

HOW TO APPROACH THE PATIENT SUSPECTED OF HAVING ACUTE APPENDICITIS, INTRODUCING NEW CRITERIA: (TWO OUT OF THREE)

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ABSTRACT

Background: Acute appendicitis is the most common cause of acute surgical abdomen. In spite of the introduction of ultrasonography, computed tomography scanning and laparoscopy in the years 1987-1997 the difficulty in accurate diagnosis of acute appendicitis has remained the same. Our way of reaching a decision for operating in a patient suspected of having acute appendicitis (which will follow) has superiority to other introduced so far approaches.

Methods: 3046 patients suspected of having acute appendicitis were evaluated during the years 2003-2005 at Shohada Medical Center. We have adopted a 3 point system, giving 1 point each to history, physical examination and laboratory tests if they meet the criteria:

1. Typical history gets 1 point if: an abdominal pain shift from epigastrium or periumbilical area to RLQ accompanying anorexia, nausea and vomiting depending on age.
2. Typical physical findings: RLQ tenderness associated with rebound tenderness,
3. Laboratory tests: leukocytosis between 10,500 to 18,000/mm³ along with normal urinalysis or leukocyturia without presence of bacteria. In pregnancy where leukocyteosis exists shift to the left is considered positive.

Each of the criteria gets zero or 1 point if it meets that mentioned above and those who get two or three points will be operated on, otherwise the patient will be observed for 12 hours until his symptoms improve or progress to have two or three point criteria when he or she will be operated on. The results of histopathological examination of appendix have been used for the accuracy of this method.

Results: Among 3046 patients, 1241 (41%) were operated on rightaway with diagnosis of acute appendicitis since they had 2 or 3 points on arrival. From these 1213 (97/1%) had acute appendicitis. 1805 (59%) patients who didn't get at least 2 points were observed for 12 hours, during this period 115 (6.4%) patients, who got at least two points were operated on, and 92 (80.5%) patients had non-perforated appendicitis; and the others were discharged since their symptoms improved. None of the patients, who were observed, developed perforation of appendix or peritonitis. Sensitivity and specificity of this method was 100% and 97.1% with positive and negative predictive values of 93.3% and 95.5%. So this method is a safe way of approaching patients suspected of having acute appendicitis.

Conclusion: The 2 out of 3 points criteria for approaching the patients suspected of having acute appendicitis provide a nonexpensive, noninvasive, simple, rapid and accurate method for diagnosis of acute appendicitis.

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Two out of Three Criteria for Appendicitis

INTRODUCTION

Acute appendicitis is the most common cause of acute surgical abdomen.¹ The lifetime rate of appendectomy is 12% for men and 25% for women with approximately 7% of all people undergoing appendectomy for acute appendicitis. The rate of appendectomy for appendicitis has remained constant at 10 per 10,000 patients per year. Despite the high prevalence of acute appendicitis and increasing knowledge about the problem, there is still difficulty in making an accurate diagnosis of acute appendicitis and many studies are undertaken all around the world to find new methods, clinical or paraclinical, to increase the accuracy of diagnosis of acute appendicitis¹⁻¹⁴ without increasing the rate of perforation.

The current accepted accuracy rate in diagnosis of acute appendicitis is around 85%² and if any center has a negative appendectomy rate of more than 15%, they should revise their approach in making a diagnosis of acute appendicitis.

Observing patients suspected of having acute appendicitis who do not have typical symptoms can increase the accuracy rate to 94% as reported in some studies. This is associated with an increased rate of ruptured acute appendicitis, so delay in diagnosis of acute appendicitis will increase the morbidity rate due to perforation of acute appendicitis.³

In developing countries, limitation for availability of new imaging techniques and trained personnel for its interpretation is an added obstacle for making the diagnosis, and dependence solely on clinical findings and simple lab tests are more appropriate.

In this study we introduce a new clinical approach to the diagnosis along with laboratory criteria which makes the diagnosis of acute appendicitis more straight forward and with a high accuracy without increasing the rate of perforation, due to delay in making the diagnosis. This is called the rule of two or more out of three.

We have performed a research study to evaluate the accuracy of this method at Shohada-e-Tajrish Medical Center, Tehran-Iran, between the years 2002-2005.

METHODS

A research was carried out to evaluate the accuracy of this method in making the diagnosis of acute appendicitis in a prospective study. During 30 months of study, 3040 patients who were suspected of having acute appendicitis who came to the Emergency Department were evaluated by surgical residents using the rules below for making the diagnosis:

1. We give 1 point to history if the pain starts in the epigastrium or periumbilical region and then shifts to RLQ. This should be accompanied with vomiting in children (<10 years old), nausea in youth (10-19 years old), anorexia in adults (20-50 years old) and none of the above in old patients (>50-60 years old).

2. We give another 1 point to physical examination if the patient has tenderness in RLQ associated with rebound tenderness. Presence of referred rebound tenderness, presence of tenderness on the right side of the pelvis on rectal examination and other signs of acute appendicitis are helpful but do not add anything to 1 point.

3. The 3rd point is given to laboratory tests if leukocytosis more than 10500 WBC per mm³ but not more than 18000/mm³ and a normal urinalysis is present but if leukocyturia is present, there should be no bacteria in the urine. In pregnant women where usually a leukocytosis exists, shift to the left is considered positive and also in immunosuppressed patients and in cases that the shift to the left exists without increase of leukocyte count.

Each of the above gets zero or 1 point and there is not a half point if the criteria is not complete. Patients who get two or three points will be operated on right away, those who do not get 2 out of 3 points will be observed.

During the time of observation, if they acquire 2 out of 3 points again they will be operated on right away and if the symptoms improve, the patients will be discharged.

RESULTS

Among 3046 patients studied 46% were female and 54% were male. Only 2% of patients were under 10 years of age and 35.7% were between 20-30 years old (Table I).

Among the males negative appendectomy was higher in both extremes of age but in females, it was more during the reproductive period (20-50 years old); this was statistically significant ($P < 0/05$, chi-square).

The average age for appendicitis was 25.4 years old both in females and males which is somewhat different with the reported figure in other countries (31.3 years) but the predominance of female over males is the same and statistically significant with P value < 0.05 .

41% (1241) of patients who presented to the emergency department suspected of having acute appendicitis had at least 2 out of 3 criteria and underwent appendectomy right away; 97.1% (1213) of these patients had documented acute appendicitis by histopathological report, out of these 5.2% (63) had perforated appendicitis which was due to delay in seeking medical attention by the patients or delay in referral of these patients to our

Table I. Distribution of patients according to age for those suspected of having acute appendicitis and those who were operated on according to rule 2 out of 3 points.

	Age	<10	10-20	20-30	30-50	>50	Total
All patients	Number	61	698	1209	794	284	3046
	Percent	2%	22.9%	35.7%	26.1%	9.4%	100
Patients operated on according to rule 2 out of 3 points.	Number	17	343	452	215	60	1087
	Percent	1.6%	31.6%	41.6%	19.8%	5.5%	100

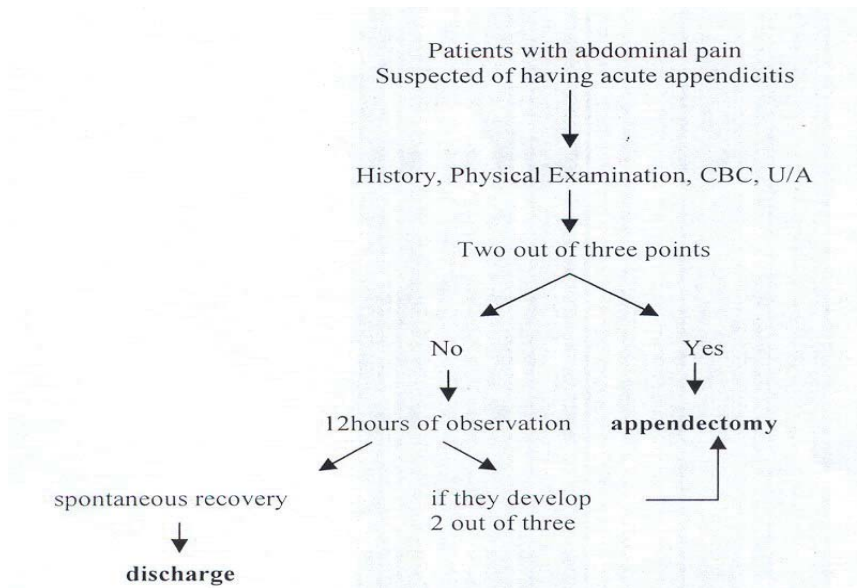


Fig. 1. Algorithm of diagnosis and treatment of patients suspected of having acute appendicitis.

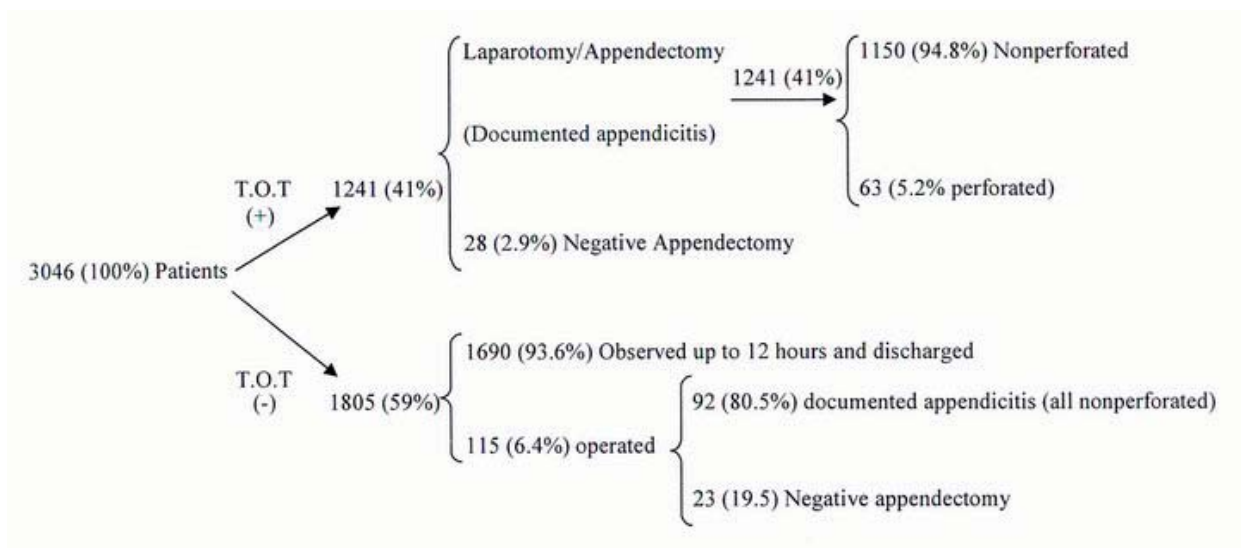


Fig. 2. Follow up diagram of patients suspected of having appendicitis

center by other medical facilities (the mean time of onset of the pain until the time of arrival to our emergency department was significantly higher in those who had perforated appendicitis).

59% (1805) of the patients who did not acquire at least 2 out of 3 were observed up until acquiring 2 out of 3 points. 6.4%(115) of those who were observed finally acquired at least 2 out of 3 and so were operated on and out of these 80.5% (92) had documented acute appendicitis and none of them had perforated appendicitis and 19.5% (23) had negative appendectomy.

93.6% (1690) of those who were observed improved and were discharged within less than 12 hours and there

was no missed diagnosis of acute appendicitis among these patients during the follow-up (Fig. 2).

Overall sensitivity and specificity of this method was calculated at 100% and 97.1%, and the accuracy rate was 98.2% and positive and negative predictive value was 93.3% and 95.5%; the rate of negative appendectomy was only 4.7% which, in comparison with other introduced methods, this method did not cause any perforated appendicitis on those who underwent observation.

DISCUSSION

Despite using advanced technology for making the di-

Two out of Three Criteria for Appendicitis

agnosis of acute appendicitis prior to surgery in other countries, the rate of negative appendicitis in some reports is still as high as 30-40%.³ While in our study which is based only on history and physical examination and simple CBC, U/A and is practical even in the underdeveloped countries is only 4.7%.

Recently a new scoring system for diagnosis of acute appendicitis which was recommended by Alvarado has been published in textbooks. Using this scoring system reported by Alvarado (2005) has decreased the rate of negative appendectomy, while our scoring system with a rate of negative appendectomy of 4.7% is by far superior to the prior scoring systems.

The main reasons that clinicians tend to over diagnose acute appendicitis is because of the fear of causing acute appendicitis to perforate while observing the patient suspected of having appendicitis. The rate of zero percent of perforated acute appendicitis in those who were observed by us proves that using this point system and observing those patients who do not acquire at least 2 points out of 3 is safe and will encourage clinicians to observe those patients not acquiring 2 points out of 3 with impunity.

So our 2 out of 3 scoring system can decrease the rate of negative appendectomy without increasing the rate of perforation of acute appendicitis by observing those patients who do not get at least 2 points out of 3.

Teaching this scoring system is very easy and all medical students and interns can become experts in using these criteria for making the diagnosis of acute appendicitis in those suspected of having acute appendicitis and safely observe those who do not acquire at least two out of three.

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