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Comparison of the RIPASA and Labeda Scoring Systems to Assess the Morphological Severity of Acute Appendicitis

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Abstract

BACKGROUND: Acute appendicitis is the most common emergency surgical case, leading to further complications if not treated immediately. Limited diagnostics infrastructure is an obstacle in developing countries, especially in the regions. Therefore, alternatives such as clinical scoring systems are required to assist in diagnosis.

AIM: This study aimed to compare the use of the RIPASA and Labeda scores to assess the severity of acute appendicitis morphology by determining the accuracy, sensitivity, specificity, positive predictive value, negative predictive value, and negative appendectomy rate.

METHODS: This was a cross-sectional study designed to assess the severity of morphology of intra-operative acute appendicitis in Dr. Chasan Boesoirie Hospital and network hospitals in Ternate, North Maluku, Indonesia. Data regarding patient characteristics, leukocytes, and acute appendicitis severity were collected and analyzed alongside RIPASA and Labeda scores using the Chi-square test. $p < 0.05$ were considered statistically significant.

RESULTS: Of 59 cases, 39 (66.1%) were complicated acute appendicitis and 20 (33.9%) were noncomplicated acute appendicitis. Chi-square test results showed that there was a significant relationship ($p \leq 0.001$) between RIPASA/Labeda scores and the severity of acute appendicitis morphology.

CONCLUSION: RIPASA and Labeda scores had the same accuracy, sensitivity, specificity, positive predictive value, and negative predictive value for acute appendicitis severity. Thus, RIPASA and Labeda scores can be used by physicians to help establish a diagnosis of acute appendicitis and determine the need for emergency surgery, as well as predict the possibility of morbidity/complications in patients.

Introduction

Acute appendicitis is the most common reason for acute abdominal surgery [1], [2], [3], [4]. In Southeast Asia, the highest incidence of appendicitis occurs in Indonesia and is increasing every year [5]. Imaging examinations such as ultrasound, computed tomography scan, and magnetic resonance imaging can help establish the diagnosis of acute appendicitis. However, such examinations are difficult to carry out if emergency department facilities are limited. Therefore, assessment using a clinical scoring system is a crucial means of assisting diagnosis [6], [7].

The most frequently used scoring system is the Alvarado scoring system; however, its sensitivity and specificity are low in Eastern ethnic groups. Therefore, the Labeda and RIPASA scoring systems are used in Southeast Asia. The RIPASA score has been found to be comparable in sensitivity and specificity to the Alvarado score [6], [8]. However, until now, there has been no research to test the reliability of the RIPASA and Labeda scores in Indonesia.

Methods

This study was a cross-sectional observational study to compare the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of the RIPASA and Labeda scoring systems in acute appendicitis patients. We conducted the study in Dr. Chasan Boesoirie Hospital and network hospitals in Ternate, North Maluku, Indonesia, from April to September 2021. Patients included in this study were diagnosed with acute appendicitis aged ≥17 years, underwent appendectomy and completed medical records as a scoring parameter. Patients who refused appendectomy, were aged <17 years, had other conditions that could have affected the examination (pregnancy, urinary tract infection, urogenital infection, and obstetrical gynecology), or who did not have complete medical records were excluded from the study.

Name, gender, age, and medical history were recorded for all patients. Then, following the physical examination of the subjects, RIPASA (Table 1) [9], [10] and Labeda (Table 2) scores were

Table 1: RIPASA scoring system [9], [10]

Clinical findings	Score
Female	0.5
Male	1
Age <39.9 years	1
Age ≥ 40 years	0.5
Right iliac fossa pain	0.5
Pain migrating to right iliac fossa	0.5
Anorexia	1
Nausea/vomiting	1
Duration of symptoms <48 h	1
Duration of symptoms > 48 h	0.5
Right iliac fossa tenderness	1
Right iliac fossa guarding	2
Rebound tenderness	1
Rovsing's sign	2
Fever < 37°C or > 39°C	1
Elevated leukocytes	1
Negative urinalysis	1
Non-Asian	1
Total score	17.5

calculated to assist in planning patient management. For RIPASA scoring, 7.5 was used as the indicated surgical threshold. A RIPASA score of 12 was judged to be very high (severely acute appendicitis), while scores of 7.5–11.5 indicated a high probability of acute appendicitis, 5.0–7.0 indicated a low probability, and 5.0 indicated that acute appendicitis was not diagnosed [10], [11].

Table 2: Labeda scoring system [6]

Clinical findings	Score positive	Score negative
Nausea	+4	−12
Vomiting	+2	−6
Fever	+7	−7
Cough pain	+4	−15
Knock pain	+10	−9
Local defense	+16	−11
Gender		
Male	+13	
Female		−6
Leukocytes		
> 10,000×10^9/L	+6	
≤ 10,000×10^9/L		−7

For Labeda scoring, a score of >10 suggested that emergency surgery was required, while scores between 10 and 57 indicated that patients should be observed for 2–3 h before making further decisions based on changes in the score. A score of ≤57 indicated that acute appendicitis was not diagnosed. Only patients with a minimum score of 10 and above were considered [6].

Our intraoperative findings were classified as follows: (1) Gangrenous appendicitis, if the appendix became blackish with a necrotic area and/or was followed by a perforation; (2) perforation appendicitis if there was a visible hole in the appendix or an appendicolith free within the abdomen; (3) phlegmonous appendicitis, if suppurative inflammation resulted in pus on the walls and purulent fluid on the serous surface; and (4) catarrhal appendicitis, if edema resulted in distension of the appendix [12], [13], [14].

We divided the appendicitis cases into two categories: (1) Uncomplicated appendicitis, defined as a phlegmonous inflamed appendix with no symptoms of necrosis or perforation, and (2) complicated appendicitis, which includes perforated appendicitis, periappendicular abscess, and peritonitis [15].

Results

A total of 59 subjects were included in this study. The mean age of participants was 29.3 ± 15.4 years, and 57.6% (34 participants) were male. Perforated appendicitis was diagnosed in 44.1% (26 participants), gangrenous appendicitis in 22.1% (13 participants), and suppurative appendicitis and catarrhal appendicitis were found in 16.9% (10 participants). In total, 66.1% of cases (39 participants) were categorized as complicated appendicitis. Based on RIPASA scores, 84.7% (50 participants) were found to have a high probability of acute appendicitis, while 15.3% (9 participants) had a low probability of acute appendicitis. Similarly, based on Labeda scores, 84.7% (50 participants) were categorized as requiring surgery, and 15.3% (9 participants) were classified as not suffering from acute appendicitis (Table 3).

A comparison of leukocyte levels and age showed that subjects with complicated appendicitis had a higher mean leukocyte count and a lower mean age, compared with subjects with noncomplicated appendicitis. However, the differences for these two variables were not significant.

In contrast, RIPASA/Labeda scores showed significant differences. Subjects categorized as high probability/immediately operated on generally experienced complicated appendicitis (38 participants, 64.4%), while subjects categorized as low probability/not immediately operated on typically had uncomplicated appendicitis (Table 4).

Both RIPASA and Labeda scoring systems exhibited sensitivity of 97%, specificity of 40%, positive predictive value of 76%, and negative predictive value of 88%.

Discussion

Delayed or inappropriate management of acute appendicitis can exacerbate inflammation and lead to life-threatening complications such as appendicular perforation, peritonitis, intra-abdominal abscess, and sepsis. Therefore, it is necessary to establish a rapid diagnosis. However, diagnosing acute appendicitis may be difficult because of atypical symptoms and differential diagnoses [14], [16]. Imaging studies may be required; however, in areas with limited resources, such procedures are challenging [17], [18]. The use of a scoring system can assist in diagnosis and ensure prompt and appropriate therapy [10], [17]

This study showed that subjects identified as high probability and undergoing emergency surgery generally had complicated appendicitis (64.4%).

Table 3: Patient characteristics

Variable	Mean ± SD	n (%)
Age (years)	29.3 ± 15.4	
Gender		
Male		34 (57.6)
Female		25 (42.4)
Intraoperative findings		
Gangrenous		13 (22.1)
Perforation		26 (44.1)
Phlegmonous		10 (16.9)
Catarrhal		10 (16.9)
Classification		
Complicated		39 (66.1)
Uncomplicated		20 (33.9)
Leukocytes	18,304 ± 6438	
RIPASA score		
Not acute appendicitis		0
Low probability		9 (15.3)
High probability		50 (84.7)
Severely acute appendicitis		0
Labeda score		
Not acute appendicitis		9 (15.3)
Observation		0
Surgery		50 (84.7)

SD: Standard deviation.

Meanwhile, participants identified as low probability and not undergoing emergency surgery commonly experienced noncomplicated appendicitis (20.3%). Statistical analysis indicated a significant relationship between RIPASA score and category of appendicitis (complicated or uncomplicated). This result is similar to previous studies by Unal Ozdemir *et al*. [19] and Karapolat [11] showing a significant relationship between RIPASA scores and histopathological findings.

Table 4: Comparison of leukocyte levels, age, and scoring system by type of appendicitis

Variable	Complicated		Uncomplicated		p
	Mean ± SD	n (%)	Mean ± SD	n (%)	
Leukocytes	20,541.5 ± 6356.1		13,648 ± 3,562.6		0.256
Age	28.0 ± 14.8		31.7 ± 16.0		0.923
RIPASA score					
Low probability		1 (1.7)		8 (13.6)	<0.001
High probability		38 (64.4)		12 (20.3)	
Labeda score					
Not acute appendicitis		1 (1.7)		8 (13.6)	<0.001
Observation		0		0	
Surgery		38 (64.4)		12 (20.3)	

SD: Standard deviation.

The RIPASA score is an inexpensive, simple, noninvasive, and rapid scoring system. Its cut-off value of 7.5 has been found to be more sensitive and specific for diagnosis than the Alvarado score [20], [21]. The RIPASA score includes 14 parameters in the history and clinical examination, which can be applied easily and quickly. The RIPASA scoring system also has a strong correlation with the pathological stage of appendicitis, providing a precise and rapid diagnosis [11].

This study also found that the sensitivity, specificity, positive predictive value, and negative predictive value of the RIPASA scores were 97%, 40%, 76%, and 88%, respectively. Several studies have found similar sensitivity results (96.2–98.52%) alongside higher specificity (81.82–90.5%) [8], [21], [22]; higher positive and negative predictive values have also been observed, reaching 98.88% and 97.67%, respectively [21]. RIPASA had high sensitivity and specificity for diagnosing acute appendicitis in an Eastern population [6], [8]. However, the study of Malik *et al*. showed contradictory results, indicating similar sensitivity for Western and Eastern populations (86% vs. 88%) and better specificity in Western than Eastern populations (70% vs. 66%) [20].

In the current study, the results for the Labeda score were identical to those obtained using the RIPASA score. The Labeda score is still not widely used for diagnosing acute appendicitis, and relatively few studies have been conducted to evaluate it. By contrast, the sensitivity of the Labeda score in another study was 81% and suggested that further research should be conducted in hospitals [23]. The Labeda score has the advantage of being easier to use, compared with the RIPASA score; furthermore, the Labeda score only requires blood tests, while the RIPASA score requires additional urine tests.

This study has several limitations. For example, the number of samples was small, comparisons were not made with the results of histopathological examinations, and the presence of comorbidities in our study participants was not ruled out.

Conclusion

In this study, RIPASA and Labeda scores had the same accuracy, sensitivity, specificity, positive predictive value, and negative predictive value for the severity of acute appendicitis. Thus, RIPASA and Labeda scores can be used by physicians to help establish a diagnosis of acute appendicitis as well as the need for emergency surgery and predict the possibility of morbidity/complications in patients.

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