Research Article

Comparative study between alvarado score and ultrasonography in correlation to histo-pathology report for diagnosis of acute appendicitis in AIMS B. G. Nagar

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Abstract

Introduction: Appendectomy for appendicitis is the most commonly performed emergency operation in the world. **Aim of Study:** To compare and evaluate the diagnostic accuracy of Alvarado scoring system and Ultrasonography in correlation to histo-pathology report for diagnosis of acute appendicitis. **Methods:** A cross sectional study of patients who underwent appendectomy, either open or laparoscopic procedure for suspected acute appendicitis at Adichunchinagiri Institute of Medical Sciences, BG Nagar between 2013-14. A clinical and radiological data of 25 pt were collected, with suspected appendicitis. These patients were evaluated by Alvarado scoring system and ultrasonography, which was correlated with histo-pathology reports. **Discussion:** The diagnosis of acute appendicitis continues to be difficult due to variable presentation of disease and lack of reliable diagnostic test. History and clinical examination provide useful information regarding diagnosis and now a days the diagnosis of appendicitis is mainly done on clinical basis. **Conclusion:** Acute appendicitis is the most common acute abdominal condition necessitating surgery. There is high prevalence among young age in adults. Diagnosis of Acute appendicitis remains challenge.
Keywords: alvarado score, ultrasonography.

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INTRODUCTION

Appendectomy for appendicitis is the most commonly performed emergency operation in the world. Despite the increased use of ultrasonography, computed tomographic scanning, and laparoscopy, the rate of misdiagnosis of appendicitis has remained constant (15.3%), as has the rate of appendiceal rupture. The percentage of misdiagnosed cases of appendicitis is significantly higher among women than among men. Compared with younger patients, elderly patients with appendicitis often pose a more difficult diagnostic problem because of the atypical presentation, expanded differential diagnosis, and communication difficulty. These factors contribute to the disproportionately high perforation rate seen in the elderly[1]

Development and Anatomy

The appendix, ileum and ascending colon are all derived from the midgut. Appendix first appears at the eighth week of gestation as an out pouching of the cecum and gradually rotates to a more medial location as gut rotates and cecum becomes fixed in the right lower quadrant. Base of appendix is located at the convergence of taeniae, which facilitates its identification during surgery. The tip of appendix may lie in various positions, the most common being retrocecal[2]. On microscopic view, lumen

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is irregular, encroached by multiple longitudinal folds of mucous membrane lined by columnar cell intestinal mucosa of colonic type. Kulchitsky cells lie at the base of crypts, submucosa contains numerous lymphatic follicles. Mucosa is bounded by a relatively thin muscularismucosa[3]. Acute appendicitis is the most common cause of acute abdomen in young adults and should be considered in differential diagnosis. Early diagnosis remains the most important clinical goal in patients with suspected appendicitis and can be made primarily on basis of history, physical examination, Alvarado scoring system and ultrasonography.

AIM OF STUDY

To compare and evaluate the diagnostic accuracy of Alvarado scoring system and Ultrasonography in correlation to histo-pathology report for diagnosis of acute appendicitis.

METHODS

A cross sectional study of patients who underwent appendectomy, either open or laparoscopic procedure for suspected acute appendicitis at Adichunchinagiri Institute of Medical Sciences, BG Nagar between 2013-14. A clinical and radiological data of 25 pt were collected, with suspected appendicitis. These patients were evaluated by Alvarado scoring system and ultrasonography, which was correlated with histo-pathology reports.

Collection of Data

1. Minimum of 25 cases of acute appendicitis.
2. Period of study is from July 2013 to august 2014.
3. A prestructured proforma to collect relavant data.
4. Detailed history taking.
5. Complete clinical examination of patient.
6. Routine and special investigation including ultrasound abdomen.
7. Application of Alvarado scoring system.
8. Performing surgery either open or laparoscopic for the suspected cases, noting per-op findings and follow up of histopathology reports.

Inclusion Criteria

Patients in the age group of 12 to 60 yr irrespective of sex admitted with provisional diagnosis of acute appendicitis.

Exclusion Criteria

1. Patients below 12yrs and above 60 yrs.
2. Patients managed conservatively.
3. Patients with RIF mass.
4. Patients undergoing interval appendectomy.
5. Patients with presentation of gynecologic, urologic and surgical problems other than acute appendicitis.

Statistical analysis:

A collected data was incorporated in a redesigned clinical proforma and then tabulated in a master chart of 25 cases. A failure of early diagnosis can lead to progression of disease with its attendant morbidity and occasional mortality. In order to achieve accuracy in early diagnosis of acute appendicitis a scoring system described by Alvarado[4] was adopted to reduce negative appendectomy rate without increasing morbidity and mortality. The scoring system was initially introduced as an adjunct to diagnosis in order to correct a high false positive appendectomy rate[5]. The scoring system as described by Alvarado is based on three symptoms, three signs and two laboratory findings.

Table 1

Alvarado scale for the diagnosis of appendicitis

	Manifestations	Value
Symptoms	Migration of pain	1
	Anorexia	1
	Nausea and/or vomiting	
Signs	Right lower quadrant tenderness	2
	Rebound	1
	Elevated temperature	1
Laboratory values	Leukocytosis	2
	Left shift in leukocyte count	1
	Total points	**10**

Patients with score of 1-4 were not considered likely to have acute appendicitis; those patients with a score of 5-6 were considered to have a possible diagnosis of appendicitis, but not convincing enough to warrant immediate surgery. Those with score of 7-8 were considered to have a probable acute appendicitis and those with score of 9-10 were considered to have an almost definitive acute appendicitis and submitted for surgery. Depending upon individual presentation of signs and symptoms a score was calculated for each case of suspected acute appendicitis. The observed value in each case was added and expressed as end score.

According to end Score

- Those patients with scores of 7-9 underwent an appendectomy.
- Those patients with scores of 5-7 who were thought on clinical grounds to require appendectomy, were operated accordingly.
- Those patients with score of <5 were observed and managed conservatively.

All necessary investigations were done. The cases subjected to emergency surgery were adequately prepared. Whenever vomiting persisted, ryles tube aspiration was done. Parenteral fluids, electrolyte supplementation, broad spectrum antibiotic were administered. Surgery was done under general or spinal anaesthesia. Patients were subjected to laparoscopic or

open appendectomy. Before resection appendix was assessed. The specimen of appendix was sent for histopathological examination and the reports analysed. Alvarado score more than or equal to 7 are considered acute appendicitis i.e. positive and scores less than or equal to 6 are considered negative. The USG findings are noted, depending upon findings they were divided in two groups. One is USG positive and other USG negative. Histopathological diagnosis was considered final. The Alvaradoand USG findings are compared to histopathology report.

When a positive Alvarado score case has histopathology positive report, the cases are considered as True positive and Alvarado score negative as True negative. Histopathology negative cases among Alvarado score positive cases are False positive and histopathology positive cases among Alvarado score negative are False negative cases. From above data sensitivity, specificity, positive predictive value and negative predictive value are calculated. When USG positive cases have histopathology positive report, the cases are true positive and USG negative cases are false negative cases. Histopathology negative cases among USG positive cases are false positive cases and histologically positive cases among USG negative cases are false negative cases. From above data the sensitivity, specificity, positive and negative predictive value are calculated and then compared with that of Alvarado scoring system.

Table 2:

Alvarado score	No of patients	%
1-4	7	28
5-6	5	20
7-8	11	44
9-10	2	8
Total	**25**	

Table 3: Alvarado scoring system

Alvarado score	No of patients	%	95% CI
Negative (<6)	12	48	43.27-52.76
Positive (>7)	13	52	47.24-56.73
Total	**25**	**100**	

Table 4: USG report

USG report	No of patients	%	95%CI
Normal	7	28	24.11-28.69
Acute appendicitis	18	72	71.31-75.89
Total	**25**	**100**	

Table 5: HPE findings of patient studied

HPE	No of patients	%	95% CI
Normal	7	28	24.05-32.39
Acute appendicitis	14	56	51.23-60.66
Chronic appendicitis	4	16	12.63-19.95
Total	**25**	**100**	

Table 6: Correlation of Alvarado score according to HPE report of patients studied

Alvarado score	HPE (Acute appendicitis)	HPE (normal)
Positive (>7)	10	3
Negative (>7)	**4**	**8**

Table 7: Correlation of Ultrasound positive with HP positive to detect acute appendicitis

Ultrasound	HPE (positive)	HPE (negative)
Acute appendicitis	8	10
Normal	**6**	**1**

Table 8: Comparison of Alvarado score and USG diagnosis in relation to HPE[6]

	Sensitivity	Specificity	PPV	NPV
Alvarado positivity to detect Acute appendicitis	71%	72.7%	76.9%	66.66%
USG positivity to detect acute appendicitis	57%	9%	44%	14%

DISCUSSION

The diagnosis of acute appendicitis continues to be difficult due to variable presentation of disease and lack of reliable diagnostic test. History and clinical examination provide useful information regarding diagnosis and now a days the diagnosis of appendicitis is mainly done on clinical basis. Different diagnostic aids have appeared recently and among these laparoscopy and ultrasongraphy have shown good results, but they also have limitations anddrawbacks[7]. Clinical scoring systems have proved useful in management of number of surgical conditions. The Alvarado scoring is simple scoring system that can be instituted easily. The present study has shown better sensitivity, as it is a cross sectional study and short comings of retrospective study are ruled out. Alvarado system is dynamic one allowing observation and critical evaluation of clinical picture. Its application improved diagnostic accuracy and reduced negative exploration and complication rates. A meta-analysis shown high sensitivity and specificity of USG in diagnosis of acute appendicitis. But drawback is operator dependent and diagnosis becomes difficult when obscured by bowel gases. The specificity of USG is less than sensitivity, because of number of false negatives, some of which cannot be controlled (poor tolerance by the patient, obesity, presence of bowel gas and unusual location of appendix). These difficulties can be reduced by employing high resolution real time imaging and by improving the graded compression technique, the high specificity is useful for differential diagnosis of associated pathology. In present study Alvarado scoring has high sensitivity and specificity and also high positive predictive value. Alvarado score is useful tool in clinical

decision making especially when USG is unavailable are inconclusive. USG is unnecessary when ones degree of clinical suspicious is high. However the additional information provided by USG does improve diagnostic accuracy in case of negative or equivocal Alvarado score. So Alvarado scoring system is best test in diagnosis of acute appendicitis compared to USG alone, and use of USG along with Alvarado score is most useful in increasing diagnostic accuracy.

CONCLUSION

Acute appendicitis is the most common acute abdominal condition necessitating surgery. There is high prevalence among young age in adults. Diagnosis of Acute appendicitis remains challenge. Although USG is used frequently for diagnosis of acute appendicitis, using Alvarado score is a useful tool in clinical decision making. As Alvarado score is simple, easily applicable in peripheral hospitals where backup facilities are sparse. It can be useful for junior doctors in patients with abdominal emergencies. As there is no clear advantage of ultrasonography over Alvarado score for diagnosis of acute appendicitis, USG is unnecessary when one has a high degree of clinical suspicion. However the additional information provided by USG does improve diagnostic accuracy in case of negative or equivocal Alvarado score. Thus we conclude that in establishing the diagnosis in patients suspected of having acute appendicitis, Alvarado scoring system is better compared to USG alone. So when used both for diagnosis of acute appendicitis diagnostic accuracy increases and reduces negative appendectomy rates.

CONSENT: Written informed consent obtained from patient.

CONFLICT OF INTEREST: All the authors have read and approved the manuscript.

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