Diagnosis of Acute Appendicitis by Using Modified Alvarado Score

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Abstract

Background: About 7% of population suffers from acute appendicitis during their life time. The number of unnecessary operations regarding appendicitis particularly in female reaches 45%. Perforation rates ranging from 4% up to 45% in adult and from 30% up to 60% in children.

Aim: To evaluate the sensitivity and accuracy of the Alvarado score in pre operative diagnosis of acute appendicitis.

Patients and method: A series of 129 patients, were studied prospectively over a period of 20 months starting from May 2007 to December 2008 in AL – Hilla teaching hospital. A questionnaire used in this study includes sex, age, duration of presentation in addition to seven predictive values constituting the Alvarado score.

Result: We had 79/ 129 male patients (61.24%) and 50 /129 female patients (38.75%). All of them underwent appendicectomy .106 /129 patients had histological diagnosis of appendicitis (82.17%) they were 70/106 males (66%) and 36/106 females (34%).and the rest 23/129 patients had normal appendix improved histologicaly (17.83%) they were 9/23 males (39%) 2 of them were have pathology (meckles diverticulum)and 7 of them were have no pathology and 14/23 females (60%) 7 of them were have pathology (twisted or rupture ovarian cyst) and 7 were had no pathology. The mean age was 23.9 years.

Conclusion: A high score rate was found to be an easy and satisfactory aid in the early diagnosis of acute appendicitis.

الخلاصة

الهدف من الدراسة:-هو تقييم مقياس الفارادو المعدل لتشخيص التهاب الزائدة الدودية الحاد.

الطريقة:- تم استخدام مقياس الفارادو المعدل للتشخيص المبكر لالتهاب الزائدة الدودية الحاد . تمت الدراسة في مستشفى الحلة التعليمي التابع لدائرة صحة بابل ولفترة زمنية بلغت 20 شهرا منذ أيار 2007 لغاية كانون الأول 2008 . تم اعتماد مقياس الفارادو في التشخيص والمتكون من ثلاثة أعراض , ثلاثة مشاهدات سريريه وفحص مختبري واحد . يتكون المقياس من تسعة نقاط . تم اعتبار سبعة نقاط كحد فاصل بين إجراء التداخل الجراحي أو المشاهدة السريرية

النتائج:- تمت دراسة 129 حالة, 79 ذكور (61,24%) 50 إناث (38,75%) بأعمار تتراوح 6-70 عاما ومتوسط عمر يقدر ب 23,9 عاما .كانت هناك 106 حالة التهاب الزائدة الدودية الحاد , 70 حالة ذكور (66%) 36 حالة إناث (34%) كانت الزائدة منفجرة في (15%) من الحالات .. وكانت دقة التشخيص 82,17 %من المرضى لديهم التهاب الزائدة الدودية , في حين كانت الزائدة طبيعية في 17,8% من الحالات , وكان التداخل الجراحي ضروري في 6,97 % من الحالات , في حين كان التداخل الجراحي غير ضروري في 10,85% من الحالات .

الاستنتاجات:- تم التوصل إلى انه باستخدام مقياس الفارادو المعدل والذي يعتمد على أعراض ومشاهدات سريريه وفحص مختبري واحد سهلة التطبيق وقابلة للاستخدام من قبل الطبيب الجراح يمكن التوصل إلى نتيجة متقدمة ومقبولة لتشخيص التهاب الزائدة الدودية الحاد والفصل بين المرضى المحتاجين لتداخل جراحي فوري وبين اللذين يجب إخضاعهم للمشاهدة السريرية .

Introduction

Approximately 7% of population will suffer from acute appendicitis during their life time. [1]

In 1889 Mc Burney in New York pioneered early diagnosis of appendicitis and was the first to point out the importance of early surgical intervention [2].

Since the time of Mc Burney and till now, early diagnosis of appendicitis was the joint goal of surgical publication. Failure to make an early diagnosis is a primary reason for persistent rate of morbidity and mortality [3].Perforation rates ranging from 4% up to 45% in adult [3,4] and from 30% up to 60% in children were reported in literature [4] . Mortality rates ranged from 0.17% [5] to 7.5 % [3, 6]. Mortality in children less than 2 years old is surprisingly high and reaching a level of 20% [3,7].As a result of this surgeons creating for themselves a" surgical security zone" which allows them to accept a 15- 20 %., negative laparatomy rate with impunity [3,8,9].

45% the number of unnecessary laparotomies particularly in women may be as high as [3,10,11]. As a result of earlier diagnosis and intervention the case fatality rate has fallen to less than 0.1% for uncomplicated appendicitis. The figures for gangrenous and perforated are 0.6 % and 5% respectively [3,8,9,12] .The limited but real morbidity associated with the removal of a normal appendix and the necessity of post operative hospitalization have prodded surgeons to develop techniques which would decrease the number of negative exploration without increasing the incidence of perforated appendicitis [13]. Now, and after more than century of study, this most common of all surgical diseases is still a diagnostic problem [8, 14].

Recently , various aids existed to facilitate more accurate preoperative evaluation of patients with presumed appendicitis in order to improve diagnostic accuracy .such as estimation of C- reactive protein, peritoneal aspiration cytology, scoring and computer analysis techniques, graded compression ultrasonography and laparoscopy .however, the usefulness of these tests in verifying the diagnosis of appendicitis has not been established [15,16] besides these measures are complex , sophisticated ,expensive and not easily available when most needed [17,18]. It was until the beginning of the eighties ,that investigators started to think of scoring system using a number of clinical predictive factors proved to be of statistical significance in diagnosis of appendicitis .Several scoring system were developed [3,19,20,21,22,23] but these have not gained wide spread acceptance because of their complex methodological characteristic and limited availability [20].

Dr. Alvarado [3] from plantation general hospital in Florida described this scoring system in 1985. He developed this score from a retrospective study and detailed statistical analysis of 305 patients admitted with suspicion of appendicitis it's a simple, easily handled score. This study aims to evaluate the usefulness of this scoring system in patients with provisional diagnosis of acute appendicitis.

Patients and Methods

A prospective study of the use of Alvarado score was made on a consecutive series of 140 patients admitted to emergency department of AL- Hilla teaching hospital from May 2007 to December 2008 over a 20 months period. Patients' referral with a provisional diagnosis of acute appendicitis was performed by doctors in their private clinics without influencing the decision made by the surgeon on call who was responsible for the patients. Eleventhes patients were excluded from the study; those were known to be Diabetics, immune-ocompromized secondary to chronic illnesses, or those receiving long term medical treatment. The exclusion of these was considered necessary to avoid recoding symptoms or signs from a known chronic disease ([24]. So we were left with a total of 129 patients, 79 males (61.2%) and 50 females (38.7%).

The scoring system (Table 1) is based on three symptoms, three signs and two laboratory tests. In this study we used a slightly modified version of the Alvarado score by excluding one laboratory finding: shift to the left of neutrophiles maturation (score 1) .this was not available from our laboratory on routine basis and, therefore our patients were scored out 0f 9 rather than 10 points .Our questionnaire used in this study include sex, age, duration of presentation in addition of seven predictive values constituting the score was used.

Interpretation and use of the system after D Talbot [17] and TD Owen [18] was as follows: patients with a score of 1-4 were considered very unlikely to have acute appendicitis and were observed, those patients with a score of 5-6 were considered to have a diagnosis compatible with appendicitis, those with a score of 7-8 considered to have a probable acute appendicitis, and those with a score of 9 were considered to have a definite appendicitis.

The Alvarado score is dynamic and can be increased or decreased on reassessment .In our series patients with a score of 7-9 were considered for surgery they underwent an appendicectomy while those scored under 7 were not considered for surgery unless there were compelling reasons to do otherwise. After 24 hours of observation, regardless the score, patients were thought on clinical ground to require appendicectomy by the surgeon on call, and then this was preformed. So all of our series patients underwent surgery finally and the specimens sent for histological examinations. The diagnosis outcome after surgery and histological examinations was compared with the preoperative diagnostic scores for obtaining sensitivity. A statistical analysis of the age, sex, duration of the presentations and the seven predictive factors of the score was done. A diagnostic ratio of larger to smaller rate was found. The ratio was assigned "positive" value whenever the rate greater in the appendicitis group, and a "negative" value when the rate was greater in the non-appendicitis group.

All diagnostic ratios were rounded to the nearest integer and thereby designated as weights .Ratios between +1.49 and - 1.49 were given weights of zero .ratios between +1.5 and +1.95 or – 1.5 and -1.95 respective weights of +1 or -1 were assigned.

The same was used to assign weights of +2 or -2 and +3 or -3.

Results

Of the 140 patients admitted with provisional diagnosis of appendicitis, 11 patients (7.85 %) Were excluded .We were left with 129 patients.

We had 79/129 male patients (61.24%) and 50/129 female patients (38.75%).

Male to female ratio was M F=1.6:1.

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Table 1: the Alvarado score of acute appendicitis

	Mantrel	Value
1. Symptoms	**Migration to .RI F**	**1**
	Anorexia	**1**
	Nausea and \ or vomiting	**1**
2. Signs	**Tenderness RIF**	**2**
	Rebound tenderness	**1**
	Elevation of temp. ≥ 37.5 C	**1**
3. Laboratory	**Leukocytosis**	**2**
Total score		**9**

Table (1-1): Sex distribution of appendicitis and non-appendicitis patients (n=129)

Sex	*Appendicitis patients (n=106)*	*Percentage*	*non appendicitis Patients (n=23).*	*Percentage*
Male	**70**	**66%**	**9**	***39.13%***
Female	**36**	**34%**	**14**	***60.87%***
Total	**106**	**100%**	**23**	**100%**

We had 70/106 male patients with appendicitis (66%) and 36/106 female patients with appendicitis (34%).9/23 male patients were with the non – appendicitis group (39.13%) and 14/23 were females (60.87%).

2- Age Distribution of the patients

Table (2-1): Age Distribution of patients with appendicitis (n=106).

Sex	6-10	11-20	21-30	31--40	41-50	51- 60	61-70	Total
Male	5	10	35	11	5	3	1	70
Female	5	6	15	7	3	-	-	36
Total	10	16	50	18	8	3	1	106
Percentage	9.43%	15.09%	47.16%	16.98%	7.5%	2.8%	0.94%	100%

The highest incidence was in the period of 21-30 years with 50/106 patients (47.16%).We had 12/106 patients (11.32%) aged over 40 years. For the age period of 20-40 years. We had 68/106 patients (64.15%).

The age range was 6-70 years, mean age was 23.9 years.

Table (2-2): Age Distribution of non – appendicitis patients (n=23).

Sex	6-10	11-20	21-30	31--40	41-50	51- 60	61-70	Total
Male	1	-	2	1	3	2	-	9
Female	3	2	3	1	3	2	-	14
Total	4	2	5	2	6	4	-	23
Percentage	17.39%	8.7%	21.73%	8.7%	26.08%	17.39%		100%

We had 17.39% Patients with non –appendicitis aged below 10 years. They had Meckels diverticulum, mesenteric lymphadenitis and gastroenteritis. 7/23 patients fell in the period of 20-40 years (30-43%).

3- Duration of the presentation.

Table (3-1): Duration of pain for patient with appendicitis (n=106).

Duration (hrs)	*Number of patients*	*Percentage*
< 24	71	66.98%
25-48	19	17.92%
48+	16	15.1%
Total	106	100%

66. 98% of our patients with appendicitis presented to us within the first 24 hours. Only 16/106 patients (15.1%) presented after more than 48 hours.

Table (3-2): Duration of pain in acute appendicitis (n=106).

Stage	*Number*	*Range (hours)*	*Mean (hours)*
Simple	62	6-48	18
Suppurative	14	16-55	29
Gangrenous	7	12-48	22
Perforated	16	25-72+	40
Obstructed	7	7-23	13
All cases	106	6-72+	24

The mean duration for all cases of appendicitis was 24 hours. The range of duration was 6-72 + hours.

Table (3-3): Duration of patients with non - appendicitis (n=23).

Duration	*Number of patient*	*Percentage*
< 24	4	17.39%
25-48	8	34.78%
48+	11	47.82%
Total	23	100%

We had 47.82 % of our non appendicitis patients presented to us with history of more than 48 hours duration. Only 17.39% of the non – appendicitis patients presented with duration of less than 24 hours.

4- The scoring system

Table (4-1): Results of Alvarado score for patients scored ≥ 7 (n=111).

Sex	Number of patients	Score>7 or 7	Percentage	App. Confirmed histologically	Sensitivity
Male	79	71	89.87%	70	98.6%
Female	50	40	80%	34	85%

We had 71/79 male patients scored ≥7 points (89.87%) of those 70/71 were proved to have appendicitis on histological basis (98.6%). In females, we had 40/50 patients scored ≥ 7 points, 34/40 had appendicitis improved histologicaly making a sensitivity rate of 85%.

Table (4-2): Results of Alvarado score for patients scored ≤ 6 (n=18).

Sex	Number of patients	Score <6 or 6	Percentage	App. Confirmed histologically	Sensitivity
Male	79	8	10.13%	-	-
Female	50	10	20%	2	20%

10.13% of our male patients (8/79) scored ≤ 6 points none of those had appendicitis, they had Meckels diverticulum, urinary tract infection and normal pathology. 20% of the female patients scored ≤ 6 points. Two of them only (20%) had appendicitis. The remaining 8 females had gynaecological problems.

5 – Diagnostic predictors

Table (5-1): sensitivity and specificity rates of the Alvarado score predictors

Patients	Migration	Anorexia	N/V	Tenderness	Rebound	Elevation	WBC
Positive+	87(82.o8%)	98(92.45%)	94(88.7%)	100(94.33%)	95(89.62%)	92(86.79%)	80(75.47%) Appendicitis (n=106)
Negative	19(17.92%)	8(7.55%)	12(11.3%)	6(5.66%)	11(10.37%)	14(13.2%)	26(24.52%)
Positive+	7(30.43%)	8(34.78%)	13(56.52%)	5(21.73%)	4(17.39%)	10(43.47%)	10(43.47%) Non - appendicitis (n=23)
Negative-	16(69.56%)	15(65.21%)	10(43.47%)	18(78.26%)	19(82.6%)	13(56.52%)	13(56.52%)

(+) Test, sign, positive (present); (-) Test, sign, negative (absent)

The Sensitivity rates in order of importance were as follows, for the symptoms: anorexia, nausea/ vomiting, and migration. For the signs: tenderness, rebound tenderness, and elevation of temperature. The WBC count achieved a sensitivity of 75%. The specificity rates in order of importance were as

follows, for the symptoms: Migration, anorexia, and nausea / vomiting. For the signs: rebound tenderness, tenderness, and elevation of temperature. WBC count achieved a specificity of 57%.

Table (5-2) Significance of diagnostic predictors of appendicitis and non-appendicitis patients (n=129)

	Predictor	*Appendicitis (n=106%)*	*non-appendicitis (n=23%)*	*Diagnostic Ratio*	*Diagnostic Weight*
1	Sex				
	Male	66%	39.13%	1.68	*+1*
	Female	34%	60.87%	1.79	*-1*
2	Age				
	6-10	9.43%	17.39%	1.84	*-1*
	11-20	15.1%	8.7%	1.73	*+1*
	21-30	47.16%	21.73%	2.17	*+2*
	31-40	17%	8.6%	1.97	*+2*
	41-50	7.54%	26.08%	3.45	*-3*
	50+	3.77%	17.39%	4.61	*-3*
3	Duration				
	<24hr.	66.98%	17.4%	3.84	*+3*
	25-48 hr	17.92%	34.78%	1.94	*-1*
	48+	15.1%	47.82%	3.16	*-3*
4	Migration				
	Positive	82%	30.5%	2.68	*+2*
	Negative	18%	69.5%	3.86	*-3*
5	Anorexia				
	positive	92.45%	34.8%	2.6	*+2*
	Negative	7.55%	65.2%	8.63	*-3*
6	N/V				
	Positive	88.7%	56.5%	1.56	*+1*
	Negative	11.3%	43.5%	3.84	*-3*
7	Tenderness				
	Positive	94.33%	21.7%	4.34	*+3*
	Negative	5.66%	78.2%	13.8	*-3*
8	Rebound				
	Positive	90%	17.3%	5.2	*+3*
	Negative	10%	82.6%	8.26	*-3*
9	Elevation of temp.				
	Positive	86.79%	43%	2.01	*+3*
	Negative	13.2%	56.52 %	4.31	*-3*
10	WBC				
	Positive ≥ 10×10^9 /L	75.47%	43.47%	1.73	*+1*
	Negative	24.52%	56.52%	2.3	-2

Table (5-3): Predictors and diagnostic weight grouped as to diagnostic outcome.

Male	+1	*-1*	*Female*
11-20 years of age	+1	*-1*	*6-10 years of age*
21-30 years of age	+2	*-3*	*41-50years of age*
31-40 years of age	+2	*-3*	*50 + years of age*
Duration first 24 hrs	+3	*-1*	*Duration 25-48 hours*
WBC count ≥ 10 × 10^9 /L	+1	*-3*	*Duration 48+ hours*
Tenderness RIF	+3	*-3*	*Absence of tenderness RIF*
Rebound tenderness	+3	*-3*	*Absence of rebound tenderness*
Elevation of temp	+2	*-3*	*Absence of elevation of temp .*
Migration	+2	*-3*	*Absence of migration*
Anorexia	+2	*-3*	*Absence of anorexia*
Nausea / Vomiting	+1	*-3*	*Absence of Nausea/ Vomiting*
		-1	WBC count < 10×10^9/L

6. Pathology

Table (6-1): Distribution of different pathological types of appendicitis according to sex (n = 106)

Sex	Perforated	Obstructed	Simple	Suppurative	Gangrenous	Total
Male	12	4	40	10	4	70
Female	4	3	22	4	3	36
Total	16	7	62	14	7	106
Percentage	15.09%	6.6%	58.49%	13.2%	6.6%	100%

85.5% of our patients with appendicitis had simple acute appendicitis, this make 62/106 patient. The perforation rate was 15.09% none of those patients with perforated appendix presented to us with duration less than 24 hours.

Table (6-2): Distribution of pathological types of appendicitis according to Duration (n = 106)

Duration	Perforated	Obstructed	Simple	Suppurative	Gangrenous	Total
<24	-	7	55	4	5	71 (66.9%)
25-48	7	-	7	3	2	19 (17.9%)
> 48	9	-	-	7	-	16 (15.09%)
Total	16	7	62	14	7	106

The majority of patients with simple appendicitis, 55/62 patients (88.7%) were presented within first 24 hours. Non after more than 48 hours, while patients with perforated appendicitis, none presented to us before 24 hours. This may explain a perforation rate of 15.09 %(table 6-1).

We had 46/62 patients with simple appendicitis aged between 20 and 40 (74.19%). 5/16 patients with perforation aged between 6-10 Years. (31.25%) and 7/16 patients, aged between 11-20 years (43.75%). The highest incidence for simple acute appendicitis was for the age period of 20-40 years.

Table (6-3): Final diagnosis in patients with non – appendicitis (n=23)

Pathology	Male	Female	Total
1 Meckels diverticulunm	2	-	2 (8.69)
2 Ovarian cysts a- Ruptured b- Twisted – torsion	-	 5 2	7(30.43%)
3 Mesenteric adenitis	1	1	2(8.69%)
4 Urinary tract infection	2	2	4(17.39%)
5 Gastroenteritis	2	1	3(13.04)
6 Pelvic inflammatory disease	-	2	2(8.69%)
7 No pathology	2	1	3(13.04%)
Total	9	14	23(100%)

Table (6-4) shows a negative laparotomy rate for appendicitis of 17.8% however, the unnecessary surgical intervention was 10.85 (14-129 patients). 5.42 % for each males and females .While the necessary surgical intervention was 6.97 %(9-129 patients) 5.42% for females and 1.55% for males.

The anatomical locations were similar to those reported in surgical texts (2, 24).

7 - Comparison table

Table (7-1): Diagnostic accuracy in patients with appendicitis with and without Alvarado score.

Author	*Country*	*Year*	*Sensitivity*	*Neg – lap.*	*Perforations*
M. Shanshal (25) AL – Yarmouk Teaching hospital	Baghdad	1991	122/158 (77.2%)	36/158 (22.78%)	17/122 (13.93%)
FN. Tikriti (26) Baghdad Teaching hospital	Baghdad	1992	159/200 (79.5%)	41/200 (20.5%)	21/159 (13.20%)
Ours, Al-Hilla Teaching hospital	Babylon	2008	106/129 (82.17%)	23/129 (17.8%)	16/106 (15.09%)

Table (7-2): Sensitivity rates of Alvarado score

Author	*Country*	*Year*	*Sex*	*No. of patients*	*Scor7 or >7*	*Appendicitis*
TD Owen (23) University Hospital Wales	England	1992	Male	75	50	47(94%)
			Female	70	40	31(77.5%)
D Talbot (22) Royal Victoria in firmary Newcastle	England	1994	Male	21	15	14(93.3%)
			Female	17	15	10(67%)
Ours, Al-Hilla Teaching hospital	Babylon	2008	Male	79	71	70(98.6%)
			Female	50	40	34(85%)

Table (7-3) : False negative and false positive results of Alvarado score

Author	*Country*	*Year*	*Sex*	*Non-appendicitis ≥ 7 False + ve*	*Appendicitis ≤ 6 False – ve*
TD Owen (23) University Hospital Wales	England	1992	Male	3/50(6%)	1/25(4%)
			Female	9/40(22.5%)	2/30(6.6%)
D Talbot (22) Royal Victoria in firmary Newcastle	England	1994	Male	1/15(6.66%)	4/6(66.66%)
			Female	5/15(33.33%)	1/2(50%)
Ours, Al-Hilla Teaching hospital	Babylon	2008	Male	1/71(1.4%)	0/8
			Female	6/40(15%)	2/10(20%)

Table (7-4): Overall accuracy rates of Alvarado score.

Author	*Country*	*Year*	*Pts . No*	*SC0re ≥ 7*	*SC0re ≤ 6*	*Appendicitis*	*Accuracy*
TD Owen (23) University Hospital Wales	England	1992	145	90	55	81	55.86%
D Talbot (22) Royal Victoria in firmary Newcastle	England	1994	38	30	8	29	76.31%
Ours, Al-Hilla Teaching hospital	Babylon	2008	129	111	18	106	82.17%

Discussion

There are a number of compelling reasons to improve our accuracy in managing

cases of appendicitis [25]. Lowering the negative laparotomy rates would result in considerable savings to the patient in costs and disability [24,25]. The problem is to secure an early diagnosis using customary clinical and laboratory methods [3].Alvarado score (table 1) was selected to aid in the decision making process because of its simple design and application [25]. Similar studies, converting likelihood ratios into weights and then diagnostic scores, have been used successfully in a number of clinical settings [25,26]. Also, it has been reported that a scoring system, such as the present one, has the same diagnostic accuracy as computer aided techniques [3,25,26]. From table (7-1), we achieved an overall accuracy rate of 82.17 % compared to previous controlled trials [27,28] note using the score with sensitivity rates of (77.2 %) [27]and (79.5 %) [28]. Our negative laparotomy rate was (17.8%)(table 6-3), which is lower than rates reported in studies not using the score of (22.78%) [27] and (20.5%) [28] rates. Also the rates in the lower range reported in surgical literatures [4, 25, 29]. We had a perforation rate of 15%. This is in the lower range of reported series [3, 4], (31, 25%) of our perforations were for patients aged less than 10 years. Several patient related factors are involved, patient education, delayed presentation to the medical care system, unreliability of the history and presentation, high progression rate of the inflammatory process, immunologic factors [15], and finally the primary care doctor [15,30].The principle cause being, delay before admission to the hospital [4,15]. 15.09 % of our patients with appendicitis presented after more than 48 hours (table 6-2), of those 8.4 % had perforated appendix (table 6-2). The surgeon has little control over this. The perforation rate alone is not a useful measurement of the quality of the diagnostic workup and treatment of appendicitis [15].Of crucial importance, was the finding that there were no perforations amongst the group with a score on admission of less than 6 who were observed for the first 24 hours.

From table (7-2) our sensitivity rates for both males and females were higher than that of D Talbot [17] and T D Owen [18], and were (98%), (85 %), (93 %), (67%), (94%) and (77.5%) respectively for both males and females .Also, from (table 7-3) our results of false positive rates were lower than those of D Talbot [17], and TD Owen [18].The rate of the negative laparotomy in female regarding appendicitis was10.85% , (table 6-3), however the rate of unnecessary surgical intervention was only 5.4 %.In spite of these figures, differentiating appendicitis from other gynecological conditions in women of childbearing age remain difficult [3,4,10]. This problem had led some investigator [31,32], to study the relation between menstrual cycle and appendicitis, in order to reach a high level of preoperative diagnosis of appendicitis unfortunately, their results were discouraging. Clearly, other aids of diagnosis are required, and it would be of interest to know whether an additional use of ultrasound or laparoscopy, could reduce the negative appendicectommy arte of this group. Our overall accuracy rate was (82.17 %), this is higher than that achieved by, D Talbot [17], and TD Owen [18] who achieved rates of 76.31 %, and 55.86 %, respectively (table 7-4). The element of sex, age and duration were found to be of statistical significance (table 5-2). We found that male patient, aged 20-40 years, with duration of symptoms within the first 24 hr., has a statistical significant association with appendicitis (table 5-2). These were the same findings of, Tiecher et al [25], Anderson et al [29], Korner et al [15] and Arnbjornsson et al [24].all the diagnostic indicants of the score were found to be significant (table 5-2).

The order of importance for each, according to its diagnostic weight, was as follow: Tenderness in RIF and rebound tenderness both were +3; Migration, Anorexia and Elevation were +2. finally,

Nausea/vomiting and Leukocytosis both were +1.These findings were supported by various studies confirming the statistical significance of these diagnostic indicants [21,22,23,24,25].However, as for the symptoms, some studies criticized scoring system for calculating on the basis of presence of symptoms and not on the presence and absence of the symptoms , mainly for anorexia, Nausea and Vomiting [24,33].With a sensitivity rate of 92.45 % for Anorexia and 88.7% for Nausea and Vomiting (table 5-1).our results are acceptable and close to the scores of Arnbjornsson et al [24], Anderson et al [29], tiecher et al [25] and Ramirez et al [22].The high sensitivity rate achieved for tenderness 94.33% and rebound 89.62% (table 5-1) is applicable with all other studies concentrating on these important signs for diagnosis of appendicitis.

A controversy exists concerning the relative usefulness of laboratory parameters in acute inflammation and infection [34, 35]. Bower's and associates [34, 36] pointed out that the diagnostic value of an elevated WBC count in acute appendicitis is limited. With a sensitivity rate of 75 % and specificity of 57%, we accept the idea, that improving diagnostic efficiency of this laboratory test is by its appropriate combination with skilled clinical evaluation [37, 38]. Finally with an overall accuracy rate of 82.17% and a negative laparotomy rate of 10.85 % our results are far more satisfactory.

Recommendations and Conclusions

1- A score indicating observation is disregarded when there is a clinical evidence of peritonitis of undetermined etiology.

2- Cases indicated for observation are to be followed closely with hourly charting of symptoms, vital signs, and abdominal examination, WBC is repeated every 4 hours.

3- Progression of signs and symptoms, regardless the score is an indication for surgery.

4- Observation period should not exceed 24 hours regardless of the score.

5- It must be emphasized, that the intent of the scoring system is not to supplant surgical judgment but, simply to discriminate between the two groups when there is uncertainty as to indications for surgery or observation.

Finally, we found that this simple score based on common findings in appendicitis, is a simple and rational manner in approaching the diagnosis of appendicitis .Its applicable in all clinical situations and doesn't require the use of a computer.

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