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CLINICOPATHOLOGICAL ASPECTS OF ACUTE APPENDICITIS AMONG PATIENTS ABOVE AGE OF THIRTY IN SULAIMANI EMERGENCY HOSPITAL

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ABSTRACT

Background: The importance of the appendix surgically results from its liability to inflammation, which results in clinical condition known as acute appendicitis. Acute appendicitis is considered the most common abdominal emergency worldwide. **Aim of the study:** Assessment of different clinicopathological aspects of acute appendicitis in patients above age of thirty. **Patients and Methods:** This is an observational (prospective) study, which was conducted from June-October/2025. In Sulaimani Emergency Hospital. The study includes 70 patients with age above 30 years old. The patients are divided into 4 age groups: group 1 (30-39 years), group 2 (40-49 years), group 3 (50-59 years) and group 4 (patients older than 60 y & above). Data collections: patients characteristics, clinical presentations, Laboratory investigations (complete blood count, general urine examination), ultrasound findings, operative findings and histopathological examination. Follow up the patients done till discharge from the hospital. **Results:** The most common histopathological examination in the fourth decade (30 -39 year) was acute appendicitis (simple inflammation) with 48.7%, to be changed in the older patients (older than 60 years) to gangrenous appendicitis (complicated) with 62.5% due to delay in diagnosis, rate of negative appendectomy was only 1.42%. **Conclusion**: The incidence of acute appendicitis decreases with aging with increase the incidence of complicated appendicitis (gangrenous).

KEYWORDS: Acute appendicitis, Aging, Clinicopathology, elderly, Histopathology.

1-INTRODUCTION

Acute appendicitis is the clinical condition which refer to inflammation of the vermiform appendix.[1] It is the most common abdominal emergency.[2, 3, 4] It accounts for more than 40, 000 hospital admissions in England every year.[5] Approximately 8% of the population in Western countries would have appendicitis during their life.[6] In the United States, the estimated incidence of acute appendicitis is 11 cases per 10, 000 population.[5] However, in South Africa, the incidence was estimated to be less than 9 per 100, 000.[6] Appendectomy is considered the most common emergency surgical procedure worldwide.[7, 8, 9] The cause of acute appendicitis is unknown but it is multifactorial; luminal obstruction, dietary and familial factors have been suggested.[5] Fecoliths are the most common cause of obstruction. It was demonstrated that the mean duration of abdominal pain in patients with gangrenous appendix is 46.2 hours and 70.9 hours for perforated.[10]

The typical presentation of peri-umbilical pain radiating to the right lower quadrant followed by anorexia, vomiting and nausea[6, 10], are unfortunately not a constant feature of acute appendicitis and present only in 37% to 53% of patients.[10] The diagnosis of acute appendicitis is primarily based on clinical findings.[5, 11, 12] An accurate diagnosis of acute appendicitis remains clinically challenging[12], supported by laboratory tests like elevated white blood cell count.[13] Ultrasonography is done usually to help in diagnosis especially in females.[10, 13]

A number of clinical and laboratory- based scoring systems have been used to assist in diagnosis. But the most widely used is the Alvarado score. A score of 7 or more is strongly predictive for acute appendicitis. When the score is (5–6), abdominal ultrasound or contrast-enhanced CT examination will reduce the rate of negative appendicectomy.[1] The peak incidence of acute appendicitis is at the age of 10 to 30 years.[6, 10] There are special features for appendicitis according to age.[1] A.A is primarily a disease of the younger population, with only 5–10% of cases occurring in elderly people, but the incidence of acute appendicitis in elderly began to increase with the increase in life expectancy.[14] Older patients with acute abdominal pain are high-risk patients, unlike their younger counterparts.[15] Morbidity and mortality rates are greater in elderly due to atypical presentations and delay in diagnosis leading to increase rate of perforation and intra-abdominal infection.. They need to be clinically evaluated by experienced surgeons within a narrow time margin.[14, 15]

In this study, we concentrate on patients older than thirty to assess their clinical presentation and their histopathological exam after surgery.

AIMS OF THIS STUDY ARE

- Estimate the incidence of A.A. in patients above age of 30 y in 4 age groups.
- Correlate between different clinical aspects and histopathological results.
- Determine rate of negative appendectomy in those patients.

PATIENTS AND METHODS

This is an observational prospective study, which was conducted from June - October / 2018, In Sulaimani emergency hospital. The study includes 70 patients with age above than thirty years old. The patients are divided into 4 age groups: group 1 (30-39 y), group 2(40-49), group 3(50-59) and group4 (patients older than 60 y). They were admitted to our emergency hospital with features of acute appendicitis. A detailed history was taken and clinical examination of the patient was carried out at the time of admission. Data was collected regarding investigations (CBC, GUE, US). Appendectomy done for the 70 patient, their operative findings along with any complications as well as histopathological findings were recorded. With follow up the patients till discharge from the hospital. Data was collected and coded. The collected data was reviewed and analyzed using the Statistical Package for Social sciences (SPSS version 22). Descriptive statistics such as frequency and percentage was calculated. Measures of central tendency and dispersion around the mean were used to describe continuous variables. P value was obtained for the continuous variable using chi square and was considered significant ifit was less than 0.05.

RESULTS

1. Gender

In a 70 patients, 55.72% were female.

Female predominance with F:M ratio 1.25:1

2. Age: About 55.71% of patients were in the first age group (fourth decade).

Table 2: Shows the number and percentage of patients in each group.

Age group	Male Frequency	Female frequency	Total	P value
30- 39	15	24	39 (55.71%)	**0.001***
40- 49	9	7	16 (22, 85%)	
50- 59	4	3	7 (10 %)	
➢ 60	3	5	8 (11.42 %)	
Total	31 (44.28 %)	39 (55.72%)	70 (100%)	

*** P value< 0.05 is statistically significant**

3. OCCUPATION

The most common occupation among female patients was housewife with 92.3%.

Table 3: shows the occupation frequency and percentage.

Occupation	Male frequency /%	Female Frequency/ %	Total	P value
Housewife	_	36 (92.3 %)	36 (51.43%)	**0.5 ***
Free job	19 (61-3%)	0	19 (27.14)	
Fix job	12 (38.7 %)	3 (7.7 %)	15 (21.43%)	
Total	31 100%	39 100%	70 (100%)	

***P value> 0.05 is statistically not significant**

4. Symptoms and signs: Abdominal pain was found in all patients.

Table 4: shows the frequency and percentage of all clinical features in this study.

Symptom, sign	Number	Percentage (%)
Abdominal pain	70	100
Migratory pain	17	24
Anorexia	66	94
Nausea, vomiting	65	92.8
Fever	18	25.7
Diarrhea	7	10
RIF tenderness	70	100
Rebound tenderness	70	100
Dunphysign	62	88.5
Rovsing sign	47	67
Obturatorsign	16	22.8
Psoas sign	15	21.4

5. Investigations

Regarding the WBC count: WBC count was elevated with range from $10.5*10^{9}$/L _ $21 * 10^{9}$/L white blood cell count was elevated in most patients (50 patients) with percentage 71.4%, this will be shown in table 9 with its correlation to HPE.

Regarding the Ultrasound: There was positive findings(abnormal US) in 37 of 70 patients with percentage 52.85 %, this will be shown in table11 with its correlation to HPE.

6. Operative findings

The most common position of appendix was retrocecal in 49 patients with 70 %.

Table 5: Shows the frequency of appendix position.

Position	Frequency	Percentage %
Retrocecal	49	70
Subcecal	14	20
Paraocecal	4	5.7
Pelvic	3	4.3
Total	70	100%

7. Histopathologicalexam

The most common HPE results was acute appendicitis (simple) with 35.71%.

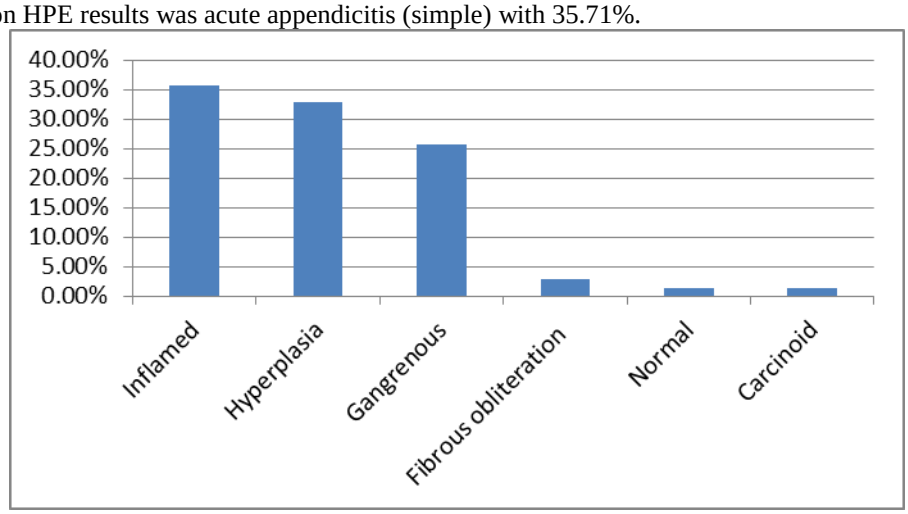

Figure 1: shows the percentage of each HPE.

Correlation between gender and HPE

Hyperplasia was the second HPE in total patients and its predominance was in female with 41% of total appendix in female, 69.6% of hyperplaised appendix was in female. while Gangrenous appendix was the most common HPE in male with 41% of total appendix in male, 72.2% of gangrenous appendix was in male. as shown in table 8.

Table 6: shows frequency, percentage the correlation of HPE to gender.

HPE	Gender		Total N. /(%)	P-value
	Male N. / (%)	Female N. / (%)		
Inflamed	11 (44.0)	14 (56.0)	25 (100.0)	**0.03***
Hyperplasia	7 (30.4)	16 (69.6)	23 (100.0))	
Gangrenous	13 (72.2)	5 (27.8)	18 (100.0)	
Fibrous obliteration	0 (0.0)	2 (100.0)	2 (100.0)	
Tumor	0 (0.0)	1 (100.0)	1 (100.0)	
Normal	0 (0.0)	1 (100.0)	1(100.0)	
Total	31 (44.3)	39 (55.7)	70 (100.0)	

***P value < 0.05 is statistically significant.**

Correlation between age groups and HPE

The most common HPE in fourth decade was acute appendicitis (simple) with 48.7%.

Table 7: shows the frequency, percentage and correlation of age group to HPE.

HPE	Age group (N./%)				Total	P value
	30-39	40-49	50-59	>59		
Inflammed	19 (48.7)	3 (18.75)	2 (28.57)	1 (12.5)	25	**0.039***
Hyperplasia	14 (35.9)	5 (31.25)	2 (28.57)	2 (25)	23	
Gangrenous	5 (12.82)	6 (37.5)	2 (28.57)	5 (62.5)	18	
Fibrous obliteration	0 (0.0)	1 (6.25)	1 (14.28)	0 (0.0)	2	
Tumor	0 (0.0)	1 (6.25)	0 (0.0)	0 (0.0)	1	
Normal	1 (2.56)	0 (0.0)	0 (0.0)	0 (0.0)	1	
Total	39 (100%)	16 (100%)	7 (100%)	8 (100%)	70	

***P value <0.05 is statistically significant**

Correlation between clinical presentation and HPE

The correlation was significant only with fever and Rovsing's sign.

Table 8: shows the frequency, percentage and correlation of clinical features to HPE.

Crosstab							
Clinical characteristics	HPE						P- value
	Normal	Inflamed	Gangrenous	Hyperplasia	Tumor	Fibrous O.	
Fever							**0.03***
Absent	1 (100.0)	18 (72.0)	10 (55.6)	22 (95.7)	1 (100.0)	2 (100.0)	
Present	0 (0.0)	7 (28.0)	8 (44.4)	1 (4.3)	0 (100.0)	0 (0.0)	
Total	1 (100.0)	25 (100.0)	18(100.0)	23 (100.0)	1 (100.0)	2 (100.0)	

Rovsing s							**0.002****
Absent	0 (0.0)	4 (16.0)	3 (16.7)	13 (56.5)	0 (0.0)	2 (100.0)	
Present	1 (100.0)	21 (84.0)	15 (83.3)	10 (43.5)	1 (100.0)	0 (0.0)	
Total	1 (100.0)	25 (100.0)	18(100.0)	23 (100.0)	1 (100.0)	2 (100.0)	

***P value < 0.05 is statistically significant**
**** P value < 0.05 is statistically significant**

Correlation between WBC count and HPE

The WBC count was elevated in 80 % of inflamed appendix and 94.4% of gangrenous appendix. WBC count was normal in 100% of normal appendix and 100% of fibrous obliterationof appendix.

Table 9: shows the correlation between WBC count and HPE.

HPE	WBC		Total N. / (%)	P-value
	Normal N. / (%)	ElevatedN. / (%)		
Normal	1 (100.0)	0 (0.0)	1 (100.0)	**0.021***
Inflamed	5 (20.0)	20 (80.0)	25 (100.0)	

Gangrenous	1 (5.6)	17 (94.4)	18 (100.0)	
Hyperplasia	11 (47.8)	12 (52.2)	23 (100.0)	
Tumor	0 (0.0)	1 (100.0)	1 (100.0)	
Fibrous obliteration	2 (100.0)	0 (0.0)	2 (100.0)	
Total	20 (28.6)	50 (71.4)	70 (100.0)	

*** P value< 0.05 is statistically significant**

Correlation between Alvarado score and HPE

The most frequent Alvarado score was 7 in about one third of cases. Alvarado score was 8 in 40% of inflamed appendix, while it was 7 in 33.3% of gangrenous appendix.

Table 10: shows the frequency. percentage and correlation of Alvarado score to HPE.

HPE	Alvarado score						Total	P-value
	3	5	6	7	8	9		
Normal	0(0.0)	1 (100.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1 (100.0)	
Inflamed	0 (0.0)	5 (20.0)	1 (4.00)	8 (32.0)	10(40.0)	1 (4.0)	25 (100.0)	
Gangrenous	0 (0.0)	1 (5.6)	2 (11.1)	6 (33.3)	4 (22.2)	5 (27.8)	18 (100.0)	
Hyperplasia	1 (4.3)	7 (30.4)	4 (17.4)	8 (34.8)	3 (13.0)	0 (0.0)	23 (100.0)	**0.03***
Tumor	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1 (100.0)	
Fibrous obliteration	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	
Total	1 (1.4)	16 (22.9)	7 (10.0)	23 (32.9)	17 (24.3)	6 (8.6)	70 (100.0)	

*** P value < 0.05 is statistically significant.**

Correlation between US findings and HPE results: There was positive US findings (Abnormal US) in 72% of inflamed appendix and 61.1% of gangrenous appendix, while the US was normal in the normal appendix and fibrous obliteration of appendix and 65.2% of appendix with hyperplasia.

Table 11: shows the frequency, percentage and correlation of US findings to HPE.

HPE	Normal US N. / (%)	AbnormaUS N. / (%)	No US N. / (%)	Total N. / (%)	P value
Inflamed	7 (28)	18 (72)	0	25(100)	
Hyperplasia	15 (65.2)	7 (30.4)	1 (4.3)	23 (100)	
Gangrenous	6 (33.3)	11 (61.1)	1 (5.6)	18(100)	
Fibrous obliteration	2 (100)	0	0	2(100)	
Tumor	0	1 (100)	0	1(100)	**0.001***
Normal	1 (100)	0	0	1(100)	
Total	31 (44.3 %)	37 (52.9%)	2 (2.9%)	70 (100%)	

***P value 0.001 is highly statistically significant**

DISCUSSION

In this study, There was female predominance in patients with acute appendicitis above age of 30 y. According to age groups, female predominance was found in the fourth decade and in patients older than 60 year with F: M ratio (1.6: 1), while the male predominance was in the fifth and sixth decades with M: F ratio (1.3: 1). In another study performed in eastern Indian on patients older than 10 year[12], also there was female predominance with F: M ratio 1.36:1 .There was study performed in Eygpt on two age groups, one group less than 30 y which shows male predominance, while in the second group (patients older than 60), there was female predominance.[14] which is in contrast to many of the studies in the west, California and Africa which found male predominance.[12,16] Also there was another study performed in Sulaimani on different ages which show male predominance with M:F ratio 1.38:1.[17]

The majority of females were housewives, only 7.7% of female were fix job. Two thirds of male patients were with free job. Unkown causes for this results, may be due to dietary and hygienic life style for unemployed patients. There was study performed in Saudi Arabia which showed significant relationship between acute appendicitis and defects in dietary life style including, low consumption of water and significant decrease in the amount of fiber at the usual food. This will lead to constipation and further cause acute appendicitis. Also the acute appendicitis patients showed moderate hygiene life style, this could contributes in increasing the probability of appendicitis in those patients.[18]

Abdominal pain found in all patients. Migratory pain only found in one quarter. This was less than other study performed in Indian on different age groups, which show that migratory pain percentage was 36%.[20] In our study, anorexia, nausea and vomiting found in 94% and 92%

respectively, which is higher than that Indian study, which show the incidence of anorexia is 87%, nausea and vomiting was 76%.[20] P value was significant for fever(0.05) and Rovsing sign (0.02), while in Indian study P value was significant for fever only.[20]

The most common position of appendix in this study was retrocecal, followed by subcecal and paracecal appendix found. This consequence goes with different studies. One of them performed in Brazil which show the following frequencies for appendix positions: retrocecal: 43.5%, subcecal: 24.4%, post-ileal: 14.3%, pelvic: 9.3%, paracecal: 5.8%, pre-ileal: 2.4%, other positions.[19]

In this study, there was significant correlation between HPE and gender. Acute inflammation and lymphoid follicular hyperplasia were more common in female with 56% and 69% respectively, While complicated acute appendicitis (gangrenous) was more common in male with 72.2%. The negative appendectomy rate was 1.42%. In another study performed in Bahrain on different age groups, simple acute appendicitis was diagnosed 80% of patients. There was complicated acute appendicitis in 10% of patients. The remaining (10% showed relatively normal appendix including the presence of luminal fecolith and lymphoid follicular hyperplasia. only (0.3%) had carcinoid tumor.[21] In Bahrain study, they consider hyperplasia as relative normal appendix while in our in our study, we consider it as early stage of A.A.according to pathologist.

The correlation was significant between HPE and age groups. The most common HPE in the fourth decade was simple acute appendicitis, while in patients older than 60 year old, complicated appendicitis was found in 2 thirds of patients. As mentioned in other studies performed in Egypt[14], France[22], and Jordan[23], there is atypical presentation and delay in diagnosis of acute appendicitis in elderly people which lead to perforation and increase morbidity. In our study, the perforation rate in adult (30 - 60 years old) was 21 %, while the rate in patients older than 60 y was 62.5 %. It is less than but approximated to perforation rate in Egypt which was 69% in patients older than 60 y, while it was 20% for patients older than 40. It is also less than the rate of France study which was 70 % in patients older than 70. But it is higher than that of Jordan study, when the perforation rate was only 41 % in patients older than 60.[14.22.23]

There was significant correlation between HPE and WBC count. This was found in many researches, one of them done in Saudi Arabia, it shows that WBCs count was significantly higher in patients with inflamed and complicated than normal appendix and in complicated higher than inflamed appendix. Several reports suggest that an elevated WBC count is usually the earliest laboratory test to indicate appendiceal inflammation.[24] The leukocytosis is helpful test but can not depend on it alone because it was normal in one quarter of inflamed appendix, may be due to early presentation, which need to put those patients under observation and follow up them.

Significant correlation between Alvarado score and HPE, score 7-9 found in two thirds of total patients, 3 quarter of them were inflamed (simple and complicated), one quarter of them were hyperplasia. In another study performed in Indian[25], 7-10 score was found in 4 fifth of patients, most of them were inflamed. Score 4-6 found in one third, one third of them were inflamed, less than half of them were hyperplasia. one case was normal and 2 were fibrous obliteration. In Indian study, 4-6 score was only found 6.5 %, 2 third of them were inflamed histopathologically.[25] In our study, score was 3 in one case only, its HPE was hyperplasia. Indian study, score was less than 4 in more than one tenth. no one diagnosed as acute appendicitis, treated as urology or gynecological cases.[25]

There was significant correlation between US findings and HPE c. But we can not depend completely on US in diagnosis because the US was normal in more than one quarter of inflamed appendix and in more than third of gangrenous appendix. The US was normal in two thirds of hyperplasia appendix and in cases of nomal appendix and fibrous obliteration of appendix. A study in UK showed that US is only useful to diagnose appendicitis if sufficient radiological experience is available. Sensitivity of ultrasound for diagnosing appendicitis was 51.8%, and the specificity was 81.4%. The appendix was not visualized in 45% of the 573 scans performed across three UK hospitals in this study. The mean negative appendicectomy rate(NAR) was 26.7%, or 18.3% after a positive ultrasound scan. To reduce the NAR, management include observation and serial examination with increased use of CT or improving the performance of ultrasonography.[26]

CONCLUSION

1. The most common incidence of acute appendicitis was in the fourth decade(30 -39 year) and decline incidence later with aging.
2. The most common HPE in the fourth decade (30 -39 year) was acute appendicitis (simple inflammation), to be changed in the older patients (older than 60) to gangrenous appendicitis (complicated) due to delay in diagnosis.
3. Rate of negative appendectomy (normal appendix) was only 1.42% in all patients.

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