Journal of Cardiovascular Disease Research
ISSN:0975-3583,0976-2833 VOL13, ISSUE05,2022

STUDY OF PREDICTIVE VALUES OF ALVARADO SCORE, SERUM CRP AND LEUCOCYTE COUNT IN THE ASSESMENT AND DIAGNOSIS OF ACUTE APPENDICITIS

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Abstract
Background: The diagnosis of acute appendicitis (AA) is quite challenging as the rate of negative appendectomy varies between 15 to 57%. Apart from increased utilization of imaging diagnostic facilities and laboratory test. Thus, Alvarado score WBC cell count and serum CRP was carried to study AA in different age groups.
Method: 207 patients of different age group were categorised in 3 different groups based on Alvarado score Group-I score between 7-10, group-II 4-6, group-III less than 3, CRP estimation and complete blood count (CBC) was done and PPV, NPV was studied for confirmation of AA.
Results: 131 patients were in category I and 107 (51.1) were confirmed as AA, 86 was PPV of elevated CRP 35 was NPV of normal CRP, 69 patients were in category II and 35 (16.9%) were confirmed as AA, 62 was PPV of elevated CRP and 70 was NPV of normal CRP, 7 patients were in category, III of Alvarado score 2 (0.96%) were confirmed as AA, 32 was PPV of elevated CRP, 84 was NPV of normal CRP.
Conclusion: This pragmatic study will be helpful for confirmation of AA in different age group and to prevent morbidity and mortality in complicated AA patients.
Keywords: Alvarado score, white blood count, Serum c-reactive protein, Acute appendicitis, Karnataka.

Introduction

Acute Appendicitis (AA) is one of the most common causes of abdominal surgical emergencies in children and adolescents. Early diagnosis and quick surgical intervention can reduce the morbidity and sometimes mortality associated complications such as gangrene, perforation and abscess formation [(1)].

Early diagnosis is often based on history and clinical examination and sometimes laboratory tests. This approach usually results in unacceptably high negative appendectomy rate as many conditions of the gastro-intestinal tract mimic acute appendicitis. This may pose a serious diagnostic dilemma which can result in delayed intervention and consequently lead to increased incidence of complications [(2)]. The Alvarado score is the most well studied and best performing in validation studies. Elevated white blood count (WBC) count with its

differential count or neutrophil, lymphocyte ratio has been shown to be helpful in the diagnosis of AA and more recently introduced laboratory biomarker is c-reactive protein [3][4]. There is paucity of literature on the use of Alvarado score WBC, and CRP in aiding diagnostic efficacy of AA hence attempt is made to correlate Alvarado score with WBC count, and CRP biomarker so that present study can be a guide line to surgeon for clinical diagnosis to prevent morbidity and mortality of AA patients.

Material and Method

207 (Two hundred seven) patients of different age group regularly visiting to Paediatrics and Surgery departments of Mata Gujri Memorial medical college and Lions Seva Kendra Hospital, Kishanganj Bihar-855107 were studied.

Inclusive Criteria: Patients admitted with clinical diagnosis of acute appendicitis were selected for study.

Exclusion Criteria: Patients without preoperative CRP test, Appendicular mass planned for conservative management, pregnancy and patients who did not meet the criteria for assessment of Alvarado score were excluded from the study.

Method: The patients aged between 10-45 years were selected. The patients were - categorised into three groups based on Alvarado score. Group-I score between 7-10, Group-II 4-6 score, Group-III less than 3 score CRP estimation was done using diagnostic reagent kit for the in vitro detection of C - reactive protein in human serum by semi-quantitative rapid latex slide tests. CRP levels were considered to be elevated when it was above normal range of 0-5 mg/L . The PPV (positive predictive value) NPV (Negative predictive value) for normal and elevated CRP for histologically confirmed appendicitis.

Statistical analysis: The Alvarado score of different categories were conformed to acute appendicitis (AA) and elevated CRP, PPV and NPV of normal CRP. The statistical analysis was performed in SPSS software. The ratio of male and female was 2:1.

Observation and Results

Table-1: Features of Alvarado scores

Table-2: Results of Alvarado scores in relation CRP study

- In category-I (group-I) score (7-10) had 13 patients and 107 (51 %) were confirmed as AA elevated CRP, PPV was 86 and NPV was 35
- In category-II (group-II) had 69 patients confirmed A was 35 (16.9%) PPV for elevated CRP was 62 and NPV for CRP Normal was 70
- In category-III 7 patients and 2 (0.96%) were confirmed AA PPV for elevated CRP was 32 and NPV for normal CRP was 84

Discussion

Present study of predictive values if Alvarado scores serum CRP and WBC count in the diagnosis of AA in odisha population. The features of Alvarado score were 1-10 (Table-1). The results of Alvarado scores in relation to CRP study. 131 patients were in group-I (Alvarado score 7-10) 107 (51.3%) were confirmed as AA, 86 was PPV elevated CRP, 35 was the NPV of normal CRP, 69 patients were group-II (Alvarado score 4-6) and 35 (16.9%) were confirmed as AA, 62 were PPV of elevated CRP, 70 was NPV of normal CRP, 7 patients in group-III (Alvarado score less than 3) and 2 (0.9%) confirmed as AA and 32 was PPV elevated value, 84 was NPV of normal CRP (Table-2). These findings are more or less in agreement with previous studies [5][6][7].

The present study supports the Alvarado score (A score) having 7-10 had (51.3%) confirmed on of AA, Alvarado score 4-6 had (16.9%) AA and less than 3 Alvarado score had (0.96%) AA with elevated PPV and NPV of CRP values

Though CT, ultrasound and laparoscopy gave the best diagnostic accuracy in terms of high sensitivity and specificity. Their use is fraught with many limitations first CT emits radiations that could lead to cancer in future; secondly it is not cost effective in low income families, third factor is ultrasound needs not only quality of machine but also qualified and experienced operator for proper imaging and diagnosing which is great disadvantage [(8)].

Under such scenario Alvarado score correlated with NPV, PPV value of CRP was great importance to confirm AA.

One main controversy of Alvarado score is its applicability's in paediatric population. This is the simply because Alvarado score requires children to identify migratory pain, nausea and anorexia which are symptoms that are not easily verified in the extremely young children [(9)]. Moreover WBC count to the diagnosis of AA in children is controversial but WBC, CRP and neutrophil count may assist in the diagnosis AA [(10)] CRP is an acute phase reactant whose serum concentration increase in response to inflammatory processes. There is plethora of reports documenting the value of CRP in improving the diagnostic value of AA.

Summary and Conclusion

Alvarado score may help in the diagnosis of AA however these predictive values of WBC count, CRP value and Alvarado score cannot be find diagnostic value for confirmation of AA because features of Alvarado scores are equivocal hence the final decision lies with surgeon.

Limitation of study – Owing to tertiary location of present studied hospital, less number of patients, lack of latest instruments we have limited results.

- This research paper is approved by Ethical committee of Mata Gujri Memorial Medical college and Lions Seva Kendra Hospital Kishanganj-855107 Bihar
- No conflict of Interest
- No Funding

Table – 1

Features of Alvarado score

Details Features	Score
Migration of pain	1
Anorexia	1
Nausea	1
Tenderness in right lower quadrant	2
Rebound pain	1
Elevated temperature	1
Leucocytosis	2
Shift of white blood count to the left	1
Total	10

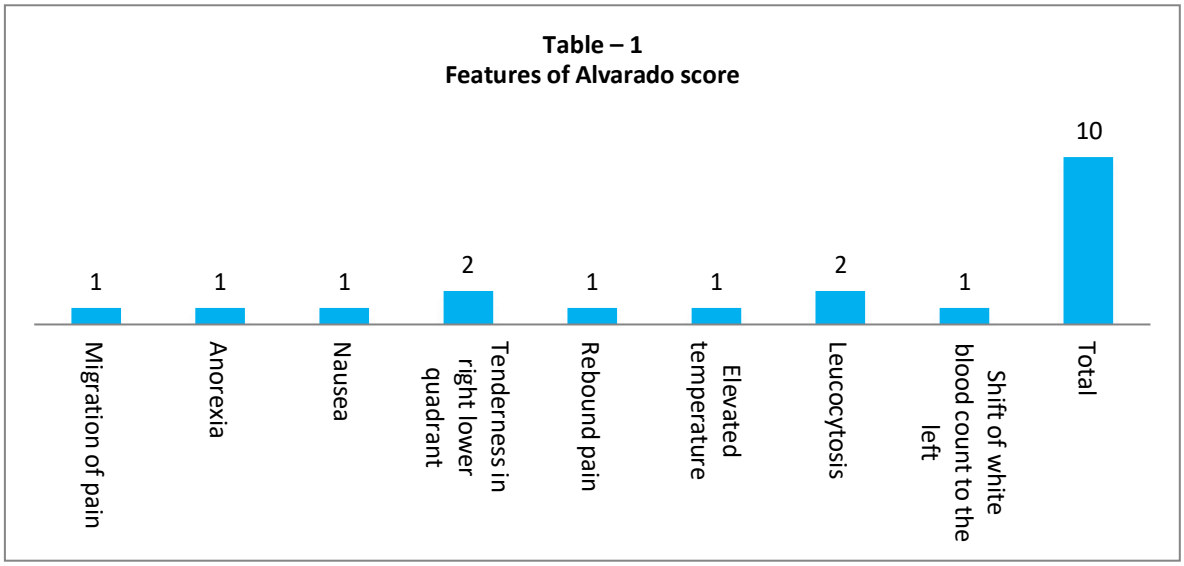
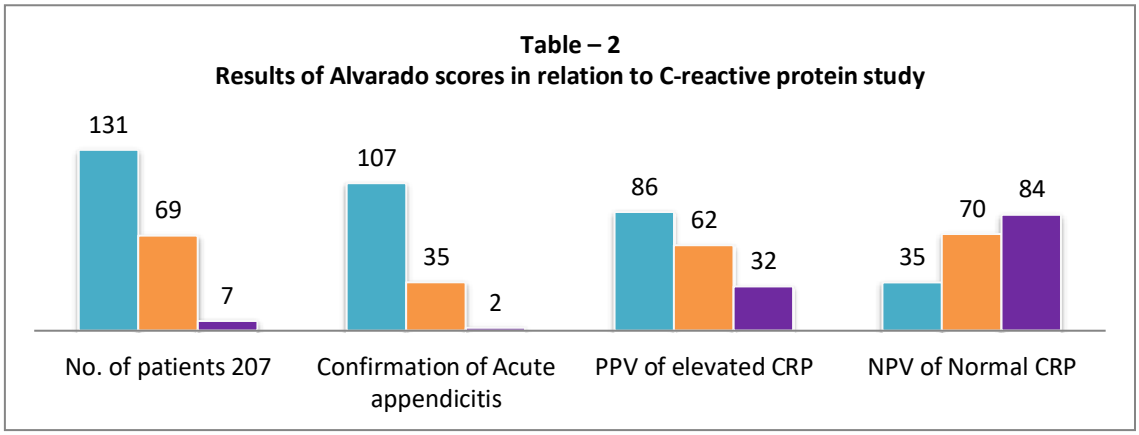


Table – 2
Results of Alvarado scores in relation to C-reactive protein study

Alvarado score	No. of patients 207	Confirmation of Acute appendicitis	PPV of elevated CRP	NPV of Normal CRP
Alvarado 7-10 (group-I)	131	107 (51.3%)	86	35
Alvarado 4-6 (group-II)	69	35 (16.9)	62	70
Alvarado less than 3 (group-III)	7	2 (0.96%)	32	84

CRP=C-reactive protein, NPV=Negative predictive value, PPV= Positive predictive value



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