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ORIGINAL RESEARCH

Study of Alvarado Scoring in diagnosis of Acute Appendicitis

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Abstract
Acute appendicitis is traditionally understood to be a clinical diagnosis. About 6% of population is expected to have appendicitis in their lifetime . Routine history and physical examination still remain most practical diagnostic modalities . Absolute diagnosis of course is only possible at operation and histopathologic examination of the specimen . For this reason it is impractical to have a definitive preoperative diagnosis by gold standard, histopathology, which leads to an appreciable rate of negative appendicectomy as reported in the world literature varying from 20–40% with its associated morbidity of around 10%, some surgeons even accept a negative appendicectomy rate of 20%. In order to reduce the negative appendicectomy rates various scoring systems have been developed for supporting the diagnosis of acute appendicitis . Alvarado scoring system is one of them and is purely based on history, clinical examination and few laboratory tests and is very easy to apply. This study was conducted on 50 patients presenting with symptoms and signs of acute appendicitis to the casualty adopting Alvarado scoring system. Our study shows Alvarado score distribution among patients. 3 patients had Alvarado score between 3-4. 21 patients had Alvarado score between 5-7. 26 patients had Alvarado score between 8-10. In our study ,Group I (Alvarado score ≥ 7) had 26 patients out of which 22 had Confirmed Appendicitis(True positive) and 04 had Normal Appendix (False positive). GroupII (Alvarado score≤ 7) had 24 patients out of which 18 were False negative and 06 were (True negative).Alvarado scoring system is easy, simple, cheap, useful tool in pre operative diagnosis of acute appendicitis and can work effectively in routine practice.

Key words : Alvarado scoring system , Acute Appendicitis

Introduction

Acute Appendicitis is the most common abdominal emergency in both developed and developing countries[1,2]. Approximately 6% of the population will suffer from acute appendicitis during their life time [3, 4].Diagnosis of acute appendicitis is difficult & its complications more in young children & the elderly[5]. Acute appendicitis is a clinical diagnosis and no laboratory or radiological tests are 100% accurate[6]. Delay in diagnosis and management may increase the morbidity &costs.Lots of efforts have been directed toward early diagnosis and treatment of acute appendicitis. A number of scoring systems have been used for aiding in early diagnosis of acute appendicitis and its prompt management. Scoring systems are valuable and valid instruments for discrimating between acute appendicitis and non specific abdominal pain [7]. One of the scoring systems is the Alvarado Scoring System which is purely based on history, clinical examination and few laboratory tests and is very easy to apply [8].This study was conducted to evaluate the usefulness of this scoring system. In 1986, Alvarado constructed a 10-point clinical scoring system, also known by the acronym 'Mantrels', for the diagnosis of acute appendicitis as based on symptoms, signs and diagnostic tests in patients presenting with suspected acute appendicitis.[9] The Alvarado score enables risk stratification in patients presenting with abdominal pain, linking the probability of appendicitis to recommendations regarding discharge, observation or surgical intervention.7 Further investigations, such as ultrasound and computed tomography (CT) scanning, are needed when probability of appendicitis is in the intermediate range Scoring systems are valuable and valid for discriminating between acute appendicitis and nonspecific abdominal pain.[10] Alvarado scoring system is one of the many scoring systems available for the diagnosis of acute appendicitis and is purely based on history, clinical examination and few laboratory tests and is very easy to apply. The use of an objective scoring system such as the Alvarado system can reduce the negative appendicectomy rate to 0-5%. However, this system is

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not a substitute for clinical judgment. It is an aid in diagnosing acute appendicitis and arriving at a conclusion whether a particular case should be operated or not, thereby reducing the number of negative laparotomies.

Interpretation of Scores:

Score of 1-3: Suggests a low likelihood of appendicitis, and further investigation may not be necessary.

Score of 4-7: Indicates an intermediate probability of appendicitis, suggesting further diagnostic tests (like CT scan) are warranted.

Score of 8-10: Suggests a high probability of appendicitis, and surgical intervention may be considered.

Studies and Accuracy: Studies have shown that the Alvarado score can be a valuable tool for triage and decision-making in appendicitis. Some studies suggest that the Alvarado score has high sensitivity (ability to correctly identify appendicitis) and specificity (ability to correctly identify non-appendicitis cases).However, other studies have shown that the Alvarado score may not be as accurate in certain populations, such as women, where other conditions can mimic appendicitis. Limitations: The Alvarado score is a clinical tool and should be used in conjunction with other diagnostic methods, such as imaging (CT scan). The score may not be as accurate in certain populations, such as women, where other conditions can mimic appendicitis.

Material and Methods

This study was conducted on 50 patients presenting with symptoms and signs of acute appendicitis to the casualty adopting Alvarado scoring system

Inclusion Criteria- Patients of all age groups and both genders presenting with pain in right lower quadrant of abdomen and diagnosed provisionally as acute appendicitis and were willing for surgery were included in the study.

Exclusion Criteria- Patients presenting with palpable lump in right iliac fossa, urological, gynaecological or surgical problems other than acute appendicitis &Pregnant females were excluded from this study.

All patients were admitted , detailed history was taken which included symptoms and duration of the disease; general and systemic examination was done. Baseline investigations CBC, RFT, LFT, Viral markers, Routine urine examination, X-ray Chest, X-ray KUB and ECG were done. A proforma containing general information about the patient plus eight variables based on the Alvarado scoring system (Table-1) was filled, their Alvarado score were calculated. A score of >7 was indicating acute appendicitis and a score below this level meant normal appendix but the decision to undergo surgery was purely on clinical grounds. Results were analyzed using Microsoft Excel software.

Results

Table 2 shows Alvarado score distribution among patients. 3 patients had Alvarado score between 3-4. 21 patients had Alvarado score between 5-7. 26 patients had Alvarado score between 8-10

Table 1: Alvarado scoring system

Symptoms	
Migratory right iliac fossa pain	1
Nausea/ vomiting	1
Anorexia	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory Findings	
Leukocytosis	2
Shift to the left of neutrophils	1
Total	10

Table 2: Alvarado score distribution among patients

Alvarado score	**Number of patients n=50**
3-4	**03**
5-7	**21**
8-10	**26**
Total -10	

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Table 3: Diagnostic accuracy of Alvarado score

Group	n=50	Confirmed Appendicitis	Normal Appendix
I (Alvarado score ≥ 7)	26	22 (True positive)	04(False positive)
II (Alvarado score≤ 7)	24	18(False negative)	06 (True negative)

Group I (Alvarado score ≥ 7) had 26 patients out of which 22 had Confirmed Appendicitis (True positive) and 04 had Normal Appendix (False positive).
Group II (Alvarado score≤ 7) had 24 patients out of which 18 were False negative and 06 were (True negative).

Discussion

Appendicitis is a disease that spares no age and it may occur at any period of life from cradle to the grave. Majority of the studies have also reported and concluded that no age is exempt from acute appendicitis. The increase of incidence during the second and third decade of life is thought to be due to the increase of lymphoid tissue of the appendix at this age. It is presumed that the lymphoid hyperplasia can very easily give rise to obstruction and thus greater chances for inflammatory changes during adolescence and early adult life. The low incidence in old age can be explained by the fact that at this age the lymphoid tissue gradually disappears and is replaced by fibrous tissue and appendix tends to become atrophic. John H. et al 1991 has emphasized that clinical examination and surgeons' experience remains the most important tool in diagnosis of acute appendicitis. Alvarado A. 1986, in his original paper has given two points to leucocytosis and one point to raised polymorphs and stated that if Alvarado score is less than 5, the chances of acute appendicitis is less likely and if Alvarado score is 7 or more, the chances of acute appendicitis are more. Alvarado Scoring System is one of the many scoring systems available today. It is based on history, physical examination and few laboratory tests. Alvarado score is a simple noninvasive diagnostic procedure, which is reliable, safe, repeatable and economical, easy and can be used in emergency setting without expensive and complicated supportive diagnostic tools.[11] Our study shows Alvarado score distribution among patients. 3 patients had Alvarado score between 3-4. 21 patients had Alvarado score between 5-7. 26 patients had Alvarado score between 8-10. In our study ,Group I (Alvarado score ≥ 7) had 26 patients out of which 22 had Confirmed Appendicitis(True positive) and 04 had Normal Appendix (False positive). GroupII (Alvarado score≤ 7) had 24 patients out of which 18 were False negative and 06 were (True negative). Early and accurate diagnosis of acute appendicitis is required to reduce the morbidity and mortality associated with delayed diagnosis and its complications. In addition to significant morbidity and mortality, negative appendectomy is also responsible for loss of precious staff hours and financial resources.These days the diagnosis of acute appendicitis is clinical. Different diagnostic aids have appeared recently and among these laparoscopy and ultrasonography have shown good results but they also have limitations and drawbacks. A no. of clinical scoring systems have been used as complimentary aid in diagnosis of acute appendicitis. Initial assessment can be improved by use of a clinical scoring system. Alvarado Scoring System is one of the many scoring systems available today. It is based on history, physical examination and few laboratory tests. It is a simple, easy to apply and cheap complimentary aid for supporting the diagnosis of acute appendicitis[12-14]

Conclusion

This study showed that in diagnosis of acute appendicitis, Alvarado Scoring System has a high diagnostic value. Alvarado scoring System is a non-invasive, safe diagnostic procedure which is simple, fast, reliable and repeatable. Scores more than 7 definitely warrant a virtual confirmed diagnosis of acute appendicitis and early operation is indicated to avoid complications like perforation. Patients with in the score range of 5–6 require admission and need re-evaluation for possible deterioration of clinical condition and earliest possible intervention. The application of Alvarado scoring system definitely improves diagnostic accuracy and possibly reduces the complication rates.

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