ORIGINAL ARTICLE

Assessment of Efficacy of Adult Appendicitis score For Diagnosis of Acute Appendicitis

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Abstract

Background: ***Diagnosing Acute Appendicitis presents challenges due to numerous differential diagnoses. Postponement in management may lead to increased mortality and morbidity rates, as clinical diagnosis entails a considerable chance of negative appendectomy, with literature reporting an incidence as high as 23%.***

Objectives: ***To assess the diagnostic efficacy of the Adult Appendicitis Score in cases with Acute Appendicitis.***

Methods: ***Prospective clinical research was implemented for 6 Months. One hundred patients with Right iliac pain and appendicitis who couldn't be excluded were recruited and subjected to Clinical and Lab. Based on a scoring system (Adult Appendicitis score).***

Results: ***AAS showed a significantly higher sensitivity (91.3% vs. 81.5%), specificity (18.5% vs. 8.7%), and negative predictive value (NPV) (71.4% vs. 28.65%) but lower positive predictive value (PPV) (48.8% vs 51.2%).***

Conclusion: ***The diagnosis of acute appendicitis is a complex endeavor in the absence of radiographic validation. AAS has exhibited superior accuracy, particularly in recognizing patients eligible for Discharge from the emergency room. These data indicate that AAS diminishes the dependency on radiological imaging and more effectively lowers the incidence of negative appendicitis.***

Keywords: Appendicitis; Alvarado; Adult Appendicitis score; Negative appendectomy

1. Introduction

Acute appendicitis is a commonly confronted abdominal surgical emergency, with an expected lifetime probability of 7–8%. In affluent nations, the frequency is roughly 90–100 instances per 100,000 individuals per year, predominantly impacting teens and young adults, with a higher prevalence among males .[1]

Consequently, diagnosing Acute Appendicitis presents challenges due to numerous differential diagnoses, particularly in females. Postponement in management may lead to increased mortality and morbidity rates, as clinical diagnosis entails a considerable chance of negative appendectomy, with literature reporting incidence as high as 23% .[2]

The clinical diagnosis of acute appendicitis traditionally relies on the patient's medical history and clinical assessment .[3]

Even with the significant advancement in understanding appendicitis, precise diagnosis continues to be inadequate. Integrating imaging studies into the diagnostic process improves the accuracy of Acute Appendicitis diagnosis and decreases the incidence of negative appendectomy .[4]

The utilization of imaging may result in a postponement of surgical consultation and intervention, hence elevating the probability of complications .[5]

Clinical scoring systems have significantly enhanced diagnostic accuracy and diminished the necessity for additional surveys such as ultrasound, CT scans, and MRI. These grading methods rely on symptoms, signs, and test results to enhance clinical suspicion of Acute Appendicitis, albeit they do not yield a conclusive diagnosis .[6]

Despite the Alvarado score's popularity, its diagnostic efficacy in predicting acute appendicitis remains inadequate to be deemed the primary scoring system .[7]

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A new scoring system termed the adult appendicitis scoring system emerged .[8]

In addition to clinical (signs and symptoms) and laboratory data (Leucocyte count and CRP), the Adult appendicitis score considers the critical effect of gender and extent of symptoms. It assists in categorizing patients correctly into three distinct groups (Low Probability, Intermediate Probability, and High Probability of AA) .[6]

Nevertheless, published research is insufficient regarding the evaluation of adult appendicitis scoring systems despite the recommendations from the WSES 8.

This study aims to assess the diagnostic efficacy of the Adult Appendicitis Score in cases with Acute Appendicitis.

2. Patients and methods

Prospective clinical research was implemented at Al-Azhar University Hospital, Cairo. And Al Ahrar Zagazig Teaching Hospital. For 6 Months, one hundred patients with Right iliac pain and appendicitis who couldn't be excluded were recruited. This study was carried out after authorization of the Ethical Committee of Faculty of Medicine, Al-Azhar University and obtaining informed and written consent from the elected participant.

Selection criteria

Adult patients (Age <18 years) who underwent appendectomy.

Participants meeting any of the subsequent criteria were eliminated from the study: aged less than eighteen years, right iliac fossa mass, Generalized peritonitis, acute abdomen, and iliac fossa pain due to Gynecological or Urological causes.

Grouping:

Participants were subdivided into two groups:

Group A: Adult Appendicitis score is ≥ 16.

Group B: Clinically diagnosed Acute appendicitis, even if AAS < 16.

The diagnosis was confirmed with a histopathological study for all cases.

Methods

Each patient included in the study was submitted to the following:

Medical history taking, General and Local examination, and Standard preoperative Investigations included CRP, Pelvic-abdominal ultrasound, and Clinical and Lab. Based on a scoring system (Adult Appendicitis score).

Surgical intervention (open appendectomy as one-day surgery)

Postoperative follow-up: Time of operation, Duration of hospital stay, Sensitivity and specificity of Adult Appendicitis score, and Histopathological Study to correlate.

Statistical Assessment

Data analysis was applied using Stata 17 SE statistical software. Qualitative data were evaluated using the Chi-square test, while quantitative data were analyzed with the independent t-test. The p-value was deemed significant at the threshold of <0.05.

3. Results

In the present research, 100 participants with acute appendicitis were separated into two groups: 54 patients operated based on clinical diagnosis (group A), and 46 patients had AAS over 16 (group B).

In group A mean age was 20.1 years, while in group B was 22.7 years; most of group A were female (81.5%), while in group B were male (69.6%) with statistically significant (p=0.01).

Both groups showed similar clinical presentation, while group B showed significantly higher temp, longer symptom duration, and higher TLC count. (Table 2-3).

Patients in group B are associated with significantly longer operative time (35.2 vs. 42.2 min), respectively, as well as hospital stays (21.9 vs 26.1 hr) respectively (p<0.05).

As regards to appendix finding, 14.8% in group A were normal, while 8.7% in group B were normal. (Table 4).

AAS showed a significantly higher sensitivity (91.3% vs. 81.5%), specificity (18.5% vs. 8.7%), and negative predictive value (NPV) (71.4% vs. 28.65) but lower positive predictive value (PPV) (48.8% vs 51.2).(Table 5)

Table 1. illustration of Adult Appendicitis scores a

SYMPTOMS AND FINDINGS		SCORE
PAIN IN RLQ		2
PAIN RELOCATION		2
RLQ TENDERNESS		3/1[b]
GUARDING	Mild	2
	Moderate or severe	4
LABORATORY TESTS		
BLOOD LEUKOCYTE COUNT (×10⁹)	≥7.2 and <10.9	1
	≥10.9 and <14.0	2
	≥14.0	3
THE PROPORTION OF NEUTROPHILS (%)	≥62 and <75	2
	≥75 and <83	3
	≥83	4
CRP (MG/L), SYMPTOMS < 24 H	≥4 and <11	2
	≥11 and <25	3
	≥25 and <83	5
	≥83	1
CRP (MG/L), SYMPTOMS > 24 H	≥12 and <53	2
	≥53 and <152	2
	≥152	1

a AAS Risk Stratification; Score 0–10 For Low Probability, score 11–15 For Intermediate Probability, Score ≥ 16 For High Probability Of AA.

b Men and women age 50+/women, age 16–49 [6].

Table 2. Comparison of clinical symptoms of studied groups:

	CLINICAL (N=54)		AAS (N=46)		P VALUE
	N	%	N	%	
ANOREXIA	53	98.1	43	93.5	0.2
NAUSEA	33	61.1	28	60.9	0.9
VOMITING	16	29.6	7	15.2	0.09
REBOUND TENDERNESS	54	100	46	100	-
	Mean	SD	Mean	SD	
TEMP (°C)	37.5	0.5	37.8	0.4	0.04*

Table 3. Comparison of AAS items of Studied groups:

		CLINICAL (N=54)		AAS (N=46)		P VALUE
		Mean	SD	Mean	SD	
SYMPTOMS DURATION (HR.)		42.2	18	48.8	18.9	0.01*
		N	%	N	%	
RLQ PAIN		54	100	46	100	-
RELOCATION		54	100	46	100	-
RLQ TENDERNESS		54	100	46	100	-
GUARDING	No	29	53.7	0	0	0.01*
	mild	17	31.5	25	54.3	
	moderator to sever	8	18.8	21	45.7	
		Mean	SD	Mean	SD	
TLC		10	4.2	14.4	3.9	0.01*
NEUT %		64.6	14	83.9	6.8	0.01*
AAS		12.4	1.8	17.4	1.4	0.001*
		Clinical (n=54)		AAS (n=46)		p Value
		< 24 hr	>24 hr	< 24 hr	>24 hr	
CRP	1 (%)	0	2 (3.7)	0	1 (2.2)	0.7
	2 (%)	19 (35.2)	30 (55.6)	8 (17.4)	33 (71.7)	
	3 (%)	3 (5.6)	0	3 (6.2)	1 (2.2)	

Table 4. Comparison of appendix findings between studied groups:

FINDING	CLINICAL (N=54)		AAS (N=46)		P VALUE
	N	%	N	%	
ABSCESS	1	1.9	0	0	0.01*
APPENDICITIS WITH FECOLITH	3	5.6	0	0	
CATARRHAL APPENDICITIS	28	51.9	10	21.7	
CATARRHAL WITH FECOLITH	2	3.7	0	0	
GANGRENOUS	1	1.9	1	2.2	
NORMAL	8	14.8	4	8.7	
SUPPURATIVE	9	16.7	31	67.4	
TUBO OVARIAN ABSCESS	2	3.7	0	0	

Table 5. Comparison of sensitivity and specificity of AAS in the studied group:

	SEN	SPE	PPV	NPV	P VALUE
AAS	91.3	18.5	48.8	71.4	0.02*
CLINICAL	81.5	8.7	51.2	28.6	

4. Discussion

Acute appendicitis is a common abdominal surgical emergency with an approximate lifetime probability of seven to eight .[1]

The diagnosis of appendicitis is complex, and disputes regarding its care persist across many settings and practice patterns globally, as clinical diagnosis entails a considerable chance of negative appendectomy, reaching up to 23% .[9]

Nevertheless, significant recent advancements in the understanding of appendicitis, precise diagnosis continues to be inadequate .[4]

The adult appendicitis score takes into account the significant influence of gender and symptom extent. It assists in the precise categorization of patients into three distinct groups: Low Probability, Intermediate Probability, and High Probability of AA .[6]

This study aims to assess the diagnostic efficacy of the Adult Appendicitis Score in cases with Acute Appendicitis.

In the present research, 100 participants with acute appendicitis were separated into two groups: 54 patients operated based on clinical diagnosis (group A), and 46 patients had AAS over 16 (group B).

In Gujar et al.[10] study migration pain to the right iliac fossa was the main prevalent warning sign, which presented in 87% of the patients, while tenderness in the right iliac fossa was the main prevalent sign, which presented in 100% and this may be due to difference in socio-economic levels between patients in the two studies as well as difference in numbers.

Also, in the present study, right iliac fossa pain and tenderness were the main symptoms, followed by Anorexia and nausea.

A substantial association was identified between both clinical assessments and AAS with the following criteria: WBC count, neutrophil count, and CRP levels. These measures indicated an escalation in the severity scoring of AA and were previously regarded as indicators for its diagnosis.

On the other hand, no individual biomarker has exhibited substantial diagnostic efficacy for standalone use in clinical practice .[11]

As regards appendix finding 14.8% in group A were normal (negative appendicitis) while 8.7% in group B (AAS) were normal (negative appendicitis). In the present study, all negative cases were female (7 cases). This finding is advantageous in relation to the literature rate.[12,13]

This is favorable compared to the prior studies that showed an elevated negative appendicitis rate in females .[14]

In a study by Ghali et al.[6] negative appendicitis was found in 4 % of female patients.

In the present analysis, the readmission incidence was 20.7% and 17.7% for the clinical and AAS groups, respectively, mainly for post-appendectomy ileus, which responds very well to conservative management.

In Ghali et al.[6] study, 20 patients (1.5%) were

readmitted for postoperative intra peritoneal, ileus, and pain.

This contrasts with another study that revealed a higher readmission incidence of 11.9% among participants, with 25% attributable to postoperative intraperitoneal collection. Furthermore, the alternative study indicated a reoperation incidence of 2.5%, which is clinically significant in contrast to our study's rate of about 0.2% .[15]

A meta-analysis conducted by Bailey et al.[16] reported a readmission incidence of 4.5 %.

The primary causes of readmission were identified as postoperative abdominal collection and abdominal pain .[17]

Numerous scoring systems have been developed over time. The Alvarado score is among the first and most widely utilized scoring systems globally. Multiple studies in the literature have assessed the Alvarado score for diagnosing appendicitis, producing inconclusive findings with both supportive and contradictory evidence .[7]

Consequently, we sought to justify a novel scoring system within our hospital, with the objective of identifying a more appropriate score that might accurately diagnose AA and mitigate the overutilization of radiological procedures.

A cut-off value (≥ 16) was chosen based on a previous study by Chae et al.[18].

Upon categorizing the AA cases according to Histopathological findings and intraoperative results, we observed that group I of AAS had a greater percentage of morphologically normal appendices or a lack of histological inflammation in comparison to group I of Alvarado. This indicates that AAS can proficiently recognize a greater number of patients with negative appendicitis and can transition the treatment approach from surgical to conservative, particularly in individuals with a lower probability score (group I).

AAS showed a significantly higher sensitivity (91.3% vs. 81.5%), specificity (18.5% vs. 8.7%), and negative predictive value (NPV) (71.4% vs. 28.65%) but lower positive predictive value (PPV) (48.8% vs 51.2%). The overall diagnostic accuracy was 71% for AAS.

Ghali et al.[6] reported the specificity and sensitivity of AAS at various cut-off points (11, 16, and 18). The higher sensitivity (88.9%) was at (11 points), while the highest specificity (86.7%) was at (18 points)

Upon assessing the sensitivity and specificity of AAS at various cut-off thresholds, Ghali et al.[6] observed that AAS scores revealed moderate overall diagnostic accuracy.

In the validation research by Sammalkorpi et al.[19] the AAS was utilized in the diagnostic assessment of adult patients suspected of appendicitis, with 48% confirmed to have the condition. The AAS high-probability group (AAS ≥16) included 439 individuals, of whom 386 (87.9%) were confirmed to have appendicitis during surgery. The post-test likelihood of appendicitis, based solely on the AAS score without imaging, rose to 92.6%, corresponding to a negative appendectomy rate of 7.3%.

Chae et al.[18] Similar findings were also reported, indicating that AAS scores have effectively excluded appendicitis in the low-risk group I, facilitating safe release.

A recent systematic review of the literature on the diagnostic efficacy of various scoring systems affirmed that AAS was predominantly effective in excluding appendicitis and categorizing low-risk patients for AA, thereby decreasing the necessity for radiological assessments and minimizing negative appendicitis rates within these cohorts.[20]

4. Conclusion

The diagnosis of acute appendicitis is a complex endeavor in the absence of radiographic validation. AAS has exhibited superior accuracy, particularly in recognizing patients eligible for release from the emergency room, since it can proficiently identify a greater number of negative appendicitis cases. These data indicate that AAS diminishes the dependency on radiological imaging and more effectively lowers the incidence of negative appendicitis.

Disclosure

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