Evaluation of Role of Alvarado Score in Diagnosis of Acute Appendicitis: A Prospective Study.

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ABSTRACT

Background: The aim and objectives of the study is to validate the role of Alvarado score in diagnosis of acute appendicitis. Methods: A total of 310 patients with clinical diagnosis of acute appendicitis were included in this study. Patients were examined thoroughly, investigated and managed accordingly. The relevant data collected and analysed. Results: Out of 310 patients, surgical procedures were performed in 22.90% of the patients. The overall negative appendicectomy rate was 9.86%, and the percentage of Positive Predictive Value (PPV) for Alvarado score was 90.14%. Conclusion: Our study validates the Alvarado score as fast, simple and reliable diagnostic tool for acute appendicitis.

Keywords: Abdominal Pain, Alvarado Score, Appendicitis, Appendicectomy.

INTRODUCTION

Acute Appendicitis is one of the commonest conditions responsible for admission of the patients to hospital for surgical treatment. 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 appendicitis.3

Acute exacerbation of COPD showed a hospital mortality 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.4 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 appendicectomy rates.5,6 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 investigations (Leucocytosis, Shift to left of neutrophils).7 This study was designed to evaluate the usefulness of the Alvarado scoring system in earlier diagnosis of acute appendicitis.

MATERIALS AND METHODS

A teaching hospital based present prospective study was conducted on 310 consecutive patients with suspicion of acute appendicitis reported in Surgical wards or OPD of Sanjay Gandhi Memorial Hospital associated with Govt. Shyam Shah Medical College, Rewa, M.P., India, over a period of one year.

Inclusion Criteria: Patients with clinical suspicion of acute appendicitis were included in the present study.

Exclusion Criteria: 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 1] 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 appendicectomy and rest of the patients were managed conservatively. Histopathological findings of appendicectomy 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**

The present prospective study included 310 patients with suspicion of acute appendicitis. As shown in the table 2, 192 (61.94%) patients were males and 118 (38.06%) were females (Ratio of Male to Female 1.6: 1). Patients belongs to age group of 21-30 years had maximum incidence of appendicitis which means that the incidence was more common in younger age group [Table 2]. Most common presenting feature was pain abdomen, associated with fever, nausea/vomiting or other abdominal symptoms [Table 3]. Patients were distributed according to Alvarado scoring and grading systems and organised in [Table 4 and 5]. Findings reveals that 115 (37.10%) patients had Alvarado score 7 or greater, and advised for surgical treatment. 71 (22.90%) patients underwent appendicectomy after positive consent. Histopathology reports showed negative appendicectomy in some (09.86%) patients in our study [Table 6]. The Positive Predictive Value (PPV) for Alvarado score was 90.14%.

| Table 2: Demographic distribution of the patients (n=310). |
|---|---|---|---|---|
| Age Group (years) |No. |% |No. |% |
| 0-10 |04 |01.30 |03 |00.98 |
| 11-20 |51 |16.45 |34 |10.97 |
| 21-30 |68 |21.94 |42 |13.55 |
| 31-40 |39 |12.58 |20 |06.45 |
| 41-50 |11 |03.59 |09 |02.90 |
| >50 |19 |06.12 |10 |03.22 |
| Total |192 |61.94 |118 |38.06 |

| Table 3: Incidence of Various Symptoms (n=310). |
|---|---|---|
| Sl. No. |Symptoms |No. of Patients |% |
| 1. |Pain Abdomen (Paramblical region) |310 |100.00 |
| 2. |Migration of Pain in Right Lower Abdomen |294 |94.83 |
| 3. |Fever |196 |63.22 |
| 4. |Vomiting/Nausea |176 |56.77 |
| 5. |Anorexia |161 |51.93 |
| 6. |Constipation |26 |08.39 |
| 7. |Diarrhoea |19 |06.13 |
| 8. |Frequency in Micturition |12 |03.87 |
| 9. |Burning Micturition |08 |02.58 |
Table 4: Distribution of the patients according to Alvarado Score (n=310).

| Score | No. of Patients | Percentage (%) |
|-------|----------------|----------------|
| 1     | 00             | 0.00           |
| 2     | 02             | 0.60           |
| 3     | 11             | 03.59          |
| 4     | 39             | 12.58          |
| 5     | 60             | 19.35          |
| 6     | 83             | 26.77          |
| 7     | 45             | 14.51          |
| 8     | 35             | 11.29          |
| 9     | 16             | 05.16          |
| 10    | 19             | 06.13          |

Table 5: Distribution of the patients according to Alvarado Grades (n=310).

| Grades of Alvarado Score | No. of Patients | Percentage (%) |
|--------------------------|----------------|----------------|
| 1-4                      | 52             | 16.77          |
| 5-6                      | 143            | 46.12          |
| 7-10                     | 115            | 37.10          |
| Total                    | 310            | 100.00         |

Table 6: Histopathological evaluation of appendicectomy samples (n=71).

| Total number of Patients Operated | Histopathology Report |
|----------------------------------|-----------------------|
|                                  | Positive | Negative |
| No.                              | (%)      | No.      | (%)      |
| 71                               | 64       | 07       | (90.14)  | (90.86)  |

DISCUSSION

Acute Appendicitis remains the most common abdominal condition requiring surgical intervention worldwide.\[8\] Misdiagnosis and delay in surgery can lead to complications like perforation and finally peritonitis.\[4\] 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, and relatively accurate. In this study, we observed that appendicitis was more common in male as compared to females with a ratio of 1.6 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 studies.\[9-11] Alvarado score was calculated and then compared once the histopathological report was available. The negative appendectomy rate in our study was 9.86%, whereas the Positive Predictive Value (PPV) was the maximum up to a percentage of 90.14% among these patients, which is comparable to other studies.\[5,12,13] On contrast a negative appendectomy rate of 20-40% has been reported in the literature.\[14\] Literature shows that if the negative appendectomy rate is less than 10-15%, then the surgeon is operating on too few patients thus increasing the risk of complications.\[4\] Removing a normal appendix is a burden both on patients and health resources.\[15\] 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.\[15\] Abdominal Ultrasonography is highly operator-dependent test in diagnosing acute appendicitis \[17\] and may end up with false negative results. CT scan may resolve the issue supported by Ultrasonography and assessment of C-reactive protein levels.\[18\] No imaging test is 100% correct in diagnosing acute appendicitis.\[19\] Different diagnostic aids have appeared recently and among this Laparoscopy and Ultrasonography have shown good results, but they also have limitations and drawbacks.\[14\] Lamparelli et al. employed a combination of Alvarado score and laparoscopy in adult females to increase the diagnostic accuracy.\[20\] However a certain diagnosis can only be obtained at surgery and after pathological examination of surgical specimen.\[21\] 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%.\[22\]

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 appendicectomy and complications, and overall improved management. Our study strongly recommends surgical interventions in patients having Alvarado score 7 or greater.
Limitations
As the study was applied only to a small group of patients, so results may not reflect the scenario worldwide, and needs to be evaluated further in a larger group of patients.

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