



Original Article

ROLE OF ALVARADO SCORE IN DIAGNOSIS OF ACUTE APPENDICITIS

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Abstract

Background: Appendicitis may be associated with morbidity and occasionally mortality. If failed to diagnose early, the situation may become more complicated.

Objective: To validate the role of Alvarado score in diagnosis of acute appendicitis.

Methods: A total of 282 patients with clinically diagnosed acute appendicitis were included in this study. Patients were examined thoroughly, investigated and managed accordingly. The relevant data collected and analysed.

Results: : Out of 282 patients, surgical procedures were performed in 59.57% of the patients. The overall negative appendectomy rate was 9.52%, and the percentage of Positive Predictive Value (PPV) for Alvarado score was 92.26%.

Conclusion: Our study validates the Alvarado score as fast, simple and reliable diagnostic tool for acute appendicitis.

Key Words: Abdominal Pain, Alvarado Score, Appendicitis, Appendectomy.

Introductn

Acute Appendicitis is one of the commonest conditions responsible for admission of the patients to hospital. The hospitalization rate for patients over 60 years old ranges from 18% to 42%¹. Acute appendicitis is the most common cause of an acute abdomen in young adult with a life time risk of about 6%². Difficulty in diagnosis arise in very young, elderly patients and females of reproductive age because they usually have atypical presentation and many other conditions also present like appendicitis and literature shows that 2-7% of all adults on exploration have diseases other than appendicitis³.

Appendicitis may be associated with morbidity and occasionally mortality. If failed to diagnose early, the situation may become more complicated. These complications will lead to rupture of appendix causing peritonitis, which leads to circulatory shock. Numerous studies have been revealed that the early diagnosis

and timely operative intervention is the key for success in the management of acute appendicitis. However, the picture of acute appendicitis may not be classical, and in such situations, a policy of early surgery to avoid risk may lead to high negative appendectomy rates⁴.

The simple scoring system developed by Alvarado in 1986 was evolved for the purpose of affirmative and earlier diagnosis of acute appendicitis. This scoring system is mainly based on history, examination and simple lab investigations which includes 3 symptoms (Migratory pain in right iliac fossa, Anorexia, Nausea/Vomiting), 3 signs (Fever, Tenderness & Rebound tenderness in right iliac fossa) and 2 lab investigation⁵ (Leucocytosis, Shift to left of neutrophils)⁵. This study was designed to evaluate the usefulness of the Alvarado scoring system in earlier diagnosis of acute appendicitis.

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Materials and Methods

This prospective study was conducted on 282 consecutive patients with suspicion of acute appendicitis reported in surgical wards of Sher-E-Bangla Medical College Hospital, Barisal over a period of one year from 1st January to 31st December, 2016. Patients with clinical suspicion of acute appendicitis were included in the present study. Patients with appendicular lump, appendicular perforation, appendicular abscess and having significant co-morbidity, or patients with negative consent were excluded from the study.

On admission, the history of presenting complaints was elicited properly and patients were examined

thoroughly. Relevant baseline investigations were sent and treatment started simultaneously. Findings were evaluated according to Alvarado scoring system (Table I) and recorded on predesigned proforma. Plan of management was decided according to the interpretation of Alvarado score as follows; score 1-4: Appendicitis Unlikely, 5-6: Appendicitis Possible and 7-10: Appendicitis highly probable. Patient with Alvarado score 7 or greater, were subjected to appendectomy and rest of the patients were managed conservatively. But the decision to undergo surgery was purely on clinical ground. Histopathological findings of appendectomy samples were recorded on proforma and data analysed.

Table -1: Alvarado Scoring System (MANTRELS).

Variables	Clinical Features	Score
Symptoms	Migratory RIF Pain	1
	Anorexia	1
	Nausea / Vomiting	1
Signs	Tenderness in RIF	2
	Rebound Tenderness	1
	Elevated Temperature	1
Laboratory Findings	Leucocytosis	2
	Shift to Left of Neutrophils	1
		Total Score 10

Results

Table-2: Demographic distribution of the patients (n=282).

Age Group (years)	No.	%	No.	%	Total	No.	%
	(Male)		Female)				
0-10	03	1.06	02	00.71	05	1.77	
11-20	48	17.02	34	12.06	82	29.08	
21-30	65	23.05	42	14.89	107	37.94	
31-40	35	12.41	18	6.38	53	18.79	
41-50	09	3.19	07	2.48	16	5.67	
>50	11	3.90	08	2.84	19	6.74	
Total	171	60.64	111	39.36	282	100.0	

Table -3: Incidence of Various Symptoms (n=282).

Sl. No.	Symptoms	No. of Patients	%
1.	Pain Abdomen (Paraumbilical region)	282	100.00
2.	Migration of Pain in Right Lower Abdomen	268	95.04
3.	Fever	175	62.06
4.	Vomiting/Nausea	155	54.96
5.	Anorexia	143	50.71
6.	Constipation	22	07.80
7.	Diarrhoea	16	05.67
8.	Frequency in Micturition	11	03.90
9.	Burning Micturition	5	1.77

Table-4: Distribution of the patients according to Alvarado Score (n=282).

Score	No. of Patients	Percentage (%)
1	00	00.00
2	02	00.71
3	10	03.55
4	32	11.35
5	52	18.44
6	77	27.30
7	41	14.54
8	35	12.41
9	15	5.32
10	18	6.38

Table-5: Distribution of the patients according to Alvarado Grades (n=282).

Grades of Alvarado Score	No. of Patients	Percentage (%)
1- 4	44	15.60
5- 6	129	45.74
7- 10	109	38.65
Total	282	100.00

Table-6: Histopathological evaluation of appendectomy samples (n=168).

Total number of Patients Operated	Histopathology Report			
	Positive		Negative	
	No.	(%)	No.	(%)
168	152	90.48	16	09.52

Table-7: Representing the values of test and disease positive (n=168).

Alvarado Score	Histopathology Positive	Histopathology Negative	Total
≥ 7	107	2	109
< 7	48	11	59
	155	13	168

Sensitivity: $107/155 \times 100 = 69.03\%$, Specificity: $11/13 \times 100 = 84.62\%$, PPV: $155/168 \times 100 = 92.26\%$, NPV: $13/168 \times 100 = 7.74\%$, Accuracy: $118/168 \times 100 = 70.24\%$

Discussion

Acute Appendicitis remains the most common abdominal condition requiring surgical intervention worldwide⁶. Misdiagnosis and delay in surgery can lead to complications like appendicular lump, abscess, perforation and finally peritonitis. Alvarado scoring system (Also known by acronym MANTRELS) was identified as a useful clinical tool for early diagnosis of acute appendicitis, because it is fast, readily available, affordable, repeatable, economical and relatively accurate. In this study, we observed that appendicitis was more common in male as compared to females with a ratio of 1.54 to 1, and the incidence was more in younger age groups (21-30 years). Negligence of female health care in our region may be the reason behind the male preponderance. Comparable results were concluded by other studies⁷⁻⁸. Alvarado score was calculated and then compared once the histopathological report was available. The negative appendectomy rate in our study was 9.52%, whereas the Positive Predictive Value (PPV) was the maximum up to a percentage of 92.26% among these patients, which is comparable to other studies^{4,9}. On contrast a negative appendectomy rate of 20-40% has been reported in the literature¹⁰. Removing a normal appendix is a burden both on patients and health resources. Atypical cases present a diagnostic dilemma. Therefore, clinical diagnosis should be complemented with other diagnostic modalities such as Ultrasound, Computed Tomography (CT), Laparoscopy, and C-reactive protein levels to reduce the negative appendectomy rate in equivocal cases. Abdominal Ultrasonography is highly operator-dependent test in diagnosing acute appendicitis and may end up with false negative results. CT scan may resolve the issue supported by Ultrasonography and assessment of

C-reactive protein levels¹¹. No imaging test is 100% correct in diagnosing acute appendicitis. Different diagnostic aids have appeared recently and among this Laparoscopy and Ultrasonography have shown good results, but they also have limitations and drawbacks. Lamparelli et al. employed a combination of Alvarado score and laparoscopy in adult females to increase the diagnostic accuracy¹². However a certain diagnosis can only be obtained at surgery and after histopathological examination of surgical specimen. Studies evaluating usefulness of Alvarado scoring system in paediatric age group shows that it is equally accurate in children with positive predictive values of up to 85.7%¹³.

Conclusion

In conclusion, the results of our study revealed that the presence of high Alvarado scoring is highly predictive of acute appendicitis. Its application in our setup for cases of acute abdomen improves the diagnostic accuracy and further reduces negative appendectomy and complications, and overall improved management. Our study strongly recommends surgical interventions in patients having Alvarado score 7 or greater.

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