ORIGINAL ARTICLE

Diagnostic accuracy of ultrasonography and scoring systems: The effects on the negative appendectomy rate and gender

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ABSTRACT

BACKGROUND: Despite the development of clinical, laboratory, and imaging methods, the diagnosis of acute appendicitis is not always easy, and negative appendectomy rates are still high. This study aims to reveal the effects of different scoring systems on the diagnostic accuracy of acute appendicitis and negative appendectomy rates, alone or when evaluated together with ultrasonography.

METHODS: In this study, 202 consecutive patients who underwent emergency appendectomy for acute appendicitis were included. Clinical scores of all patients were preoperatively calculated using Ohmann, Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA), Lintula, Eskelinen, and Alvarado scoring systems. Abdominal ultrasonography (USG) was performed randomly in all cases. The sensitivity and specificity of scoring systems were calculated according to the threshold values. The area under the curve (AUC) was calculated using ROC analysis. In the regression model, histological diagnosis of appendicitis was used as the dependent variable, while scoring systems and USG were preferred as independent variables.

RESULTS: The negative appendectomy rate was 15.8%. In the diagnosis of acute appendicitis, Ohmann was the most predictive for both genders (DOR=24.2, 95% CI 6.98–84.44). Similarly, the lowest negative appendectomy rates were obtained with the Ohmann score as 6.9% in females and 3.4% in males. When the scores were combined with USG, the rate of diagnostic accuracy for acute appendicitis was not increased. However, when Ohmann and USG were combined, negative appendectomy rates were further reduced for women from 6.9% to 4%.

CONCLUSION: In addition to being a good diagnostic predictor of acute appendicitis in male and female patients, Ohmann score provides the best negative appendectomy rates. The combination of USG and scoring systems does not increase the diagnostic accuracy of acute appendicitis. However, negative appendectomy rates are significantly reduced when the USG and Ohmann scale are used together in females, while this reduction is minimal in men.

Keywords: Alvarado; Eskelinen; Lintula; negative appendectomy rate; Ohmann; RIPASA; USG.

INTRODUCTION

Acute appendicitis (AA) is the most common cause of emergency abdominal surgery. To prevent serious complications up to 17–33% perforation rates, rapid and early diagnosis should be made.[1] Occasionally, the decision of surgical indication in atypical acute appendicitis may be difficult due to the incomplete clinical findings.[2] Therefore, the main objective is to achieve the lowest negative appendectomy rates (NARs), while reducing morbidity and hospital cost without diagnostic delay.

Various scoring systems have been developed to support diagnosis in suspected cases for AA.[3–7] Some of these systems target pediatrics or female populations;[4,5] other systems target the general population.[7] Positive and negative predictive values were reported to differ between the results,[8] and it was suggested that accurate diagnosis rates could be in-

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creased and NARs could be reduced with integration scoring systems and imaging methods.[9,10] However, in the literature, studies on the superiority between appendicitis scoring systems are limited and the results are controversial.

Diagnostic imaging of acute appendicitis has improved in recent years. Although the sensitivity and specificity of computed tomography (CT) in the diagnosis of appendicitis is known to be as high as 94%,[11] it is not preferred in all routine cases because it contains ionized radiation, increases the cost of routine health, and may delay the emergency appendectomy. Ultrasonography (USG) is still the most widely used diagnostic method in the diagnosis of acute appendicitis in many centers due to its rapid and practical application and its good tolerability by the pediatric population.[1] However, despite these advances in diagnostic methods, to our knowledge, there is no information in the literature that NARs have been reduced to the desired level.[12] Therefore, this study aims to determine the effects of various appendicitis scoring systems on the diagnostic accuracy of AA and NARs, alone or when evaluated together with USG.

MATERIALS AND METHODS

A total of 202 consecutive patients, who were admitted to the emergency ward of Gülhane Training and Research Hospital in Ankara, Turkey, and were operated on in the general surgery clinic with the diagnosis of acute appendicitis between 01 January 2017 and 31 December 2017, were included in this study. This was a retrospective cross-sectional study. The Ethical Committee of Clinical Research found no ethical problem in carrying out the present study because this study did not involve a prospective evaluation of a new method and only involved research showing standard clinical practices or advancement of practices.

Demographic characteristics, age and gender of the cases were recorded. Physical examinations were performed randomly by five general surgeons from the same clinic, and the clinical parameters of all patients were recorded in a prospective manner using a previously prepared form on admission, according to the RIPASA,[3] Alvarado,[7] Ohmann,[6] Lintula,[5] and Eskelinen[4] scoring systems (Table 1). Thus scores were preoperatively calculated.

Due to the design of this study, abdominal ultrasonography was performed randomly by four separate radiologists working in the same department. USG examination was performed with a Toshiba Fomio 8, using the 3.75 and 8 Mhz linear probes. The diagnosis of appendicitis was based on the visualization of the blind-ending tubular structure in the right lower quadrant of the abdomen with a diameter greater than 6 mm, indicating a non-compressible intestinal structure. In this study, patients with a score equal to or above the threshold according to scoring systems, or patients whose diagnosis of acute appendicitis was supported by USG were operated on. Negative appendectomy was defined by postoperative histopathologic examination as no evidence of inflammation in the appendix wall or absence of polymorphonuclear leukocytes.

Data analysis was performed using SPSS version 15.0 (IBM®, Chicago, USA). The sensitivity, specificity of RIPASA, Alvarado, Ohmann, Lintula and Eskelinen scoring systems were calculated according to the threshold values reported in the literature. In addition, the area under the curve (AUC) was calculated using ROC analysis. The values with the best sensitivity and specificity were defined by the likelihood ratio. The combination of the score with USG was defined as the presence of positive USG findings in patients whose scoring systems exceeded the threshold. Negative appendectomy rates, sensitivity and specificities of scoring systems were analyzed separately and in combination with USG. Pairwise comparisons of ROC analysis were used to analyze the superiority of scoring systems. Also, binary logistic regression analysis was preferred for comparison of scoring systems. In the regression model, histological appendicitis diagnosis was used as the dependent variable, while scoring systems and USG were preferred as independent variables. Results were expressed as Diagnostic Odds Ratio (DOR) at 95% Confidence Interval (95% CI). In statistical analysis, the p-value was considered significant below 0.05.

RESULTS

The mean age of 202 patients who underwent laparotomy for acute appendicitis was 25.6±8.8 years (range between 14-69 years). The majority of patients were male. The male/female ratio was 1/0.3. Mean RIPASA score was 9.8±2.1 (range between 4.5–15), Ohmann score was 13.5±2.1 (range between 8-16), Lintula score was 21.5±5.2 (range between 4–32). The Eskelinen score was 59.6±5.7 (range between 44.7–67.7), and the Alvarado score was 7.3±1.7 (range between 2–10). Acute appendicitis was detected in 79.7% of the patients by USG. Histological examination revealed acute appendicitis in 84.2% (n=170) of the patients. The NAR was 15.8% (n=32). Table 2 shows the sociodemographic characteristics, clinical characteristics, and scores of the patients.

When the thresholds previously reported in the literature were used for the diagnosis of acute appendicitis, Sensitivity of RIPASA, Ohmann, Lintula, Eskelinen, and Alvarado was 83.5%, 82.3%, 69.4%, 76.4%, and 75.8% (respectively), and specificity was 37.5%, 81.2%, 50%, 65.6%, 65.6% (respectively). NARs were 12.3%, 4.1%, 11.9%, 7.8%, 7.9% respectively. In all scoring systems, NARs tended to be lower in male patients than in female patients. The lowest NARs were obtained with Ohmann scoring in both female (6.9%) and male (3.4%) patients.

In the logistic regression model, the most predictive scale for acute appendicitis was Ohmann (DOR=24.2, 95% CI

6.98–84.44), and the second was Alvarado (DOR=2.5, 95% CI 0.85–7.88) (Table 3). Similarly, when divided by gender, the most predictive method of diagnosis for acute appendicitis in females (DOR=60.2, 95% CI 2.84–1274) and in males (DOR=30.5, 95% CI 6.54–142.75) was Ohmann. Also, USG's sensitivity was 91.9%, and specificity was 23%, and its effectiveness in the diagnosis of acute appendicitis was observed to be low (DOR=1.7, 95% CI 0.55–5.44).

Although all scoring systems for acute appendicitis were determinative in ROC analysis, the highest AUC (accuracy in predicting acute appendicitis) value was observed in Ohmann scoring (AUC=0.818, p<0.001, 95% CI=0.758–0.869) (Table 4, Fig. 1). In the comparison of the pairwise ROC curves for the diagnosis of acute appendicitis, the Ohmann scale was more predictive than Lintula (p<0.001), Eskelinen (p=0.012), RIPASA (p<0.001), and Alvarado (p=0.040).

Table 1. RIPASA, Ohmann, Lintula, Eskelinen and Alvarado evaluation tables

RIPASA	**Score**
Male	1
Female	0.5
Age <39.9	1
Age >40	0.5
RIF pain	0.5
Pain migration to RIF	0.5
Anorexia	1
Nausea & Vomiting	1
Duration of symptoms <48 h	1
Duration of symptoms >48 h	0.5
RIF tenderness	1
Guarding	2
Rebound tenderness	1
Roving sign	2
Fever	1
Raised WBC	1
Negative urine analysis	1
Foreign	1
Probability of acute appendicitis is high	>7.5

Lintula	**Score**
Male	2
Intensity of pain	2
Migration of pain	4
Right lower quadrant pain	4
Vomiting	2
Body temperature >37.5°C	3
Guarding	4
Bowel sounds (absent, tinkling or high pitched)	4
Rebound tenderness	7
Cut off scoring for acute appendicitis	≥21

Alvarado	**Score**
Migratory RIF pain	1
Anorexia	1
Nausea & Vomiting	1
Tenderness in RIF	2
Rebound tenderness in RIF	1
Elevated temperature	1
Leucocytosis	2
Shift to the left of neutrophils	1
Cut off scoring for acute appendicitis	≥7

Ohmann	**Score**
Pain in the lower right quadrant	4.5
Rebound tenderness	2.5
Absence of urinary symptoms	2
Continuous pain	2
WBC count >10000/µlL	1.5
Age <50	1.5
Involuntary muscular defense	1
Migration of pain to the RIF	1
Cut off scoring for acute appendicitis	>12

Eskelinen	**Score criterion**	**Score**
Pain	2- RIF	11.41
	1- Any other location	
Rigidity	2- Yes	6.62
	1- No	
WBC count (/µlL)	2- >10000	5.88
	1- <10000	
Rebound tenderness	2- Yes	4.25
	1- No	
Pain upon arrival	2- RIF	3.51
	1- Any other location	
Duration of pain	2- >48 h	2.13
	1- <48 h	
Cut off scoring for acute appendicitis≥57		

RIPASA: Raja Isteri Pengiran Anak Saleha Appendicitis; WBC: White blood cell; RIF: Right Iliac Fossa; NRIC: National record of identity card;

By combining USG with scoring systems, the highest predictivity was obtained by Ohmann+USG combination. However, for acute appendicitis, the USG combination with Ohmann (DOR=17.5, 95% CI 4.35–70.75) was found to have lower predictivity compared to the Ohmann scale alone (DOR=24.2, 95% CI 6.98–84.44) (Table 5). On the other hand, the lowest NARs (4%) were achieved in women when Ohmann was combined with USG. In ROC analysis, the highest AUC value was observed in Ohmann scoring (AUC=0.748, p<0.001, 95% CI=0.683–0.807) (Table 6).

When the ROC analyses obtained with using scoring systems alone or in combination with USG were compared, the AUC for acute appendicitis was decreased with the USG combination with the scoring systems, but no statistical difference was in found two analyses.

Table 2. Socio-demographic and clinical characteristics of the patients

	n	%	Mean±SD
Age			25.6±8.8
Gender			
Female	50	24.8	
Male	152	75.2	
RIPASA			9.8±2.1
Ohmann			13.5±2.1
Lintula			21.5±5.2
Eskelinen			59.6±5.7
Alvarado			7.3±1.7
Abdominal ultrasonography			
Positive (+)	161	79.7	
Negative (-)	41	20.3	
White blood cell count			13.5±3.9
Pathology report			
Positive (+)	170	84.2	
Negative (-)	32	15.8	

RIPASA: Raja Isteri Pengiran Anak Saleha Appendicitis; SD: Standard deviation.

Table 4. ROC analysis of scoring systems in the diagnosis of the AA

	AUC	SD	p	%95 CI
RIPASA	0.605	0.046	0.021	0.534–0.673
Ohmann	0.818	0.038	<0.001	0.758–0.869
Lintula	0.597	0.048	0.044	0.526–0.665
Eskelinen	0.710	0.046	<0.001	0.643–0.772
Alvarado	0.708	0.046	<0.001	0.640–0.769

AUC: Area under the curve; SD: Standard deviation; CI: Confidence interval; ROC: Receiver Operating Characteristic; AA: Acute appendicitis; RIPASA: Raja Isteri Pengiran Anak Saleha Appendicitis.

Table 3. Diagnostic performance parameters of scoring systems and ultrasonography in the diagnosis of the acute appendicitis

	Sensitivity	Specificity	PPV	NPV	DOR	%95 CI	NAR
RIPASA	83.5	37.5	87.6	30	0.4	0.12–1.42	12.3
Female	64.8	46.1	77.4	31.5	<0.1	0–1.15	22.6
Male	88.7	31.5	90	28.6	0.6	0.14–3.17	9.9
Ohmann	82.3	81.2	95.8	46.4	24.2	6.98–84.44	4.1
Female	72.9	84.6	93.1	52.3	60.2	2.84–1274	6.9
Male	85	79	96.6	42.9	30.5	6.54–142.75	3.4
Lintula	69.4	50	88	23.5	0.4	0.10–1.47	11.9
Female	56.7	61.5	80.7	33.3	1.1	0.11–11.66	19.2
Male	72.9	42.1	89.8	18.1	0.3	0–1.71	10.2
Eskelinen	76.4	65.6	92.2	34.4	2.1	0.53–8.26	7.8
Female	64.8	84.6	92.3	45.8	7.4	0.45–122.3	7.7
Male	79.7	52.6	92.1	27	0.9	0.16–5.77	7.8
Alvarado	75.8	65.6	92.1	33.8	2.5	0.85–7.88	7.9
Female	78.3	69.2	87.8	52.9	3.2	0.37–27.5	12.1
Male	75.1	63.1	93.4	26.6	2.6	0.63–11.03	6.5
Ultrasonography	81.1	28.1	85.7	21.9	1.7	0.55–5.44	14.3
Female	91.9	23	77.2	50	11.1	0.42–291.64	22.7
Male	78.2	31.5	88.8	17.1	1.5	0.42–5.83	11.1

PPV: Positive predictive value; NPV: Negative predictive value; DOR: Diagnostic Odds Ratio; CI: Confidence interval; NAR: Negative appendectomy ratio.

Table 5. Diagnostic performance parameters of scoring systems and USG combination in the diagnosis of the acute appendicitis

	Sensitivity	Specificity	PPV	NPV	DOR	%95 CI	NAR
USG+Ripasa >7.5	65.9	53.1	88.1	22.6	0.2	0–0.83	11.8
Female	59.5	61.5	81.5	34.8	0	0–1.48	18.5
Male	67.7	47.4	90	17.3	0.2	0–1.59	10
USG+Ohmann >12	65.2	84.3	95.6	31.4	17.5	4.35–70.75	4.3
Female	64.9	92.3	96	48	34.7	1.84–655.21	4.0
Male	65.4	79	95.7	24.6	17.2	3–97.92	4.4
USG+Lintula ≥21	55.8	68.7	90.4	22.6	0.5	0.12–2.63	9.5
Female	54.1	84.6	90.9	39.2	1.7	0.16–19.91	9.1
Male	56.4	57.9	90.4	15.9	0.2	0–2.50	9.6
USG+Eskelinen ≥57	61.7	71.8	92.1	26.1	1.6	0.33–8.60	7.9
Female	59.5	84.6	91.7	42.3	4.1	0.26–66.88	8.3
Male	62.4	63.1	92.2	19.3	1.2	0.1–12.21	7.8
USG+Alvarado ≥7	61.1	71.8	92	25.8	2.5	0.74–8.97	8
Female	70.2	69.2	86.7	45	2.5	0.34–18.13	13.3
Male	58.6	73.7	94	20.2	3.7	0.78–18.46	6.0

USG: Ultrasonography; PPV: Positive predictive value; NPV: Negative predictive value; DOR: Diagnostic Odds Ratio; CI: Confidence interval; NAR: Negative appendectomy ratio.

Table 6. ROC analysis of scoring systems and USG combination in the diagnosis of the AA

	AUC	SD	p	%95 CI
RIPASA+USG	0.595	0.048	0.049	0.524–0.663
Ohmann+USG	0.748	0.037	<0.001	0.683–0.807
Lintula+USG	0.623	0.046	0.007	0.552–0.690
Eskelinen+USG	0.668	0.044	0.001	0.599–0.733
Alvarado+USG	0.665	0.044	0.001	0.596–0.730

AUC: Area under the curve; SD: Standard deviation; CI: Confidence interval; ROC: Receiver Operating Characteristic; AA: Acute appendicitis; RIPASA: Raja Isteri Pengiran Anak Saleha Appendicitis; USG: Ultrasonography;

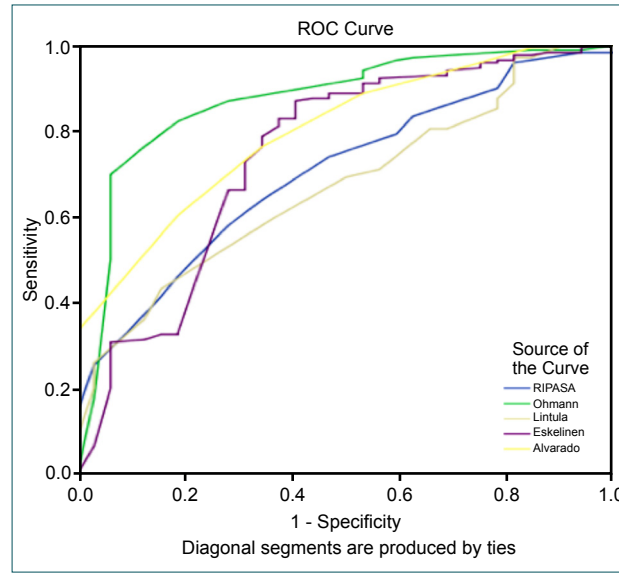

Figure 1. ROC curves of scoring systems.

DISCUSSION

Despite the development of clinical and diagnostic methods in acute appendicitis, difficulties in making the correct diagnosis remain. While morbidity rates due to diagnostic delays increase, NARs are still seen between 15–23%.[13] In this study, the NARs were 15.8% comparable with other studies. Various non-invasive and cost-effective scoring systems have been developed to minimize morbidity and negative appendectomy. In this study, the sensitivity and specificity of the Ohmann scoring system were highest among all scoring systems and it was found to be more predictive in the diagnosis of acute appendicitis in the regression model compared to other scoring systems. In all scoring systems, the rate of a negative appendectomy was lower in male patients than in female patients. When scoring systems were combined with USG, it was seen that the diagnostic accuracy of acute appendicitis and DOR were not increased, whereas when Ohmann scoring system was combined with USG, the lowest NAR was obtained, especially in women.

It is stated in some of the literature that the Ohmann scoring system is superior to other scoring systems in the diagnosis of acute appendicitis. In the study of Rastović et al.[14] comparing Modified Alvarado, Ohmann, and Eskelinen scoring systems in the diagnosis of acute appendicitis, it was stated that the scoring system with the best sensitivity and speci-

ficity was Ohmann. Similarly, Erdem et al.[2] reported that among Alvarado, Eskelinen, Ohmann, and RIPASA, the best scoring system was the Ohmann scoring system with 83.1% sensitivity and 80.6% specificity. Zielke et al.[15] reported that the sensitivity and specificity of the Ohmann scoring system were 63% and 93% in a study of 2359 patients with acute appendicitis. In this study, the sensitivity and specificity of the Ohmann scoring system were 82.3% and 81.2%, respectively. In addition, the highest AUC was observed via the Ohmann scoring system, although Lintula and Ripasa were weak, and all other scoring systems have strong diagnostic accuracy for acute appendicitis. Although some prospective studies have shown that scoring systems may be insufficient as a diagnostic test alone, it has been reported that good results can be obtained by combining clinical evaluation with either USG or Ohmann scoring.[15]

Although USG has been shown to have more than 70% sensitivity and specificity in the diagnosis of acute appendicitis, and it has been shown to have high diagnostic accuracy in acute appendicitis, the method depends largely on the user's experience and knowledge.[16–18] In the study conducted by Hosseini et al.,[19] the sensitivity and specificity of USG were reported as 37.1% and 87.2%, respectively, in tertiary health care centers. Due to its low negative predictive value (11.7%), USG was recommended for differential diagnosis and complicated cases of appendicitis rather than routine use. In a review by Pinto et al.,[20] it was stated that USG had highly variable sensitivity and specificity. In this study, sensitivity, specificity and Negative Predictive Value (NPV) of USG were 81.1%, 28.1%, and 21.9%, respectively. In addition, the scoring systems had similar sensitivity to USG and higher specificity than USG, and the combination of scoring systems with USG did not increase the diagnostic accuracy of acute appendicitis. These results were consistent with the recommendations in the literature stating that USG needs to be used in differential diagnosis or suspicious cases rather than routinely.

It is demonstrated in a study that acute appendicitis might be overlooked in 33% of premenopausal women, the NARs were 45% and gynecological causes constituted more than half of the cases in the premenopausal period. Additionally, the sensitivity of diagnosis of acute appendicitis by USG was 65%, with a specificity of 41%, which was lower than reported. USG had a 65% sensitivity and 41% specificity. Althoubaity et al.[21] concluded that negative appendectomy rates did not decrease with USG and could be decreased to a minimum of 8.3% by CT. In this study, the higher detection rate of negative appendectomy (22%) using only USG in female patients indicated that USG and scoring systems were more important in females. On the other hand, it was reported that scoring systems were also affected by age group, gender, and geographical population.[22] In our study, the integration of USG with the scoring systems did not change the DOR of Alvarado and Lintula, regardless of gender, but decreased the others. Similarly, it did not significantly reduce the NARs. In other words, the combination of the scoring systems with USG did not contribute positively to diagnostic accuracy and NARs. However, when analyzed by gender, NARs decreased in Lintula, Ripasa, and Ohmann scoring systems in female patients, yet did not change significantly in male patients. In conclusion, combining Ohmann, Lintula, and Ripasa scoring systems with USG can reduce NARs down to 4% in female patients. Regression analysis showed that the combination of scoring systems with USG reduced the AUC value in the diagnosis of acute appendicitis and the lowest NAR was obtained in female patients who were evaluated by a combination of USG and Ohmann. Similarly, Horzić et al.[23] stated that NARs were reduced by using Ohmann and Alvarado scores in female patients, while Althoubaity[21] stated that the Alvarado score in women had 89% sensitivity and 40% specificity and could have an effect on reducing NAR in female patients.

It has been reported in previous studies that scoring systems reduce NARs or increase diagnostic accuracy. These scoring systems include Alvarado[10,24] RIPASA,[25] Ohmann,[14] Eskelinen,[26] Lintula[27] and Adult Appendicitis Score.[28] However, the number of studies in which these systems were evaluated on a large scale and with imaging methods was quite limited. Mariadason et al.[9] found that in 76.1% of patients with positive Alvarado score 1.9% NARs were obtained, in 82.4% of patients in appendicitis detected with CT 1.3% NARs were obtained, especially male patients had minimal benefit from CT, and that CT would not be needed for many patients. Genzor et al.[10] reported that NAR rates decreased from 5.2% to 4.3% when Alvarado score above 5 and USG were evaluated together. Jha et al.[29] suggested that performing CT after USG can only benefit 3.1% of false-negative USG patients. Therefore, the patients can be evaluated with scoring systems without a CT scan. In this study, it was seen that more accurate results were obtained with Ohmann scoring rather than Alvarado scoring which is preferred more frequently in surgical practice, NARs were lowered, and for female patients, the lowest NAR was obtained when Ohmann was combined with USG.

Our study had some limitations. First, the effects of CT imaging could not be evaluated, but it was aimed to analyze the effects of USG which were more accessible and more applicable. Second, scoring systems were evaluated only in patients who underwent the appendectomy. Therefore, the sensitivity and specificity of scoring systems in the diagnosis of acute appendicitis may be overestimated.

In conclusion, the use of scoring systems in the diagnosis of acute appendicitis not only increases the accuracy of the diagnosis but also reduces the NARs. Among the scoring systems in which the results differ geographically, Ohmann scoring gave the best results considering the NARs and DOR in the patients. To decrease NAR, especially in female patients, USG is recommended to be evaluated together with scoring sys-

tems. With the quick and easy application of Ohmann scoring, diagnosis of acute appendicitis can be supported in cases where CT or USG facilities are limited, the need for tests that contains ionizing radiation, such as CT can be reduced, and unnecessary health costs, can be prevented by facilitating the early diagnosis of acute appendicitis.

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ORİJİNAL ÇALIŞMA - *ÖZET*

Skorlama sistemleri ve ultrasonografinin tanısal doğruluğunun negatif apandektomi oranı ve cinsiyet üzerine etkisi

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AMAÇ: Klinik, laboratuvar ve görüntüleme yöntemlerinin gelişmesine rağmen akut apandisit tanısı her zaman kolay olmamakta ve negatif apendektomi oranları hala yüksek seyretmektedir. Bu çalışmada amaç skorlama sistemlerinin kendi başına ve ultrasonografi (USG) ile beraber değerlendiğinde, doğru tanı oranlarına (DOR: Diagnostic Odds Ratio) ve negatif apendektomi oranlarına etkilerinin ortaya konulması amaçlandı.

GEREÇ VE YÖNTEM: Çalışmamıza akut apandisit tanısıyla ameliyat edilen ardışık 202 hasta ileriye yönelik olarak dahil edildi. Tüm hastaların Ohmann, Raja Isteri Pengiran Anak Saleha appendicitis (RIPASA), Lintula, Eskelinen ve Alvarado skorlama sistemleri kullanılarak ameliyat öncesi skorları hesaplandı. Olguların tümüne abdominal ultrasonografi randomize olarak uygulandı. Skorlama sistemlerinin sensitivitesi ve spesifitesi eşik değerlerine göre hesaplanmıştır. Eğri altındaki alan (AUC), ROC analizi ile hesaplanmıştır. Regresyon modelinde bağımlı değişken olarak apandisit histolojik tanısı kullanılırken, bağımsız değişkenler olarak skorlama sistemleri ve USG tercih edildi.

BULGULAR: Negatif apendektomi oranı %15.8'di. Akut apandisit tanısında her iki cinsiyet için de en belirleyici yöntemin Ohmann olduğu görüldü (Diagnostic Odds Ratio (DOR)=24.2, %95 GA 6.98–84.44). Benzer şekilde en düşük negatif apandektomi oranları kadınlarda %6.9, erkeklerde %3.4 ile Ohmann ölçeğiyle elde edildi. Ölçekler, USG ile kombine edildiğinde, akut apandisit belirleyiciliğinde artış olmadığı görüldü. Bununla birlikte kadınlarda Ohmann ile USG kombine edildiğinde negatif apandektomi oranlarının daha da düştüğü görüldü (%6.9 ve %4).

TARTIŞMA: Ohmann skorlaması kadın ve erkek hastalarda akut apandisit için iyi bir belirleyici olmasının yanı sıra, en iyi negatif apendektomi oranlarını sağlamaktadır. USG ile skorlama sistemlerinin kombinasyonu akut apandisit tanı değerini arttırmamaktadır, ancak kadınlarda USG ile Ohmann ölçeği birlikte kullanıldığında negatif apandektomi oranları oldukça düşmekteyken, erkeklerde bu fayda minimumdur.

Anahtar sözcükler: Alvarado; Eskelinen; Lintula; negatif apendektomi oranı; Ohmann; RIPASA; USG.

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