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Presentation and Outcome of Acute Appendicitis in the Governmental Referral Hospitals In Sana'a City Yemen, 2023

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قال تعالى :

(إِنَّ الَّذِين آَمَنُوا وَ عَمِلُوا الصَّالِحَاتِ إِنَّا لَا نُضِيعُ أَجْرَ مَنْ أَحْسَنَ عَمَلًا ۝)

صدق الله العظيم

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قرار لحنة المناقشة :

إهداء

إلى من علمنا كيف نقف بثبات فوق الأرض

ابائنا الكرام

إلى ينابيع الحنان والمحبة والايثار

امهاتنا الحبيبات

إلى أقرب الناس إلينا

اخوة واخوات

إلى جميع من تلقينا منهم النصح والدعم

نهديكم بحثنا وندعي الله ان ينال إعجابكم

شكر و تقدير

أولًا : وقبل كل شيء،
ود ان نعبر عن امتنانينا العميق

لله تعالى الذي منحنا القوة والثقة

لإكمال هذا المسار التعليمي

ثانياً:

نتقدم بكل الشكر والتقدير

لكل من ساعدنا في إعداد هذا البحث

دكاترة في جامعة ٢١ سبتمبر

والعاملين في المستشفيات التي أُخذ منها البحث

(مستشفى الثورة , المستشفى الجمهوري , مستشفى الكويت , مستشفى ٤٨)

ونختصر بالذكر

العاملين في أقسام الجراحة العامة

وذلك لما بذلوه لإنجاح هذا البحث

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List of Abbreviations

LOS	**Length of stay**
SD	**Stander division**
WHO	**World Health Organization**
CT	**Computer Tomography**
US	**Ultra sound**
SD	**Standard Deviation**
USA	**United State of America**
Jan	**January**
Dec	**December**
Epi info 7.5	**Is a public domain software package designed for the global public health community of practitioners and researchers**

الملخص العربي

مقدمة : التهاب الزائدة الدودية الحاد هو أحد الأسباب الأكثر شيوعاً للجراحة الطارئة داخل البطن في جميع أنحاء العالم . لقد هدفنا إلى تقييم العلامات و الأعراض و التشخيص ومعالجة التهاب الزائدة الدودية الحاد ونتائج ما بعد الجراحة وتقييم عوامل الخطر المرتبطة بالمضاعفات الشديدة وطول مدة الإقامة .

المواد والأساليب : تم إجراء دراسة مقطعية مستقبلية قائمة على الوصف في أقسام الجراحة العامة في المستشفيات الحكومية بصنعاء خلال الفترة من ديسمبر ٢٠٢٢ الى فبراير ٢٠٢٣ تم جمع البيانات عن طريق تعبات الإستطلاع والمقابلة الشخصية , وتم تحليلها باستخدام **info 7.5 Epi** وبرنامج الاكسيل.

النتائج : من بين ١٥٥ مريضاً ,كان متوسط العمر **(10 ± 23.4 =SD-/+)** سنوات, والجنس الذكور (٦١,٣٪) لم يكن هناك اختلاف عرقي في تشخيص المرض وعرضه . كان متوسط مدة الأعراض ٢٢ساعة التاريخ المرضي عادةً عبارة عن ألم موضعي أو في البكن مرتبط بفقدان الشهية والغثيان والقيئ والحمى , كانت النتائج الجسدية الأكثر شيوعاً هي ألم البطن الأيمن المرتبط بالارتداد والحراسة ,خضع جميع المرضى إلى التصوير أشعة فوق السمعية قبل الجراحة لتحديد تشخيص التهاب الزائدة الدودية قبل الجراحة , بينما خضع ٩٥,٥٪ لعملية جراحية للتشخيص السريري وفحص الدم (زيادة عدد الكريات البيضاء) , و تم إجراء عملية استئصال الزائدة الدودية المفتوحة في ٩٨,١٪ من المرضى , لم يتم إجراء عملية استئصال الزائدة الدودية بالمنظار على الإطلاق , كان متوسط مدة الإقامة في المستشفى ٣ أيام , كانت مضاعفات الجراحة بعد الجراحة ٢٪ ولم يكن هناك وفيات في دراستنا .

المناقشة : أظهرت دراستنا أن التشخيص السابق للعملية لالتهاب الزائدة الدودية الحاد يمكن إجراؤه بدقة من خلال العلامات و الأعراض السريرية الكلاسيكية أو عن طريق التصوير , تضمنت عوامل الخطر المستقلة المرتبطة بزيادة فترة الإقامة في المستشفى , زيادة العمر , وجنس الذكور, والمدة الطويلة للأعراض قبل الدخول إلى المستشفى , والوقت , مقارنة بطريقة عمل العملية المفتوحة , لم يتم استخدام استئصال الزائدة الدودية بالمنظار في مستشفياتنا لقصر مدة الإقامة في المستشفيات والتي ورد ذكرها في الدراسات و الأبحاث الأخرى .

الخلاصة : إن أثر تقليل مدة إقامة كل شخص بأقل من ثلاثة أيام سيكون له تأثير كبير و سيوفر أسرة في المستشفى لحالات أخرى أكثر حرجاً.

ABSTRACT

Background

Acute appendicitis is one of the most common causes of intra-abdominal emergency surgery worldwide. We aimed to identify the presentation, diagnosis, and management of acute appendicitis and post-operative outcome and also to estimate the prevalence of complicated appendicitis and prolonged length of stay (LOS)

Materials and Methods

A descriptive cross sectional prospective study was conducted in the department of the referral hospitals in Sana‟a, during the period Dec. 2022 to Feb. 2023. The data was collected using filling questionnaires and face to face meeting, and was analyzed using Epi. Info7.3 and excel sheet.

Results

Out of 155 patients, the mean age was (+/- SD= 23.4 ± 10 years), male gender was (61.3%). There was no racial variation in the diagnosis and presentation of disease. The mean duration of symptoms was 22 hours. The history was most common presenting symptom was right lower quadrant pain (95,5%) followed by migration of abdominal pain (94,8%). while the most common physical sign was rebound tenderness (100%) followed by right iliac fossa tenderness (99,4%). All of the patients underwent pre-operative US to establish the diagnosis of appendicitis prior to surgery. An open appendectomy was performed in (98,1%)of the patients. The laparoscopic appendectomy wasn‟t done at all. The mean length of hospital stay was 3days. The prevalence of postoperative surgical complication were as bowel injury bleeding and surgical site infection (2%) . There was no mortality in our study.

Discussion

Our study showed that pre-operative diagnosis of acute appendicitis can be made accurately by classical clinical presentation or by imaging. The open approach is the only choice for the appendectomy, compering to using laparoscopic appendectomy that wasn‟t done in our hospitals to shorter length of stay in hospitals which reported in the literature and other researches.

Conclusion

The impact of shortening every person‟s length of stay by less than three days will have large impact and free up hospital beds for other more critical cases.

Chapter 1: Introduction and Literature Review

INTRODUCTION

Acute appendicitis is the most common disease of appendix and is defined as sudden severe inflammation, it's characterized by abdominal pain, nausea, vomiting, and is among the most common causes of lower abdominal pain leading patients to attend the emergency department and the most common diagnosis made in young patients admitted to the hospital with an acute abdomen.[i]

Acute abdominal pain accounts for 7–10% of all emergency department accesses.[ii]

In 2019, the results were estimated that, 17.7 million cases (incidence 228/100,000) with over 33,400 deaths (0.43/10,000,000).[iii]
Appendicitis is defined as inflammation of the vermiform (worm shaped) appendix, a narrow blind ending pouch approximately 5–9 cm long opening off the caecum.[iv]

The incidence of acute appendicitis has been declining steadily since the late 1940s. In developed countries, acute appendicitis occurs at a rate of 5.7–50 patients per 100,000 inhabitants per year, with a peak between the ages of 10 and 30.[v]

Geographical differences are reported, with a lifetime risk for acute appendicitis of 9% in the USA, 8% in Europe, and 2% in Africa.[vi]
It is one of the causes of surgery throughout the world attacking 160/100,000 people in the Middle East till 206/100,000 people in Asia.[vii]

On the other hand, according to the study conducted at Ibn- Sina General Hospital in Al-Mukalla, Yemen, during the period 1st January 2011 to 31st December 2017. “The prevalence of acute appendicitis during the 7 years was (20.39%)” among patients who had been registered in the hospital at that interval.[v]

Moreover, there is great variation in the presentation, severity of the disease, radiological workup, and surgical management of patients having acute appendicitis that related to country income.[ix]

In other study indicated that "Unlike people in developed countries whom are educated and awarded of the consequences of the appendicitis; hence attend clinics/ hospitals immediately as soon as they develop abdominal pain". People in our areas are poor and illiterate, so the situation is different, since they presented late.

Therefore, complication rate may be higher so understanding the complications of acute appendicitis, will help to manage these patients properly and decrease the morbidity and mortality. In other words, complicated appendicitis causes more morbidity than simple acute appendicitis.[x]

The cause remains poorly understood, with few advances in the past few decades.[xi]

There are several etiologies of appendicitis, each of which leads to the final common pathway of invasion of the appendicular wall by intraluminal bacteria. Most cases may be due to ulceration as a result of enteric infection.

Other examples may be caused by foreign bodies or by ischemia due to blunt abdominal trauma or other circulatory disturbance. Diet may modulate the effect of these etiologies, possibly by an effect on the gut flora. It is probable that obstruction is directly responsible for only a small minority of cases.[xii]

Is still a challenge to obtain a confident preoperative diagnosis, since the possibility of appendicitis must be entertained in any patient presenting with an acute abdomen. Although biomarkers and imaging are valuable adjuncts to history and examination, their limitations mean that clinical assessment is still the mainstay of diagnosis.[xiii]

Diagnosis by the anatomic pathologist of appendectomies from cases with clinical features of acute appendicitis? First, if inflammation is present, its pattern shuld be described. The diagnostic term acute appendicitis should only

be applied to cases in which neutrophils are present in the muscular is propriety. If the intraluminal, mucosal, or mucosal and submucosal pattern is present, then an outright diagnosis of acute appendicitis should not be made, and the possibility that the appearances represent either an incidental linking unrelated to the patient's symptoms or a sign of some other disease process (e.g. infective colitis) should be considered.[xiv]

The risk factors for appendicitis include exposure to smoke, repeated antibiotics, inflammatory bowel disease, cystic fibrosis and a family history of appendicitis. There is significant geographical and seasonal variability; it is more prevalent in rural areas, regions associated with low fibred diets and during the summer months. Women are more likely to undergo an appendectomy but have higher rate of negative appendicectomies due to the number of potentially mimicking conditions. Delaying appendectomy for presumed uncomplicated appendicitis for up to 24 h after admission does not appear to be a risk factor for complicated appendicitis, postoperative surgical-site infection or morbidity. Delaying appendectomy for up to 24 h may be an acceptable alternative for patients with no preoperative signs of complicated appendicitis.[xv]

Perforated and non-perforated appendicitis may have different pathophysiology and that non-operative management with antibiotic therapy may be appropriate for some initially non-perforated cases.[xvi]

Another study conducted in United States which indicted that „Appendiceal perforation is associated with increased morbidity and mortality compared with non-perforating acute appendicitis. The mortality risk of acute but not gangrenous acute appendicitis is less than 0.1%, but the risk rises to 0.6% in gangrenous acute appendicitis. On the other hand, perforated acute appendicitis carries a higher mortality rate of around 5%. Currently, growing evidence suggests that perforation is not necessarily the inevitable result of appendicular obstruction, and an increasing amount of evidence now suggests

not only that not all patients with acute appendicitis will progress to perforation, but even that resolution may be a common event".[xvii]

JUSTIFICATIONS

- Acute appendicitis is life threatening and common surgical health problem in worldwide,
- Scarcity of appendicitis studies in Yemen
- This study is submitted in Partial fulfillment for the requirements of the graduation.

Research Question:

- What are the signs and symptoms of the appendicitis patient?
- What are investigations of the appendicitis ?
- What are the outcomes of the appendicitis?

Chapter 2 : Objectives

GOALS AND OBJECTIVES

- General:

1. • To identify of the different presentation of acute appendicitis and its outcome in the referral hospitals in Sana'a City, Yemen.

- Specific:

2. To identify the prevalence of acute aappendicitis among different age group.
3. To identify the prolonged length of stay (LOS).

Chapter 3 : Methodology

METHODOLOGY

Study design:

•A descriptive cross sectional prospective study.

- **2.0 Study Location:**

• Public referral hospitals in Sana‟a City - Yemen (Al-Thawra Hospital , 48 hospital , Al-Kwait hospital and AL-Jumhoree hospital).

- **3.0 Study Duration:**

• The study took approximately 3 months from 1st Dec. 2022 to 28th Feb. 2023.

- **4.0 Study Population:**

• The study Population included all patients who diagnosed with acute appendicitis and admitted to surgical wards at the public referral hospitals in Sana'a City Yemen, also who was eligible to participate in the study. On other hand all patients met inclusions and exclusions ccriteria

4.1 Inclusions criteria

• Being diagnosed with acute appendicitis, both genders in any age during study period.

4.2 Exclusions criteria

• Patient who refused to participate.

• Patient who did operation in other hospital and admitted to a referral hospital in Sana'a City, Yemen.
•patient who undergo to incidental appendectomy.

- **5.0 Sample Size Determination**

• The Sample took from all population whom admitted to referral hospitals in the determined period above.

6.0 Study variables

• The variables of this study divided into independent and dependent variables.

6.1 Dependent variables

• Patients with acute appendicitis disease presentations.

6.2 Independent variables

- Socio-demographic.
- associate risk factors
- Complications.

➢ **7.0 Data collection**

• Data were collected by twelve medical students through face to face interviews with acute appendicitis patients by filled the previously design questionnaires.

➢ **8.0 Measurement Tools**

• All the patients with acute appendicitis in the selected study were approached by the study team. Data on sociodemographic characteristics, all were collected by using the questionnaire**.**

➢ **Questionnaires:** -

The questionnaire will include four parts: Demographic data, presentations, outcomes of patients, complications of acute appendicitis see the appendix (1).

9.0 Data Analysis:

• Immediately after the data collection was completed and each check list was thoroughly reviewed for completeness and consistency by the collectors, supervisor and investigators.

• The data was analyzed by Epi. Info7.5 and excel sheet.

➢ **Human subject protection**

- Ethical clearance was obtained from the university prior to start of the study.
- Institutional approval was obtained from the hospitals.
- Participation in the study was voluntary to accept or not, participants had a right to withdraw from the study totally at any time or not to answer any question.
- An oral informed consent was obtained from each participate in the study.

- Confidentiality of gathered information was assured, using pass worded computer.

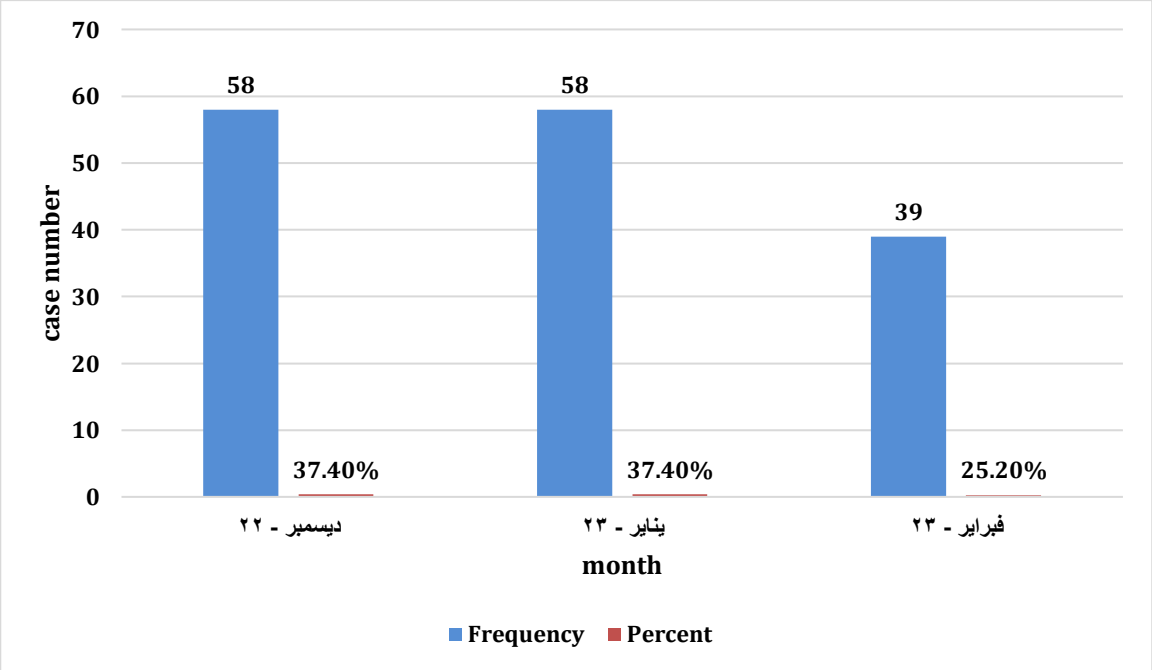
Chapter 4 : Results

RESULTS

By time:

From 1st December 2022 to 28th February 2023,we interviewed a total of 155 patients who underwent appendectomy at the four referral hospital, we found that Dec. And Jan had same admitted cases as showed in figure (1).

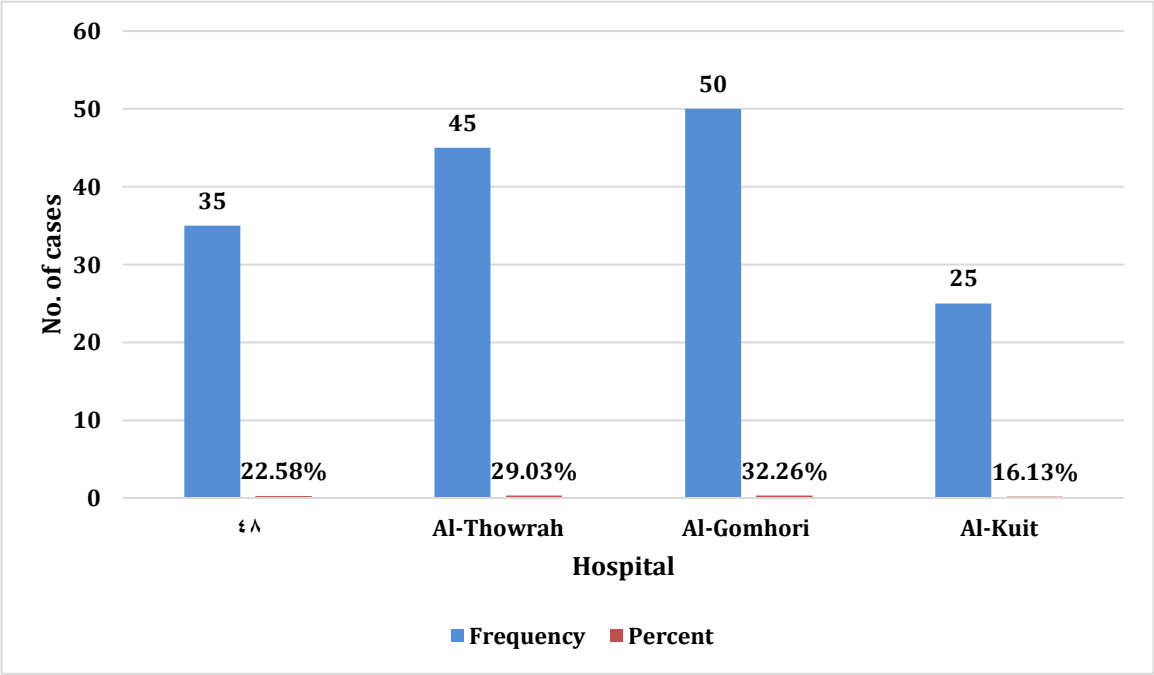
Figure(1):Distribution of acute aappendicitis cases according to admitted month,Sana'a,Yemen,1stDec.2022to28thFeb. 2023(n=155).



By Hospital Admitted:

We found that the number of reported cases is more in Al-Gomhori hospital (n= 50, 32%) as is showed in figure (2).

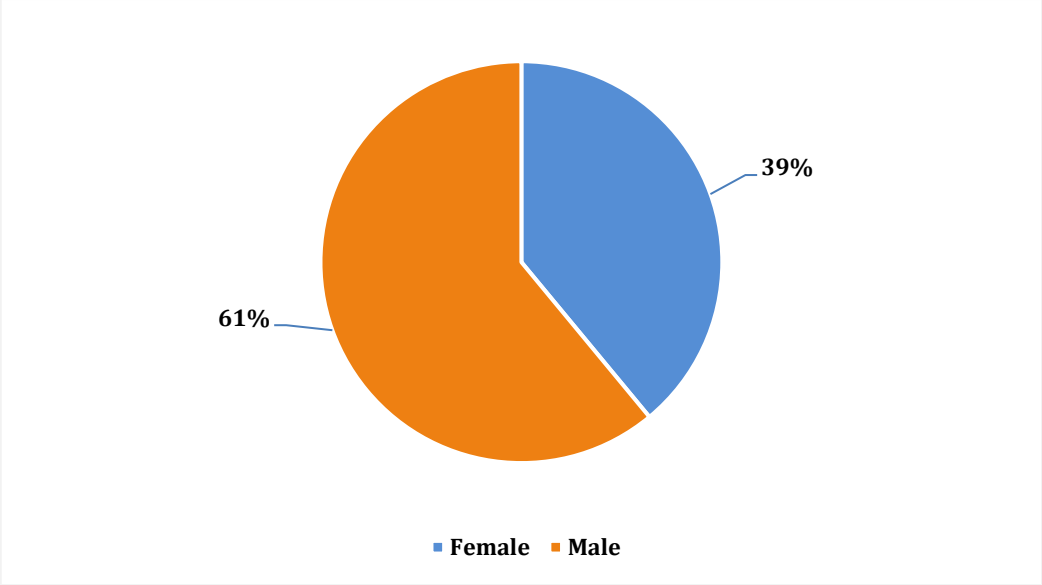
Figure(2):Distribution of acute aappendicitis cases according to the hospitalattended,Sana'a,Yemen,1stDec.2022to28thFeb. 2023(n=155).



By gender:

Male gender was more than half (n= 95, 61. 3%) as showed in figure (3).

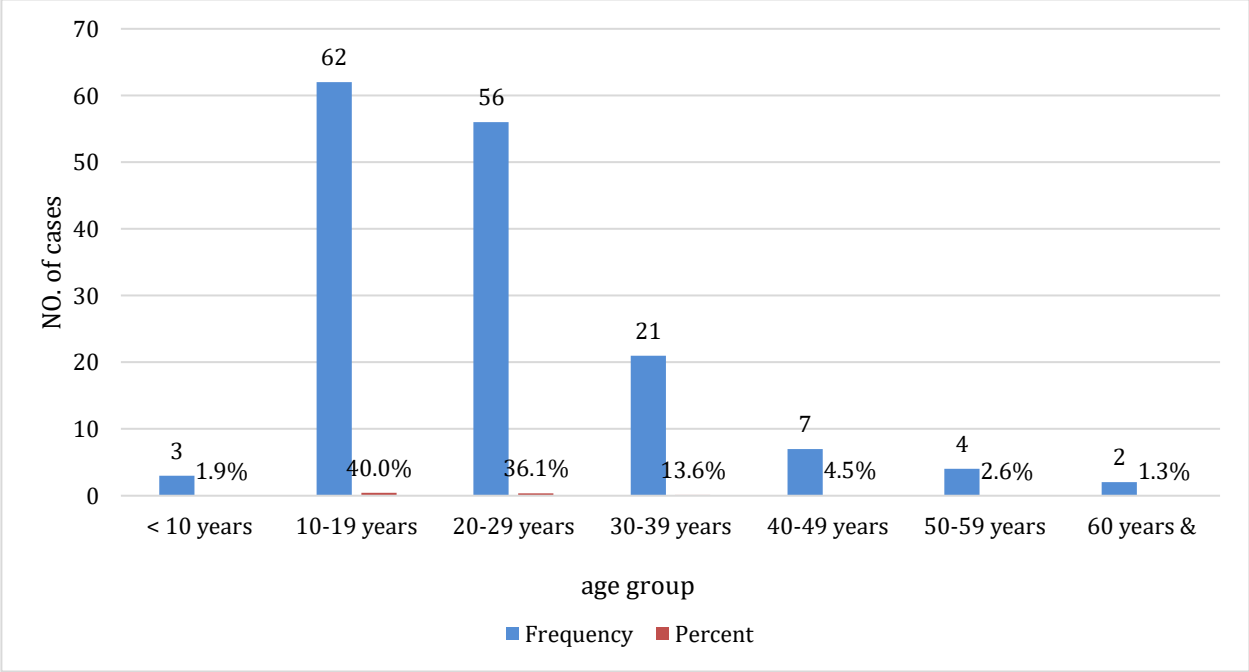
Figure(3):Distribution of acute aappendicitis cases according to the sex, Sana'a, Yemen, 1st Dec. 2022 to 28th Feb. 2023(n=155).



By Age:

Most patients were young (mean age +/- SD= 23.4 ± 10 years) as showed in figure (4).

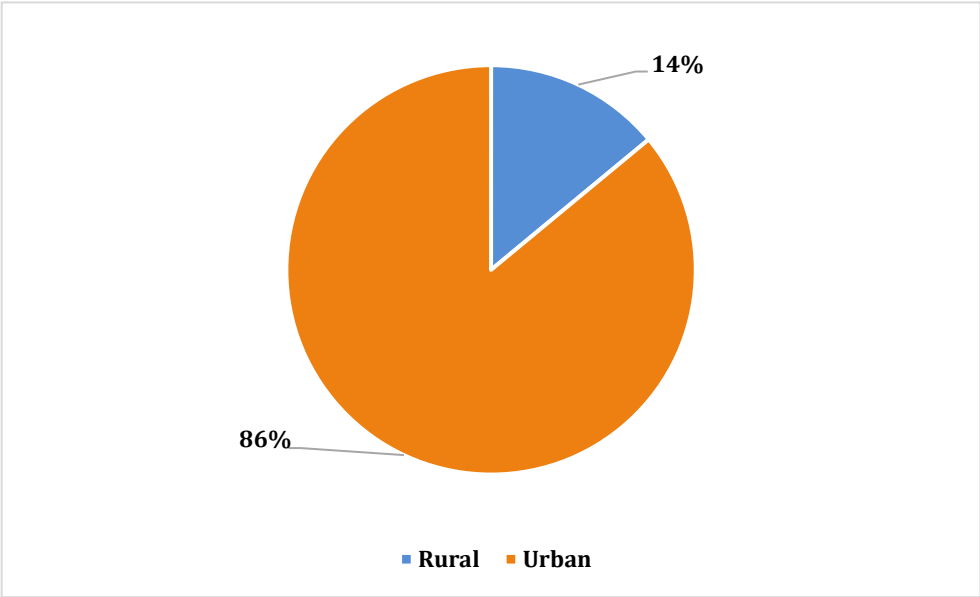
Figure (4): Distribution of acute aappendicitis cases according to age group, Sana'a, Yemen, 1st Dec. 2022 to 28th Feb. 2023(n=155).



By residence:

According to residence, the majority came from urban areas, as shown in figure (5)

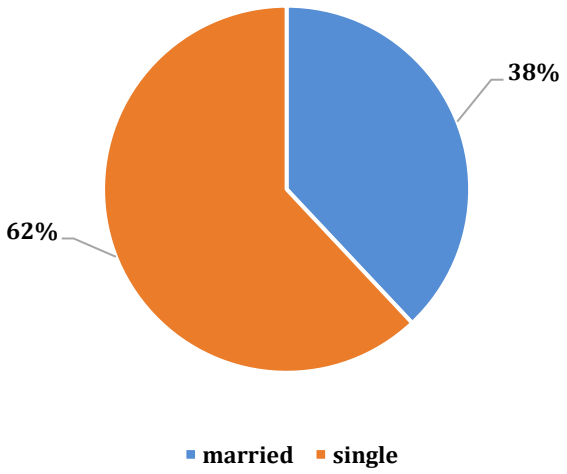
Figure (5): Distribution of acute aappendicitis cases according to residence,Sana'a,Yemen,1stDec.2022to28thFeb.2023(n=155).



By Marital Status:

Most patients were married, as sho wed in figure (6).

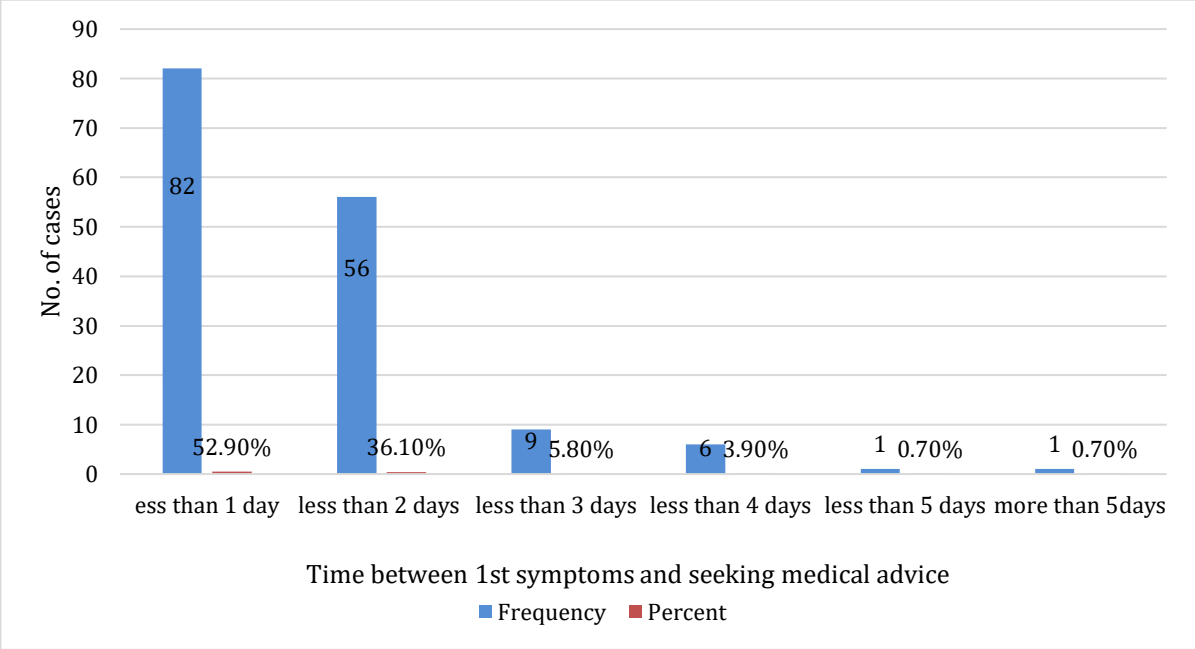
Figure (6): Distribution of acute aappendicitis cases according to the marital status,Sana'a,Yemen,1stDec.2022 to28thFeb.2023(n=155).



By Duration of Symptoms

The mean duration of symptoms was 22 +/- 17.7 hours (+/- SD) as showed in figure (7).

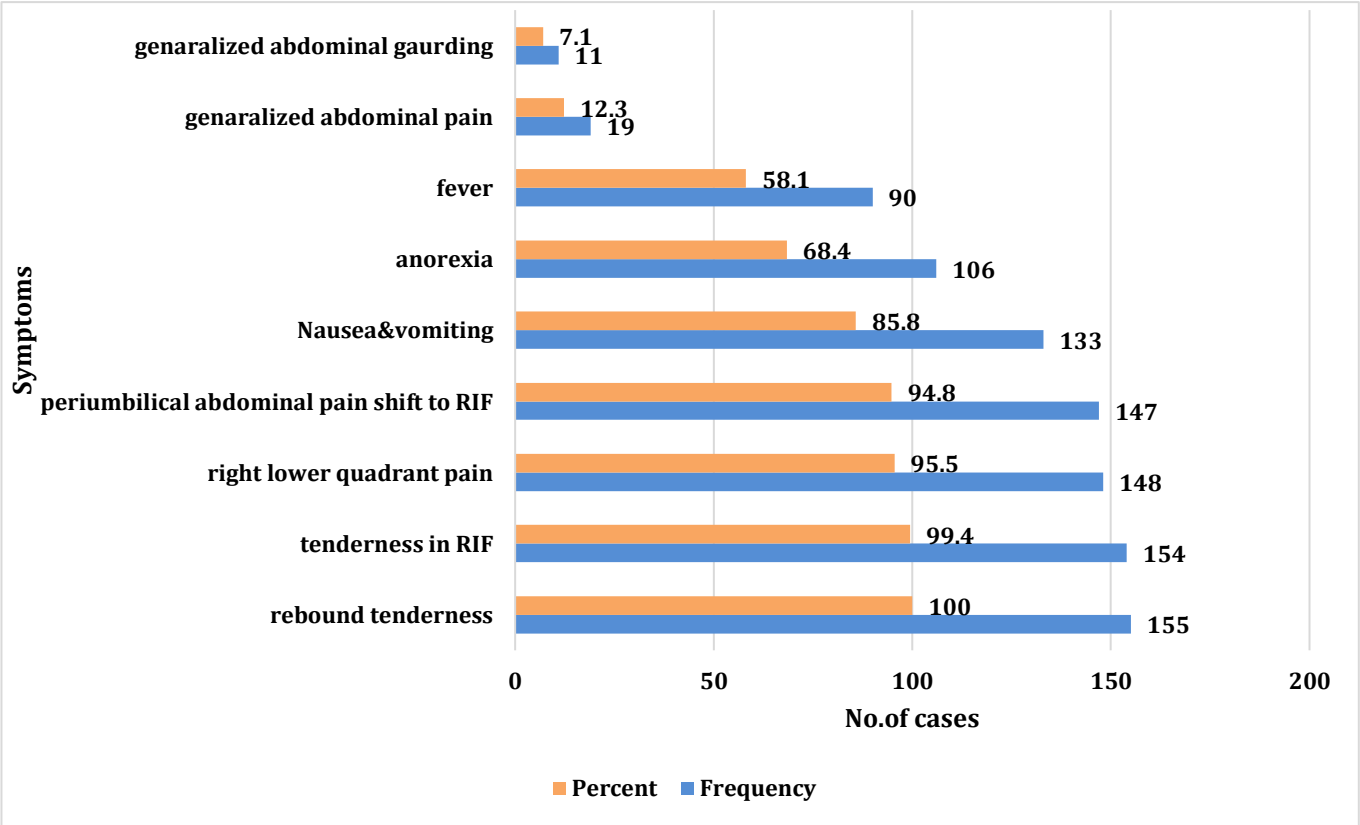
Figure (7): Distribution of acute aappendicitis cases according to Time between 1st symptoms and seeking medical advice, Sana'a, Yemen, 1st Dec 2022 to 28th Feb. 2023(n=155).



By Symptoms

The history was commonly a localized or migratory abdominal pain associated with anorexia, nausea, vomiting, and fever. The commonest physical findings were right-sided abdominal tenderness associated with rebound and guarding as showed in figure (8).

Figure (8): Distribution of acute aappendicitis cases according to symptoms, Sana'a, Yemen, 1st Dec. 2022 to 28th Feb. 2023(n=155).



A diagnosis of appendicitis was established in all patients after ultra sound of the abdomen and pelvis prior to surgery. Decision of surgery was made on clinical diagnosis and blood investigation (leukocytosis) table (1).

Table 1: Type of investigations for the patients with acute appendicitis 1st December 2022 to 28th February 2023, Sana'a, Yemen.	
Characteristics	**Value**
Type of investigations, N (%)	
US	**155 (100%)**
Leukocytosis	**148 (95.5%)**
CT	**1 (0,7%)**

Open surgery was the vast management for acute appendicitis (152, 98.1%) then laparotomy approach (2, 1.3%). Only a patient undergo a conservative treatment then open surgery (1, 0.7%) table (2).

Table 2: Surgical approach for patients with acute appendicitis 1st December 2022 to 28th February 2023, Sana'a, Yemen	
Characteristics	**Value**
Surgical approach, N (%)	
Conservative treatment then Open Surgery	**1 (0,7%)**
Laparotomy	**2 (1.3%)**
Open appendectomy	**152 (98,1%)**

The mean Length of Stay was 2.9 (± 1.7 days, SD). The post-operative complications were noted as bowel injury and surgical site infection ,(2%) table (3).

Table 3: The complications for patients with acute appendicitis 1st December 2022 to 28th February 2023, Sana'a, Yemen	
Characteristics	**Value**
Complications of appendicitis, N (%)	
Surgical site infection	**2 (1.3%)**
Bowel injury	**1 (0,7%)**
Length of stay, mean ± SD (days)	**3 ± 1.7**
Not: SD, standard deviation **N, number**	

Chapter 5: Discussion

DISCUSSION

Our study population was predominantly young male (n= 95, 61.3%), who presented with a relatively short duration of symptoms which was less than 24 hours. The clinical presentation and physical findings were classical of acute appendicitis as reported in the literature.[18]

About a half of patient (48%) delayed to attend the hospitals as soon as possible in first day, and that may refers to low education and low income.

For the imaging, 100% underwent pre-operative ultra sound and (0.7%) CT scan, and the decision to operate after a clinical diagnosis of acute appendicitis and blood investigation were common (95,5%). In contrast to the national audit in the Netherlands, nearly all patients underwent pre-operative imaging specially CT scan,[19] and in a prospective multi-center observational study across 44 countries worldwide, the use of imaging (US, CT, or both) was reported in 70% (with 30% CT scan, 70% US) of the patients.[20] In the United States, the Surgical Care and Outcomes Assessment program (SCOAP) in Washington State demonstrates that 86% of patients underwent pre-operative imaging (of whom, 91% CT).[21] This can be explained by our young study population, and the CT scan wasn‟t done due to its coast and its done to rule out other pathologies such as tumor.

on the other hand, the length of stay in hospital more than one day still a challenge for our country due to using open surgery contrasting to laparoscopic procedure which refers to shortening every person‟s length of stay by less than three days and that, will have large impact and free up hospital beds for other more critical cases . Unnecessary days in hospitals may lead to increase hospital –acquired patient complication (e.g., health care associated infection, falls) and increased coast for patient and health care system.[22]

Chapter 6 : Conclusion

CONCLUSION

In our public health hospitals, befor surgical management of acute appendicitis some pre-operative investigation should be done such as WBC, imaging ultra sonography then open surgery approach., with low conversion rate, and morbidity, driven the surgical management of acute appendicitis. . Unnecessary days in hospitals may lead to increase hospital –acquired patient complication (e.g., health care associated infection, falls) and increased coast for patient and health care system.The impact of shortening every person's length of stay by less than three days will have large impact and free up hospital beds for other more complex procedures cases.

RECOMINDATION:

1- Apply the laparoscopic surgical strategy to perform appendectomy in order to reduce the length of staying in hospitals.
2- Preform more studies to find more factors that lead to complication and increase the length of staying in hospitals.

STUDY LIMITATION:

1- Shortening of the study time to clearing the relation factors.
2- Shortage of the budget of the study.

Chapter 7: Reference

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Chapter 8 : Appendix

Appendix (The questionnaire)

Socio demographic Data:

No	Socio demographic data questions	Expected answers
1	Hospital name	1.Al-Thawra Hospital ( )
		2.Al-Jomhory Hospital ( )
		3.al-kuait hospital ( )
		4- 48 hospital ( )
2	Age by years	( )
3	Sex	1.Male( )
		2.Female( )
4	Residence	1.Urban( )
		2.Rural( )
5	Education Level	1.Illiterate ( )
		2.Primary school( )
		3.Secondary school( )
		4.Diploma( )
		5.Bachelor( )
		6.Higheducation( )
6	Socioeconomic status	1.low ( )
		2.medium ( )
		3. high ( )

Personal Habits:

No	Personal habits questions	Expected answers

1	Kat Chewing?	1.Yes ( ) 2.No( )
2	Cigarette smoking	1.Yes( ) 2.No( )
3	Shamma intake?	1.Yes( ) 2.No( )
4	The time between appear first symptoms and seek medical advice	( )
5	Use of factors relive symptoms mainly (pain)	1- Medical ( ) 2- traditional ( )

No

Presentation:

1	Symptoms	1- Right lower quadrant pain .( ) 2- pre-umbilical Abdominal pain shifted to RIF( ) 3-fever ( ) 4-4.Anorexia.( ) 5- Nausea & vomiting ( ) 6- generalized abdominal pain ( )
2	signs	1-tenderness in RLQ. ( ) 2-Rebound tenderness. ( ) 3- generalized abdominal tenderness ( )
3	Investigation	1-CBC: Leukocytosis( ) Shifted to the left ( )

No	**Complications:**	
1	Septic shock	( )
2	Appendicular mass	( )
3	Peritonitis	( )
4	Appendicular abscess	( )

No	**outcomes:**	
1	Hospital stay in days	( )

2	Early postoperative complication	1-. bleeding ( ) 2-.bowel injury ( ) 1-.abscess ( ) 2-.peritonitis ( ) 3-.surgical site infection ( )
3	Postoperative mortality	1-yes ( ) 2-.no ( )

Note: