Comparative Study between Alvarado Scoring System and Ohmann Score as a Diagnostic Tool for Acute Appendicitis at two Teaching Centers Study in Baghdad City

Saddam Ali Abbas[1], Haider I. Alneime[2], Baidaa Najm Obeed[3]

[1]Instructor Surgical Dep., College of Medicine, Ibn Sina University of Medical and Pharmaceutical Sciences, Iraq, Baghdad, [2]Specialist in Surgery/Surgical Department at Baghdad Teaching Hospital/Medical City Complex, Iraq, Baghdad, [3]Instructor Community Medicine Dep., College of Medicine, Ibn Sina University of Medical and Pharmaceutical Sciences, Iraq, Baghdad

Abstract

Background: Acute Appendicitis first characterized as a surgical entity in 1886 by pathologist Reginald Fitz, appendicitis is now the most common abdominal emergency and appendectomy is the non-elective surgery most frequently performed by general surgeons. More than 250,000 cases are diagnosed and intervened annually in the United States. It occurs less frequently in men than in women, with a lifetime risk of 8.6% and 6.7% respectively. Acute appendicitis occurs infrequently in very young children as well as in older adults. Having its peak incidence in patients between the end of the second decade and the third decade of life. Showing an inverse relationship between incidence and mortality, its prevalence was less than 1% in the general population and increases to 4-8% in older adults.

Aim of the Study: To assess Alvarado scoring system as a diagnostic tool for acute appendicitis

Method: A prospective cross-sectional study carried at Al-Yarmouk Teaching hospital and Baghdad Teaching hospital in the period from the first of Jan 2020 to end of July 2020, in which 190 patients from both genders were enrolled, and their ages ranged from 12-68 years.

Conclusion: Alvarado score was better than Ohmann score in diagnosis of the patients with acute.

Keyword: *Acute appendicitis, Alvarado score,Ohman score.*

Introduction

Acute appendicitis were first characterized as a surgical entity in 1886 by pathologist Reginald Fitz[(1)], appendicitis is now the most common abdominal emergency and appendectomy is the non-elective surgery most frequently performed by general surgeons[(2)]. Annually more than 250,000 cases are diagnosed and intervened in the United States[(3)]. It occurs less frequently in men (8.6%) than in women (6.7%), with a lifetime risk of presenting it[(4)].

Acute appendicitis occurs infrequently in very young children as well as in older adults, having its peak incidence in patients between the end of the second decade and the third decade of life. Showing an inverse relationship between incidence and mortality, since the latter is less than 1% in the general population and increases to 4-8% in older adults[(5)].

Anatomical Considerations:

Embryology: The vermi form appendix is derived

Corresponding Author:
Dr. Saddam Ali Abbas
Instructor Surgical Dep., College of Medicine, Ibn Sina University of Medical and Pharmaceutical Sciences, Iraq, Baghdad
e-mail: saddamabbas2020@gmail.com
Phone Number: +9647722059779

from the midgut along with the small intestine, the cecum, the ascending colon, and the right half of the transverse colon; all these structures in turn supplied by the superior mesenteric artery.

It is visible in the eighth week of gestation and the first accumulations of lymphatic tissue develop during the fourteenth and fifteenth weeks of gestation [6].

Anatomy: The appendix in the adult is blind tubular in shape, approximately 9 cm in length, varying from short forms of 5 cm up to long forms of 35 cm. The appendix has a small mesentery that contains the appendicular artery in its free edge, in this mesentery the typical arches of intestinal irrigation do not appear, so the appendicular artery is terminal, this fact may overlap the clinical environment, since being part From a terminal irrigation, the appendicular artery in cases of appendicitis is unable to supply the tissue needs, generating ischemic damage. The base of the appendix also receives blood supply from the anterior and posterior colic arteries, hence the importance of proper ligation of the appendix stump, in order to avoid bleeding from these vessels [7]. The appendicular artery is usually described as a branch of the ileocolic artery.

Clinical Diagnosis: Despite the multiple diagnostic method currently available, the clinical history focused on the evolution of pain and associated symptoms as well as the findings obtained during the physical examination are still the cornerstones of the diagnosis of appendicitis.

Historically, pain is described as acute onset and initially localized at the epigastric or periumbilical level, later with the passage of time the pain migrates to the right iliac fossa where it increases in intensity, however this only occurs in 50-60% of patients [8].

It is important to take into account anatomical considerations and their variants since they largely influence the presentation of pain, for example with an appendix in a retrocecal location, the pain can start in the right iliac fossa or in the right flank, in the same way an appendix length beyond the midline can cause pain in the left lower quadrant[9].

Anorexia and nausea frequently accompany abdominal pain, vomiting may occur but rarely occurs before the onset of pain.

During the evaluation of the patient, emphasis should be placed on the location of the pain and the classic signs. Taking into account that the positivity or negativity of these depends largely on the variants in the location of the appendix as well as the time that has elapsed since the onset of pain[9].

Temperature is a poor predictor of appendicitis, however the presence of marked fever and tachycardia warn of the possibility of perforation and formation of an intra-abdominal abscess [1At this point, it is important to discuss the use of analgesia in patients who are under observation for abdominal pain, especially in those who still do not have a definitive diagnosis and in whom the need for surgery has not yet been ruled out. Classically it has been described that the use of analgesics can attenuate or even abolish the signs suggestive of acute appendicitis, so they should not be administered to these patients. However current evidence does not support this judgment[11]. It should be taken into account that there are drugs with pure analgesic properties (opioids), as well as others that additionally have anti-inflammatory mechanisms of action (such as the case of non-steroidal anti-inflammatory drugs), a case-control study carried out by Frei and colleagues showed that opioids are not associated with treatment delay, on the other hand anti-inflammatory drugs did show an association with treatment delay[12].

Radiologic: Plain abdominal radiography should not be used routinely, but it can be useful in cases of atypical symptoms and diagnostic doubt, it can show a fecalith, a localized ileus, loss of the fatty pattern of the peritoneum or unsuspected pneumonia. Pneumoperitoneum only occurs in 1-2% of appendicitis cases[9].

Ultrasound (US) and abdominal tomography (CT) have been compared in recent years in order to refine the diagnosis of acute appendicitis[13]. CT has shown a sensitivity and specificity of 94% and 95% in children, respectively, and 94% and 94% in adults. In the same study, US showed a sensitivity and specificity of 88% and 94% in children respectively, and of 83% and 93% in adults[14].

Another disadvantage of US is its known dependence on the knowledge, skill, and patience of the sonographer who performs and interprets it [15].

Some authors have promoted the protocol use of CT in patients who meet the criteria for suspicion of acute appendicitis since their admission, as they have shown a reduction in hospitalization costs and better results in these patients [13].

Since CT use has become more popular in the United States, rates of negative appendectomies have decreased. However, no improvement has been shown in patients with classic appendicitis symptoms [16,17].

Carrying out a CT scan unnecessarily delays the diagnosis and treatment, which is why it is concluded that it is preferable to carry out the study in cases where there is diagnostic doubt [18].

Laboratory: Most patients have a blood count prior to surgery as part of the basic studies; leukocytosis between 12,000 and 18,000 mm3 is very frequently observed.[34] The leukocyte count can be useful in the diagnosis and in the exclusion of appendicitis, but it has no value in the differentiation between complicated and uncomplicated appendicitis.. [35]

Urinalysis is usually requested to exclude the possibility of urinary tract infection when it is suspected, and pyuria and/or hematuria without bacteriuria may be found in one third of patients with appendicitis due to the proximity of the ureter and the bladder.. [36]

Differential Diagnosis: The differential diagnosis of acute appendicitis could involve any entity that causes abdominal pain, however there are some pathologies that are more commonly confused.

Aim of the study: To Compare between Alvarado scoring system and Ohman score as a diagnostic tool for acute appendicitis

Patients and Method

A prospective cross-sectional study carried at Al-Yarmouk Teaching hospital and Baghdad Teaching hospital at the period from the first of Jan 2020 to end of July 2020, in which 190 patients from both genders were enrolled, and their ages ranged from 12-68 years.

Statistical Analysis: SPSS version 26 (Statistical Package for the Social Sciences) used for entry and analysis of data. Results existing in the form of tables and graphs. Chi square test used to assess association between descriptive data and Fisher exact test used if the chi square test is not applicable. P value <0.05 will be considered significant.

Results

The current study was included 190 patients with suspected appendicitis, with in a mean age (27.4±0.8) year and the main age group was in group between (10-19) years old, female (57.6%) was more than male (42.4%), and the female mean age was (25.4±7.2) years which is younger than male mean age (27.5±3.1) years.

Table 1 revealed that time needed from the beginning of the clinical presentation until the time of operation was mainly in group of time < 24 hours, then patient's in-group between 24-48 hours, and patients needed more than 2 days (>48 hours) with the majorities of female group (79.5%).

Table 1: Time needed until operation

Variable		Male		Female		Total	
		No	%	No.	%	No.	%
Duration (hours)	<24	52	69.3	23	30.7	75	100.0
	24-48	22	52.4	20	47.6	42	100.0
	>48	15	20.5	58	79.5	73	100.0
Total		89	46.8	101	53.2	190	100.0

As for the validity test of the AS to diagnosis of the acute appendicitis we found that from those in group I (Alvarado score ≥ 7) 114/120 patients were truly positive diagnosed with the disease while 6/120 were false positive. For group II (Alvarado score < 7) we found that 12/40 were diagnosed as false negative and 28/40 patients were diagnosed as true negative.

Table 2: Validity test of Alvarado group

AS group	No.	Confirmed Appendicitis	Not Appendicitis	P value
Group I (Alvarado score ≥ 7)	135	(True positive) 122	(False positive) 13	0.001 Hs
Group II (Alvarado score <7)	55	(False negative) 17	(True negative) 38	
Total	**190**	**139**	**51**	

Hs: Highly significant difference

Regarding to the validity test of the Ohmann score to diagnosis of the acute appendicitis we found that from those in group I (≥ 12) about 143/148 patients were truly positive diagnosed with the disease while 5/148 were false positive (patients don't have the appendicitis but we diagnosed it as app). As for group II (score <12) we found that 60/82 were diagnosed as false negative and 22/82 patients were diagnosed as true negative. (Table 3).

Table 3: Validity test of Ohmann group

Ohmann group	No.	Confirmed Appendicitis	Not Appendicitis	P value
Group I (≥ 12)	117	(True positive) 105	(False positive) 13	< 0.001
Group II (score <12)	73	(False negative) 50	(True negative) 23	
Total	**160**	**155**	**35**	

Table 4 show the accuracy of the test to detect the acute appendicitis: for the Ohman score we found that the sensitivity was (68%), specificity was (64%) accuracy (67%), positive predictive value (89%), negative predictive value (32%). While for AS the sensitivity was (88%), specificity was (75%) accuracy (84%), positive predictive value (90%), negative predictive value (60%).

Table 4: Accuracy of the test

	Ohmann score	AS
Sensitivity	68	88
Specificity	64	75
Accuracy	67	84
PPV	89	90
NPV	32	69

Discussion

The current study shows that incidence of acute appendicitis was more common in youthful group with more prominent in female than male. which is in contract with greatest of the outcomes of regular world's studies, and recognized that it happened mostly in young population. Which is same that stated by American studies approved by Abdeldaim Y et al, [19]. A number of scoring systems that have been developed for the perseverance of rising the validity of both the sensitivity and specificity of the diagnosis of acute appendicitis had been frequently tested. Scoring systems signify low-cost, non-invasive and easy to use diagnostic benefit[20]. As for Ohmann scoring system, the study done by Koppad SN et al, specified that Sensitivity of 96%, specificity 66.7%, positive predictive value 82.8% and negative predictive value of 90.9%. [21] Moreover, in a study carried by Memon ZAetal, found that sensitivity (92.3%) and specificity (80.6%), positive predictive value was (92.3%) and negative predictive values (83.3%). [22]

in the present study we found that the validity test at Alvarado score cutoff value of (7) was as follow: sensitivity (88%), specificity was (75%), accuracy (84%), positive predictive value (90%), negative predictive value (69%). Xingye W et al, found that Alvarado score established the highest sensitivity (92.7%) percentage.[23] In Agbo S et al, study in the same cut-off of the Alvarado scores found that validity test was butter than that in our study. [24]

Memon et al, study found that the sensitivity of this scoring system (Alvarado) has a sensitivity of 93.5%, specificity of 80.6 %, PPV of 92.3 %, NPV of 83.3%, and accuracy of 89.8%.[22] While in Tekeli MT et al, study

the sensitivity was (75.2%), specificity was (76.1%) PPV (90.2%), NPV (50.9%) and accuracy of the test to diagnose the disease was (75.4%).[25]

Conclusion

Alvarado score was better than Ohmann score in diagnosis of the patients with acute.

Conflicts of Interest: No

Source of Funding: Self

Ethical Clearance: Was taken from the scientific committee of the Iraqi Ministry of health

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