VALIDATION OF RIPASA SCORING SYSTEM FOR THE DIAGNOSIS OF ACUTE APPENDICITIS

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ABSTRACT

Acute appendicitis is one of the most common surgical emergencies. The diagnosis of acute appendicitis is based on clinical history, examination combined with investigations. A delay in performing an appendectomy increases the risk of developing perforation and sepsis. The opposite is also true wherewith decreased diagnostic accuracy, the negative appendectomy rates increase. Ultrasonography and Computerized Tomography help in confirming the diagnosis; however, they are expensive and sometimes inaccessible.

Several scoring systems have been developed to help in the diagnosis of appendicitis namely Alvarado and modified Alvarado scoring system. A new RIPASA (Raja Isteri Penigiran Anak Saleha) scoring system was developed to aid in the diagnosis of acute appendicitis in Asian countries. The purpose of this study is to validate the scoring system in our setup.

KEYWORDS

Right Iliac Fossa Pain Abdomen, Acute Appendicitis, Appendectomy, RIPASA (Raja Isteri Penigiran Anak Saleha) Scoring System.

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INTRODUCTION

"Diagnosis of Appendicitis is usually easy" thus wrote Sir Zachary Cope, but with the order, "But there are difficulties which need to be discussed." The "Difficulty" alluded to by Cope relates to our inability to reliably diagnose appendicitis on clinical ground.¹

Nothing can be so easy or as difficult as the diagnosis of acute appendicitis. Acute appendicitis is a common cause of abdominal pain, for which a prompt diagnosis is rewarded by a marked decrease in morbidity and mortality.²

The question, does this patient have appendicitis?, is an important question for the following reasons:

- Appendicitis is one of the common causes of abdominal pain.
- Western literature report that 6% of populations have risk of suffering from appendicitis during their lifetime.³
- The mortality rate has dropped due to early surgical intervention and antibiotics from 26% to less than 1%.
- The morbidity due to perforation ranges from 17–40%, the perforation rate is higher in elderly and children.^{4,5}
- Failure to diagnose early appendicitis converts acute appendicitis to perforated appendicitis, a disease with potential complication including abdominal wall abscesses, wound infection and death.⁶
- The negative laparotomy ranges from 15-35% and is associated with significant morbidity.^{4,5}

The routine diagnosis of appendicitis is by eliciting typical history of migrating abdominal pain followed by anorexia and nausea. Physical examination reveals tenderness in right iliac fossa and rebound tenderness.

The routine laboratory examination of blood and urine is necessary to rule out other causes of right iliac fossa pain. C reactive protein may be used to assist in the diagnosis of appendicitis.^{7,8}

Ultrasonography and Computerized tomography may be used to assist in the diagnosis of appendicitis, but are often an expensive tool in developing countries.

Even with these diagnostic aids, the rate of negative appendectomy of 15-25% has been accepted. However, the complication of unnecessary operation is 13%, close to that of a genuinely inflamed appendix. Removing a normal appendix carries a mortality rate of 0.65 for every 100 operations. Prolonged clinical observation in an attempt to minimize unnecessary operations may mean a delayed operation in 28% of cases and an unnecessary risk of perforation.

Several scoring systems have been introduced to increase the diagnostic accuracy of appendicitis with the Alvarado scoring system being the most popular. However, these were developed in the Western Countries and several studies have shown reduced sensitivity and specificity when applied to a population with a completely different ethnic origin.^{9,10} A new RIPASA (Raja Isteri Penigiran Anak Saleha) scoring system was developed to aid in the diagnosis of acute appendicitis in the Asian Countries. The purpose of this study is to validate the scoring system in our setup.

MATERIAL AND METHODS

Between the years 2011 and 2013, 150 patients presenting with right iliac fossa pain abdomen were recruited into this prospective study.

RESULTS

Age distribution of the patients studied.

AGE	PERCENTAGE DISTRIBUTION
<20	15%
20-29	39%
30-39	31%
40-49	8%
50-59	5%
>60	2%

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Mean age of the patients studied: 25.87.
Most common age group was between 20-29.
Gender distribution of the patients studied with 58 patients (39%) followed by 30-39 years (31%).

SEX	NUMBER	PERCENTAGE
MALE	104	69%
FEMALE	46	31%

Our study consisted of 69% males and 31% females.

Table above shows the distribution of appendicitis among males and females.
Among 104 males in the study, 76% (n=79) had appendicitis.
Among the 46 females, 70% (n=32) had appendicitis.
The study included all patients presenting with RIF pain.

Total of 150 patients in the study had right iliac fossa pain.

MIGRATION OF PAIN

MIGRATION OF PAIN	NUMBER	PERCENTAGE
PRESENT	88	59%
ABSENT	62	41%

A total of 59% of the patients gave a positive history of appendicitis.

Among the 88 patients with history of migration of pain to right iliac fossa, 84 patients had appendicitis (95%) which was statistically significant ($p < 0.01$).

ANOREXIA

ANOREXIA	NUMBER	PERCENTAGE
PRESENT	44	29%
ABSENT	106	71%

A total of 29% (44) gave a positive history of anorexia.

36% of the patients with appendicitis gave a history of anorexia.

NAUSEA AND VOMITING

NAUSEA AND VOMITING	NUMBER	PERCENTAGE
PRESENT	49	33
ABSENT	101	71

A total of 49 (33%) of the patients gave a positive history of nausea and vomiting.

37% of the patients with appendicitis had nausea and vomiting.

DURATION OF SYMPTOMS

DURATION OF SYMPTOMS	NUMBER	PERCENTAGE
<48 HOURS	97	65%
>48 HOURS	53	35%

Among the 150 patients, 65% (n=97) presented to us with a history lasting less than 2 days.

71% of the patients with appendicitis gave history lasting less than 48 hours.

SIGNS
RIGHT ILIAC FOSSA TENDERNESS

RIF TENDERNESS	NUMBER	PERCENTAGE
PRESENT	134	89%
ABSENT	16	11%

A total of 135 (89%) patients had right iliac fossa tenderness on examination.

99% of the patients with appendicitis had right iliac fossa tenderness on examination.

REBOUND

REBOUND TENDERNESS	NUMBER	PERCENTAGE
PRESENT	91	61%
ABSENT	59	39%

A total of 91(61%) of the patients had rebound tenderness on examination.

79% of the patient's appendicitis had rebound tenderness.

FEVER

FEVER	NUMBER	PERCENTAGE
PRESENT	19	13%
ABSENT	131	87%

Only 19(13%) of our patients had fever.

15% of the patients with appendicitis had fever.

GUARDING

GUARDING	NUMBER	PERCENTAGE
PRESENT	26	17%
ABSENT	124	83%

A total of 26 patients (17%) had guarding.

All the patients with guarding and RIF tenderness had appendicitis. Only 23% of the patients with appendicitis had guarding.

ROVSING'S SIGN

ROVSING'S SIGN	NUMBER	PERCENTAGE
PRESENT	45	30%
ABSENT	105	70%

45 patients (30%) had Rovsing's sign positive on examination.

40% of the patients with appendicitis had Rovsing's sign positive.

**INVESTIGATIONS
RAISED TOTAL COUNT**

RAISED TC	NUMBER	PERCENTAGE
<11000	37	25
>11000	113	75

113 patient's (75%) had a total count more than 11,000.

92% of patients with appendicitis had raised TC.

SHIFT TO LEFT

SHIFT TO LEFT	NUMBER	PERCENTAGE
PRESENT	108	72
ABSENT	42	28

URINE ANALYSIS

The Alvarado score was able to pick up 90 (81%) of the 111 cases diagnosed with appendicitis.

The Alvarado score has,

True positive rate of 81%,

True negative rate of 87%,

False positive rate of 19%,

False negative rate of 13%.

The sensitivity of Alvarado score is 81.1% and specificity is 87.2%.

The RIPASA (Raja Isteri Pengiran Anak Saleha) score was able to pick up 106(95%) of the 111 cases of appendicitis.

The RIPASA (Raja Isteri Pengiran Anak Saleha) score has,

True positive rate of 95%.

True negative rate of 89%.

False positive rate of 5%.

False negative rate of 11%.

The sensitivity of RIPASA score is 95.5%.
The specificity of RIPASA score is 89.7%.
This figure shows the ROC curve for both RIPASA and Alvarado scoring systems.
The area covered under the RIPASA score, 92.6% is greater than that of the Alvarado score 84% which is statistically significant ($p<0.001$).

Area under the Curve

Test Result Variable(s)	Area	Std. Error	Asymptotic Sig. ^b	Asymptomatic 95% Confidence Interval	
				Lower Bound	Upper Bound
ALVARADO SCORE (<7=1,>7=2)	.841	.038	.000	.767	.916
RIPASA SCORE (<7.5=1,>7.5=2)	.926	.031	.000	.866	.986

DISCUSSION

A total of 150 patients with right iliac fossa pain undergoing appendectomy were recruited into the study based on the inclusion and exclusion criteria mentioned earlier.

The most common age group in this study was 20-29 years (39%) followed by 30-39 years (31%) with a mean age of 25.87 years. Most of the patients, 69% in this study were males. The mean age and sex incidence was in agreement with the study by Chong et al. (25.1 years).

The Alvarado scoring system had a sensitivity and specificity of 81.1% and 87.2% for the diagnosis of acute appendicitis, which was statistically significant ($p<0.001$).

The sensitivity and specificity of the Alvarado score compared with the studies conducted by Chong et al. and Fenyo et al. is as shown. The specificity is in agreement with the 2 studies, but the sensitivity compared to Fenyo et al. is less but better than the sensitivity as per Chong et al.

The positive predictive value for the diagnosis of appendicitis was 81% and negative predictive value was 87%.

RIPASA score in this study had a sensitivity of 95.5% and a specificity of 89.7%, it was in agreement with the study conducted by Chong et al.

The positive predictive value was 95% and negative predictive value was found to be 89%. This is compared to the study by Chong et al.

The ROC curve was compared with the study by Chong et al.

The difference in the area covered by the 2 scoring systems in this study equates to 8.6% and to 5.3% in the study by Chong et al. This confirms that RIPASA scoring system is better than Alvarado scoring system for the diagnosis of acute appendicitis.

CONCLUSION

RIPASA scoring system is an easy and reliable diagnostic tool for the diagnosis of acute appendicitis.

RIPASA scoring system is better than Alvarado scoring system for the diagnosis of acute appendicitis.

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