Acute Appendicitis Clinico – pathological Study

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Abstract

Acute appendicitis is one of the most common surgical emergencies in the world. The aim of the present project was to study the clinical presentations, pathological features and laboratory test of acute appendicitis in Babylon province-IRAQ.

A total of 2000 patients with suspected acute appendicitis who underwent surgery were included in this prospective study. Clinical history , detailed physical examination, pathological features and laboratory investigations were reviewed.

The results showed in this study showed that 1240 patients (62%) had appendicitis, 320 patients (16%) of them had acute appendicitis with complications , and the remaining 440 patients (22%) had normal appendicitis . Right iliac fossa pain, nausea and vomiting were seen in 85%of cases. Tachycardia, fever seen in 95% cases.

Tenderness in the right iliac fossa and rebound tenderness were seen in 88% . The WBC count was over 10,000, in 85%,the WBC count was sensitive and valuable test. Ultrasound examination found to be low sensitivity. General urine examination was not valuable in the diagnosis.

It is concluded that acute appendicitis is a condition, which requires immediate treatment. The use of highly sensitive tests favors the appropriate diagnosis and treatment and minimizes the risk of missing acute infection cases.

الخلاصه

يهدف البحث إلى دراسة الأعراض ألسريريه والمرضية والفحوص ألمختبريه في تشخيص التهاب الزائدة الدودية الحاد والأسباب ألرئيسيه لإجراء جراحة اسعافيه . ضمت الدراسة 2000 مريض اشتبه لديهم زائدة دوديه حاد واجريت لهم جراحه. تمت دراسة هذه الحالات وأجريت لها الفحوص ألسريريه ولمختبريه وقد تم تسجيل الملاحظات ألجراحيه والمرضية .أظهرت النتائج عن وجود التهاب الزائدة الدودية لدى 1240 (62%) من المرضى والتهاب الزائدة الدودية مع اختلاطات لدى 320(16%) من المرضى بينما كانت الزائدة الدودية طبيعية في 440 (22%) من الحالات.سجلت النتائج الم الحفرة الحرقفيه اليمنى والغثيان والاقياء في 85% من المرضى. تسرع القلب والحمى كانت أعراضا موجودة في 88% من المرضى.إن تعداد الكريات البيض ذو حساسية لتشخيص التهاب الزائدة الدودية الحاد بالمقارنة مع نتائج التصوير بالصدى ، وان فحص البول العام ليس ذو قيمه تشخيصيه .تم الاستنتاج إن التهاب الزائدة الدودية الحاد حاله تتطلب معالجة فوريه. وان اللجوء إلى فحوص عالية الحساسية وذات ايجابية عالية، يساعد في التشخيص والمعالجة المناسبين، ويقلل من خطورة وجود حالات مهمله.

Introduction

Acute appendicitis is one of the most common surgical emergencies in the world (1-10). early diagnosis and prompt operative treatment prevention of serious complications especially perforation. There is some difficulty in establishing an accurate early diagnosis in patients at the extremes of age and in pregnant females this difficulty is reflected in the number of normal appendices removed

in the different groups : 30-50% in women of childbearing age and 30-40% in children as compared to 5-22% (2) in young males. On the other hand, the difficulty in the diagnosis of acute appendicitis in the older age groups is reflected by the high rate of perforation found at surgery (11-13). Although senior surgeons are able to diagnosis acute appendicitis accurately in over 80%

Junior surgeons are often in charge of establishing the diagnosis and performing the surgery. Some studies have shown that an incorrect diagnosis is made in 50% of such cases(14-16). Another possible source of difficulty, is the prior administration of antibiotics and antispasmodics which might complicate the situation by delaying correct diagnosis and thereby increase the rate of complications. This study has been performed in order to estimate the Pathological changes and the important signs and symptoms commonly considered in the diagnosis of acute appendicitis along with commonly requested laboratory investigations.

Material and Methods

This study was conducted in the teaching hospital of Babylon Province Iraq during the 3 years period from 1998-2001. A total of 2000 suspected appendicitis who admitted to our hospitals and underwent surgery during that period were included in the study . A complete medical history and physical were performed on each patient . operative findings were obtained from the surgeon's operation notes in the case sheets .The white blood cell count was considered positive when it was equal to or greater than $10x10^9$ /L. The general urine examination (G.U.E) were done in every case and was considered positive for urinary tract infection when the pus cell count was equal to or more than 5 cell/ HFP in males and 10 cells /HFP in females. The calculation of the sensitivity , specificity, and positive predicative value (PPV) for each of the signs, symptoms, and investigations included, was based on the condition of the appendix. Either negative for normal appendices or positive for inflamed appendices (with or without complications).

Result:

Of the 2000 cases, 1240 patients (62%) were suffering from acute uncomplicated appendicitis, 320 patients (16%) had complicated appendicitis, and 440 patients (22%) had normal appendix. Almost ¾ of all cases of appendicitis were in the age group of 15-29 years. Table-1 shows the age distribution of the study population according to the results of the operation. The study found that during 3- months period, cases of appendectomy constituted about 21% of the surgery conducted and about 15% of the total admissions in Hilla Teaching General Hospital.

Clinical features The usual presentation of acute appendicitis was with periumbilical colicky pain and vomiting, with the pain later localizing in the right lower abdominal quadrant. These symptoms were often accompanied by fever, leukocytosis, an elevated erythrosedimentation rate, and C-reactive protein. If perforation of the appendix occured, there might be temporary relief of pain followed by signs of acute peritonitis.

Table-2 shows a comparison between the frequency distribution of positive signs and symptoms between appendicitis patient and those who had no appendicitis . No marked differences found regarding the symptoms of right iliac fossa pain, anorexia, nausea and vomiting between the two groups. Tachycardia and fever, however ,were markedly higher among the patients with appendicitis. Rebound tenderness were more frequently found in patients with

appendicitis in comparison with normal group . Table-3 shows that an elevated white blood cell count was more frequent in appendicitis patients in comparison with normal appendix . There was no significant difference between the two groups with regard to urine analysis findings (table-4). Table-5 shows sensitivity ,specificity and PPV of clinical symptoms and signs of acute appendicitis. Nausea, and vomiting were of moderately high sensitivity and PPV and of low specificity. The signs of tachycardia and fever were of low sensitivity and high specificity and PPV. Tenderness in the right iliac fossa and rebound tenderness were highly sensitive signs. All were of low specificity and of a moderately high PPV. Table 5 also shows the sensitivity, specificity and PPV of WBC , general urine examination, and ultrasound examination.

Pathologic features Grossly, an appendices with well-developed acute inflammation showed a fibrinous or purulent coating of the serosa, with engorgement of the vessels. The mucosa showed areas of ulceration against a markedly hyperemic background. Obstruction of the lumen by a fecalith or some other agent was found in about one fourth of the cases. Microscopically, the changes ranged from minimal focal inflammation to total necrosis of the appendiceal wall, the degree of abnormalities being partially dependent on the interval between the onset of symptoms and the operation (Fig. 1). In early lesions, neutrophils appeared at the base of the crypt adjacent to a small defect in the epithelium. After this inflammatory process reached the submucosa, it spreaded quickly to the remaining appendix. In advanced stages, the mucosa was absent, and the wall was necrotic. Thrombosed vessels were seen in one fourth of the cases.

Clusters of neutrophils in the lumen should stimulate a search for evidence of mucosal inflammation, but these were not diagnostic of acute appendicitis by themselves.

The various stages of acute appendicitis were designated as acute focal, acute suppurative, gangrenous (phlegmonous), and perforative. The type of inflammatory infiltrate and the likelihood of recovering bacteria from the appendiceal tissue and peritoneal fluid differed among these various stages. Anaerobic bacteria were found in half of the cases, perhaps as secondary colonizers. Cases having a prominent histiocytic component with clusters of xanthoma-type cells were referred to as xanthogranulomatous appendicitis. This was regarded as an unusual healing pattern of appendicitis, in contrast to the conventional pattern, which might feature an intraluminal cord of granulation tissue.

The most common complication of acute appendicitis was perforation, which may lead to diffuse peritonitis or to the formation of a periappendiceal abscess or fibrous induration (Fig. 2). Another serious complication was the spread of the inflammation via the ileocolic, upper mesenteric, and portal veins to the liver, with formation of "pylephlebitic" abscesses.

Discussion

Acute appendicitis was the most common indication of acute abdominal surgery conducted in the governorate of Babylon during the study Period . This was correlated well with others (16-19). The diagnosis was correct in 87% of the cases. In 16%, there was a delay in diagnosis, which led to complications, Mainly gangrene and perforation reported in the U.S.A and England is slightly higher (20-22) , but it reported in the very young and the elderly. In our study, the fact that rate of perforation was highest in the 15-29 age groups indicates misdiagnosis of the disease at

the age when the index of suspicion should be at It,s highest.

In 22% of the cases , appendicitis was not present, this is higher than that by others.(23-25) the over-diagnosis might be attributed to over- zealous or inexperienced house officers. At the present time, there is a shortage of training opportunities as a result of the limitation of elective surgery due to a shortage of anesthetics and equipment resulting from the blockade imposed on Iraq.

The validity of diagnostic was studied by calculating sensitivity, specificity, and positive predictive value(ppv)(26-28) for each. A highly sensitive test is usually positive in the presence of the disease and is of great importance. A sensitive test is useful when there is reason is reason to suspect a dangerous but treatable condition such as acute appendicitis. Specificity confirms a diagnosis suggested by other data. Highly specific test is rarely positive in the absence of the disease i.e. rarely gives false positive results. Thus its desirable to use a test that is both highly sensitive and highly specific. The PPV is the probability of disease in a patient with a positive test result. The positive predictive value is calculated by dividing the number of true positive values by the sum of all positive (both true and false) test result.

$$PPV = \frac{\text{No of true positive value}}{\text{Sum of positive test (true \& false)}}$$

Clinical symptoms of acute appendicitis are highly sensitive with a high positive predictive value, but the specificity is low. Thus, if the examining physician depends only on symptoms, there will be over diagnosis and an increase in the of unnecessary appendecectomies. The same was true with the clinical signs. The diagnosis of acute appendicitis based on clinical signs only is, thus, very(sensitive), but not very (specific) this finding is similar to that noted by other observers (25-28) .

The study also found that more than 70% of the patients who were diagnosed with acute appendicitis had an elevated white blood count. This was significantly higher than that found in those cases who had normal appendices. Other studies have reported similar findings. Some studies have suggested that if the WBC count is repeated after some hours, it remains high in patients with acute appendicitis, but tends to fall in those without appendicitis. This practice is followed by us. It was also found that an increased WBC count in acute appendicitis is relatively highly sensitive with a high PPV, but that it is not a very specific test. There was no significant difference observed between cases of acute appendicitis and normal appendix regarding the general urine examination.(28-33). A urinalysis showing no elements of infection is considered a positive in the diagnosis of acute appendicitis, but the presence of infection does not exclude the diagnosis.

Ultrasound examination for acute appendicitis has a sensitivity ranging from 75- 89% and a specificity ranging from 86-100% reported in the literature (14,15 ,25) in addition to being highly specific when conducted by experienced staff. Ultrasound examination has further advantages, it is accurate in exclusion of diseases that do not require surgical intervention such as mesenteric adenitis, terminal ileitis, ureteric stones and gynecological conditions. In addition, it is helpful in diagnosing surgical conditions other than appendicitis such as ectopic pregnancy . In spite of the importance of this examination, it was conducted in only 190 patients in this study. This is due to the unavailability of this examination except for limited morning hour's. In addition, there is a lack of awareness of its importance by the examining physicians.

In this study , the preoperative diagnosis using ultrasound was incorrect 95 out of 190 cases. In addition to the use of ultrasound , the use of the barium enema has been suggested as a test with high sensitivity and specificity . Other studies have shown that the use of TC-99 mlg G scintigraphy can provided the clinician with a simple, rapid, and very valid test (29-33). laparoscopy has also been suggested to reduce surgery when appendicitis is not present. Elevated serum C- reactive protein level has been found to support the clinical evaluation and diagnosis.

A system of scoring signs, symptoms, and WBC count has been proposed.(34,35,36) the sensitivity and specificity of this method may approach 90% and 91% respectively. Unnecessary appendectomies could be reduced by about 30% using such a system .

Conclusion

Acute appendicitis requires prompt diagnosis and treatment . tests of high sensitivity and high predictive value should be used even when specificity is low because it is of the utmost importance that no cases of appendicitis should be undiagnosed.

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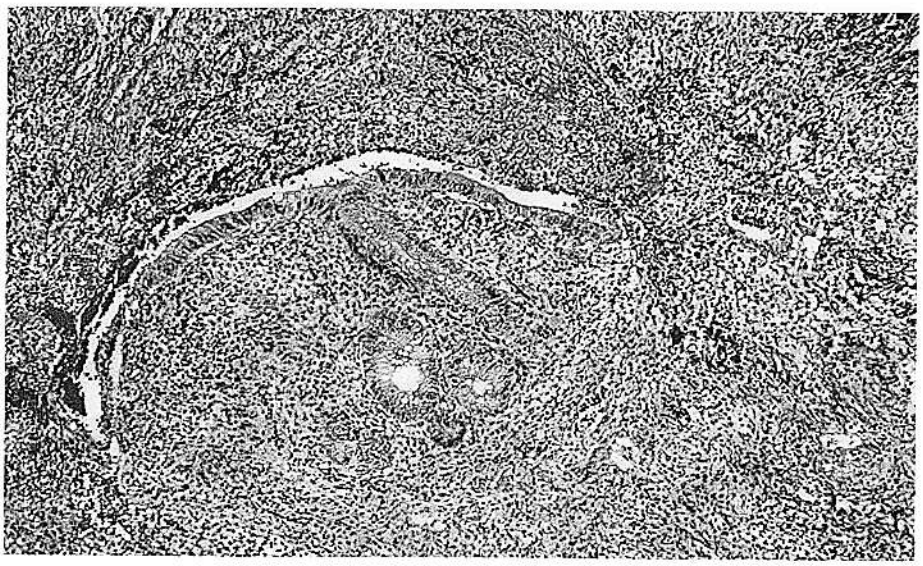

FIG 1. Acute appendicitis with massive inflammatory infiltrate, extensive ulceration, and hemorrhage. An island of heavily inflamed residual mucosa is seen in the center.

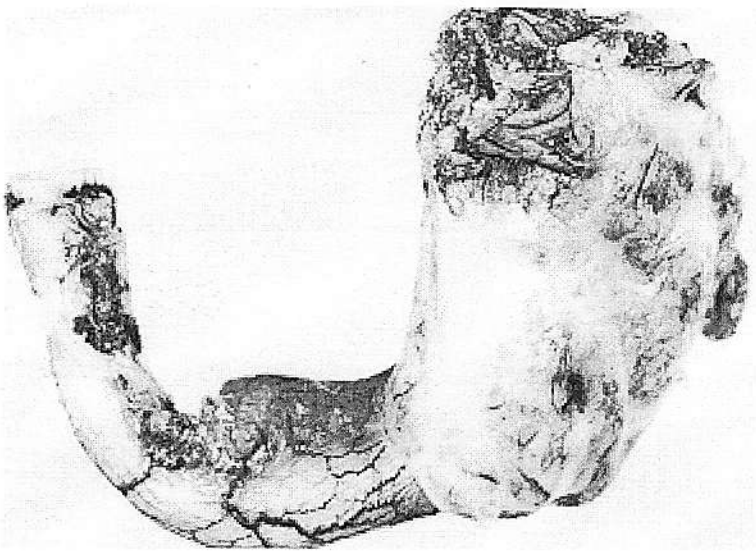

FIG 2. Acute appendicitis with obstruction, perforation, and periappendiceal inflammation.

Table 1 Age distribution of acute appendicitis cases according to the operation results.

Age group (year)	Result of laparotomy					
	Acute appendicitis		Complicated appendicitis		Normal appendix	
	No	%	No	%	No	%
0-14	186	15	48	15	75	17
15-29	868	70	224	70	313	71
30-44	162	13	39	12	44	10
> 45	25	2	10	3	9	2
total	1240	62%	320	16%	440	22%

Table 2 Clinical symptoms and signs in patients diagnosed as acute appendicitis .

Clinical symptoms and signs		Acute appendicitis	Complicated appendicitis	Normal appendix	total
		%	%	%	%
R.I.F pain	Typ	80	65	50	75
	atyp	20	35	50	25
anorexic	yes	85	90	10	85
	no	15	10	90	15
Nausea/ vomiting	yes	70	90	15	80
	no	30	10	85	20
Tachycardia	yes	85	95	25	80
	no	15	5	75	20
Fever	yes	65	80	20	65
	no	35	20	80	35
Tenderness In R.I.F	YES	95	100	75	95
	NO	5	0	25	5
Rebound tenderness	yes	95	100	70	90
	no	5	0	30	10
Rovsin s sign	yes	80	90	60	75
	no	20	10	40	25

Table 3 WBC count in patients with appendectomy according to the operation results.

Diagnosis.	+ve WBC count			
	Normal **		Positive***	
	no	%	no	%
Acute appendicitis	240	19	1620	81
Chronic appendicitis	320	10	1800	90
Normal appendix	440	70	600	30

*cases of appendicitis were compared with cases of normal appendix in both instances . $p< 0.001$.

** normal value when WBC < 10x109/L

*** positive value when WBC >10X109/L

Table4 The result of G.U.E in patients according to operation results*

Diagnosis	G.U.E			
	Normal*		U.T.I**	
	No	%	no	%
Acute appendicitis	1240	75	500	25
Complicated appendicitis	320	72	560	28
Normal appendix	440	69	620	31
	2000	100		

*Cases of appendicitis were compared with cases of normal appendix in both instances .$p>0.05$

** Urinary tract infection (UTI)was considered when the pus cells are equal or more than 5/HPFin males and 10/HPF in females.

Table 5 Sensitivity ,specificity and PPV of clinical symptoms and signs of acute appendicitis

Symptoms and signs	Sensitivity (%)	Specificity(%)	P.P.V(%)
symptom			
Typical R.I.F. pain	80	50	86
anorexia	85	15	75
Nausea/vomiting	80	20	76
tachycardia	10	90	86
fever	30	80	78
Tenderness in R.I.F	98	5	85
Rebound tenderness	95	40	82

rovsing	75	45	80
examinations			
WBC count	75	50	82
C.U.E	80	30	75
ultrasound	35	55	70