



Incidence and Stages of Obstructive and non-Obstructive Acute Appendicitis in Sulaimani Teaching Hospital

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Abstract

Background: Appendicitis is the most common abdominal emergency, and affects about seven percent of the population. Although history and physical examination results remain the cornerstone of the diagnosis of acute appendicitis, many additional adjuncts have been established to increase diagnostic accuracy, i.e: W.B.C. count, ultrasound and sometimes C.T scan. The stages of appendicitis can be classified in to different stages as early, suppurative, gangrenous, and perforated.

Any delay in patient presentation may adversely affects the stages of the disease of acute appendicitis and leads to increased in the incidence of infectious complications and also prolonged hospital stay.

Aim: This paper is a trial to identify the frequency and occurrence of different stages and types of acute appendicitis in our locality.

Patients and Methods: Prospective study was carried out at AL-Sulaimaniy Teaching Hospital (a tertiary hospital in Al-Sulaimani city, Kurdistan, Iraq), which included a randomized collection of 182 patients during the period of six months from 1st Oct. 2012 to 1st Apr.2013 in two surgical units and operated by eighteen surgeons. The patients were suspected to have acute appendicitis on the basis of history, physical examination, investigation and abdominal ultrasound .The final assessment and the decision to operate was made by the surgeon on call.

Results: A total of 182 patients were included in the study, 102 patients of them were male (56 %), and the rest were females (44%), with male to female ratio 1.3:1. The age of patients was ranges from (6 to 67 years),with mean of age (24.6 years) one third of patients 64 (35.2%) patients were between 11 to 20 years .Two thirds of the patients were presented with severe pain 116 (63.7%) patients .While the rest had moderate or mild pain. During operation, there were 147 (80.8%) patients found to have inflamed appendix by naked eye.

Conclusion: Duration of the pain and awareness about possible appendicitis, may affect the clinical stage but not the type of appendicitis.

Keywords: Acute appendicitis, obstructive acute appendicitis, non-obstructive acute appendicitis, gangrenous acute appendicitis, perforated acute appendicitis.

Introduction

The vermiform appendix is a small, finger-shaped pouch. ⁽¹⁾ Its length ranging from 2-20 cm. ⁽²⁾ The base attached to cecum (1.7 to 2.5 cm) below the terminal ileum in a dorsomedial location from the cecal fundus, directly beside the ileal orifice. ⁽³⁾ While position of the tip is variable, it may be retrocecal, pelvic, subcecal, preileal, or in the right paracolic position, and this anatomic fact has significant clinical importance in the context of acute appendicitis. ⁽⁴⁾

The luminal capacity of the normal appendix is only 0.1 mL, and when the fluid exceeds 0.5 mL in the cavity, it raises the intraluminal pressure. ⁽⁵⁾

Appendicitis is the most common abdominal emergency, ⁽⁶⁾ and affects about seven percent of the population. ⁽⁷⁾ Although history and physical examination results remain the cornerstone of the diagnosis of acute appendicitis; many additional adjuncts have been established to increase diagnostic accuracy, i.e: W.B.C. count, ultrasound and sometimes C.T scan. ⁽⁸⁾

Males are affected more, with an estimated male-to-female ratio of (1.4:1), ⁽⁶⁾ while it is rare in infants, and becomes increasingly common in childhood and early adult life, reaching a peak incidence in the teens and early 20s. ⁽³⁾ After middle age, the risk of developing appendicitis is small. ⁽⁴⁾

Pathologically there are two types of acute appendicitis, obstructed and non-obstructed, in non-obstructive acute appendicitis; the inflammation commences either in mucous membrane or in lymph follicles and terminates either as resolution, ulceration, suppuration, fibrosis or gangrene, ⁽⁹⁾ in obstructive acute appendicitis; obstruction of the narrow appendiceal lumen initiates the clinical illness of acute appendicitis, that may be caused by variable factors including: lymphoid hyperplasia, fecaliths, parasites, foreign bodies, Crohn's disease, primary or metastatic cancer and carcinoid syndrome. ⁽¹⁰⁾

The stages of appendicitis can be classified in to different stages as early (granulocytic invasion of the mucosa, deeper lesions up to the sub mucosa or in to the muscular wall) ⁽⁸⁾, suppurative (which is associated with obstructed lymphatic and venous drainage and allows bacterial and inflammatory fluid to invade appendiceal wall) ⁽³⁾, gangrenous (when ischemic necrosis of the wall due to Intramural venous and arterial thromboses occur) ⁽⁵⁾, and perforated Persisting

tissue ischemia results in appendiceal infarction and perforation, which is usually distal to the point of luminal obstruction along the antimesenteric border of the appendix, ^(3,5).

Any delay in patient presentation may adversely affects the stages of the disease of acute appendicitis and leads to increased in the incidence of infectious complications and also prolonged hospital stay. ⁽¹¹⁾

The aim is to identify the frequency and occurrence of different stages and types of acute appendicitis in our locality.

Materials and Methods

Prospective study was carried out at AL-Sulaimani Teaching Hospital (a tertiary hospital in Al-Sulaimani city, Kurdistan, Iraq), which included a randomized collection of 182 patients during the period of six months from 1st Oct. 2012 to 1st Apr. 2013. The patients were suspected to have acute appendicitis on the basis of history, physical examination, investigation and abdominal ultrasound. The final assessment and the decision to operate was made by the surgeon on call.

Demographic data include name, age and gender. Clinical data includes duration of pain, severity, nature of pain, point of the start of the pain and shifting.

Blood samples sent for W.B.C. count, urine sent for laboratory analysis and abdominal ultrasound were performed for all patients preoperatively. All patients operated through open appendectomy.

Intraoperatively; assessment of appendix macroscopically achieved and grouped into normal or inflamed appendix when they were edematous or there is necrosis, fibrinous or purulent film and vascular changes in mesoappendix.

State of obstruction in inflamed appendices recognized grossly, and all appendices were grouped grossly in to one of the five groups; normal appendix, early inflamed appendicitis, suppurative appendicitis, gangrenous appendicitis and perforated appendicitis.

All appendices were sent for pathological examination, and the results were either normal appendix, acutely inflamed appendicitis, suppurative appendicitis, gangrenous appendicitis and perforated appendicitis.

The data were analyzed by Statistical Package for Social Science (SPSS) version 19.

Results

A total of 182 patients were included in the study, 102 patients of them were male (56 %), and the rest were females (44%), with male to female ratio 1.3:1. The

age of the patients was ranging from (6 to 67 years), with mean of age (24.6 years), one third of patients 64 (35.2%) patients were between 11 to 20 years.

About one third of patients 56 (30.8%) patients presented within 6 to 12 hours from the onset of the pain. as shown in table 1.

Table I: showing duration of pain from the onset to attendance in the emergency department.

Duration in hours	No. of patients	Percentage of patients
< 6 hr	24	(13.2%)
6-12 hr	56	(30.8%)
12-18 hr	34	(18.7%)
18-24 hr	29	(15.9%)
> 24 hr	39	(21.4%)
Total	182	(100%)

Two thirds of the patients were presented with severe pain 116 (63.7%) patients, while the rest had moderate or mild pain.

Majority of patients had continuous pain 147 (80.8%) patients; the rest had intermittent colicky pain 35 (19.2%) patients.

The pain started in periumbilical area in more than half of patients (53.3%),others in right iliac fossa (RIF) and epigastric area ;(41.2% ,5.5%)respectively ,and the pain of 107 (58.8%) of the patients was shifted from periumbilical and epigastric areas to RIF within (6)hours .

More than two thirds of patients 124 (68.1%) patients had elevated temperature up to one degree centigrade, and 130 (71.4%) patients had leukocytosis (more than 11000 cell/mm³).

Abdominal ultrasound revealed features suggested inflamed appendix in 82 (45 %) patients.

During operation, there was 147 (80.8%) patients found to have inflamed appendix by naked eye.

While more than half of appendices were macroscopically of obstructed type of appendicitis (50.6%); as there was fecolith, lymph nodes enlargement, perforation or gangrene at the site of obstruction.

Early stage of appendicitis was found macroscopically in 51 (28%) patients, and pathologically¹ was found in 75 (41.2%) patients . While Suppurative appendicitis was found macroscopically in 70 (38.5%) patients and pathologically was found in 64 (35.2%) patients. Gangrenous appendicitis was found macroscopically in 11 (6%) patients and pathologically in 14 (7.7%) patients. Perforated appendicitis was found macroscopically in 15 (8.2%) patients and pathologically in 8 (4.4%) patients. Also normal looking appendix in texture, size, shape and free of adhesions, was found macroscopically in 35 (19.2%) patients, while pathological examination proved to be normal in 21(11.5%) patients, and were acutely inflamed in the rest 14 (7.7%) of these group of patients, as shown in table 2.

Table II: The number of the patients and frequency of different macroscopical and pathological states of the appendix.

Stage of appendix	macroscopic stage of appendix N (%)	pathologic stage of appendix N (%)	p-value
Early inflammation	51 (28.0)	75 (41.2)	<0.001
Suppurative appendix	70 (38.5)	64 (35.2)	0.005
Gangrenous appendix	11 (6.0)	14 (7.7)	0.0011
Perforated appendix	15 (8.2)	8 (4.4)	0.0056
Normal appendix	35 (19.2)	21 (11.5)	0.0026

Results showed significant relationship between the pathological stage and pain duration (P-value 0.004), while age and gender were unrelated to pathological

stage (P-value 0.322 and 0.793) respectively, as shown in table 3.

Table III: Correlation of pathological result of appendix with age, gender and pain duration.

	Pathological result of appendix	
	Effect (r)	P value
Age of patient	0.07	0.322
Gender of patient	- 0.02	0.793
Pain duration	0.26	0.004

Also results showed significant relationship between macroscopic stage of appendix and pain duration (P-value 0.008), while age and gender were unrelated to

macroscopic stage (P-value 0.599 and 0.214) respectively, as shown in table 4

Table IV: Comparison of macroscopic stage of inflamed appendix with age, gender and pain duration.

	Stage of inflamed appendix	
	Effect (r)	P value
Age of patient	-0.04	0.599
Gender of patient	0.09	0.214
Pain duration	0.19	.008

Discussion

Acute appendicitis is the most common cause of acute non-traumatic surgical abdomen in Sulaimani area,⁽¹²⁾ and its diagnosis remains a challenge.⁽¹³⁾ In Asian and African countries, the incidence of acute appendicitis is probably lower because of the higher intake of dietary fiber, which is thought to decrease the viscosity of feces, decrease bowel transit time, and discourage formation of fecaliths.⁽³⁾

The accuracy of clinical diagnosis of acute appendicitis based on patient's history and physical examination alone ,ranges from (70%-84 %), and this is less in children and women of child- bearing age from (60 %- 68%) , because of overlap features of other conditions causing acute abdominal pain in these groups.⁽⁸⁾ It is possible to increase the preoperative diagnostic accuracy of acute appendicitis even in a small hospital without the facilities of a larger hospital by using a protocol based on repeated clinical examination and Alvarado score appliance.⁽¹⁴⁾

In the present paper, a total of 182 patients were studied, the accuracy of preoperative clinical diagnosis of acute appendicitis was 88.5% which was higher than other studies.^(7, 8) We may explain this variance as following; most of the patients were presented late, when the features of the acute appendicitis were clear. On the other hand those patients who operated for suspected appendicitis and normal appendix were found were those presented in duration less than 12 hours, when the features of acute appendicitis is vague .

The results showed that males were affected more than females, 102 (56%), 80(44%) patients respectively with male to female ratio 1.3:1, and this agreed with other studies.^(3, 15, and 16) The incidence of appendicitis is strongly age dependent.⁽¹⁵⁾ the age of the patients was ranging between 6-67 years, its incidence was higher in patients of age ranging from 11-30 years 116(63.8%) patients, this was in line with other studies,^(12, 15) and most of them were in second decade of life 64 (35.2%) patients, and this meets the result of a study done in Sulaimani city –Iraq by **(Hiwa O.Ahmed, 2006)**⁽¹⁷⁾.

One hundred forty seven (80.8%) appendices were macroscopically inflamed, and 91(62%) appendices of these were of obstructed type, this is lower than the study done in Baghdad-Iraq by **(Maitham H. Kenber 2007)**.⁽¹⁵⁾

Pathological examination of the appendix specimens are the important for final diagnosis of acute appendicitis, appendix is one of the more commonly received specimens at pathology department.⁽⁷⁾ All appendices were sent for pathological study the findings were not comparable with clinical naked eyes intraoperative macroscopically results .Thirty five (19.2%) of those appendices grossly labeled as normal ,pathological study revealed that 14 appendices of them to be inflamed, agreement between macroscopic state of appendices and pathological studies was 60% ;and this slightly higher than the result of study done by **(Maitham H. Kenber,2007)**,⁽¹⁵⁾ who found agreement between the results in57.5%of the patients. this may be explained by high suspension of acute appendicitis clinically by author , although the inflammation was present , but grossly looks normal in this early stage .

The pathological changes were varying from focal infiltrating of the mucosa with inflammatory cells up to diffuse infiltration of all layers of the appendix and

mucosal necrosis. In more detail of the results; gangrenous appendices were found in 14(7.7%) patients, not relating to age or gender distribution, and it was higher than a study done in Sulaimani city-Iraq by **(Hiwa O.Ahmed, 2011)** as their percentage of gangrenous appendicitis was (5.73 %).⁽⁸⁾ this might be explained by presentation of some patients after twelve hours from onset, especially those failed to have assessment early, or in those who have higher pain threshold level, which cause more tolerance of the pain simultaneously the inflammatory changes continuously advanced, Now it is clear that there is striking variation in the intensity of pain experienced in diseases with apparently similar lesions, which is clinically significant and a common observation⁽¹⁸⁾as pain thresholds have large intra-individual variations,⁽¹⁹⁾and biological factors that enter into an individual's judgment of whether or not a stimulus is painful.⁽²⁰⁾

Suppurative appendicitis were found in 64/182 (35.2%) patients, it was less than study done in Iran by **(Fateme Nabipour 2005)**,⁽⁷⁾ she found (38.8%) .

After perforated appendicitis, the risk of 10 years small bowel obstruction was noted to be 2.10%, whereas the risk is 0.50% in non-perforated acute appendicitis.⁽²¹⁾ It has also been shown that perforated appendicitis carries higher incidence of complications, 19% vs. 6% in non-perforated appendicitis.⁽¹⁴⁾ In the present work, perforated appendices were found in 8 (4.4%) patients, this result meets with other studies,^(7,15) seven patients of this subgroup presented in more than 24 hours, and two thirds of them were extreme in age.

Active observation does not increase the rate or the total number of perforated appendices,^(14, 22) most perforated appendices are reported to have occurred already at the time of arrival at hospital.⁽²³⁾

During the last decade several studies have shown that the rate of negative explorations for suspected appendicitis could be decreased with the use of scoring systems and retrospective analyses of different combinations of blood tests or diagnostic radiological examinations, like ultrasound or computed tomography.⁽¹⁴⁾ In this paper, pathologically negative appendectomies were 21 (11.5%) patients, which is comparable with previously reported rates elsewhere.^(24, 25) From the 21 negative appendectomies patients, 15 (71.5%) patients were females and the rest were males. The findings are in line with the reported

difficulties involved in making the correct diagnosis in females. ^(8, 25, and 26) Accordingly, some investigators advised routine diagnostic laparoscopy in women of child-bearing age with suspected appendicitis, but in men its use is not recommended routinely. ⁽²⁵⁾

The highest percentage of appendices was acutely inflamed 75 (41.2%) appendices, and this is same as recent studies. ^(7, 8) Appendectomy done for all operated patients, even those with normal looking appendices, that is done because it is accepted generally to remove normal appendices during open appendectomy, beside this normal looking appendices have a 22% chance to be inflamed on pathological examination ⁽⁸⁾. Duration of the pain and awareness about possible appendicitis, may affect the clinical stage but not the type of appendicitis.

Conclusion

Duration of the pain and awareness about possible appendicitis, may affect the clinical stage but not the type of appendicitis.

Recommendation

Rising of awareness needs media-based information about possibility of acute appendicitis and necessity of early consultation.

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