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COMPARISON OF APPENDICITS INFLAMMATORY RESPONSE (AIR) SCORE WITH ALVARADO SCORE IN THE DIAGNOSIS OF ACUTE APPENDICITIS

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Abstract:

Introduction: *Acute appendicitis is acute inflammation of appendix. It is a common acute surgical condition for which mainstay standard treatment is appendectomy.* ***Objectives:*** *The main objective of the study is to compare the appendicits inflammatory response (AIR) score with alvarado score in the diagnosis of acute appendicitis.* ***Material & Methods:*** *This cross-sectional study was conducted in SIMS during June 2019 to January 2020. All patients fulfilling inclusion criteria were included in the study. Demographic data was collected from medical records.* ***Results:*** *A total of 100 patients were included in the study. Surgery was performed in 59 patients and samples sent confirmed acute appendicitis on histopathology. No significant difference was found in both groups between the positive and negative appendicitis regarding patient`s gender. The AIR score also outperformed the Alvarado score in the analysis of the more difficult to diagnose patients, including women, children, and the elderly.* ***Conclusion:*** *It is concluded that the AIR score probably works better in the pediatric population than the Alvarado score because the variables scored are easy to apply to children. The Alvarado score requires children to identify nausea, anorexia, and migration of pain.*

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INTRODUCTION:

Acute appendicitis is acute inflammation of appendix. It is a common acute surgical condition for which mainstay standard treatment is appendectomy. While delay in diagnosis and intervention may lead to serious complications like perforation and abscess or mass formation, rushing to surgery without considering other pathologic conditions can lead to unindicated appendectomy up to 15-30% [1]. Computed abdominal tomography (CAT) is now gold standard tool for diagnosis. It is highly sensitive and specific. While helping surgeons reach a definitive diagnosis of acute appendicitis, radiation exposure remains an Achilles heel for this effective diagnostic modality which can lead to increased incidence of cancer. Hence, other diagnostic modalities have also been suggested [2].

Ultrasound scan is not only cost effective but also has lesser radiation exposure. Its efficacy is marred by operator dependability leading to its low sensitivity. Alvarado score is a clinical scoring system of for diagnosis of acute appendicitis developed by Alvarado [3]. To our knowledge no evaluation has been done or published study yet to compare diagnostic performance of Alvarado score and ultrasound in our set up [4].

Objective

The main objective of the study is to compare the appendicits inflammatory response (AIR) score with alvarado score in the diagnosis of acute appendicitis.

MATERIAL & METHODS:

This cross-sectional study was conducted in SIMS during June 2019 to January 2020. All patients fulfilling inclusion criteria were included in the study. Demographic data was collected from medical records. Alvarado score was calculated for each patient in accordance with original Alvarado score. Alvarado score and AIR score were present in table 01.

Table 01: Characteristics of the appendicitis inflammatory response (AIR) score and the Alvarado score

Diagnosis	Alvarado score	AIR score
Vomiting		1
Nausea or vomiting	1	
Anorexia	1	
Pain in RLQ	2	1
Migration of pain to the RLQ	1	
Rebound tenderness or muscular defense	1	
Light		1
Medium		2
Strong		3
Body temperature >37.5°C	1	
Body temperature >38.5°C		1
Leukocytosis shift	1	
Polymorphonuclear leukocytes		
70–84%		1
≥85%		2

Variables recorded to evaluate the scoring systems include nausea, vomiting, anorexia, migration of pain to the right lower quadrant (RLQ), pain in the RLQ, rebound tenderness, muscular defense, body temperature, high white blood cell (WBC) count, proportion of polymorphonuclear leukocytes, and a high level of C-reactive protein (CRP). These variables are necessary to calculate both the Alvarado score and the AIR score. The two scores are based on different variables, with different points assigned to each variable.

We used SPSS version 21 for data analysis in our study. Regarding continuous variables, descriptive statistics were computed and described as mean ± SD.

RESULTS:

A total of 100 patients were included in the study. Surgery was performed in 59 patients and samples sent confirmed acute appendicitis on histopathology. A total of 41 patients did not had appendicitis but some other diseases confirmed on ultrasound scan. These patients were treated accordingly without doing an appendectomy. (Table 1)

Table 1. The final diagnosis in the negative appendicitis group (n=41)

Diagnosis	Number of cases
Ovarian cyst	15
Ileocecal tuberculosis	19
Ureteric stone	2
Mesenteric lymphadenitis	5
Total	41

Our study included 100 patients out of which 68 were males and 22 were females. Age of the patients range from 20-54 years with a mean age of 33.6±11.2 years. No significant difference was found in both groups between the positive and negative appendicitis regarding patient`s gender. The AIR score also outperformed the Alvarado score in the analysis of the more difficult to diagnose patients, including women, children, and the elderly.

Table 2. Analysis of AIR parameters for statistical significance

	No. of patients	AIR score	Alvarado score	*p* Value
Overall	100	0.96	0.82	<0.001
Advanced appendicitis[a]	71	0.96	0.82	<0.001
Gender				
Men	68	0.95	0.79	<0.001
Women	22	0.96	0.82	<0.001
Age, years				
<18	20	0.96	0.80	<0.001
18–49	60	0.97	0.88	<0.001
≥50	20	0.92	0.75	<0.001

Table 3: Diagnostic characteristics of the AIR score and Alvarado score according to the cut off points

	AIR score		Alvarado score	
Diagnostic value	**>4 points**	**>8 points**	**>4 points**	**>8 points**
All appendicitis				
Sensitivity	0.93	0.10	0.90	0.29
Specificity	0.85	1.00	0.55	0.95
PV+	0.79	1.00	0.53	0.77
PV–	0.95	0.66	0.90	0.70
Advanced appendicitis				
Sensitivity	0.93	0.24	0.92	0.35
Specificity	0.85	1.00	0.55	0.95
PV+	0.52	1.00	0.26	0.55
PV–	0.99	0.88	0.98	0.90

PV+ positive predictive value, *PV*− negative predictive value

DISCUSSION:

Although CT scan is the investigation of choice for diagnosis of acute appendicitis but radiation exposure and long term risk of cancer remains the pitfall of this scan. The present study shows that the AIR score has a good statistical discrimination for patients with acute appendicitis and outperforms the Alvarado score. The discriminatory property of the AIR score remains high in the more difficult to diagnose patients (e.g., women, children, and the elderly). Nowadays, the use of US or CT in patients suspected of having appendicitis is common. However, imaging does not perform well in patients with low and high prevalence of the disease, and CT should be used selectively to minimize exposure to ionizing radiation [7].

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be used selectively to minimize exposure to ionizing radiation [8]

Routine use of an Alvarado-like scoring system was evaluated in a large German study comparing 870 patients who did not receive routine scoring with 614 patients who were evaluated with Alvarado-like scoring system. The scoring system consisted of eight variables developed in another study and validated on a Dutch population [9]. The scoring system also did not include C-reactive protein, and it found no difference in the rates of perforated appendix, negative appendectomy, or complications between groups. However, it did find a significantly lower delayed appendectomy rate (2 vs. 8%) and a lower delayed discharge rate (11 vs. 22%) in the group that routinely used the scoring system [10].

CONCLUSION:

It is concluded that the AIR score probably works better in the pediatric population than the Alvarado score because the variables scored are easy to apply to children. The Alvarado score requires children to identify nausea, anorexia, and migration of pain. This is probably the reason why the Alvarado score compares best to the AIR score in the adolescent age group, because this group closely mimics the initial cohort on which the Alvarado score was designed. The management of patients with suspected acute appendicitis is still challenging, and the optimal management strategy is still unknown, even after the introduction of US, CT, and diagnostic laparoscopy. This study externally validates that the AIR score has a high discriminating power and outperforms the Alvarado score.

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