

To Study the Pattern of RIPASA (Raja Isteri Pengiran Anak Saleha Appendicitis) Score in Acute Appendicitis

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ABSTRACT

Introduction: Acute appendicitis is the most common cause of an acute abdomen requiring surgery, with a lifetime risk of about 7%. Various scoring systems are used to aid the diagnosis. One of them is Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score. Present study was done to study the pattern of RIPASA in cases of acute appendicitis

Material and Methods: This study was a prospective study conducted in 100 patients reporting to surgery department with complaint of pain in right iliac fossa, suspected for acute appendicitis. RIPASA score was calculated preoperatively in all these patients and diagnosis further confirmed through operative findings

Results: Out of 100, 70 patients were males and 30 patients were females. Majority of patients (76%) in this study group presented within first 48 hours of symptoms while 24% patients presents late after 48 hours of onset of symptoms. In this study out of 100 cases ultrasound was able to diagnose 90 cases while rest of 10 cases were diagnosed by CT scan. The sensitivity and specificity of RIPASA score were 90% and 92.22% respectively

Conclusion: RIPASA score is simple and valuable tool for diagnosis of acute appendicitis and can help the surgeons to reduce the rate of negative appendectomy.

Keywords: Acute Abdomen, Acute Appendicitis, RIPASA.

INTRODUCTION

Acute appendicitis is the most common cause of an acute abdomen requiring surgery, with a lifetime risk of about 7%.¹ The incidence of acute appendicitis is 1.5–1.9 per 1,000, and is approximately 1.4 times greater in men than in women.² Worldwide, perforated appendicitis is the leading general surgical cause of death.³

The diagnosis of acute appendicitis is usually based on history, clinical examination and laboratory investigations such as elevated white cell count.⁴ However, diagnostic accuracy can be further improved through the use of ultrasonography or computed tomography imaging. But these modalities are costly and making arrangements for these diagnostic modalities may lead to further delays in diagnosis and surgery.⁵

The clinical presentation of acute appendicitis is typical only in 50% of the cases and the decision to explore the patient can be challenging sometimes.⁶ Particularly among the young, the elderly and females of reproductive age, where a host of other genitourinary and gynaecological inflammatory conditions can present with signs and symptoms that are similar to those of acute appendicitis diagnosis is difficult to establish.⁷ Any delay in performing an appendectomy increases the risk of appendicular perforation and sepsis, which in turn increases morbidity and mortality.⁸

To overcome this problem several scoring systems have been developed to aid in the diagnosis of acute appendicitis like ALVARADO score, Modified ALVARADO score and Acute Appendicitis Response score (AIR).^{9,10}

The ALVARADO score and the modified ALVARADO score are the two most commonly used scoring systems. The reported sensitivity and specificity for the ALVARADO and the Modified ALVARADO Scores range from 53%–88% and 75%–80%, respectively.^{9,10}

Appendicitis Inflammatory Response (AIR) score was designed to overcome drawbacks of Alvarado score. This score incorporated the C-reactive protein value in its design and was developed and validated on a prospective cohort of patients with suspicion of acute appendicitis. The score has sensitivity of 75% and 90% respectively.¹¹

Alvarado and the modified Alvarado scoring system, despite good sensitivity and specificity when applied to a western population both these scoring systems have been shown to achieve low sensitivity and specificity, ranging from 50 to 59% and 23 to 94% respectively, when applied to middle Eastern, Asian or oriental populations. This is attributed to different diet and different environmental factors.^{12,13}

The Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) is a new diagnostic scoring system developed for the diagnosis of Acute Appendicitis and has been shown to have significantly higher sensitivity, specificity and diagnostic accuracy.¹⁴ It was developed in the Department of Surgery of RIPAS (Raja Isteri Pengiran Anak Saleha) Hospital in 2008 by Chong et al. They found that Modified ALVARADO Score has very low sensitivity and specificity when applied to completely different ethnic origin with different diet and different environmental factors specially when applied in Middle Eastern and Asian populations.⁶

The RIPASA scoring system (Figure 1) includes more parameters than Alvarado system as the later did not contain certain parameters such as age, gender, duration of symptoms prior to presentation.⁴ These parameters are shown to affect the sensitivity and specificity of Alvarado scoring system in the diagnosis of acute appendicitis.⁴

RIPASA score is a simple qualitative scoring system based on 14 fixed clinical parameters (two demographics, five clinical symptoms, five clinical signs and two clinical investigations) and one additional parameter (foreign national Identity card).¹⁴

As per RIPASA SCORE appendicitis is diagnosed as

<5= Probability of acute appendicitis is unlikely,

5-7= low Probability of acute appendicitis

7.5-11.5=high Probability of acute appendicitis

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12 OR >12= definite acute appendicitis, In this study we analyzed the pattern of RIPASA Score in cases of acute appendicitis to find its relevance in diagnosis of acute appendicitis.

MATERIAL AND METHODS

This study was carried out as prospective study in 100 patients reporting to surgery department of G.G.S Hospital with complaint of right iliac fossa pain and were suspected for acute appendicitis. In each case detailed history and general physical examination was carried out.

All routine investigations including WBC count and urine analysis was done and patients were subjected to ultrasonography (USG). Computer Tomography (CT) scan was done only in the cases when ultrasound was inconclusive or negative. Final diagnosis was based on clinical examination, routine investigations and imaging studies. RIPASA score was calculated preoperatively in all these patients and diagnosis further confirmed through operative findings. Other patients in which diagnosis changed on USG or operative findings were excluded from the study.

Patients of acute appendicitis with concomitant other medical or surgical conditions (like abdominal tuberculosis, pelvic inflammatory disease, ureteric calculi, mesenteric lymphadenitis, ovarian cyst etc) symptoms of which can interfere with the score and could affect the study were excluded from the study.

STATISTICAL ANALYSIS

All the data was systematically collected, compiled using Microsoft excel worksheet and is presented as tables and figures. Statistical analysis was carried out with help of Statistical Package for Social Sciences (SPSS). Data is presented as mean, std deviation, mode, median. Unpaired t test, chi square test and kappa test were applied on data to fulfill the objectives of study.

RESULTS

This prospective study was carried out on 100 patients of acute appendicitis. In total 100 cases 70 patients were males and 30 pateints were females. (Table 1) Male to female ratio was 2.34:1. Age distribution is shown in table 2. Most of the patients were in the age group 11-20 i.e 32%. Pattern of signs, symptoms and lab investigation in RIPASA score is shown in table 3.

Around 76% patients presented within 48 hours of onset of symptoms of acute appendicitis and 24 % presented after 48

hours of onset of symptoms. (Table3). In this study all the patients had right iliac fossa (RIF) pain, anorexia and nausea. Migration of pain was found in 66 % of patients. (table 3). Pattern and diagnostic value of RIPASA score in cases of acute appendicitis is shown in table 4 and figure 2. Sensitivity and specificity of score is shown in table 5.

Sex	No. of cases
Male	70
Female	30
Total	100

Table-1: Sex distribution

Age (yr)	Number of cases	Percentage
0-10	26	26%
11- 20	32	32%
21-30	13	13%
31-40	18	18 %
41-50	6	6%
51-60	2	2%
Above 60	3	3%
Total	100	100%

Table-2: Age distribution of cases in study

Symptoms	Number of patients
Duration	
Duration of symptoms more than 48 hours	24
Duration of symptoms less than 48 hours	76
Signs	
Right iliac fossa pain (RIF)	100
Pain migration to RIF	66
Anorexia	100
Nausea	100
Symptoms	
Right iliac fossa tenderness	100
Guarding	100
Rebound tenderness	60
Rovsing's sign	51
Fever>37°C,<39°C	100
Investigations	
Raised WBC'S	99
Negative urinalysis	79
Positive urinalysis	21

Table-3: Pattern of signs, symptoms and investigations in ripasa score

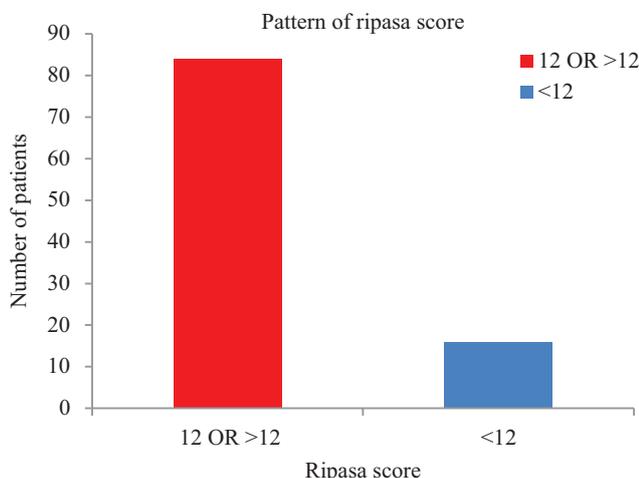


Figure-1: Diagnostic value of ripasa score in acute appendicitis

No of patients of acute appendicitis	RIPASA score
1	10
4	10.5
6	11
5	11.5
23	12
12	12.5
7	13
13	13.5
11	14
11	14.5
7	15

Table-4: Pattern of ripasa score in cases of acute appendicitis

DISCUSSION

Acute appendicitis is one of the most common surgical emergency, with emergency appendicectomy making up 10% of all emergency abdominal surgeries. The evaluation is mainly based on history and clinical findings which is an important parameter in arriving at a diagnosis of acute appendicitis.

The RIPASA score is a simple and easy to use quantitative scoring system and most of the included 14 clinical parameters are easily obtained from a good clinical history and examination.

Patients demographic	Score
Female	0.5
Male	1.0
Age <40 years	1.0
Age >40 years	0.5
Symptoms	
RIF Pain	0.5
Pain migration of RIF	0.5
Anorexia	1.0
Nausea and Vomiting	1.0
Duration of symptoms <48 hours	1.0
>48 hours	0.5
Signs	
RIF Tenderness	1.0
Guarding	2.0
Rebound tenderness	1.0
Rovsing's Sign	2.0
Fever >37 degree C, <39 degree C	1.0
Investigations	
Raised WBC Count	1.0
Negative Urinalysis	1.0
Foreign I.C	1.0
Total	17.5

Table-5: RIPASA (Raja isteri pengiran anak saleha appendicitis) score

	RIPASA	U.S.G
Diagnosed	84	90
Undiagnosed	16	10
Total	100	100

Sensitivity – 92.22 % and Specificity – 90%; Positive Predictive Value- 98.8% and Negative Predictive Value- 56.25

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	Value	Asymptomatic Std. Error	Approx. T	Approx Sig.
Measurement of Agreement	0.649	0.113	6.728	0.000
Number of valid cases	100			

Kappa: 0.649, P value: 0.000 (<0.005 i.e statistically significant)

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	Value	df	Asymp. Sig (2-sided)	Exact sig. (2- sided)	Exact sig. (1 sided)
Pearson chi sq	45.271	1	0.000		
Continuity correction		1	0.000		
Likelihood ratio	39.360	1	0.000		
Fischer's exact test	32.237			0.000	0.000
Linear by linear association	44.818	1	0.00		
N of valid cases	100				

Chi sq – 45.271; P value -0.000 (< 0.005 i.e statistically significant)

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This also includes urinalysis which can be easily performed. Hence a score can be obtained quickly and a rapid diagnosis made without having to wait for the full investigations to be available.

Out of 100 cases in our study majority of patients were male i.e 70% and 30 % were females suggesting that disease prevalence was more in males as compared with females. In our study most of the patients were in the age group of 11-20 i.e 32%, 26% patients were in age group 1-10, 3% patients were above the age of 60 yr. (table 1, 2)

In studies by Lee et al¹⁵ and Oguntola et al¹⁶, their demographic findings were similar to our study. Acute appendicitis was more common in males as compared to females and also showed that peak incidence of appendicitis was seen between 10 and 30 yr of life so incidence of disease seen more in younger age group.

In the present study all the patients had right iliac fossa (RIF) pain, anorexia and nausea. Migration of pain was found in 66 % of patients. When looking at symptoms, all the patients have signs of right iliac fossa tenderness, guarding and raised body temperature. Rebound tenderness was present in 60 % of patients. Rovsing's sign was present in 51% of patients.

Lee et al¹⁷ and Wagner¹⁸ in their studies analysed that appendicitis usually starts with periumbilical and diffuse pain that eventually localizes to right lower quadrant thus RIF pain and tenderness being most important and common determinant of acute appendicitis as seen in our study in 100 % cases of acute appendicitis.

Salari¹⁹ found in their study that anorexia had a Positive predictive value was 87.2% and Negative predictive value was 19.8%. They concluded that anorexia increases probability of appendicitis

Our findings were also similar to the studies conducted by Alubaidi et al²⁰ in which they found that the most common clinical parameters in the patients with appendicitis were right iliac fossa tenderness or peritonism (100.0%), anorexia (78.8%), nausea (75.9%), migratory abdominal pain i.e. pain migrating to right lower quadrant (55.7%), tachycardia (41.3%) and pyrexia i.e. body temperature of 37.8 degrees Celsius and above (22.1). The positive predictive value of this triad was 94.1% while the negative predictive value was 21.9%.

Majority of patients (76%) in this study group presented within first 48 hours of symptoms while 24% patients presents late after 48 hours of onset of symptoms. In this study out of 100 cases ultrasound was able to diagnose 90 cases while rest of 10 cases were diagnosed by CT scan. Accuracy of ultrasound in our study group came out to be 90% while CT scan was having 100

% accuracy when compared to diagnosis. Studies by Randan et al²¹, Doria et al²², Terasawa T et al²³, Sandra E. Bendeck, et al²⁴ also confirmed our findings by saying CT scan had sensitivity, specificity, positive predicted value (PPV), negative predicted value (NPV) and accuracy better than ultrasonography in diagnosis of acute appendicitis

In this study, in diagnosed cases of acute appendicitis RIPASA score was calculated. In this study RIPASA Scores of 100 patients varied from value 10 to 15. (table) In 84% of cases the value of RIPASA Scores was found to be 12 or more than 12 (definitive for acute appendicitis) while in 16 % of cases RIPASA Score of patients was less than 12 i.e failed to lie in definitive group of acute appendicitis.

In this study mean value of RIPASA score in 100 cases was 12.865 (median 12.5, standard deviation ± 1.272) and this value is statistically and significantly above the diagnostic value (12), p value was 0.00 (i.e statistically significant) this suggest that in all cases of acute appendicitis atleast 10 out of 14 parameters were consistently positive this strengthens the relationship between RIPASA score and acute appendicitis.

In 84% cases in which RIPASA score was above the diagnostic value that is (12 or more than 12) Mean was: 13.226. (Median: 13.25, Mode: 12, Standard deviation: 1.03378.) The difference from diagnostic value was statistically significant which suggests that diagnostic value of RIPASA score for acute appendicitis is more than 12, p value: 0.00 (i.e statistically significant)

In 16% of cases RIPASA score was <12 . The mean was 10.968 (median 11, standard deviation ± 0.46435) which still means high Probability of acute appendicitis (7.5-11.5). Out of 16 cases 7 cases reported late in emergency with findings of perforation peritonitis thus interfering with parameters of RIPASA score. Three patients were above the age of 60 yr and typical signs and symptoms were absent. Four patients in age group of less than 10 yr were with inadequate history.

In our study when RIPASA score was correlated to ultrasound, the positive predictive value of RIPASA score was 98.8%, Specificity was 90%, Negative Predictive Value was - 56.25 and Sensitivity was 92.22 %.

Studies done by Khadda et al²⁵ showed almost similar results, according to them, the diagnostic effectivity of RIPASA Score sensitivity was found in 97.73% of patients, specificity was found in 77.42%, positive predictive value was 86.00% while negative predictive value was 96.00%. They concluded that that RIPASA score is currently a much better diagnostic scoring system for acute appendicitis with significantly higher sensitivity and negative predictive value, particularly in our population setting. The 14 fixed parameters can be easily and rapidly obtained in any population setting by taking a complete history, and conducting a clinical examination and two simple investigations. In terms of healthcare cost savings, the use of RIPASA score may help to reduce unnecessary inpatient admissions and expensive radiological investigation.

Similarly Chong et al,²⁶ conducted a prospective study on 200 consecutive patients who presented to the Accident and Emergency Department with right iliac fossa pain. Only 192 out of 200 patients who satisfied the inclusion and exclusion criteria were included in the analysis. At the optimal cut-off threshold score of 7.5 derived from the ROC, the sensitivity, specificity, PPV, NPV and diagnostic accuracy of the RIPASA score were 98.0 percent, 81.3 percent, 85.3 percent, 97.4 percent and 91.8 percent, respectively. At the cut-off threshold score of 7.0 for the Alvarado score, the sensitivity, specificity, PPV, NPV and diagnostic accuracy were 68.3 percent, 87.9 percent, 86.3 percent, 71.4 percent and 86.5 percent, respectively. They found

that RIPASA score at a cut-off threshold total score of 7.5 was a better diagnostic scoring system than the Alvarado score for the diagnosis of acute appendicitis in their local setting.

CONCLUSION

As there is strong positive co-relation between pattern of RIPASA Score and diagnosis of acute appendicitis. This can be concluded that RIPASA score which is easily measurable by history, clinical signs and routine lab investigations, is a valuable and cost effective tool in diagnosis of acute appendicitis.

REFERENCES

1. Ohle R, O'Reilly F, O'Brien KK, Fahey T, Dimitrov BD. The Alvarado score for predicting acute appendicitis: a systematic review. *BMC medicine*. 2011;9:1.
2. Cuscheri A. The small intestine and vermiform appendix. *Essential Surgical Practice*. 3rd ed. Oxford: Butterworth-Heinemann. 1995:1297-329.
3. Maa J, Kirkwood K. The Appendix. 19th ed. Sabiston *Textbook of Surgery: The biological basis of modern surgical practice*. Elsevier Saunders. 2012.p-1279-1291.
4. Wani MM, Yousaf MN, Khan MA, Abdul B, Durrani M, Shafi M. Usefulness of The Alvarado Scoring System With Respect To Age, Sex And Time Of Presentation, with Regression Analysis Of Individual Parameters. *The Inter Jour of Surg*. 2007;11:562-9.
5. Doria AS, Moineddin R, Kellenberger CJ, Epelman M, Beyene J, Schuh S, Babyn PS, Dick PT. US or CT for diagnosis of appendicitis in children and adults? A Meta-Analysis 1. *Radiology*. 2006;241:83-94.
6. Chong C F, Thein A, Ahamed Mackie A J, S Tin A, Tripathi S, A Ahmad M A. Evaluation of the RIPASA score: A new scoring system for the diagnosis of a Acute Appendicitis. *Brueni Int Med J*. 2010;6:17- 26.
7. Gilmore OJ, Browett JP, Griffin PH, Ross IK, Brodrigg AJ, Cooke TJ, Higgs MJ, Williamson RC. Appendicitis and mimicking conditions: a prospective study. *The Lancet*. 1975;306:421-4.
8. Velanovich V, Satava R. Balancing the normal appendectomy rate with the perforated appendicitis rate: implications for quality assurance. *The American surgeon*. 1992;58:264-9.
9. Alvarado A. A practical score for the early diagnosis of acute appendicitis. *Annals of emergency medicine*. 1986;15:557-64.
10. Kalan M, Talbot D, Cunliffe WJ, Rich AJ. Evaluation of the modified Alvarado score in the diagnosis of acute appendicitis: a prospective study. *Annals of the Royal College of Surgeons of England*. 1994;76:418.
11. De Castro SM, Ünlü C, Steller EP, Van Wagensveld BA, Vroenenraets BC. Evaluation of the appendicitis inflammatory response scores for patients with acute appendicitis. *Worl J Surg*. 2012;36:1540-5.
12. Al-Hashemy AM, Seleem MI. Appraisal of the modified Alvarado Score for acute appendicitis in adults. *Sau Med J*. 2004;25:1229-31.
13. Khan I, Rehman A. Application of Alvarado scoring system in diagnosis of acute appendicitis. *J Ayub Med Coll Abbottabad*. 2005;17:13-21.
14. Chong CF, Thien A, Mackie AJ, Tin AS, Tripathi S, Ahmad MA, Tan LT, Ang SH, Telisinghe PU. Comparison of RIPASA and Alvarado scores for the diagnosis of acute appendicitis. *Singa Med J*. 2011;52:340-5.
15. Lee JA. The influence of sex and age on appendicitis in

- children and young adults. *Gut*. 1962;3:80-4.
16. Oguntola AS, Adeoti ML, Oyemolade TA. Appendicitis: Trends in incidence, age, sex, and seasonal variations in South-Western Nigeria. *Annals of African medicine*. 2010; 9 (4).
 17. Lee SL, HO HS: Is there is difference between children and adults? *Am Surg*. 2006.72:409-413.
 18. Wagner JM, McKinney WP, Carpenter JL. Does this patient have appendicitis? *J Ameri Med Assoc*. 1996;276:1589-94.
 19. Salari AA, Binesh F. Diagnostic value of anorexia in acute appendicitis. *Pak J Med Sci*. 2007;23:68.
 20. Alubaidi K, Aikoye M, Basnyat PS. Diagnosis of Acute Appendicitis in Adults: Role of a Simple Clinical Diagnostic Triad. *Surgical Science*. 2016;7:191.
 21. Randen AV, Bipat S, Zwinderman AH, Ubbink DT, Stoker J, Boermeester MA. Acute Appendicitis: Meta-Analysis of Diagnostic Performance of CT and Graded Compression US Related to Prevalence of Disease. *Radiology*. 2008;249.
 22. Doria AS, Moineddin R, Kellenberger CJ, Epelman M, Beyene J, Schuh S, Babyn PS, Dick PT. US or CT for diagnosis of appendicitis in children and adults? A Meta-Analysis. *Radiology*. 2006;241:83-94.
 23. Terasawa T, Blackmore CC, Bent S, Kohlwes RJ. Computed tomography and ultrasonography to detect acute appendicitis in adults and adolescents. *Ann Intern Med*. 2004;141:537-546.
 24. Bendeck SE, Murcia MN, Berry GJ, Jeffrey RB. Imaging for suspected appendicitis: negative appendectomy and perforation rates. *Radiology*. 2002;225:131-6.
 25. Khadda S, Yadav AK, Ali A, Parmar A, Sakrani JK, Beniwal H. Clinical study to evaluate the ripasa scoring system in the diagnosis of acute appendicitis. *Ameri J Adva Med and Surg Res*. 2015;1:67-73.
 26. Chong CF, Thien A, Mackie AJ, Tin AS, Tripathi S, Ahmad MA, Tan LT, Ang SH, Telisinghe PU. Comparison of RIPASA and Alvarado scores for the diagnosis of acute appendicitis. *Singapore Med J*. 2011;52:340-5.

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