Evaluation of Appendicitis Inflammatory Response Score in Suspected Cases of Acute Appendicitis.

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Abstract

Background: Acute appendicitis is a common surgical disease with varied clinical presentation, diagnosis of which can be at times a clinical challenge. In individuals with severe abdominal pain, scoring systems have been developed to help in the identification of acute appendicitis. In 2016 the World Society of Emergency Surgery published guidelines for diagnosing acute appendicitis that included diagnostic scoring.

Aims & Objectives: To validate the AIR score on a consecutive cohort of patients with clinical suspicion of acute appendicitis and compare the AIR score with histopathological report

Methodology: Prospective study was conducted, using consecutive sampling technique during 2020 to 2022 at Sree Gokulam Medical College, Trivandrum, Kerala, India. Totally 97 patients presenting with pain in the right lower quadrant of abdomen at the Emergency Department, who after clinical examination and relevant investigations were provisionally diagnosed to have acute appendicitis and warranted surgery for the same were evaluated using the scoring systems - Alvarado Score and Appendicitis Inflammatory Response Score. The scores were tallied and compared with final histopathology report.

Results: The majority of participants (56.7%) were under the age of 20, and the majority of them were men (60.6%). We have observed that Alvarado scoring system and AIR Scoring system both had significantly related with Histopathological report (P<0.001). Yet the

diagnostic accuracy is higher in Alvarado Scoring system (87.62%) than AIR scoring method (79.38%). Likewise, sensitivity is significantly higher (P=0.05) in Alvarado Scoring system (79.38%) than in AIR (88%).

Conclusion: While assessing high-risk groups, AIR and Alvarado scores fared similarly. It is undoubtedly possible to make accurate decisions in suspected instances of appendicitis using scoring systems like the AIR score, which uses CRP as a variable (PPV=100%). In order to prevent negative appendectomies, scoring systems should help with proper diagnosis.

Keywords: Appendicitis, Scoring system, Alvarado, AIR.

Introduction

Appendix inflammation is referred to as appendicitis. Right lower abdomen pain, nausea, vomiting, and decreased appetite are typical symptoms. 40% of persons, however, do not exhibit these classic symptoms [1]. Diagnosing appendicitis accurately is difficult in a country like India where around 75% of the population lives in rural and remote areas with limited access to medical and surgical care. A 2005 study in the Netherlands indicated that 15% of patients suffered a negative appendectomy, a figure that was similar to one from a Swedish study [2].

In individuals with severe abdominal pain, scoring systems have been developed to help in the identification of acute appendicitis. The diagnosis and treatment of acute appendicitis were the subject of a consensus statement published in 2015 by the European association of endoscopic surgeons (EAES). According to the severity of the appendicitis, they suggested in their statement that the patient be divided into three classes using diagnostic scoring [3]. In 2016 the World Society of Emergency Surgery published guidelines for diagnosing acute appendicitis that included diagnostic scoring.

The Alvarado score is the most popular and effective method for confirming acute appendicitis, however it has certain limitations. Its development was based on a review of individuals who had undergone surgery because there was a suspicion of appendicitis, and the C reactive protein level is not included in the grading system [4].

To address these issues, the appendicitis inflammatory response score (AIR) was developed. C reactive protein levels are taken into account by the score [5]. So we have aimed to assess whether appendicitis inflammatory response score can be used a scoring system to diagnose Acute Appendicitis.

Methodology

Prospective study was conducted, using consecutive sampling technique during 2020 to 2022 at Sree Gokulam Medical College, Trivandrum, Kerala, India. Totally 97 patients presenting with pain in the right lower quadrant of abdomen at the Emergency Depart Ment, who after clinical examination and relevant investigations were provisionally diagnosed to have acute appendicitis and warranted surgery for the same were evaluated using the scoring systems - Alvarado Score and Appendicitis Inflammatory Response Score.

The scores were tallied and compared with final histopathology report. Cases with score of 1-4 were observed for development of acute appendicitis. Cases with score of 5-8 were observed for next 24 hours, reevaluated. If their clinical condition was highly suspicious of acute appendicitis as decided by treating surgeon, they were subjected for appendicectomy. If at any point, the surgeons decided that on examination, clinical features were convincing enough to warrant

surgery, then irrespective of the scores appendicectomy were performed. All patients who were considered for appendectomy underwent ultrasonography of abdomen to rule out other conditions mimicking acute appendicitis. Both scoring systems were compared with final His to pathology analysis report as it is taken as the gold standard for the diagnosis.

Appendicitis is pathologically diagnosed when infiltration of the muscularis propria by neutrophil, granulocyte is seen in the appendix specimen. Data were analysed with SPSS Software Sensitivity, specificity, positive predictive value and negative predictive value of AIRS system will be computed. Statistical analysis was by Mcnemar test to compare the AIRS scoring system with histopathology report and Alvarado score.

Results

Overall 97 patients were included in this study, among which majority of them (56.7%) were under the age of 20, and the most of them were men (60.6%).
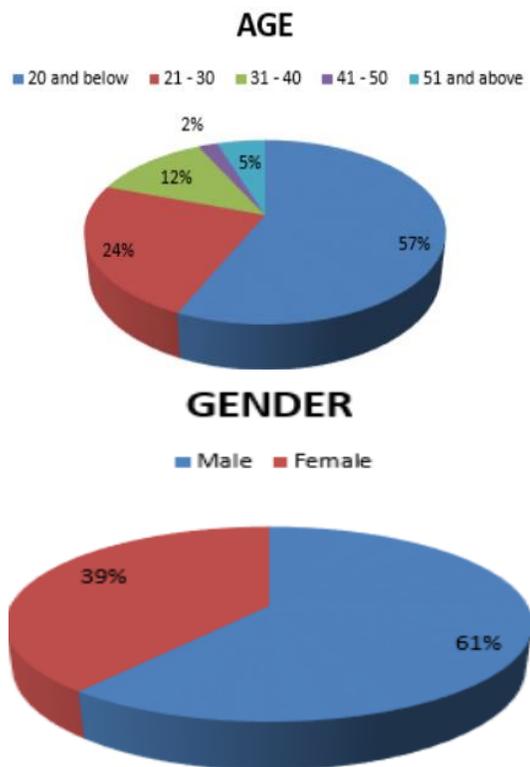

Figure 1: Distribution according to age and gender.

We have observed that Alvarado scoring system and AIR Scoring system both had significantly related with Histopathological report (P<0.001) (Table 1 & 2)

Table 1: AIRS Vs Histopathological.

| AIRSGR | HISTOPATHOLOGICAL | | Total | Chi Square | df | p-value |
	NEGATIVE APPENDICITIS	SUGGESTIVE OF ACUTE APPENDICITIS				
Low Risk (Indeterminate)	14	20	34			
High Risk (Acute Appendicitis)	0	63	63	30.317 a	1	<0.001
Total	14	83	97			
Sensitivity: 75.9%, Specificity: 100%, PPV: 100, NPV: 41.17% and Diagnostic Accuracy: 79.38%						

*p <0.001.

Table 2: ALVARGR Vs Histopathological

| ALVARGR | HISTOPATHOLOGICAL | | Total | Chi Square | df | p-value |
	NEGATIVE APPENDICITIS	SUGGESTIVE OF ACUTE APPENDICITIS				
Low Risk (Indeterminate)	12	10	22			
High Risk (Acute Appendicitis)	2	73	75	37.071 a	1	<0.001
Total	14	83	97			
Sensitivity: 88%, Specificity: 85.7%, PPV: 97.33, NPV: 54.4% and Diagnostic Accuracy: 87.62%						

*p<0.001.

Graph 2: Comparison of AIRS and ALVARGR scoring systems in terms of diagnostic accuracy in a case of acute appendicitis
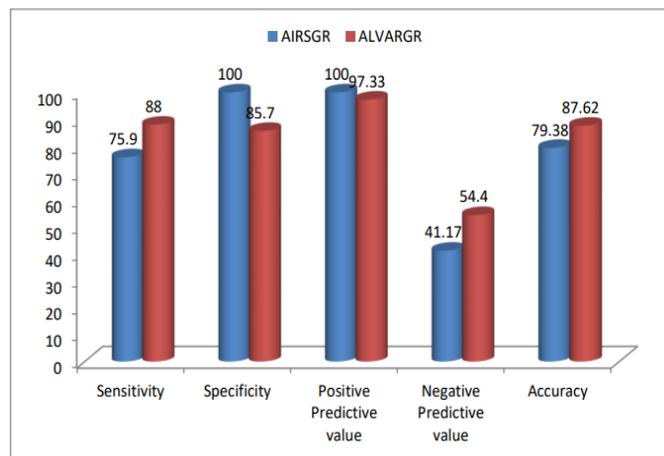
Table 3: Comparison of AIRS and ALVARGR scoring systems in terms of diagnostic accuracy in a case of acute appendicitis.

	AIRSGR	ALVARGR	t	P - values
Sensitivity	75.9	88	13.55*	0.05
Specificity	100	85.7	12.99*	0.05
False positive	24.1	12	2.98	0.21
False Negative	0	14.3	1.00	0.50
Positive Predictive value	100	97.33	73.91**	0.01
Negative Predictive value	41.17	54.4	7.22	0.09
Positive Likelihood ratio	-	6.2	1.00	0.50
Negative Likelihood ratio	0.2	0.14	5.67	0.11
Accuracy	79.38	87.62	20.27*	0.03

**Significant at 0.01 level, * p=0.05, significant

The diagnostic accuracy is higher in Alvarado Scoring system (87.62%) than AIR scoring method (79.38%). Likewise, sensitivity is significantly higher (P=0.05) in Alvarado Scoring system (79.38%) than in AIR (88%) (Figure 2 & Table 3).

Discussion

A simple and efficient scoring method without Tomo graphic or imaging tests could aid in emerging and low-income nations to reduce misdiagnosis and lower the rate of unsuccessful appendectomies. The Alvarado scoring system has undergone a number of revisions. Thus, the Appendicitis Inflammatory Response Score (AIR) was created in Sweden in 2008 based on pros pectively gathered data of variables with independent predictive value to solve the shortcomings of the Alvarado scoring system. Due to its straight forward application and design, this scoring system is able to estimate the likelihood of appendicitis and can be used to enhance decision-making in cases of acute appen dicitis [6].

Our research compared the AIR score with the Alvarado scoring system in situations where acute appendicitis was suspected. Another benefit of AIR scoring involves not only making a specific (Specificity -100%) accurate diagnosis but also determining objectively and (Positive Predictive value – 100%) whether performing surgery or not without a follow-up is necessary. When compared to the Alvarado scoring system in our investigation, the AIR score in patients with acute appendicitis had a high statistical correlation in sensitivity and Positive Predictive value. The same was confirmed in a number of earlier research by Sudhir et al and Kim BS et al. [7 & 8]

In our findings the diagnostic accuracy is higher in Alvarado Scoring system (87.62%) than AIR scoring method (79.38%). Likewise, sensitivity is significantly higher (P=0.05) in Alvarado Scoring system (79.38%) than in AIR (88%). These findings are correlating with Patil et al's findings where in their study he concluded that Alvarado score was exceeded by the appendicitis inflammatory response score, which showed greater sensitivity and specificity. A rating system like this is necessary for better results. In order to prevent negative appendectomies, scoring systems should help with proper diagnosis. Acute appendicitis can be diagnosed in individuals using ultrasound. Comparable to investi gations by Castro et al. were the results of the current study.

Conclusion

The therapy of acute appendicitis remains difficult even though it is one of the most prevalent surgical emergencies. When assessing high-risk groups, AIR and Alvarado scores fared similarly. Alvarado score was outperformed by the appendicitis inflammatory response score because it had more specificity. The Alvarado score fared better than the AIR score and showed greater sensitivity. It is undoubtedly possible to make accurate decisions in suspected instances of appendicitis using scoring systems like the AIR score, which uses CRP as a variable (PPV=100%). This reduces the necessity for

radiological tests, which lowers costs for the patient and the hospital. A rating system like this is necessary for better results. In order to prevent negative appendectomies, scoring systems should help with proper diagnosis.

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