



EVALUATION OF RIPASA SCORE COMPARED TO ALVARADO SCORE IN THE DIAGNOSIS OF ACUTE APPENDICITIS

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ABSTRACT

Background: In a recent study, a new clinical scoring system named as Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) scoring was hypothesized. In this study an attempt is made to compare the diagnostic accuracy between these two scoring systems and to draw a conclusion that which scores is more accurate and cost effective in respect to our socio-economic condition and also to minimize the negative appendectomy as much as possible.

Materials and methods : All patients undergoing Appendicectomy for the provisional diagnosis of Appendicitis from April 2018 to October 2019 in Department of General Surgery, RAJENDRA INSTITUTE OF MEDICAL SCIENCES, Ranchi were included in the study.

Results : The RIPASA score correctly classified 79 (97.5%) patients confirmed with histological acute appendicitis to the high-probability group (RIPASA score \geq 7.5) compared with 69 (55.5%) patients with Alvarado score \geq 7.0. The diagnostic accuracy was 95.15% (95% CI 89.14%-97.9%), for the RIPASA score and 64.08% (95% CI 54.46%-72.69%) for the Alvarado score, showing a difference of 31.07% ($p < 0.001$), which was statistically significant.

Conclusion: The RIPASA score is a better tool in evaluation of suspected appendicitis based on the more sensitivity and more negative predictive value in comparison to ALVARADO.

KEYWORDS : Appendicitis, scoring, diagnosis

INTRODUCTION :

Acute appendicitis is one of the most common surgical emergencies in clinical practice, with estimated life time prevalence approximately 1 in 7[1]. Diagnosis of acute appendicitis is essentially clinical; however, a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15-30% of cases [2]. The 'Alvarado score' and the 'Modified Alvarado score' are the two most commonly used scoring systems available. In a recent study conducted in the Accident and Emergency Department (AED) of Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, Brunei Darussalam, from November 2008 to April 2009, hypothesized a new clinical scoring system named as Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) scoring. The study demanded that this scoring system is having much more sensitivity, specificity, positive and negative predictive value than Alvarado scoring system [3]. In this study an attempt is made to compare the diagnostic accuracy between these two scoring systems and to draw a conclusion that which scores is more accurate and cost effective in respect to our socio-economic condition and also to minimize the negative appendectomy as much as possible.

MATERIALS AND METHODS

This is a Observational, prospective, institution based comparative study done in the department of general surgery, Rajendra Institute of Medical Sciences, Ranchi. All patients undergoing Appendicectomy for the provisional diagnosis of Appendicitis from April 2018 to October 2019 in Department of General Surgery, RAJENDRA INSTITUTE OF MEDICAL SCIENCES, Ranchi were included in the study. Scoring of patients posted for emergency appendectomy was done using both Alvarado and RIPASA Scoring Systems. Corroboration of both the scores was done with operative findings and histopathological findings.

Table 1: Parameters used and scores assigned to them in ALVARADO and RIPASA scoring systems

ALVARADO SCORING		RIPASA SCORING	
PARAMETERS	SCORE	PARAMETERS	SCORE
Migratory RIF pain	1	Female	0.5
Anorexia	1	Male	1.0

Nausea/vomiting	1	Age < 39.9years	1.0
Tenderness in RIF	2	Age > 40years	0.5
Rebound tenderness in RIF	1	RIF pain	0.5
Fever > 37.5 C	1	Pain migration to RIF	0.5
Leukocytosis	2	Anorexia	1.0
Shift to Left of neutrophils	1	Nausea and vomiting	1.0
		Duration of symptoms < 48hrs	1.0
		Duration of symptoms > 48hrs	0.5
		RIF tenderness	1.0
		Guarding	2.0
		Rebound tenderness	1.0
		Rovsing's sign	2.0
		Fever > 37 C , < 39 C	1.0
		Raised WCC	1.0
		Negative urinalysis	1.0
Total	10	Total	15

Statistical analysis of data done with appropriate statistical technique using available statistical software (SPSS software), Microsoft excel datasheet, comparison by ANOVA method and computation of statistical significance by Mc Nemar Chi square test.

RESULTS

Of the 120 patients recruited, only 103 patients satisfied the study inclusion and exclusion criteria. The mean age of the patients (43 male, 60 female) was 26.24 ± 10.53 years. 103 patients underwent emergency appendectomy based on the surgeons' clinical judgement. Out of these, only 81 cases were confirmed histologically for acute appendicitis among them 63 (61.1%) cases are simple acute appendicitis, 4 (3.8%) cases had perforated appendicitis, 13 (12.6%) cases had gangrenous appendicitis and 1 (0.9%) had appendicular abscess. 22 cases were negative for acute appendicitis and histology specimens showed normal appendix, indicating a negative appendectomy rate of 21.3% (table 2).

Table 2. Correlation of Significant Value of Alvarado Score (7) and RIPASA score(7.5) with Histopathology:

Histopathology	Alvarado Score ≥ 7	Alvarado Score < 7	RIPASA Score ≥ 7.5	RIPASA Score < 7.5	Total
Acute Appendicitis	45	36	79	2	81
Normal appendix	1	22	3	19	22
Total	46	57	82	21	103

The RIPASA score correctly classified 79 (97.5%) patients confirmed with histological acute appendicitis to the high-probability group (RIPASA score ≥ 7.5) compared with 69 (55.5%) patients with Alvarado score ≥ 7.0 (p < 0.001). The 36 patients who were missed by the Alvarado score were classified wrongly into the false negative group with Alvarado score < 7.0. This number was significantly higher than those wrongly classified as false negative by the RIPASA score (p < 0.001).

Both the RIPASA and Alvarado scores correctly classified 19 (86.3%) and 21 (95.4%) patients without acute appendicitis into the true negative group with scores < 7.5 and < 7.0, respectively. There was no statistical significance between the true negative groups (p = .599). True positive cases achieved mean total RIPASA scores of 9.5 ± 1.5 (range 7.5–14.5), while true negative cases had mean scores of 6.1 ± 1.02 (range 4.5–7.0).

At the optimal cut-off threshold score of 7.5 for the RIPASA score, the calculated sensitivity and specificity were 97.53% (95% confidence interval [CI] 91.44%-99.32%) and 86.36% (95% CI 66.66%-95.25%), respectively compared with 55.55% (95% CI 44.73%-65.88%) and 95.45% (95% CI 78.2%-99.19%), respectively for Alvarado score at an optimal cut-off threshold of 7.0. The PPV and NPV for the RIPASA score were 96.34% (95% CI 89.79%-98.75%) and 90.47% (95% CI 71.09%-98.75%), respectively compared with 97.82% (95% CI 88.67%-99.62%) and 36.84% (95% CI 25.52%-49.82%), respectively for the Alvarado score (Table 4). The NPV was significantly higher for the RIPASA score compared to that for the Alvarado score (p < 0.001). The diagnostic accuracy was 95.15% (95% CI 89.14%-97.9%), for the RIPASA score and 64.08% (95% CI 54.46%-72.69%) for the Alvarado score, showing a difference of 31.07% (p < 0.001), which was statistically significant.

This difference of 31.07% equates to a total of 34 patients with confirmed histological acute appendicitis who were missed from being diagnosed by Alvarado score. The predicted negative appendectomy rates for both the RIPASA and Alvarado scores were 3.66% and 2.18% respectively, which was not statistically significant (p = .947)

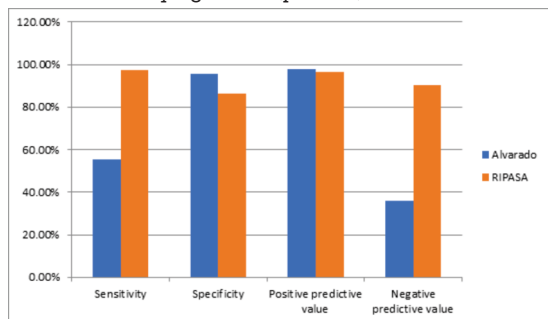


Chart 1. Comparative Chart of Diagnostic Accuracy between Alvarado and RIPASA Score

DISCUSSION

Acute appendicitis is one of the most common surgical emergencies encountered by the surgeons with emergency

appendectomy making up one in ten of all emergency abdominal surgeries [4,5].

Despite being a common problem, acute appendicitis remains a difficult diagnosis to establish, particularly among the young, the elderly and females of reproductive age group, where a host of other genitourinary and gynecological inflammatory conditions can present with signs and symptoms that are similar to those of acute appendicitis [6]

A delay in performing an appendectomy increases the risk of appendicular perforation and sepsis, which in turn increases morbidity and mortality. The opposite is also true, where with reduced diagnostic accuracy, the negative or unnecessary appendectomy rate is increased, and this is generally reported to be approximately 20%- 40% [7].

The Alvarado score, which was developed in 1986, was a simple additive scoring system to help with the diagnosis of acute appendicitis [8]. Although it showed very good sensitivity and specificity when applied in a Western population, several subsequent studies have shown its limitations when applied in an Asian or Oriental population [9,10].

As a result, a new scoring system called the RIPASA score has been developed, which is a more extensive yet simple additive scoring system consisting of 14 fixed parameters that is unique to our population setting. All these 14 parameters are easily obtainable from a good clinical history, examination and investigations.

The reported literature about RIPASA scoring suggests sensitivity of 97.5%, specificity of 81.8%, PPV of 86.5%, NPV of 96.4% and a diagnostic accuracy of 91.8% [11].

In a retrospective study, the RIPASA score has been shown to achieve better sensitivity (88%) and specificity (67%) than the Alvarado score (sensitivity 59%, specificity 23%) in an Asian population [11].

In this study the RIPASA score considerably better than the Alvarado score in terms of correctly diagnosing the acute appendicitis (sensitivity and diagnostic accuracy) as well was found to be as those who were negative for acute appendicitis (NPV).

It was previously been hypothesized that in view of ethnicity and dietary habit the Alvarado score per se may not be as predictable in the South Asian population as it in the Western World [9,10]. On the other hand the RIPASA score has been hypothesized to be directly approachable to the South Asian population [11].

In this study, it is seen that Acute appendicitis is more commonly seen in females (58%).

Results of previous studies by Chong et al [14], showed male preponderance (57.69%), study by Walid et al [13], showed female preponderance (71.7%), study by Abdullah et al [12], showed male preponderance (52.9%), study by Butt et al [15], showed male preponderance (58.4%).

CONCLUSION

Scoring systems for acute appendicitis is a necessity in the emergency scenario for avoiding negative appendectomy with ALVARADO score and RIPASA score being established scoring systems for diagnosis of acute appendicitis. The RIPASA score is a better tool in evaluation of suspected appendicitis based on the more sensitivity and more negative predictive value in comparison to ALVARADO.

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