

# THE USE OF THE ALVARADO SCALE IN THE DIAGNOSIS OF ACUTE APPENDICITIS

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## Abstract

The examination and surgical treatment of 1759 patients with acute appendicitis are presented. Analysing the Alvarado scale using the possibility of diagnosing acute appendicitis can help reduce the number of diagnostic errors and unjustified surgical interventions if acute appendicitis is suspected.

**Keywords:** acute appendicitis, Alvarado scale.

## INTRODUCTION

The incidence of acute appendicitis (AA) in the general population is 0.1–0.6%, with a steady downward trend [1, 2]. The improvement of diagnostic methods makes an outstanding contribution to this. Diagnostic errors lead to “unjustified” surgery and delayed surgical care, and their frequency is 2,3–34,5% [3, 4, 5].

Interest in the preoperative diagnosis of AA does not weaken. In order to improve diagnostic search schemes for suspected acute appendicitis in several countries around the world, various scoring systems are used to evaluate various clinical, laboratory and anamnestic signs. The A.Alvarado system is most often used, which includes a list of symptoms and signs characteristic of an uncomplicated variant of acute appendicitis [6, 7, 8].

The purpose of the study is to examine the effectiveness of the Alvarado scoring system in the diagnosis of acute appendicitis in the conditions of the Almaty City Clinical Hospital, which provides emergency surgical care around the clock.

## Materials and methods of research

A retrospective analysis of the case histories of 1759 patients with AA was carried out. The data of clinical, laboratory, ultrasound, radiological and histological studies and the possibilities of using the A. Alvarado scale to improve the diagnosis of OA has been studied. (Table 1).

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**Table 1.** Alvarado scale (MANTELS).

Symptoms	Scores
<b>M</b> = Migrating pains in the right iliac region	1
<b>A</b> = Anorexia	1
<b>N</b> = nausea and vomiting	1
Symptoms	
<b>T</b> = soreness in the right iliac region	2
<b>R</b> = positive symptom of Shchetkin-Blumberg	1
<b>E</b> = Elevated temperatures	1
Laboratory report	
<b>L</b> = Leukocytosis	2
<b>S</b> = Shift of the leukocyte formula to the left	1
Total number of points	10

Depending on the signs, symptoms and laboratory tests, the number of points is decided:

- the result is less than 5 points: acute appendicitis is unlikely;
- a score of 5-6 points: acute appendicitis is possible, and the patient needs to be monitored;
- 7-8 points: acute appendicitis is likely;
- score 9-10 points: acute appendicitis is present, and the patient requires immediate surgical intervention.

**Results and discussion:**

Distributing by gender, we received the following: out of 1,759 patients, 763 (43.4%) were men, and 996 (56.6%) were female, from 16 to 91. The youth age group underwent the most surgical treatment - 846 (48.1%) people, in second place the age group corresponding to the young age - 669 (38.0%), in third the average age group - 165 (9.4%), then respectively the elderly - 65 (3.7%) and senile - 14 (0.8%) (Table 2).

**Table 2.** Age groups in acute appendicitis.

Age categories	Number	%
Youth (under 18 years old)	846	48,1
Young (18-44 years old)	669	38.0
Average (45-59 years old)	165	9,4
Elderly (60-74 years old)	65	3,7
Senile (75-90 years old)	14	0,8
Total	1759	100

In a retrospective analysis, we obtained the following data:

- The Kocher –Volkovich symptom in 93.3% of cases in patients who underwent surgical treatment in our hospital.
- Dyspeptic phenomena, such as nausea and vomiting, were observed in our patients in almost 99.3% of cases, and soreness in the right iliac region – in 100% of cases, according to case histories.
- Symptom of irritation of the peritoneum – Shchetkin-Blumberg, was positive in 60 cases (3.4%).

The minimum studies necessary to diagnose acute appendicitis include measuring body temperature and determining the leukocyte reaction. The temperature can be increased with any form of acute appendicitis, but it rarely exceeds 38 ° C. The body temperature can only reach or exceed 39 ° C with a developing appendicular abscess or diffuse peritonitis. Our data shows that temperatures above 37 ° C are observed in only 3.2% of patients. In 96.8%, the temperature did not increase the norm (Table 3).

**Table 3.** Body temperature indicators of patients with AA.

Body temperature	Year			total
	2015	2016	2017	
Above 37 ° C	18 (2,9%)	27 (4,4%)	12 (2,3%)	57 (3,2%)
In norm	603 (97,1%)	593 (95,6%)	506 (97,7%)	1702 (96,8%)
Total	621 (100%)	620 (100%)	518 (100%)	1759 (100%)

According to the Central Clinical Hospital of Almaty, the number of patients with leukocytosis was 77.5% (Table 4).

**Table 4.** Indicators of leukocytosis in patients with OA.

The level of white blood cells in the blood	years			Total
	2015	2016	2017	
till 4*10 <sup>9</sup>	6 (1,0%)	4 (0,6%)	4 (0,8%)	14 (0,8%)
5-9*10 <sup>9</sup>	145 (23,3%)	116 (18,7%)	120 (23,2%)	381 (21,7%)
10*10 <sup>9</sup> and higher	470 (75,7%)	500 (80,6%)	394 (76,1%)	1364 (77,5%)
Total	621(100%)	620 (100%)	518 (100%)	1759 (100%)

At the same time, neutrophilia occurred in 80% of patients.

**Table 5.** Score on the Alvarado scale.

Scores	Acute appendicitis forms		
	Catarrhal	Phlegmonous	Gangrenous
5 points: acute appendicitis is unlikely	-	-	-
5-6 points: possible, and	12 (63,2%)	513 (33,2%)	-

the patient needs observation			
7-8 points: acute appendicitis is likely	7 (36,8%)	500 (32,4%)	31 (15,8%)
9-10 points: there is, and the patient requires immediate surgical intervention	-	531 (34,4%)	165 (84,2%)
Total	19 (100%)	1544 (100%)	196 (100%)

As seen from our table, not a single case fell into the first group when dividing patients into groups by points. All these figures clearly showed that using this scale prevents errors in diagnosing this pathology.

## Conclusion

As the first stage of diagnosis formation, A. Alvarado scale can help systematise the data obtained as a result of a clinical examination and solve the question in doubtful cases (less than 6 points) about the dynamic observation of additional modern diagnostic methods and therapeutic tactics.

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