

Significance of Ripasa Scoring System in Diagnosis of Acute Appendicitis

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Abstract: Acute appendicitis is one of the commonest surgical emergencies. The risks of two primary outcomes must be balanced in the management of presumed appendicitis: perforation and misdiagnosis. Data was collected from 96 patients with complains of right iliac fossa pain over a period of 2 years in our hospital. All patients were categorised using the RIPASA SCORE. The preoperative and histological findings were compared with the preoperative diagnosis. Histopathologically 91 patients were in appendicitis groups and 5 patients were in no appendicitis group. On Evaluation of scoring system in the present study, RIPASA system was found sensitive (97.80%), specificity of RIPASA score (77%). Positive predictive value of score came out to be 98.89% in RIPASA . Negative predictive value of RIPASA system was 66.67%. Accuracy is 89.04% in RIPASA system. Predictive negative appendectomy rate by application of score is 0.7% by RIPASA system. ROC analysis was done to depict the cut off with maximum sensitivity and specificity. RIPASA cut off was found to be 8.5 as compared to the original cut off 7.5. It was observed in the present study that there has been an increase in mean scores in the scoring system, with an increase in histopathological severity. Presence of gangrene was found statistically significant at RIPASA score ≥ 12 . It can be concluded that there is high possibility to find gangrenous appendix when the RIPASA score are greater than 12. On considering the above fact it is observed that RIPASA score is more accurate and more sensitive to diagnose acute appendicitis than other scoring system.

Keywords: Acute appendicitis, ripasa score, histopathology. Statistical analysis used: The collected data was analysed with regards to various parameters like sensitivity, ROC curve, specificity, predictive values and diagnostic accuracy.

I. INTRODUCTION

Acute appendicitis is a common cause of abdominal pain for which a prompt diagnosis and treatment is rewarded by a marked decrease in morbidity and mortality. Routine history and examination both remain the most effective and practical diagnostic modalities.¹ Acute appendicitis is associated with raised TLC.² Ultrasound is operator dependent and often misses or over-diagnose the condition.³ CECT scan is investigation of choice with high sensitivity and specificity for diagnosis.⁴

One of the common scoring system is ALVARADO system which is based on clinical and laboratory evidence of acute appendicitis.⁵ RIPASA score has been derived for Asian countries.⁶ The confirmation of diagnosis is done by histopathology.

II. SUBJECTS AND METHODS

The study was a prospective study and conducted in Department of surgery, SUBHARTI MEDICAL COLLEGE, MEERUT (U.P.) between October 2012 to July 2014.

Study Design:

The study included 96 clinically diagnosed acute appendicitis patients coming to the hospital and fulfilling the inclusion criteria.

Inclusion Criteria:

All patients presenting with RIGHT ILIAC FOSSA PAIN with high suspicion of acute appendicitis.

Exclusion Criteria:

1. Patients with generalised peritonitis
2. Patient with appendicular lump
3. Patient with appendicular perforation

III. METHODOLOGY

Written informed consent was obtained from all patients.

Preoperative work up:

1. Clinical History and Physical Examination.
2. All patient had the following preoperative investigations:

Hemoglobin, TLC, Shift of WBC's to the left, Blood urea with serum creatinine, serum electrolytes, Ultrasound abdomen, abdomen X-ray-Erect and Supine films, Urine-analysis, Application of RIPASA scoring in every clinically diagnosed cases.

OPERATION: Emergency appendicectomy by grid iron or lanz incision.

Parameters Evaluated:

1. RIPASA scoring in every clinically diagnosed case of appendicitis.
2. Histopathological confirmation and assessment under following headings- Acute appendicitis, acute suppurative appendicitis, acute gangrenous appendicitis, periappendicitis and normal.
3. Sensitivity, specificity, PPV, NPV, diagnostic accuracy and negative appendectomy rates of scoring system with respect to histopathology, as gold standard for diagnostic confirmation.

Ripasa Scoring Chart:

RIPASA SCORE

1	Male Female	1.0 0.5
2	Age <39.9 yrs Age >40 yrs	1.0 0.5
3	RIF pain	0.5
4	Migration of RLQ pain	0.5
5	Anorexia	1.0
6	Nausea and vomiting	1.0
7	Duration of symptoms <48 hrs Duration of symptoms >48 hrs	1.0 0.5
8	RIF tenderness	1.0
9	RIF guarding	2.0
10	Rebound tenderness	1.0
11	Rovsing's sign	2.0
12	Fever	1.0
13	Raised WBC	1.0
14	Negative urinalysis	1.0

IV. RESULTS

The study was conducted in department of surgery, SUBHARTI MEDICAL COLLEGE, MEERUT from October 2012 to July 2014. The study included 96 patients with right iliac fossa pain and clinically suspected to be acute appendicitis. It was a prospective study for evaluation of RIPASA score in diagnosis of acute appendicitis and correlated both these scoring system with histopathological findings.

All patients presenting with RIGHT ILIAC FOSSA PAIN with high suspicion of acute appendicitis were included in study.

Patients with generalised peritonitis, appendicular mass and appendicular perforation were excluded from study. Written informed consent was obtained from all the patients. Blood investigations such as Hemogram, TLC, Shift of WBC to left, Blood urea and Creatinine with Electrolytes were done in all the patients. Urine pregnancy test for female patients in reproductive age group, presenting with amenorrhoea, was done. Urine routine and microscopy was done in all patients. Abdomen X ray and ultrasound were done in all the subjects.

The mean age of the patient in study was 29.94 years. There were 71 males and 25 females in study. All the patients clinically suspected to be acute appendicitis were scored according to both scoring systems and were taken up for surgery. Histopathology was the gold standard for confirmation of the diagnosis. The histopathologically inflamed appendix was classified under three groups namely, acute appendicitis, acute suppurative appendicitis and acute gangrenous appendicitis. The no appendicitis group was further classified as periappendicitis and normal.

Histopathologically 91 patients were in appendicitis groups and 5 patients were in no appendicitis group.

On Evaluation of scoring system in the present study, RIPASA system was found sensitive (97.80%), specificity of RIPASA score (77%). Positive predictive value of score came out to be 98.89% in RIPASA. Negative predictive value of RIPASA system was 66.67%. Accuracy is 89.04% in RIPASA system. Predictive negative appendectomy rate by application of score is 0.7% by RIPASA system.

ROC analysis was done to depict the cut off with maximum sensitivity and specificity. RIPASA cut off was found to be 8.5 as compared to the original cut off 7.5.

It was observed in the present study that there has been an increase in mean scores in the scoring system, with an increase in histopathological severity. The mean score for acute appendicitis, acute suppurative appendicitis and acute gangrenous appendicitis were 8.6, 10.1 and 11.9 respectively for RIPASA scoring system.

Other findings were not statistically when analyzed with the system at their respective cutoff score. Presence of gangrene was found statistically significant at RIPASA score ≥ 12 . It can be concluded that there is high possibility to find gangrenous appendix when the RIPASA score are greater than 12. On considering the above fact it is observed that RIPASA score is more accurate and more sensitive to diagnose acute appendicitis.

V. TABLES AND CHARTS

Table 1: Age Distribution

Age in years	Frequency	Percentage
<40Yrs	76	79.2%
≥ 40 Yrs	20	20.8%
Total	96	100%

Table 2: Sex Distribution

Sex	Frequency	Percent
MALE	71	74
FEMALE	25	26
Total	96	100.0

Table 3: Symptoms Frequency Distribution

SYMPTOMS	FREQUENCY (OUT OF TOTAL 96 PATIENTS IN STUDY GROUP)	PERCENTAGE (%)
RIGHT ILIAC FOSSA PAIN	96	100%
MIGRATION OF PAIN TO RIF	43	44.8%
ANOREXIA	83	86.45%
NAUSEA AND VOMITING	71	74%
FEVER	61	63.54%
DURATION OF SYMPTOMS <48 HRS	81	84.37%
DURATION OF SYMPTOM >48 HRS	15	15.62%

Table 4: Signs Distributions Frequency

SIGNS	FREQUENCY (OUT OF TOTAL 96 PATIENTS IN STUDY GROUP)	PERCENTAGE (%)
TENDERNESS	96	100%
REBOUND TENDERNESS	67	69.79%
GUARDING	20	20.83%
ROVSING'S SIGN	23	23.95%

Table 5 :Blood And Urine Analysis

INVESTIGATION	FREQUENCY (OUT OF TOTAL 96 PATIENTS IN STUDY GROUP)	PERCENTAGE (%)
RAISED TLC	72	75%
SHIFT TO WBC TO THE LEFT	46	47.91%
NEGATIVE URINALYSIS	57	59.37%

Table 6: Comparison of Ripasa Scoring Diagnosis with Histopathologic Diagnosis

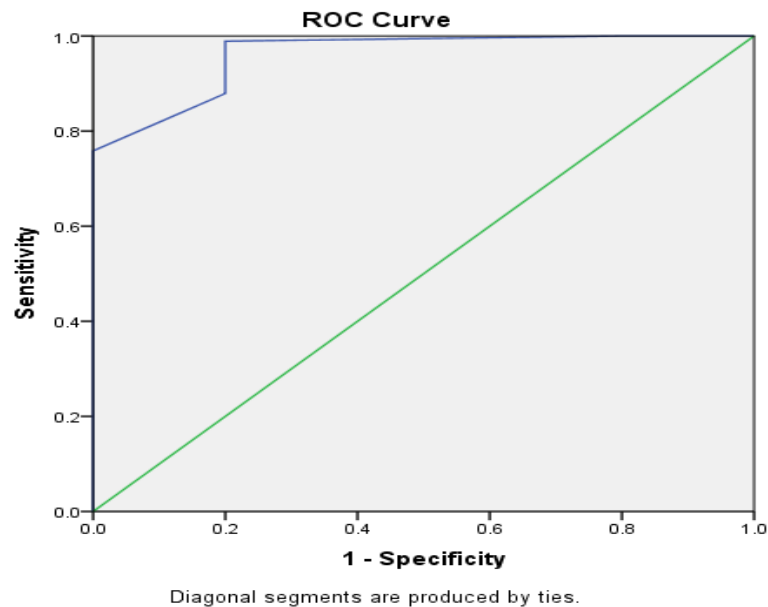
	HISTOPATHOLOGICAL DIAGNOSIS APPENDICITIS	HISTOPATHOLOGICAL DIAGNOSIS NO APPENDICITIS	TOTAL
RIPASA SCORE ≥ 7.5	89	1	90
RIPASA SCORE <7.5	2	4	6
TOTAL	91	5	96

Table 7: Ripasa Score Receptor Operating Curve (Roc) Analysis

RIPASA SCORE EQUAL TO OR GREATER THAN	SENSITIVITY	1-SPECIFICITY
5.000	1.000	1.000
6.500	1.000	.800
7.250	.986	.600
7.750	.904	.600
8.250	.863	.400
8.750	.740	.200
9.250	.507	.000
9.750	.507	.000
10.250	.342	.000
10.750	.301	.000
11.250	.164	.000
11.750	.096	.000
12.250	.027	.000
13.000	.014	.000
14.500	.000	.000

Table 8: Presence Of Gangrene In Ripasa Score

RIPASA SCORE	PRESENCE OF GANGRENE	ABSENCE OF GANGRENE	TOTAL
≥7.5	11	80	91
<7.5	0	5	5
TOTAL	11	85	96



Graph 1. Ripasa Score Receptor Operating Curve (Roc) Analysis

VI. DISCUSSION

Acute appendicitis is one of the most common surgical emergencies encountered in the emergency in the world particularly in age group less than 30 years of age .¹ Surgeon’s good clinical assessment is considered to be most important requisite in diagnosis of appendicitis. Several other condition can mimics this clinical condition.²Ultrasonography has greatly helped in diagnosis thereby reducing the incidence of negative appendectomy.³Only CECT can diagnose the condition with very high sensitivity and specificity but it is not feasible to have this investigation done for each and every patient suspected to be appendicitis, particularly in emergency in our country with limited resources.^{4,5}

There has been a need of scoring system that can overcome these problems with acceptable sensitivity, specificity and negative appendectomy rate. One of the most commonly used is the Alvarado scoring system which incorporates symptoms, signs and laboratory investigation to reach the diagnosis.⁶Another scoring system RIPASA score has been developed, which claimed to have better outcome in Asian settings.⁷ Another score **Lintula score** made for the diagnosis of acute appendicitis in children includes nine variables. Another scoring system **Eskelinen scoring** system was developed in Germany in 2003. **THE APPENDICITIS INFLAMMATORY RESPONSE SCORE**, a scoring system developed in 2008 in Sweden is based on prospectively collected data of variables with independent prognostic value using a mathematically more appropriate method for the construction. **The Appendicitis Inflammatory Response Score** but the best scoring system is **Raja IsteriPengiranAnakSaleha (RIPAS) hospital, BruneiDarussalem.**

This study is an attempt to score in diagnosis of acute appendicitis and to see whether there is correlation between score with histopathological findings.

Present study included clinically suspected 96 cases, with 76 patient in <39 years age group and 20 patient in ≥40 years. Mean age of the patient was 29.94 years. There were 71 males and 25 female in study. All the patients clinically suspected to be acute appendicitis were scored according to both the scoring system and were taken up for surgery. Histopathology was gold standard for confirmation of diagnosis.

The histopathologically inflamed appendix was classified under three groups namely, acute appendicitis, acute suppurative appendicitis and acute gangrenous appendicitis. The no appendicitis group was further classified as periappendicitis and normal. Histopathologically 91 patients were in appendicitis group and 5 patient were in no appendicitis group.

Symptoms such as Migration of pain to the RIF was present in 42 cases (43.75%) out of 96 cases of acute appendicitis (p value 0.643), Anorexia in 83(86.45%) (p value 0.468), Nausea and Vomiting in 71 cases (71.8%) (p value 0.001), Fever in 61 cases (63.54%)(p value 0.653). RIF pain was present in all cases of acute appendicitis (100%). Only symptom that came out to be statistically significant was nausea and vomiting. In a study by Korner H et al nausea and vomiting and pain migration to the RIF were two symptoms that were statistically significant.⁸ Present study agreed with the study by Korner H et al with respect to nausea and vomiting being statically but did not find pain migration as statistically significant. The difference is probably due to poor communication skills is the uneducated and illiterate population coming to our hospital.

Sign such as RIF tenderness was present in all the 96 cases of acute appendicitis, rebound tenderness in 67 patient (p value 0.025), guarding in 20 patients (p value 0.58), Rovsing's sign in 23 patient (p value 1.0). Out of all clinical signs, rebound tenderness was found to be statically significant. The finding has been found consistent with the study by Wagner JM.⁹

RIPASA score when applied in all the patient suspected to be acute appendicitis, 89 patient were in ≥ 7.5 score groups and 2 were in < 7.5 score group. When analyzed with respect to histopathology the sensitivity of scoring system in the present study came out to be 97.80%, specificity of 77%, positive and negative predictive value were 98.89% and 66.67% respectively. Negative appendectomy rate was 0.7% and accuracy was 89.04%. Chong CF et al study based on retrospective and ROC analysis quoted that the expected sensitivity and specificity of the RIPASA scoring system were 88% and 67% respectively, and diagnostic accuracy being 81%.¹⁰ The positive and negative predictive value were expected to be 93% and 53% respectively.¹¹

RIPASA score has been found sensitive (97.80%) specificity of RIPASA score (77%). Positive predictive value of RIPASA score 98.89% in RIPASA score. Negative predictive value of RIPASA score was 66.67%. Accuracy was 89.04% in RIPASA system. Predictive negative appendectomy rate was 0.7% by RIPASA system.

In a study by Chong CF et al, a prospective study, the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of RIPASA score were 98.0%, 81.3%, 85.3%, 97.4% and 91.8% respectively. The authors of the RIPASA scoring system have claimed in the comparative prospective study that RIPASA score is better than Alvarado settings.¹² There is paucity of published studies, by other authors, comparing their scoring systems.

Receptor operative curve analysis was done in present study to look for the cut off score for RIPASA scoring system, with good sensitivity and specificity..

RIPASA score cut off came out to be 8.5, which was inconsistent with the original cut off 7.5.¹⁰ The sensitivity and specificity was found to be 86.3% and 60% respectively at cutoff 8.5, when compared with sensitivity and specificity of 97.80% and 66.67% respectively at cutoff 7.5 in the present study. The cutoff value needs to be evaluated in further studies with increased sample size and in different geographical conditions.

There is paucity of studies that correlate scoring system with the intraoperative and histopathological findings. The present study has found the mean of scores of gangrenous appendicitis to be 9.1, which is found consistent with previous observational studies. The mean scores for acute appendicitis and acute suppurative appendicitis were 7.1 and 7.9 respectively. In RIPASA scoring system, mean scores of 8.6, 10.1 and 11.9 respectively for acute appendicitis, suppurative and gangrenous appendicitis were observed. There has been an increase in the score, in both the scoring systems, with increase in the histopathological severity.

Presence of gangrene was significant in RIPASA score at ≥ 12 . There is lack of published studies which correlate scoring system and further analysis through multicentric prospective studies is needed.

VII. CONCLUSIONS

It was observed in the present study that there has been an increase in mean scores in the scoring system, with an increase in histopathological severity. The mean score for acute appendicitis, acute suppurative appendicitis and acute gangrenous

appendicitis were 8.6, 10.1 and 11.9 respectively for RIPASA scoring system. Other findings were not statistically when analyzed with the system at their respective cutoff score. Presence of gangrene was found statistically significant at RIPASA score ≥ 12 . It can be concluded that there is high possibility to find gangrenous appendix when the RIPASA score are greater than 12. On considering the above fact it is observed that RIPASA score is more accurate and more sensitive to diagnose acute appendicitis.

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