on examination are excluded from this study.

METHODOLGY

All the patients fulfilling the criteria were admitted and included in the study. History was taken, examinations were done, relevant investigations were done. Patients were scored according to both ALVARADO SCORING SYSTEM and RAJA ISTERI PENGIRAN ANAK SALEHA APPENDICITIS (RIPASA) scoring system. In both groups after final scoring patients were categorised into 4 groups.

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

All the patients underwent appendectomy and the specimen was sent for histopathological examination. The result of ALVARADO and RIPASA were reported independently. The results were correlated with the histopathological findings and subjected to statistical analysis. All the data were analysed using the necessary statistical calculations and the results are then presented.

RESULTS

A) OBSERVATION 1 : DISTRIBUTION OF THE PATIENTS ACCORDING TO ALVARADO SCORING SYSTEM

CATEGORY	SCORE	NO. OF PATIENTS
D (Definite)	>8	9
HP (High Probability)	7-8	17
LP (Low Probability)	5-6	15
U (Unlikely)	<5	9
Total		50

For further correlation of scoring system with histopathological findings we have divided it into 2 categories. Score of >=7 is considered as ALVARADO Positive whereas <7 is ALVARADO Negative.

CATEGORYSCORENO. OF PATIENTSD (Definite)>127HP (High Probability)7.5-1235LP (Low Probability)5-78U (Unlikely)<50Total 50

B) OBSERVATION 2: DISTRIBUTION OF THE PATIENTS ACCORDING TO RIPASA SCORING SYSTEM

For further correlation of scoring system with histopathological findings we have divided it into 2 categories. Score of >7 is considered as RIPASA Positive whereas <=7 is RIPASA Negative.

CATEGORY	SCORE	NO. OF PATIENTS
D (Definite)	>12	7
HP (High Probability)	7.5-12	35
LP (Low Probability)	5-7	8
U (Unlikely)	<5	0
Total		50

C) OBSERVATION 3 : QUALITATIVE ANALYSIS OF BOTH SCORING SYSTEM

		RIPASA		Total
		>7 (Positive)	<=7 (Negative)	
ALVARADO	>=7 (Positive)	26	0	26
	<7 (Negative)	16	8	24
Total		42	8	50

D) OBSERVATION 4 : RESULTS OF HISTOPATHOLOGICAL EXAMINATION

DIAGNOSIS	NO. OF PATIENTS
Acute Appendicitis	30
Acute ulcerative Appendicitis	11
Acute Suppurative Appendicitis	3
Acute Gangrenous Appendicitis	1
Chronic Appendicitis	5
Total	50

It can be seen from the above table that there are in total 45 cases of acute appendicitis and 5 of chronic appendicitis. Acute appendicitis is further divided based on the histology into acute ulcerative, acute suppurative appendicitis and acute gangrenous appendicitis.
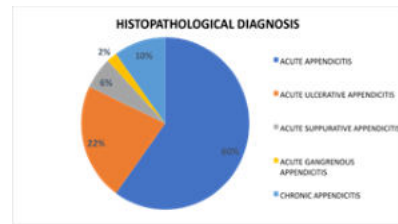
E) OBSERVATION 5 : COMPARISION OF ALVARADO WITH HISTOPATHOLOGICAL DIAGNOSIS

		HPE REPORT		Total
		ACUTE	CHRONIC	
ALVARADO	>=7 (Positive)	25	1	26
	<7 (Negative)	20	4	24
Total		45	5	50

STATISTICAL ANALYSIS	RESULT
Sensitivity	55.55%
Specificity	80%
Positive Predictive Value	96.15%
Negative Predictive Value	20%
Diagnostic Accuracy	58%

### F) OBSERVATION 6 : COMPARISION OF RIPASA WITH HISTOPATHOLOGICAL DIAGNOSIS

		HPE REPORT		Total
		ACUTE	CHRONIC	
RIPASA	>=7 (Positive)	40	2	42
	<7 (Negative)	5	3	8
Total		45	5	50

STATISTICAL ANALYSIS	RESULT
Sensitivity	88.89%
Specificity	60%
Positive Predictive Value	95.23%
Negative Predictive Value	37.5%
Diagnostic Accuracy	86%

G) OBSERVATION 7 : COMPARISION OF ALVARADO AND RIPASA SCORING SYSTEM IN DIAGNOSING ACUTE APPENDICITIS

STATISTICAL ANALYSIS	ALVARADO	RIPASA
Sensitivity	55.55%	88.89%
Specificity	80%	60%
Positive Predictive Value	96.15%	95.23%
Negative Predictive Value	20%	37.5%

Diagnostic Accuracy	58%	86%

COMPARISON OF ALVARADO AND RIPASA
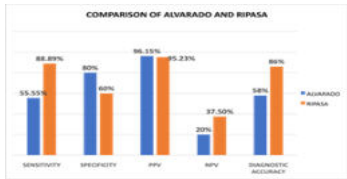
DISCUSSION

From the above study, majority of the patients were in the age group of 12-40 years with a male predominance (72%) of acute appendicitis in our study. The sensitivity of RIPASA scoring system (88.89%) was more as compared to that of ALVARADO (55.55%) whereas the specificity of ALVARADO (80%) was more as compared to that of RIPASA scoring system (60%). The PPV was more with ALVARADO (96.15%) as compared to RIPASA (95.23%). The NPV was more with RIPASA (37.5%) as compared to that of ALVARADO (20%). The diagnostic accuracy of RIPASA (86%) was more as compared to that of ALVARADO (58%).

According to a recent study by Nanjudaiyah N, A Mohammed, V Shanbaug, Kalpana, Priya SA, Clin Diagn Res.2014 Nov; 8(11): NC03-NC05 Published online 2014 Nov 20, sensitivity and specificity of RIPASA score were 96.2% and 90.5% respectively. The sensitivity and specificity of Alvarado score were 58.9% and 85.7% respectively. RIPASA score correctly classified 96 percent of all patients confirmed with histological acute appendicitis to the high probability group (RIPASA score greater than 7.5) compared with 58.9% with Alvarado score (Alvarado score greater than 7.0; p-value less than 0.001).

Analysing both ALVARADO and RIPASA scoring systems, it was found that both the scoring systems were easy to perform as they mainly relied upon the clinical symptoms and signs, along with basic laboratory investigations and they did not need elaborate investigations. As RIPASA has a greater number of parameters compared with ALVARADO, subjectively it felt better like it summarised the patient's clinical condition better. The time taken to apply the scores (both ALVARADO and RIPASA) were minimal and did not cause any undue delay in the management.

CONCLUSION

RIPASA has the following additional parameters as compared to ALVARADO - Age, Sex, Duration, Guarding, Rovsing's sign, Negative urine analysis.

The present study concludes that in the diagnosis of acute appendicitis, RIPASA score is more sensitive than ALVARADO score and also has a higher diagnostic accuracy. This means that RIPASA scoring system is better as compared to ALVARADO scoring system to find out the true positive cases of acute appendicitis. RIPASA score also reduces the number of "missed appendicitis" cases.

Hence, RIPASA scoring system is clinically and statistically a better scoring system for the diagnosis of acute appendicitis as compared to ALVARADO.

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