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The correlation of Labeda scores and the severity level of acute appendicitis

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ABSTRACT

Background and Objectives. Radiological examinations help clinicians establish the diagnosis of acute appendicitis, thereby reducing the number of diagnostic errors. However, many emergency departments have limited radiological facilities. Labeda score is an appendicitis scoring system that might be a good alternative. This study aims to determine the correlation between the Labeda score and the severity level of appendicitis.

Materials and Methods. This cross-sectional study design was performed using the results of clinical findings, pre-operative leucocyte, and intra-operative appendix morphological examination of acute appendicitis patients. The clinical findings determined by the Labeda score and Intraoperative findings for appendicitis morphological were classified into catarrhal, phlegmonous, and gangrenous appendicitis.

Results. The study found 40 patients with acute appendicitis who had undergone appendectomy surgery with a Labeda score ≥ 10. The patients had varying degrees of appendicitis, with the sample ages ranging from 17 to 74 years old. The range of Labeda scores is 10 – 62 for men and 10 – 43 for women. The frequency of clinical features based on Labeda scores is fever in all study subjects,

cough pain and leukocytosis 92.50%, local defense 90%, nausea 82.50%, knock pain 67.50%, and vomiting 55%. There was a significant relationship between Labeda scores by sex and the severity of appendicitis based on intraoperative findings.

Conclusions. This study found that higher Labeda scores were associated with more severe morphological findings of appendicitis. These findings suggest that the Labeda score could be a valuable tool in the pre-operative management of acute appendicitis, helping to reduce the risk of wrong diagnosis or unnecessary surgery.

Keywords: Labeda scores, appendicitis, severity of illness, scoring system

Abbreviations:

CT-scan – Computed Tomography

MRI – Magnetic Resonance Imaging

SPSS – Statistical Package for the Social Sciences

INTRODUCTION

Acute appendicitis is a surgery case with a lifetime risk of exposure of 7-8% and postoperative mortality ranging from 0.07 to 0.7%. It might increase to 0.5 to 2.4% in patients with perforation. Furthermore, the overall postoperative complication rate ranges from 10-19% for uncomplicated appendicitis and around 30% in complicated appendicitis cases. Increasing diagnostic capability is the basis for reducing the risk of wrong diagnosis or surgery [1,2].

While diagnosing appendicitis in pre-operative management settings the clinical manifestations might range from mild symptoms to general signs of peritonitis and sepsis [3,4]. Therefore, it is very important to use supporting tools besides the physical examination, if possible [3,5]. Although the accuracy of diagnostic methods development is continuous, the diagnostic error rate is still around 20-30%. Also, in women aged 12-40 years old, the percentage of unnecessary laparotomy is 45.6%. In some of these cases the intra-operative findings include a caecum tumor, twisted ovarian cyst, or ectopic pregnancy. In addition to unnecessary surgery, patients are also at risk for surgical wound infection, mechanical hernia, or ileus, which usually occurs as a result of adhesions after an appendectomy [6,7].

Technological developments in radiology, such as ultrasound, CT-scan, and MRI, might help diagnose acute appendicitis [5,8]. However, many emergency rooms in developing countries have limited facilities to accurately diagnose patients with acute appendicitis. Therefore, we need another diagnostic tool, particularly one that uses a clinical scoring system [9,10].

There have been many methods to reduce the incidence of negative appendectomy, one of which is the Labeda score. The Labeda score is a simple, easy, and quick scoring system and is non-invasive [9]. This study aims to determine the correlation of Labeda score (clinical findings)

and the severity of appendicitis (intra-operative findings). We hypothesize that a high Labeda score reflects the clinical (morphological) severity of appendicitis during surgery.

MATERIALS AND METHODS

Study Design

This cross-sectional study design was performed by conducting clinical, pre-operative Leucocyte and appendicitis morphological examinations in acute appendicitis patients who underwent an emergency appendectomy in the Digestive Surgery Division of Dr. Wahidin Sudirohusodo and its network hospitals from January 2024 to June 2024. We obtained ethical approval from our institutional review board, with registration number 239/UN4.6.4.5.31/PP36/2024.

Samples

We included both male and female patients diagnosed with acute appendicitis with Labeda score ≥ 10, aged ≥ 17 years, who underwent emergency appendectomy at the Digestive Surgery Division of Dr. Wahidin Sudirohusodo and its network hospital. The patients signed a consent form and had a complete medical record. Patients with other comorbidities that might affect the examination (pregnancy, urinary tract infections, urogenital and obstetric gynecology) were excluded. The patient was withdrawn from the study if their intraoperative findings did not represent acute appendicitis.

Protocol

We recorded the sample's identity, including name, age, and sex. Then we took their history, performed a physical examination, and determined the Labeda score (Table 1) to manage the treatment. A score of ≥10 indicated surgery was needed; a score of (10) - (-57) indicated observation for 2-3 hours to obtain a new decision based on the changes in the score; and a score of <-57 indicated it was not acute appendicitis. We only took patients with a minimum score of 10 and higher. Our intraoperative findings for appendicitis morphological were classified into (1) catarrhal appendicitis if edema occurred, causing appendix distension; (2) phlegmonous appendicitis if there was suppurative inflammation that produced pus on the walls and purulent fluid on the serous surface; and (3) gangrenous appendicitis if the appendix became blackish with a necrotic area and/or followed by a perforation.

Statistical analysis

The collected data was processed using SPSS version 23.0 (Armonk, NY: IBM Corp.). The results are presented in tables and presentations following the research objectives.

RESULTS

We found 40 patients with acute appendicitis who had undergone appendectomy surgery with a Labeda score of ≥ 10. The patients were categorized into catarrhal, phlegmonous, and gangrenous appendicitis, with varying proportions of men and women in each category. The age range of the patients was 17 to 74 years, with men and women having different age distributions (Table 2).

Out of the 40 patients, 50% were male and 50% were female. Clinical features based on the Labeda score included complaints of fever in all patients, cough pain, and leukocytosis findings in 92.50% of patients, local defense in 90%, nausea in 82.50%, knock pain in 67.50%, and vomiting in 55%. The distribution of clinical features based on the severity of acute appendicitis revealed that fever was present in all patients at each severity level, while leukocytosis, cough pain, and local defenses were observed in all phlegmonous and gangrenous patients (Table 3).

Table 4 demonstrated a strong correlation between Labeda score and the severity of acute appendicitis in both sexes. The correlation coefficients of 0.86 for men and 0.89 for women indicate a significant positive relationship, suggesting that higher Labeda scores are linked to more severe intraoperative findings of appendicitis.

DISCUSSION

The study included 40 patients, with an equal number of men and women. The distribution of acute appendicitis severity showed that catarrhal appendicitis was equally prevalent in both men and women, while phlegmonous appendicitis was more common in men. Gangrenous appendicitis was more prevalent in women. According to Warsinggih [11], the incidence of acute appendicitis in both sexes is commonly comparable, but slightly higher in males aged 20-30 years.

The study included 40 patients of varying ages, with the highest incidence of acute appendicitis occurring in individuals aged 17 to 27 years. The distribution of appendicitis severity showed that gangrenous appendicitis was more prevalent in both men and women in this age group. Additionally, the incidence of acute appendicitis was found to be slightly higher in males aged 20-30 years. However, it was noted that appendicitis can develop in individuals of all ages, although it is rarely reported in children [11,12].

The study found that gangrenous appendicitis is more common in males with higher Labeda scores, ranging from 51 to 62, and in females with scores ranging from 41 to 50. The higher the Labeda score, the more severe the morphological findings of intraoperative appendicitis.

In the study, all 40 patients, regardless of sex, experienced a fever higher than 37.5 °C. Specifically, all cases of catarrhal appendicitis and phlegmonous appendicitis, as well as

gangrenous appendicitis, exhibited fever and other clinical symptoms such as cough pain, local defense, and leukocytosis.

The local defense symptom is known to be in line with the increase of the inflammatory process in acute appendicitis. The higher the increasing peritoneal irritation process, the stronger the abdomen muscle contracting above the irritated parietal peritoneum. Normal leukocyte levels occur at the early stages of appendicitis, and an increase in leukocyte count is proportional to the progression and severity of the disease [13]. Therefore, it is necessary to do a serial examination of leukocytes, which will increase the accuracy of the test; this has been proven [2,14,15].

One limitation of this study is its relatively small sample size, which may limit the generalizability of the findings to a larger population. Additionally, the study was conducted at a single center, which could introduce bias and limit the diversity of patient demographics and clinical presentations. Furthermore, the retrospective nature of the study may have led to incomplete or missing data, potentially impacting the accuracy of the results. Additionally, the study focused on the correlation between the Labeda score and intraoperative findings but did not assess the long-term outcomes or postoperative complications in patients with acute appendicitis. Therefore, further prospective studies with larger and more diverse patient populations and longer follow-up periods are needed to validate the findings and assess the clinical utility of the Labeda score in managing acute appendicitis.

CONCLUSION

There is a significant relationship between Labeda score and the severity of acute appendicitis from intraoperative findings, both sexes. We conclude that the higher the Labeda score, the more severe the findings of intraoperative appendicitis. These findings suggest that the Labeda score could be a valuable tool in the pre-operative management of acute appendicitis, helping to reduce the risk of wrong diagnosis or unnecessary surgery. Further research and validation of the Labeda score in larger patient populations are warranted to confirm these findings and establish its utility in clinical practice.

CONFLICT OF INTEREST: None declared

AUTHOR'S CONTRIBUTIONS: LUK, IL, and JH (idea, planning, availability, materials, gathering and processing of data, interpretation and analysis, literature search, and writing of manuscripts). SM, MID, MIK, and JAU (idea, design, supervision, evaluation and interpretation, and literature search). ES (idea, design, supervision, evaluation and interpretation, and literature search). AA (concept, design, critical review). MF (Concept, Design, Analysis and Interpretation, Critical Review)

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INFORMED CONSENT: Informed consent was obtained from all participants in the study.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE: The study was approved by the Ethics Review Committee of the Faculty of Medicine, Hasanuddin University, Makassar, Indonesia under reference number 239/UN4.6.4.5.31/PP36/2024.

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TABLES

Table 1. Labeda scoring system [9].

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
Leucocyte		
>10.000 x 109/L	+6	
≤ 10.000 x 109/L		-7
Sex		
Male	+13	
Female		-6

Table 2. Distribution of patient data based on sex, age, and Labeda score

Variables	The severity of appendicitis (Intraoperative Findings)		
	Catarrhal (n = 12)	Phlegmonous (n = 8)	Gangrenous (n = 20)
Sex			
Male	6 (50)	6 (75)	8 (40)
Female	6 (50)	2 (25)	12 (60)
Age distribution of male patients (years)			
17 – 27	3	3	5
28 – 37	2	1	1
38 – 47	1	-	1
48 – 57	-	2	1
58 – 67	-	-	-
≥ 68	-	-	-
Age distribution of female patients (years)			
17 – 27	5	-	5
28 – 37	-	1	1
38 – 47	-	1	2
48 – 57	-	-	1
58 – 67	1	-	2
≥ 68	-	-	1
Labeda scores of male patients (years)*			
≥10 – 20	2	-	-
21 – 30	2	1	-
31 – 40	2	4	1
41 – 50	-	1	2
51 – 62	-	-	5
Labeda scores of female patients (years)**			
≥10 – 20	5	1	-
21 – 30	1	-	1
31 –40	-	1	1
≥ 41	-	-	10

Note: * The maximum Labeda Score for Men is 62; ** The maximum Labeda score for women is 43.

Table 3. The frequency distribution of acute appendicitis clinical features according to severity

Clinical Features	Appendicitis severity					
	Catarrhal (N = 6)		Phlegmonosa (N = 6)		Gangrenous (N = 8)	
	n	%	n	%	n	%
Male (n = 20)						
Fever	6	100	6	100	8	100
Nausea	4	66.60	4	66.60	6	75
Vomiting	1	16.60	3	50	4	50
Cough pain	5	83.30	5	83.30	8	100
Knock pain	3	50	3	50	7	87.50
Local defense	4	66.60	5	83.30	8	100
Leukocytosis	3	50	6	100	8	100
Female (n = 20)						
Fever	6	100	2	100	12	100
Nausea	5	83.30	2	100	12	100
Vomiting	3	50	0	0	11	91.60
Cough pain	5	83.30	2	100	12	100
Knock pain	2	33.30	1	50	11	91.60
Local defense	5	83.30	2	100	12	100
Leukocytosis	5	83.30	2	100	12	100

Table 4. The correlation of Labeda score based on sex with the severity of appendicitis on intra-operative findings

Sex	Total (n)	p-value	Correlation Coefficient (r)
Male	20	0.00	0.86
Female	20	0.00	0.89

Note: *Spearman correlation test, $p < 0.05$