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Application of RIPASA Scoring in Acute Appendicitis

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Abstract: Acute appendicitis is one of the most common surgical emergencies with a lifetime presentation of approximately 1 in 7[1]. Its incidence is 1.5-1.9/1000 in males and females. A difficulty in diagnosis is experienced in very young patients and females of reproductive age. Scoring systems based on history, clinical examination and basic investigations are there in aiding the diagnosis of acute appendicitis and decreasing negative exploration. This study applies RIPASA scoring system for diagnosing acute appendicitis.
Keywords: RIPASA score, acute appendicitis, appendectomy.

INTRODUCTION

Appendicitis is one of the commonest causes of abdominal pain. Diagnosis of acute appendicitis is based on history, clinical examination and laboratory investigations (e.g. WBC count). Diagnosing acute appendicitis purely based on the clinical acumen, i.e. 'clinical judgment' leads to a negative appendectomy rate of 17-36% [2, 3]. The diagnostic accuracy of clinical assessment of acute appendicitis varies from 50%-80% [4]. Several scoring systems have been developed to increase the diagnostic accuracy of the appendicitis, of these, the Alvarado scoring system has been the most popular. This popular system has been developed for the western population and several studies had pointed out its inadequacy in the South East Asian scenario [5]. A new scoring system, Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score has been developed to aid in the diagnosis of acute appendicitis in the Asian countries [6]. RIPASA score contained 14 parameters (table1). The RIPASA scoring system has been found to be having more sensitivity, specificity and predictive value compared to that of Alvarado scoring system. This study aims to apply RIPASA scoring system in our setup and evaluate the diagnostic accuracy thereof.

Table-1: RIPASA Scoring System

RIPASA Score			
1	Sex	Male	1.0
		Female	0.5
2	Age	Age <39.9 years	1.0
		Age >40 years	0.5
3	Pain	Right iliac fossa pain	0.5
4	Migration of right lower quadrant pain		0.5
5	Anorexia		1.0
6	Nausea and vomiting		1.0
7	Duration	Duration of symptoms <48 hours	1.0
		Duration of symptoms >48 hours	0.5
8	Right iliac fossa tenderness		1.0
9	Right iliac fossa guarding		2.0
10	Rebound tenderness		1.0
11	Rovsing's sign		2.0
12	Fever		1.0
13	Raised white cell count		1.0
14	Negative urine analysis		1.0

MATERIALS AND METHODS

A total of 78 patients who were admitted on emergency basis were analysed for this prospective study conducted from 2014 to 2016. Out of 78 cases, 61 cases were taken up for surgery. The remaining 17 cases with low scores and not convincing to warrant emergency surgery were excluded. The detailed history, clinical examination, laboratory investigations were done, which included routine haematological investigations, urine routine, x-ray KUB and USG abdomen and pelvis in some equivocal cases. Preforma had similar patient details and the fourteen variables based on RIPASA scoring system. The decision to operate on the patient (vs. conservative line of management) was based solely on the clinical suspicion of an experienced surgeon who was not part of/involved in the study. Scoring was performed at every review until a decision was made from either appendectomy or continued conservative line of management. The diagnosis of acute appendicitis was confirmed by operative findings and histopathological assessment of the appendectomy specimen with the ultimate criterion for the final diagnosis of acute appendicitis being the histological demonstration of polymorph nuclear leucocytes throughout the thickness of the appendix wall. Those patients who were treated conservatively and subsequently discharged were reviewed in the surgical outpatient within a week. Sensitivity, specificity, positive predictive value and negative predictive value for both these scorings were calculated and analysed comparatively with a Chi-square test (SPSS Software).

Inclusion Criteria

Patients with provisional clinical diagnosis of acute appendicitis

Exclusion Criteria

- Paediatric age group.
- Pregnancy.
- Patients with pain more than 5 days with suspicion of appendicular mass.
- Previous history of urolithiasis or pelvic inflammatory diseases.
- Elderly above 70 years of age.

RESULTS

Out of 78 cases, 61 cases were taken up for surgery. The remaining 17 cases with low scores and not convincing to warrant emergency surgery were excluded.

Table-1: Age Distribution

Age (Yrs.)	Number of Patients	Percentage(rounded to nearest decimal)
0-10	02	3
11-20	15	25
21-30	21	34
31-40	14	23
41-50	06	10
51-60	01	2
61-70	02	3
Total	61	100

In our analysis, it has been observed that the most involved age group is third decade of life followed by second decade of life.

Table-2: Comparison of Age among various studies

Author	Age in Years
Talukder DB [14]51	20-30
Ramachandra [13]	11-20
Nishikant Gujar *et al*. [12]	21-30
Rajashekar Jade [15]	20-30
Our Study [11]	20-30

In our study, the most frequently affected persons by appendicitis were in 3rd decade of life which is comparable to the authors except Ramachandra [13] which reported second decade as most involved age group.

Table-3: Sex Distribution

Sex	Cases	Percentage(rounded to nearest decimal)
Male	33	54
Female	28	46
Total	61	100

In this study, number of male patients (33) was more than the number of female (28) patients.

Table-4: Sex

Author	Male (%)	Female (%)
Talukder DB [14]51	58	42
Ramachandra [13]	64	36
Nishikant Gujar *et al*. [12]	46	54
Rajashekar Jade [15]	60	40
Our Study[11]	54	46

In our study, preponderance is higher for males when compared to females.

Table-5: RIPASA Score Correlated With Operative Findings in Males

Scores	Total Case	Appendicitis	Appendix Normal
<4	-	-	-
<5	-	-	-
6	2	-	2
>6	31	31	-
Total	33	31	2

In our study, 31 out of 33 male patients had acute appendicitis and RIPASA score correlated well with the operative findings.

Table-6: RIPASA Score Correlated With Operative Findings in Females

Scores	Total Case	Appendicitis	Appendix Normal
<4	-	-	
<5	-	-	
6	5	-	5
>6	23	23	-
Total	28	23	5

In our study, 23 out of 28 female patients had acute appendicitis and RIPASA score correlated well with the operative findings.

Table-7: Clinical Features

Symptoms	Number of Patients	Percentage (rounded to nearest decimal)
Right iliac fossa pain	61	100
Migration of pain to RIF	50	82
Nausea/vomiting	42	70
Anorexia	37	60
Duration of symptoms > 48 hours	31	51
Duration of symptoms < 48 hours	30	49

In our study, 100% patients with acute appendicitis presented with RIF pain followed by migration of pain to RIF (50%) and nausea/vomiting (42%).

Table-8: Comparison of Clinical Features

Author	Anorexia	Nausea/ Vomiting
Ramachandra [13]	39%	39%
Nishikant Gujar *et al*. [12]	44%	72%
Rajashekar *et al*. [15]	78%	74%
Our study	60%	70%

This shows the percentage of cases with clinical features like anorexia, nausea/vomiting observed in our study when compared to other authors.

Table-9: Signs

RIF tenderness	61	100
RIF guarding	52	85
Rebound tenderness	22	44
Rovsing's sign	31	51
Fever	54	88

In our study, predominant signs were RIF tenderness followed by RIF guarding, rebound tenderness and so on.

Table-10: Laboratory investigations

Raised white cell count	44	72
Negative urine analysis	60	95

It has been observed that leucocytosis is a predominant factor in 72% of cases and forms a useful modality of investigation in diagnosis of acute appendicitis.

Table-11: Comparison of Leucocytosis among various studies

Author	<10,000 cu/cm (%)	>10,000 cu/cm (%)
Ramachandra [13]	40	60
Nishikant Gujar *et al.* [12]	44	66
Our Study [11]	38	72

This shows the percentage of cases with leucocytosis observed in our study was comparable to other authors.

Table-12: Diagnosis after surgery

Diagnosis	Cases	Percentage (rounded to nearest decimal)
Acute appendicitis (not perforated)	35	57
Perforated appendix	11	18
Appendicular abscess	6	10
Ruptured ectopic	2	3
No pathology found	7	12
Total	61	100

This shows that out of 61, 52 patients had appendicular pathology.

Table-13: Value of RIPASA Score

Parameters	Number of Patients
Sensitivity	96.16%
Specificity	66.23%
Positive predictive value	93.17%
Negative predictive value	77.47%

The sensitivity of RIPASA score is 96.16%. This means RIPASA identified more patients with acute appendicitis. In case of specificity, i.e. ability to identify patients without appendicitis was lower in our study. The sensitivity obtained in our study is comparable to the results obtained by Chong *et al.*[7] Nanjundaiah *et al*.[8]and Ismail *et al*.[9] While the specificity is similar to that of Ismail *et al*.[9] while it is lower than that of Chong *et al.* [7] and Nanjundaiah *et al*.[8]. The positive predictive value of RIPASA was 93.17% and negative predictive value 77.47%. RIPASA score correctly classified more patients confirmed with histological acute appendicitis to the high probability group (RIPASA score greater than 7.5).

Table-14: Comparison of Sensitivity and Specificity

Author	Sensitivity	Specificity
Sinnet PR. *et al*. [4]	95.51%	65.0%
Our study	96.16%	66.23%

The above results demonstrate quite effectively that the sensitivity and specificity of our study is comparable with the observations in the study Sinnet PR. *et al*. [4].

DISCUSSION

Appendicitis still continues to challenge the diagnostic skills of a surgeon[10]. The exact aetiopathogenesis is poorly understood. The presentation of acute appendicitis is not always classical. While newer investigative tests, although helpful, will have cost implication, require expertise and may not be available round the clock in a healthcare facility other than the tertiary centre. For this purpose, many scoring system has been brought up. These include Alvarado, Samuel, Ohmann, Eskelinen, Fanyo, Lindberg, Logistic score of Kharbanda *et al*. In 2010, RIP AS developed the RIPASA scoring system by adding few other demographic variables, symptoms, signs and laboratory results to already popular Alvarado scoring system [11]. The accuracy is higher with RIPASA scoring rather than with Alvarado scoring. The implementation of RIPASA score is simple and cost effective.

CONCLUSION

Acute appendicitis is one of the most frequent reasons for emergency abdominal operations. Correct preoperative diagnosis sometimes can be difficult. In our country, the surgeon should largely rely upon clinical findings. This study showed that clinical scoring like the RIPASA score can be a cheap and quick tool to apply in emergency departments to rule in acute appendicitis. After doing study on 61 patients who are provisionally diagnosed with acute appendicitis, we conclude that RIPASA scoring can be considered as a diagnostic scoring system for acute appendicitis in the Indian population. RIPASA scoring system achieved a significantly higher sensitivity and diagnostic accuracy compared to other studies. The new scoring system utilises demographic factors, clinical symptoms, signs and a few laboratory values. The 14 clinical parameters can be derived from a good clinical history and simple laboratory tests without any delay. The scoring can be quickly done and a decision to operate or not can be taken up based on this score. With a RIPASA score more than 7.5; the surgeon can make a quick decision to operate while those with a score less than 7.5 can be managed conservatively. Unnecessary and expensive investigations can be avoided by using RIPASA score.

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