

Diagnostic Accuracy of Alvarado Scoring System in Acute Appendicitis

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ABSTRACT

OBJECTIVE: Acute appendicitis is one of the commonest surgical emergency. There are different scoring systems in use to diagnose the appendicitis. Aim of this study was to document the diagnostic accuracy by application of Alvarado Scoring System in clinical practice for acute appendicitis.

DESIGN: Descriptive case series.

SETTING: Surgical Unit-II, Liaquat University Hospital Hyderabad, Sindh – Pakistan; from January 2003 to September 2004.

METHODS: All the patients with suspected appendicitis were admitted in the ward. A proforma was designed and relevant findings were documented. These were observed regarding the increase or decrease in severity of symptoms and hence the change in the initial score according to Alvarado Scoring System was documented at the time of admission. Decision regarding surgical intervention was made on the basis of change in the score.

RESULTS: A total of 227 patients with clinical features suggesting acute appendicitis was admitted in the ward. Among them, 150 (66.07%) were males and 77 (33.92%) were females. Age ranged from 10-62 years. Main symptoms at presentation included pain in right iliac fossa 67.8%, fever 66.9% and nausea and vomiting 49.7%. Thirty two patients were received with Alvarado Score of 1-4 and three out of them required surgery. Thirty five patients were in the score of 5, twenty three out of them required surgery. One hundred sixty patients were in the score of 6 and above, all of them required surgery. Out of 185 patients who underwent surgery, 178 patients had appendicitis. The negative appendectomy rate was 3.78%.

CONCLUSION: It is concluded that according to Alvarado the patients with score up to 4 probably do not require surgery and among the patients with score up to 5, most of them need surgery while the patients with the score of 6 and above will require surgery.

KEY WORDS: Appendicitis. Appendectomy. Alvarado scoring system.

INTRODUCTION

Acute abdominal pain is one of the commonest surgical emergencies. Appendicitis is one of the commonest causes of abdominal pain requiring emergency surgery. Often, it is difficult to reach the proper diagnosis. There may not be classical symptoms and signs of appendicitis. Different clinical signs and symptoms always mimic the diagnosis of acute appendicitis, as there are number of causes leading to pain in right iliac fossa particularly in female patients. Purpose of different scoring systems for diagnosis of the appendicitis is to facilitate the surgeon and to avert negative appendectomy.^{1,2} At present, other scoring systems are also in use, like Ramirez and Dues. Alvarado scor-

ing system is based on history, physical examination, few laboratory investigations and is easy to apply in comparison to other systems. Decision making in cases of acute appendicitis may be difficult, radiological investigations are not of much help, though ultrasound, laparoscopy and C.T scan may be helpful. Diagnostic accuracy regarding appendicitis also depends on the experience of surgeon, yet the need for supportive measures is always there. Aim of this study was to evaluate the diagnostic accuracy of Alvarado scoring system in our setup which is simple to apply³, and is of much help to junior surgeons. Definitive diagnosis can however be reached at surgery and after histopathology.

PATIENTS AND METHODS

This descriptive case series was carried out at Liaquat University Hospital Hyderabad to evaluate the efficacy of Alvarado scoring system in diagnosis of acute appendicitis. This study was conducted from January 2003 to September 2004. A proforma was designed and all the findings were recorded according to Alvarado scoring system. Two hundred twenty seven patients with suspected acute appendicitis were included in the study. The investigations carried out included complete blood picture, blood sugar, urine detailed report, blood urea, X-ray chest and ultrasound abdomen. All patients were scored by Alvarado scoring system (Table I).

Patients with Alvarado score below 4 were reassured along with symptomatic treatment and were asked to come back if the symptoms persist or get worse. Patients with score of 4-5 were observed for any change in the score, and were initially kept on conservative treatment. Those who showed improvement were discharged where as who deteriorated were submitted for surgery. Patients with score of 6-10 required surgery. All the patients included in the study remained in contact with doctor for early post operative complications.

RESULTS

Two hundred twenty seven patients with clinical features suggesting acute appendicitis were included in the study. Among them, 150 (66.07%) were male and 77 (33.92%) were females. Mean age was 20.47 years. Age ranged from 10-62 years. One hundred twenty (52.8%) patients were between 12-20 years. The symptoms at presentation included pain in right iliac fossa (67.8%), pain in whole abdomen (19.3%), fever (66.9%), nausea and vomiting (49.7%) and anorexia (62.5%). Of the signs in the patients undergoing surgery, tenderness in right iliac fossa was found in 170 (91.8%) cases, rebound tenderness in 149 (80.54%) cases, elevated temperature in 156 (84.32%) cases and Rovsing's sign in 103 (55.67%) cases. Regarding investigations, TLC was raised in 140 (75.67%) cases and with neutophilia in 129 (69.72%) cases. Out of the 227 patients, 32 (14.01%) patients had an Alvarado score of 1-4, amongst them, 20 were females and 12 males. All of them were discharged after initial assessment and symptomatic treatment. Three out of 32 however were readmitted due to increase in severity of symptoms and required

surgical intervention. Operative findings confirmed acute appendicitis. Thirty five (15.4%) patients with an Alvarado score of 5 were admitted for observation and evaluation. Of them, 26 were males and 9 were females. Of these 35, twenty three patients required appendicectomy because of persistence of symptoms. Remaining 12 patients were discharged after 24 hours of observation. Out of the 227 patients, 69 (30.3%) patients had score of 6-7 and were admitted for observation and evaluation. This group comprised of 45 (65.2%) males and 24 (34.7%) females. All the patients had increased severity of symptoms and required surgical intervention. Ninety one (40%) out of 227 patients were in the score range of 8-10 and all of them underwent emergency surgery. Of the ninety one, 70(76.9%) were males and 21 (23%) were females. All the patients who underwent surgery in this series, the operative findings included acutely inflamed appendix (58.37%), perforated appendix (24.32%), appendicular mass (4.3%) and gangrenous appendix (9.18%). In 7 cases, the appendix was found normal, resulting in a negative appendicectomy rate of 3.78% in this series. The underlying pathology in seven patients with negative appendicectomy included mesenteric lymphadenitis in two patients and ruptured ovarian cyst, Meckel's diverticulitis and twisted ovarian cyst in one patient each and no pathology was found in two cases. (Table II)

**TABLE I:
ALVARADO SCORING SYSTEM¹⁶**

Feature	Score
Symptoms	
Migratory right iliac fossa pain	1
Nausea / vomiting	1
Anorexia	1
Signs	
Right Iliac fossa tenderness	2
Fever > 37.3°C	1
Rebound pain in right iliac fossa	1
Laboratory test	
Leucocytosis (>10 X 10 ⁹ /L)	2
Neutrophilic shift to the left > 75%	1
Total Score	10

**TABLE II:
FINDINGS AT EXPLORATION**

Finding	Alvarado Score	No. of Patients	Percentage
Inflamed appendix			
Acute appendicitis	5-8	108	58.37
Perforated appendix	8-9	45	24.32
Gangrenous appendix	9-10	17	9.18
Mass	9-10	8	4.32
Normal appendix			
Mesenteric adenitis	5	2	1.08
Ruptured ovarian cyst	9	1	0.54
Meckel's Diverticulitis	7	1	0.54
Twisted ovarian cyst	9	1	0.54
No pathology found	5-6	2	1.08
Total operated patients		185	81.49

DISCUSSION

The main aim of clinical decision making is to reach the diagnosis.⁴ Good history and proper clinical examination helps much to reach the diagnosis in most of the cases. Purpose of the different studies is to facilitate the surgeon's decision because unnecessary surgical intervention carries the risk of morbidity and mortality.⁵ Since the advent of surgery, the diagnosis of acute appendicitis is mainly clinical, though ultrasound and laparoscopy can be helpful. But even then the correct diagnosis could hardly be made.⁵⁻⁷ Diagnostic accuracy regarding appendicitis also depends on the experience of surgeon yet the need for supportive measures is always there.^{5,8} C.T. Scan may solve the problem. Ultrasonography⁷ and C-reactive protein can also help in the diagnosis. Thus, always there is need for complimentary support. At present, many scoring systems are also in use but Alvarado scoring system which is based on history, physical examination and few laboratory investigations is easy to apply in comparison to other systems.⁹ The Alvarado scoring system first described in 1988 is simple scoring system that can be instituted easily in out patients setting.¹⁰ Good clinical acumen remains the mainstay of correct diagnosis of acute appendicitis.^{11,12} In this study, 185 (81.49%) out of 227 patients with sus-

pected acute appendicitis underwent appendectomy. Of those operated, 7 patients were found to have normal appendix and other pathologies were responsible for their symptoms. Hence, the negative appendectomy rate in this series was 3.78%. The other studies show a negative appendectomy rate varying from 9.37 to 19.3%.^{7,8} Of the seven patients who underwent negative appendectomy, 5 had associated pathology. This highlights the sensitivity of Alvarado scoring system. In females, additional investigations may be required to confirm the diagnosis.¹³⁻¹⁶ None of the patients in this series with a score of below 4 had appendicitis. If this was used as admission criteria, 32 patients with score of 3 and 4 would have required admission and observation. Thirty five patients with score of 5 were admitted in hospital of which 23 patients required appendectomy. The remaining 12 patients who were females, were discharged on conservative treatment. This highly suggests that patients with Alvarado Score of 4 or less have no appendicitis and thus no surgical intervention is required. While patients with the score of 5 or above probably require surgical intervention. It is also important to emphasize that the scoring may not be accurate in patients who are unable to give proper history, such as very young or those with communication problem.¹⁰ Ninety one patients in this series were in the score range of 8-10. All underwent emergency surgery and were found to have acute appendicitis or its complications or found to have other pathology. This also shows the high sensitivity and specificity of Alvarado scoring system.

CONCLUSION

This study shows that Alvarado scoring system can be used to diagnose acute appendicitis in the emergency department. It is easy and quick to apply. It also allows observation and re-observation regarding clinical behavior of patient, whether or not to intervene for surgery. Its application can avert negative appendectomy or else prevent from complications leading to gangrene, perforation, wound sepsis, and hence use of costly antibiotics and increased hospital stay.

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