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EVALUATION OF MODIFIED ALVARADO SCORE IN THE DIAGNOSIS OF ACUTE APPENDICITIS AT SURGERY DEPARTMENT OF NMC, SASARAM, BIHAR

Gynaecology

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ABSTRACT

Background: Acute appendicitis, the most common surgically correctable cause of abdominal pain, the diagnosis of which remains difficult in many instances and is essentially clinical. However a decision to operate based on clinical suspicion alone can lead to removal of normal appendix in 15-30% cases. Several diagnostic scoring systems have been devised as an aid to early diagnosis of acute appendicitis and to reduce the incidence of negative appendicectomy. One such scoring system was described by Alvarado and later modified by Kalan et al. The present study is attempted to evaluate the efficiency of modified Alvarado score in pre-operative diagnosis of acute appendicitis.

Methods: One hundred twenty consecutive patients suspected of acute appendicitis that were admitted, investigated and treated were taken for the study. After detailed examination and investigations a modified Alvarado score was applied to these patients. They were assigned in three groups and were treated accordingly.

Results: The result of the study showed that high scores in men and children (7-9) had a sensitivity of 92.3% and 83.3% respectively, whereas in females it had a sensitivity of 72.7%. The score (5-6) in males and females had a sensitivity of 57% and 50% respectively.

Conclusions: The high scores in modified Alvarado score is dependable aid in the early diagnosis of acute appendicitis in men and children but it's not true as far as women are considered. Ultrasonography of abdomen is a useful tool in avoiding negative appendicectomy rates particularly in females.

KEYWORDS

Acute appendicitis, Modified alvarado score, Right iliac fossa pain, Right lower quadrant pain

INTRODUCTION

Acute appendicitis is the most common surgically correctable cause of abdominal pain, the diagnosis of which remains difficult in many instances. Some of the signs and symptoms can be subtle to both the clinician and the patients and may not be present in all instances. Arriving at the correct diagnosis is essential, however delay may allow progression to perforation and significantly increased morbidity and mortality. Incorrectly diagnosing the patient with appendicitis, although not catastrophic often subjects the patient to an unnecessary operation.

The diagnosis of acute appendicitis is essentially clinical; however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15 to 30% cases. The premise that it is better to remove a normal appendix than to delay diagnosis doesn't stand up to close scrutiny, particularly in the elderly. A number of clinical and laboratory based scoring systems have been devised to assist diagnosis. The most commonly used is Alvarado score and equally its modifications. Modified Alvarado score consists of three symptoms, three signs and a laboratory finding as described by alvarado and later modified by Kalan et al. The main aims and Objective of this study is to evaluate the efficiency of modified Alvarado score in the preoperative diagnosis of acute appendicitis in a patient presenting with right lower quadrant pain.

METHODS

This study was conducted on patients presenting with acute onset pain in the right lower quadrant of abdomen, lasting fewer than 7 days, who after clinical examination were provisionally diagnosed to have acute appendicitis and were admitted in Department of Surgery, Narayan Medical College, Jamuhar, Sasaram, Bihar. The majority of the patients were from Sasaram, or nearby villages.

Exclusion criteria

- Patients with generalized peritonitis due to appendicular perforation.
- Patients with appendicular mass or abscess.

Collection of data

Total of 120 cases suspected of acute appendicitis were admitted, investigated and treated were taken for the study. After detailed examination and investigations a modified Alvarado score was applied to each case Table -1. The proforma containing demographics, presenting signs, and symptoms were documented. Each patient's three symptoms, three signs, and laboratory indicators of appendicitis recorded, according to modified Alvarado score for appendicitis and subsequently patients were divided into three groups. Cases with score of 1-4 [Group-I] were observed and not operated and were followed up after discharge for next one year for development of acute appendicitis. Cases with score: 5-6 [Group-II] were observed for next 24 hours for revision of scoring. If score became ≥7 or their clinical condition was highly suspicious of acute appendicitis, they were subjected for appendicectomy. All patients who were considered for appendicectomy underwent ultrasonography of abdomen to rule out other conditions mimicking acute appendicitis.

Patients with score 7-9 [Group-III] who were planned for appendicectomy were assessed again after ultrasonography. If any other conditions mimicking acute appendicitis were found in them, they were not operated and categorised as false positive cases. The entire appendicectomy specimen was sent for histopathological confirmation of acute appendicitis. Final correlation between the scoring system and final diagnosis was made. With appropriate follow-up statistical analysis was performed using statistical package for the social science software (SPSS). The sensitivity, specificity, negative predictive value, positive predictive value and accuracy were calculated.

Table 1: Modified alvarado score.

Symptoms/signs/investigation	Score	
	Yes	No
Symptoms		
Migration of pain to right iliac fossa	1	0
Anorexia	1	0
Nausea/Vomiting	1	0
Signs		
Tenderness over right iliac fossa	2	0
Rebound tenderness over right iliac fossa	1	0
Temperature >37.3°C	1	0
Investigation		

Leucocytosis >10x10^9 / L	2	0
Total score	9	0

Scoring system; Modified alvarado score;
Group-I 1-4 appendicitis unlikely.
Group-II 5-6 appendicitis possible.
Group-III 7-9 appendicitis definitive.

RESULTS

In our study patients age ranged from 10-59 years (The overall mean age being 26.23 years). The highest occurrence (42.5%) was seen in the age group of 20-29 years. The next age group affected (24.2%) was 10-19 years. Overall (66.7%) of the cases were seen in the age group 10-29 years Table 2. In our study there were 68 (56.7%) male patients, 40 (33.3%) female and 12 (10%) children Table 3. Group – I; 27 Patients were in the first group (1-4), who were not considered likely to have appendicitis. They were observed and were treated conservatively. Discharged after 2-3 days and were followed up every month for one year and none of them required surgery. Group – II; 33 Patients were in the second group (5-6), 9 were operated on clinical suspicion of high probability of acute appendicitis Table 4. Rest of the cases (24) were treated conservatively, observed and discharged after 3-4 days of stay in hospital and followed up every month for one year and none of them required surgery during the period of observation. Nine patients with score of 5-6 who were operated, 7 were males and 2 were females. Four out of seven males and one out of two females, had acute appendicitis. The overall negative appendicectomy rate of patients with score ≤6 was 44.4%. Group – III; Out of 60 patients in the third group 54 patients underwent appendicectomy Table 5. Six female patients on subjecting for Ultrasonography of abdomen had other pathology mimicking acute appendicitis and they didn't undergo appendicectomy. Three patients had pelvic inflammatory diseases, two patients had twisted ovarian cyst and one patient had ruptured ectopic pregnancy. 50 out of 60 cases had acute appendicitis. The sensitivity of modified Alvarado score of ≥7 was 83.3% (proportion of true positive). The sensitivity was highest among males i.e. 92.3% while in females and children, it was 72.7% and 83.3% respectively. A negative appendicectomy rate was highest among females (27.3%), where as in case of males it was 7.7% and in children it was 16.7%. Two male patients with normal appendix had Meckel's diverticulitis. Two children who had normal appendix had thread worm in appendix.

Table 2: Age distribution.

Age in years	No. of cases with score (1-4)	No. of cases with score (5-6)	No. of cases with score (7-9)	Total	Percentage
10-19	8	5	14	29	24.2
20-29	8	17	26	51	42.5
30-39	6	5	13	24	20
40-49	4	4	5	13	10.8
50-59	1	-	2	3	2.5
Total	27	33	60	120	

Age distribution of one hundred twenty cases according to groups of modified alvarado score.

Table 3: Sex distribution.

Sex	No. of cases with score (1-4)	No. of cases with score (5-6)	No. of cases with score (7-9)	Total	Percentage
Male	17	25	26	68	56.7
Female	10	8	22	40	33.3
Children	-	-	12	12	10

Sex distribution of one hundred twenty cases according to groups of modified alvarado score.

Table 4: Distribution of cases according to Modified Alvarado Score (5-6).

Category of cases	No.of cases operated	No. of cases with histopathology confirmed appendicitis	No. of cases without histopathology confirmed appendicitis	Proportion of true positive
Male (n=25)	7	4	3	57%
Female (n=8)	2	1	1	50%
Child (n=0)	0	0	0	0%
Total (n=33)	9	5	4	55.6%

Histopathological reports of patients undergoing appendicectomy in group – II.

Table 5: Distribution of cases according to modified Alvarado score (7-9).

Category of cases	No.of cases operated	No. of cases with histopathology confirmed appendicitis	No. of cases without histopathology confirmed appendicitis	Proportion of true positive
Male (n=26)	26	24	2	92.3%
Female (n=22)*	22	16	-	72.7%
Child (n=12)	12	10	2	83.3%
Total (n=60)	60	50	4	83.3%

Histopathological reports of patients undergoing appendicectomy in group – III.

Table 6 : Symptoms distribution.

Symptoms	No. of cases with score (1-4)	No. of cases with score (5-6)	No. of cases with score (7-9)	Total	Percentage
Migration of pain to RIF	3	7	54	64	53.3
Anorexia	23	17	46	86	71.7
Nausea/vomiting	11	28	47	76	63.3

The three symptoms of modified alvarado score and their distribution in each group.

Table 7: Distribution of signs.

Signs	No. of cases with score (1-4)	No. of cases with score (5-6)	No. of cases with score (7-9)	Total	Percentage
Tenderness over RIF	4	27	60	91	75.8
Rebound tenderness over RIF	0	9	47	56	46.7
Elevated temperature >37.3°C	19	25	46	90	75

The three signs of modified alvarado score and their distribution in each group.

The predominant symptom seen in the present study was anorexia (71.7%), the next common symptom being nausea/ vomiting (63.3%) and migration of pain to right iliac fossa (53.3%) as seen in Table 6. The predominant sign seen in the present study was tenderness over RIF (75.8%). The next common sign was elevated temperature >37.3°C (68.3%) and rebound tenderness over RIF (46.7%) as shown in Table 7. In our study out of 120 patients, 81 had leucocytosis of which 7 were in group – I, 21 in group – II and 53 in group – III. The leucocytosis seen in present study was 67.5%.

DISCUSSION

Though acute appendicitis is the commonest surgical abdominal emergency with a life time prevalence of approximately 1 in 7. Its diagnosis can sometimes be difficult. In an attempt to prevent negative appendectomies modified alvarado score can be used. The result of the present study showed that a high score (≥7) in men was a satisfactory aid in the early diagnosis of acute appendicitis, the overall sensitivity in men with scores ≥7 was 92.3%, with negative appendicectomy rate of 7.7%. But in females the negative appendicectomy rates were quite high in groups with score of 5 to 6 as well as 7 to 9. The negative appendicectomy rate in the above groups is 50% and 27.3% respectively. In children, it was dependable in the diagnosis of acute appendicitis when the score was ≥7, the sensitivity in the present study being 83.3%. Sensitivity of acute appendicitis 92.3% for males in the present study with the score of 7 to 9 correlates well with the figures of studies by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have reported 93%), Bhattacharjee PK, Chowdhary T, Roy D (who have reported 94.1%). Sensitivity of acute appendicitis 72.7% for females in the present study with the score of 7 to 9 correlates well with the figures of studies by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have reported 67%) and Bhattacharjee PK, Chowdhary T, Roy D (who have reported 71.9%). Sensitivity of acute appendicitis 83.3% for children

in the present study with the score of 7 to 9 correlates well with the figures of studies by P. K. Bhattacharjee, T. Chowdhary, D. Roy (who have reported 80%), but is less sensitive compared to study conducted by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have reported 100%). The overall sensitivity of acute appendicitis being 83.3% in the present study with score 7 to 9 correlates well with the figures of studies by by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have reported 83.7 %) and Bhattacharjee PK, Chowdhary T, Roy D (who have reported 82.7%). Sensitivity of acute appendicitis 57% for males in the present study with score of 5 to 6 is lesser than the figures of studies by Kalan M, Rich AJ , Talbot D, Cunliff WJ (who have repoerted 67% in men) and Bhattacharjee PK, Chowdhary T, Roy D (who have reported 83.3%). Sensitivity of acute appendicitis 50% for females in the present study with score of 5 to 6 correlates well with the figures of studies by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have repoerted 50%) and lesser compared to Bhattacharjee PK, Chowdhary T, Roy D (who have reported 66.7%).

CONCLUSION

From the present study it is concluded that high scores (7-9) in modified Alvarado score is dependable aid in the early diagnosis of acute appendicitis in men and children but the same is not true as far as women are concerned. Ultrasonography of abdomen is a useful tool in avoiding negative appendicectomy rates particularly in females.

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