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Research Article

### IMPORTANCE OF ALVARADO SCORE IN MAKING THE TREATMENT PLAN AND DIAGNOSIS OF ACUTE APPENDICITIS

<sup>1</sup>Dr Saleem Raza Shah, <sup>2</sup>Dr Abdul Rehman, <sup>3</sup>Dr Sultan Mehmood

<sup>1</sup>Senior Registrar Surgery, Nawaz Sharif Medical College and Aziz Bhatti Shaheed Teaching Hospital Gujrat., <sup>2,3</sup>Medical Officer, Aziz Bhatti Shaheed Teaching Hospital Gujrat.

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**Abstract:**

**Objective:** To reduce the rate of negative appendectomy and perforation risk by using the Alvarado score as an admission criterion and management plan for acute appendicitis.

**Study design:** Interventional study.

**Place and Duration:** In the Surgical Unit of Aziz Bhatti Shaheed Teaching Hospital Gujrat. for One year duration from April 2018 to April 2019.

**Methodology:** This study was based on data that the use of the Alvarado scoring system was evaluated prospectively in 140 sequential patients of above twelve years of age with right iliac fossa pain and with or without acute abdominal features.

**Results:** 140 total patients were selected for the study, male were 95 (67.8%) and females were 45 (32.1%). 1.5: 1 was the male / female ratio. Of the 140 cases, Alvarado score was 4 or less in 28 (20%), were discharged and were scheduled for follow up at the outpatient clinic after 24 hours. For observation of cases having Alvarado score 5-6, 43(30%) patients were admitted, 9 (20.9%) of patients show improvement and appendectomy was done in 34 (79%) due to Alvarado Score rise up to 7. Sixty nine patients have above seven Alvarado score. The appendectomy was done in all of them. In 22 patients (31.8%); gangrenous or perforated appendix was noted. In general, the negative appendectomy rate was 3 male and 6 patients were female (9% (8.5%).

**Conclusion:** In acute appendicitis, the Alvarado score can be used as an objective criterion in the selection of patients receiving admission and conservative or operative treatment. In women, a complementary ultrasound should be performed on the abdomen and pelvis to exclude other pathologies.

**Key Words:** Alvarado score, Appendicitis, diagnosis.

**Corresponding author:**

**Dr Saleem Raza Shah,**

Senior Registrar Surgery, Nawaz Sharif Medical College  
and Aziz Bhatti Shaheed Teaching Hospital Gujrat.

MOBILE +92-335-6876999.

QR code



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**INTRODUCTION:**

In young adults; most usual reason of acute abdomen is acute appendicitis. Six percent population approximately will agonise from acute appendicitis throughout their lives [1]. The acute appendicitis diagnosis is evident with abdominal pain history that begins in the periumbilical region and then radiate to the right iliac fossa [2]. It is related with anorexia, nausea, vomiting and sometimes mild fever. In the right iliac fossa; rebound tenderness was noted during abdominal examination and tenderness on touch [3]. The acute appendicitis diagnosis is problematic in

women of reproductive age, particularly during pregnancy [4]. It is not practical to make a definitive diagnosis before surgery, but we can decrease the negative appendectomy rate using a modest clinical scoring system [5]. There are various scoring systems for the acute appendicitis diagnosis but the Alvarado score is simple, complementary aid and easy for diagnosis<sup>6</sup>. In 1986; Alvarado's score was first introduced by three constituents, such as clinical examination, several laboratory tests and history, ie a TLC number (Table I).

**Table I. Alvarado Score**

Features	Score
<b>Migration of pain RIF</b>	<b>1</b>
<b>Anorexia</b>	<b>1</b>
<b>Nausea / Vomiting</b>	<b>1</b>
<b>Tenderness in RIF</b>	<b>1</b>
<b>Temp. &gt; 37.5C</b>	<b>1</b>
<b>Rebound tenderness in RIF</b>	<b>2</b>
<b>Leukocytosis &gt; 11,000</b>	<b>2</b>
<b>Shift to the left of neutrophils</b>	<b>1</b>
<b>Total</b>	<b>10</b>

If the clinical picture shows acute appendicitis and the Alvarado score is above seven, surgical treatment is first choice [7]. Using a score higher than > 7 has been shown to have a sensitivity of 98.3% and a specificity of 69.6%. In the literature; negative appendectomy rate of 20 to 40% has been reported, and most people inevitably consider a 30% rate [8]. The negative appendectomy rate is highest in patients with an Alvarado score of 5-6 (26.5%) [9]. The similar rate of negative appendectomy is higher in women than in men. The aim of various analysis is to ease the decision of the surgeon because unnecessary surgical interference carries the risk of mortality and morbidity.

**MATERIALS AND METHODS:**

This interventional study was held in the Surgical unit of Aziz Bhatti Shaheed Teaching Hospital Gujrat. for One year duration from April 2018 to April 2019.

We included 140 patients older than 12 years, regardless of sex. The data was calculated in a specially designed format and the surgery decision was taken by the doctor. In all patients; Alvarado score was applied in cases with pain in the right iliac fossa with or without acute abdominal topographies.

According to the Alvarado score; into 3 groups, patients were divided.

Group score I 4 or lower

Group II score 5-6

Group III score is 7 or higher.

The time interval between presentation and surgery was changed in different patient groups. In the group III (7 Alvarado score or higher), the interval between surgery and admission was four to six hours. In Group II (5-6 Alvarado score), patients were accepted for initial surveillance and surgery was done if the Alvarado score increased to 7. Blood chemistry was performed for each patient who was admitted. CBC, CXR and ECG were recommended for Anesthesia protocol in patients 40 years and older. In some selected patients with equal findings, especially in young women, additional ultrasound was recommended for the abdomen and pelvis. In two stages; Diagnosis was confirmed. 1<sup>st</sup>, intraoperative findings and second, reports from histopathology. For 3 months in surgical OPD; all of these patients were followed up. To the Alvarado score; descriptive analysis was applied. The Alvarado scoring system reliability was evaluated by recording the negative

appendectomy rate and the PPV (positive predictive value). In order to find a meaningful relationship between negative appendectomy ratio in individuals with different Alvarado scores, simple chi-square test was applied and dual-stage test was applied to gender.

### RESULTS:

In all 140 patients; on admission Alvarado score was applied for surveillance and surgical treatment criteria. Of the 140 patients, 95 were male-dominated (67.7%). 12 to 49 years was the age range, with 29 years mean age. In mostly patients age range was 21-30 years in 52 patients (37.1%), Table II. 6.22 was the average Alvarado's average score.

**Table II. Demographic data (n=140)**

Age Groups	Gender	
	Male (No. %)	Female (No. %)
12-20 Years	29 (20.7)	13 (9.2)
21-30 Years	35 (25)	17 (12.1)
31-40 Years	19 (13.5)	10 (7.1)
> 40 Years	12 (8.5)	5 (3.5)
<b>Total</b>	<b>95 (67.8)</b>	<b>45 (32.1)</b>

#### First group:

(Alvarado's score less than four) included twenty eight cases (20%). All these cases were treated in emergencies and discharged within 24 hours later for follow-up at the general surgery clinic. Only 20 patients were admitted to the outpatient clinic, 16 of them (80%) were recovered completely and for observation 4 (20%) were admitted long.

Alvarado score increased to seven in 2 (07%) patients who have tenderness and pain in the right iliac fossa. Both underwent an appendectomy and later found an inflamed appendix confirmed in the histopathology report.

#### Second group:

(Alvarado score 5-6) included forty three (30.7%) of 140 patients admitted to the observation room for surgery.

Nine (20.9%) subjects were clinically improved and were sent home. The Alvarado score rise in In 34 patients (79%) by 7 and surgery was done in them. In these patients, appendix was normal in six cases. In three women (2 of whom had ovarian cyst rupture and one had ectopic pregnancy). The appendix was

surgically removed in these patients to evade future diagnostic difficulties and confusion due to a given incision.

#### Third group:

(Alvarado score 7-10) included 69 patients (49.2%), all accepted and operated. Only 3 patients (2.9%) had acute appendicitis and 44 patients (63.7%), while complicated abscesses (gangrene) developed in 22 patients and in (31.2%) perforated. Subsequently, the histopathological examination tested the data described above. Abdominal and pelvic ultrasound was performed in 25 patients who were difficult to diagnose. It was normal in 7 males and 18 females and 2 males and 8 females. Ultrasonography revealed acute appendicitis in 3 men and 11 women. 3 men and 7 women had free fluid in the right lower abdomen. Right ovarian cyst was detected in four women and ectopic pregnancy was noted in one patient. In the Obs / gynec unit, one ectopic pregnancy and 2 ovarian cysts were referred and two patients with disease cysts were operated on in our department, because even those were suspected acute appendicitis. Both were found with inflamed supplements.

Groups	Score	(No. %)
<b>Group I</b>	1	
	2	6 (4.2)
	3	10 (7.1)
<b>Group II</b>	4	12 (8.5)
	5	14 (10)
	6	29 (20.7)
<b>Group III</b>	7	30 (21.4)
	8	25 (17.8)
	9	11 (7.8)
	10	3 (2.1)

**Table III. Frequency distribution of subjects with Alvarado Score (n=140)**

The negative appendectomy rate was five percent, with 9 patients (8.5%), male were 3 and female were 6 (Tables III and IV).

Suggested Management	Score	Results	Mean Core
<b>Surgery</b>	<b>Group III</b>		
	69+34+2	105(75%)	7.9
<b>Observation</b>	<b>Group II</b>		
	43-34	9(6.4%)	5.6
<b>Discharge</b>	<b>Group I</b>		
	28-2	26(18.5%)	2.8

**Table IV. Suggested management after application of Alvarado Score (n=140)**

Overall, the Alvarado score positive predictive value was 90.2, whereas (95.3%) in males and in (81.5%) in females (Table V). There was a vast difference

between group II and I who underwent surgery due to negative appendectomy rate of Group III subjects and increased Alvarado score.

**Table V. Positive predictive value (n=105)**

Gender	Operated No. (%)	Patients	Negative Appendectomy No. (%)	Positive Predictive Value No. (%)
Male	95	66	3 (4.6)	3 (4.6)
Female	45	39	6 (15.3)	6 (15.3)
Total	140	105	9 (8.5)	9 (8.5)

**DISCUSSION:**

In the last 100 years; the most common acute surgical intervention performed is acute appendectomy and mortality and morbidity rates have decreased significantly<sup>10</sup>. This is due to the acknowledgement of the harmful effects of appendix perforation and the destructive surgical treatment plan, including early operations, is universal with a negative appendectomy rate of 16-29%. Alvarado's score is an objective assessment of pain in the right lower quadrant [11].

Above 7 Alvarado score indicates a high likelihood of acute appendicitis. Therefore, Alvarado's score is reliable, easy and practical to qualify. With the Alvarado scoring system application, we can reduce postoperative morbidity and mortality<sup>12</sup>. Making accurate and safe decisions in patients with acute appendicitis may be useful and may also classify patients for observation. Acute appendicitis is a advanced disease and can be easily reproduced to assess disease progression after the acceptance of the Alvarado score in observed patients<sup>13</sup>. Abdominal and pelvic U / S and diagnostic laparoscopy are excellent diagnostic tools in equivalent patients. In our analysis, (67.8%) 95 of 140 patients were male and female were 45 (32.1%). The ratio was 1.5: 1. In our study, negative appendectomy rate (9.7%) was emphasized, but the 2001 and 2003 studies were 21% and 13%, respectively. While the equally PPV of our study (89.92%), it was higher in men (95.3%) and lower in women (81.5%) than in the Han study (81.1) and (87%) respectively<sup>14</sup>. The acute appendicitis rare causes were cancer and parasitic infections such as Entamoeba histolytica and Enterobius Vermicularis. The Alvarado score has a high diagnostic value below four and above seven. In 28 cases (7.1%), 14 had right iliac fossa pain with the Alvarado score 5, in 2 patients (the score increased from Alvarado to 6). Unlike Tade AO studies in Nigeria, none of the 7 patients with appendectomy and inflammation reported that the patient did not return with an increase in Alvarado score with an increase in pain. Presently, the Alvarado 7 score provides additional evidence that the negative appendectomy rate is only 4.3% for 7/10, but the Alvarado score is only 4.3%, but shows the rate of perforated or gangrenous appendicitis in 9% cases. All patients with an Alvarado score of 5-6 were admitted, but after recovery, 9 patients (20.9%) were discharged and 34 (79%) of the increase in Alvarado score were operated<sup>15</sup>. Delay in appendectomy for acute appendicitis had adverse effects on postoperative complications, but in selective cases, late appendectomy did not significantly increase

perforation or operative time and residence time a few hours after presentation.

The score Alvarado described in 1986 had its own limitations. Age, sex and duration of symptoms are not taken into account. In extreme cases, early surgery should be performed even if the score is low.

**CONCLUSION:**

Alvarado's scoring system has a high diagnostic value of 90%. This scoring system is dynamic, its application increases the accuracy of the diagnosis and reduces the rate of negative appendectomy successively.

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