

Evaluation of Modified Alvarado Score Combined With Ultrasonography in Decreasing Negative Appendectomy Rate

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Abstract:

Background And Objectives – to assess accuracy of modified Alvarado score along with aid of ultrasonography in the pre-operative diagnosis of acute appendicitis to decrease the negative appendectomy rate.

Methods-A consecutive series of 100 patients who came to emergency opd with provisional diagnosis of acute appendicitis was evaluated with modified Alvarado score and subjected to ultrasonography ,diagnosis was confirmed by histopathology.

Results- in our study men were affected more than women 1.2:1, 4 men with Alvarado score <7 had negative appendectomy (7.2%), and two women with scores ≥ 7 and 4 women with scores <7 had negative appendectomy(13.3%).

Conclusions- combined technique of using both clinical and sonological criteria is a cheap and effective tool in diagnosing appendicitis and reduce the negative appendectomy.

Key Words: abdominal pain ,appendicitis, Alvarado score, ultrasonography.

I. Introduction

Even after a lapse of more than 120 years, since its first description by fitz(1886) the classical signs and symptoms of acute appendicitis as a disease entity; this common surgical disease continues to remain a diagnostic problem and can baffle best of clinicians. Delay in diagnosis definitely increases the morbidity, mortality and cost of treatment. In equivocal cases, however , aggressive surgical approach "when in doubt take it out" , has resulted in increased negative laparotomies

Further due to increase in use of appendix for urinary tract reconstruction and and biliary tract replacement^[1,2,3]. It is probably important to save a normal appendix (for future) as it is to remove a pathological (inflamed) appendix

Alvarado scoring system (Table 1) described by Alvarado was designed to reduce the negative appendectomy rate without increasing the morbidity and mortality, our study is to use the modified alvarado score combined with ultrasonography to see the accuracy of the score and also to reduce the negative appendectomy rates

II. Materials And Methods

The study was conducted in surgical emergency wards of Sree Siddhartha Medical Col lege & Hospital , Tumkur and Govt. General Hospital, Tumkur. The patient on admission were evaluated on the basis of alvarado scoring. Alvarado score consists of 3 symptoms (migratory RIF pain, anorexia, nausea or vomiting) 3 signs (tenderness in RIF, rebound tenderness in RIF, elevated temperature) 2 lab findings (leucocytosis and shift to left)^[4,5,6]. In our study we used a slightly modified version of alvarado score by excluding one lab finding shift of neutrophil maturation (score 1), this was not available from our laboratory on a routine basis , instead patients were subjected to ultrasonography of abdomen(Table 2) Patients, with score of 1-4 were not considered 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, these were marked for review. Those with a score of 7-8 were considered to have a probable acute appendicitis and those with a score of 9-10 were considered to have an almost definite appendicitis and submitted to surgery All patients who came to emergency OPD at above mentioned hospitals with complaints of pain in right iliac fossa, a provisional diagnosis of acute appendicitis was made and included in the study ,while patients with appendicular mass and appendicitis in pregnancy were excluded.

III. Results

In this series out of 100 patients 55 were male and 45 were female patients. 50% of our patients presented with complaints of pain around umb ilicus which had shifted to right iliac fossa later, in this study commonest symptom was anorexia wh ich was seen in 94%, second most common was nausea/vomiting seen in

89% , rebound tenderness was noted in 74% of cases and total leukocyte count was elevated in more than 48% of cases (Table 3). All cases were subjected to ultrasonography and graded tenderness was present in 80% of cases.

IV. Discussion

We conducted our study in 100 consecutive patients with provisional diagnosis of acute appendicitis. This discussion is based on observations and analysis of results in this study with regard to incidence, age, sex, symptoms, signs, investigations, operative findings and alvarado scores compared to other previously reported studies.

Men are at greater risk than wo men for developing appendicitis ^[7] .In our study also men were affected more than women.(1.27 :1)

Appendicitis is most frequently seen in patients in their second decades of life.^[8] It occurs infrequently during first 3 years of life. ^[9] In our study we had similar results with 45% of patients between 20-30 years and 22% in 30-40 age group (mean age of 28.23 years and median age of 26 years).

According to study conducted by Michelle colson et.al.^[10] female patients were more likely to have negative explo rations. In a study conducted by Kalan M et. al.^[4] negative appendix rate in wo men using alvarado score(it was modified by deleting last parameter –shift of neutrophils to left) was 33% v/s 22%.

In a study conducted by Sudhir Ku mar Mohanty et.al ^[6] where usg finding was added to modified alvarado score(shift of neutrophils to left was deleted fro m o rig inal score) negative appendectomy rate was 4.8% for males and 6.7% for females. In a study conducted by Bhattacharjee PK ^[11] who also incorporated usg for mod ified alvarado score by deleting last parameter shift of neutrophils to left incidence of negative appendectomy was highest among females (28.1%).

In our study 4 men with alvarado score < 7 had negative appendectomy (7.2%). and 2 wo men with scores ≥ 7 and 4 women with scores < 7 had negative appendectomy(13.3%) (Table 4,5,6).

In a study done by Owen TD ^[5] (using orig inal Alvarado score) males with score ≥ 7 had sensitivity of 94% while wo men with ≥ 7 score had 78%. In a study done by Kalan et. al ^[4] men with alvarado score ≥ 7, sensitivity was 93% while for wo men with score ≥ 7 it dropped to 67%. In a study conducted by Bhattacharjee ¹¹ overall sensitivity in men with scores ≥ 7 was 94.1% while in females scores ≥ 7 it was only 71.9% .

In our study overall sensitivity score in men with scores ≥ 7 was 100% . while in females with scores ≥ 7 it was 94.1%

In a study conducted by Kalan et. al.^[4] men with scores < 7 had sensitivity of 67% wh ile wo men with scores < 7 had sensitivity of 50% . In a study conducted by Bhattacharjee P.K. et. al.^[11] men with alvarado score < 7 (≤ 6) had sensitivity of 83.3% while women with same scores had sensitivity of 66.7%.

In our study men with alvarado score < 7 sensitivity was 71.4% and wo men with alvarado sc ore < 7 sensitivity was 63.63% (Table 6).

V. Tables And Charts

TABLE 1 ALVARADO SCORE ^[4,5,6]

symptoms	scores	signs	Scores	lab findings	scores
Migratory right iliac fossa pain	1	Tenderness in right Iliac fossa	2	Leucocytosis	2
Anorexia	1	Rebound tenderness in right iliac fossa	1	Shift to the left	1
Nausea / vomiting	1	Elevated temperature	1		

TABLE 2 USG criteria of acute appendicitis ^[6]

- Visualisation of appendix*, Diameter > 6mm, Wall thickness > 3mm, Complex mass (echo poor asymmetric) ,Irregular asymmetry ,Loss of contour ,Free fluid ,Local adynamic ileus ,Graded tenderness over McBurney’s point

**If the appendix can be seen on usg examination this is taken to indicate the presence of acute appendicitis. If the organ cannot be seen, appendicitis is excluded.* ^[12]

TABLE 3 Symptoms /signs/lab report analysis

Patients presenting with	No. of patients	Percentage
Nausea	89	89%
Anorexia	94	94%
Migratory pain	51	51%
Raised temperature	47	47%
Rebound tenderness	46	46%
Increased TLC	48	48%

TABLE 4 modified alvarado score with usg score

Alvarado scores	No. of patients
Score 4	2
Score 5	12
Score 6	11
Score 7	28
Score 8	40
Score 9	6
Score 10	1

TABLE 5 ULTRASONOGRAPHIC FINDINGS

USG FINDINGS	NO. OF PATIENTS	PERCENTAGE
Visualisation of appendix	30	30%
Diameter > 6mm	5	5%
Wallthickness > 3mm	20	20%
Complex mass (echo poor, asymmetric)	-	-
Irregular asymmetry	-	-
Loss of contour	-	-
Free fluid	-	-
Local adynamic ileus	71	71%
Graded tenderness over McBurney's point	80	80%
Normal study	9	9%

TABLE 6 Patients were divided according to alvarado scores (≥ 7 or < 7)

Total Cases	No. of cases With score ≥ 7	Negative dectomy Appen-	Sensitivity	No. of cases With score ≤ 7	Negative dectomy Appen-	Sensitivity	Total Negative Appen-dectomy	Percentage
Male (55)	41	0	100%	14	4	71.4%	4	7.2%
Female (45)	34	2	94.1%	11	4	63.6%	6	13.3%

VI. Conclusions

Alvarado scoring system combined with ultrasonography is a cheap and quick tool that can be applied in emergency department to diagnose acute appendicitis. The Scoring system is dynamic allowing observation and critical re-evaluation of evolution of clinical picture. Its application improves diagnostic accuracy and reduces negative appendectomy without increase in morbidity and /or mortality.

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