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Accuracy of ultrasonography in the diagnosis of acute appendicitis in Baquba'a teaching hospital in Diyala, Iraq

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Submitted by

Ghofran Thamer Hussien

Supervised by

Dr. Ghasaq Ma'an Bakr

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Abstract

Purpose: to identify the accuracy of ultrasonography in the diagnosis of acute appendicitis.

Patients and methods: we collected a sample of 50 patients with clinical diagnosis of acute appendicitis who attend Baquba'a teaching hospital. We collected the data by written questionnaire.

Results: 28 males and 22 females were enrolled in the study. The RIF pain and the rebound tenderness were the most common clinical features with 98% and 100% respectively. The mean WBC count was 14.014×10^3 . the accuracy of ultrasonography was 84%.

Conclusion: US has a good accuracy in the diagnosis of AA and should be used routinely

Keywords: ultrasonography, appendicitis

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:Abbreviations

-AA acute appendicitis

-US Ultrasound

-CT computed tomography

-MRI magnetic resonance imaging

-RIF right iliac fossa

-WBC white blood count

-SPSS statistical package for social sciences

Introduction

Acute appendicitis (AA) is a disease with a high prevalence, requiring rapid and accurate diagnosis to confirm or exclude perforation. It is the most common abdominal emergency. The clinical diagnosis remains difficult, both in the paediatric and adult population, as the presentation is often atypical. Symptoms are frequently non-specific and overlap with various other diseases. In an ideal medical world, we would like to optimally diagnose and treat all patients with suspected AA without unnecessary appendectomies. As AA with perforation is associated with significant morbidity and an increase in mortality, there is broad agreement that high rates of negative appendectomies (around 15 %) have to be accepted in order to reduce the rate of perforation [1-3].

The clinical diagnostic scoring system for AA that combines history, symptoms, physical signs and laboratory indices. Imaging modalities that have been used in the detection or exclusion of AA are abdominal ultrasound (US), computed tomography (CT) and magnetic resonance imaging (MRI) [4].

has been mentioned as a possible tool for diagnosis of AA. . If AA is misdiagnosed in patients with abdominal pain who do not have the disease, they are subjected to unnecessary surgery [5,6].

In graded compression technique, where a uniform pressure is applied in RIF by a hand held US transducer. Normal and gas filled loops of intestine are either displaced from the field of vision or compressed between anterior and posterior abdominal walls. Inflamed appendix being incompressible is thus optimally seen the inflamed appendix is seen as a blind ended tubular structure with laminated wall arising from the base of caecum. It is aperistaltic, noncompressible and its diameter should be more than 6mm .Appendicoliths appear as bright echogenic foci with distal acoustic shadowing, and their visualization is another contributory finding [7].

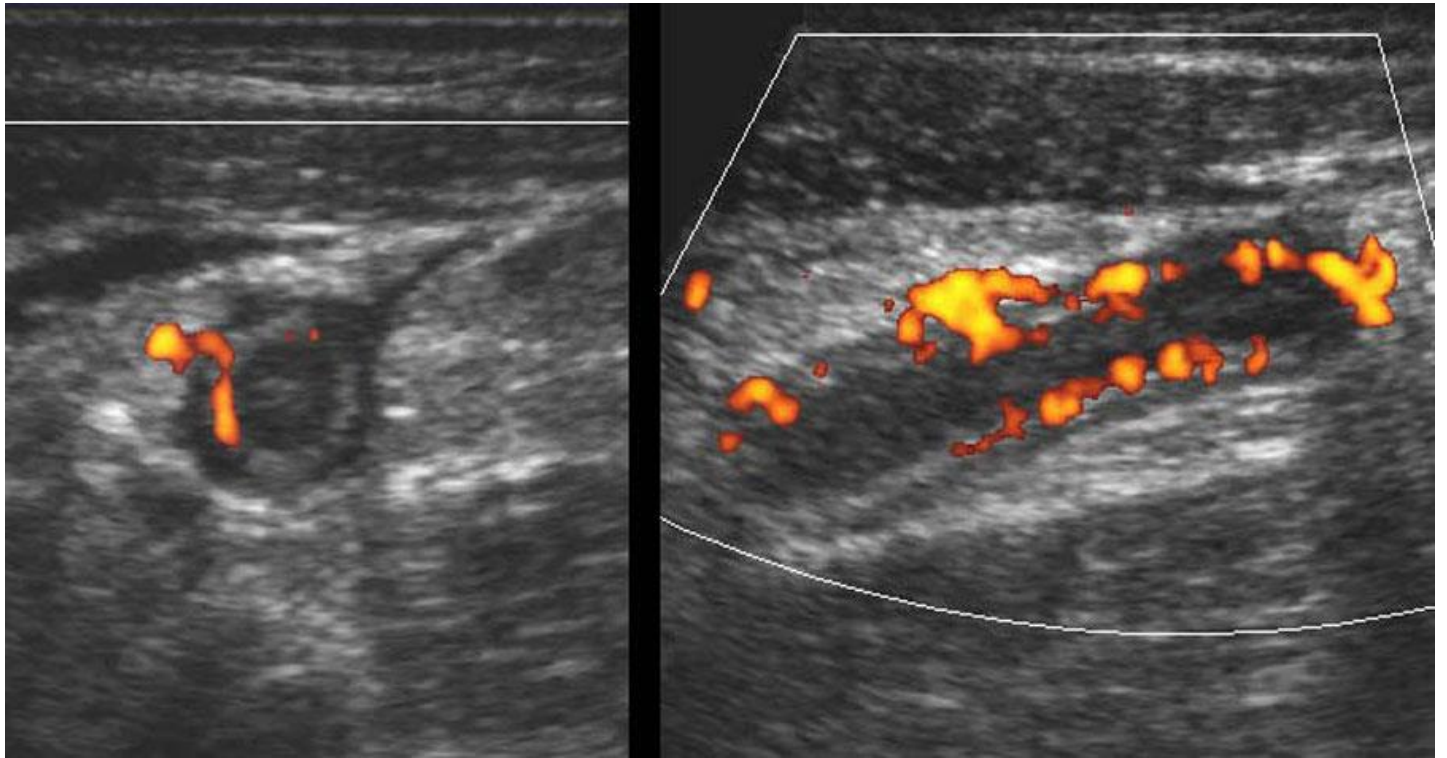


Figure 1. US findings of AA [9].

Aim of study

To determine the accuracy of ultrasound in detecting acute appendicitis among the patients attend Baquba'a teaching hospital.

Patients and methods

This is cross sectional study. It involved the patients with clinical diagnosis of appendicitis and preformed US before the surgery. We collected a sample of 50 patients with AA who attended Baquba'a teaching hospital in the period from July 2022 to December 2022. We collected the data by prepared written questionnaire. It involved questions about age, the clinical signs and symptoms of the condition, the ultrasound findings and the measured diameter of appendix as shown by the ultrasound. We included the patients who underwent surgery and excluded the patient who didn't. the privacy and confidentiality of the patients were preserved.

Statistical analysis

Statistical package for social sciences (SPSS) version 26 was used to analyze the data.

Results

50 patients were involved in this study. Their mean age was 26.6 ± 12.5 years. 28 male (56%) and 22 female (44%) were the sample. They have the following clinical features in table 1.

Table 1. clinical features

Clinical features	Frequency	Percentage
RIF pain	49	98%
Fever	29	58%
Nausea	33	66%
Vomiting	31	62%
Peri-umbilical pain	31	62%

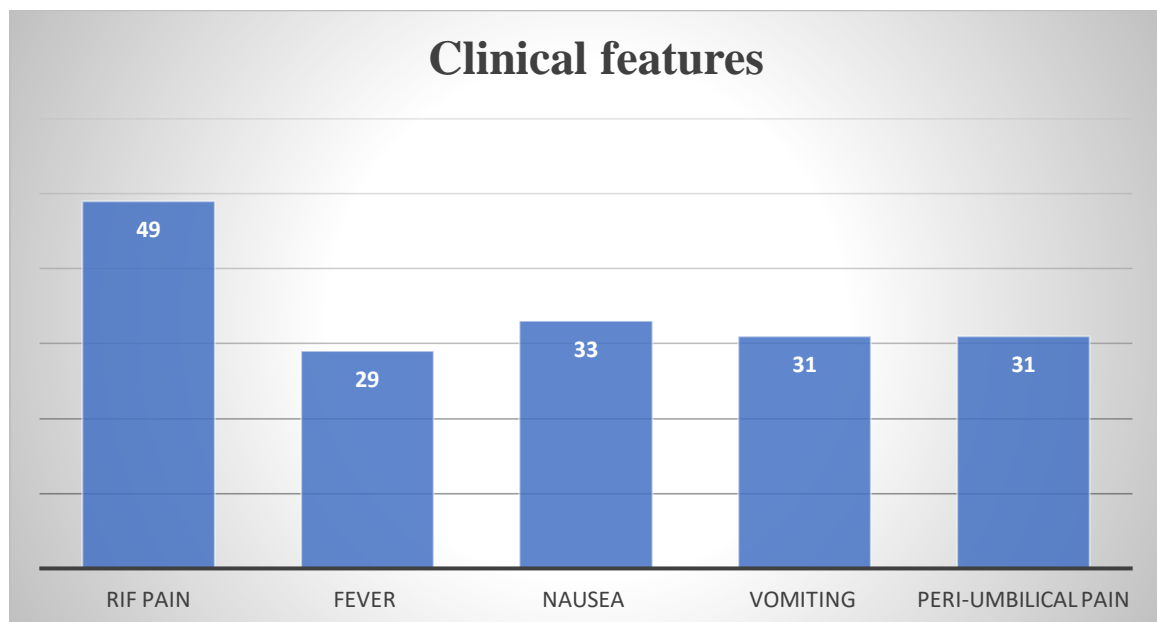


Figure 2. bar chart of the clinical features in our study.

And on examination there was the following clinical signs in table 2.

Table 2. clinical examination results

Clinical signs	Frequency	Percentage
Rebound tenderness	50	100%
Pain with cough	11	22%
Rovsing sign	18	36%
Obturator sign	20	40%
Psoas sign	5	10%

The mean WBC count was $14.014 \pm 4.67 \times 10^3$ with lower limit of 3.8×10^3 and upper limit of 22.1×10^3 all measured by cell/microliter.

The ultrasonography was sensitive in 84% and specific in 88.7% of the cases as in table 3.

Table 3. ultrasonography findings

U/S findings	Frequency	Percent
Yes	42	84%
NO	8	16%
Total.	50	100%

The mean diameter of appendix in patients with positive US findings was 8.23 ± 2.62 millimeters.

Discussion

Diagnosis of Acute Appendicitis is not always straight forward. Sometimes presentation is so atypical that even the most experienced surgeon may remove normal appendix or sit on the perforated one. Clinical decision to operate leads to removal of 20% of normal appendices to avoid the complications of missed or delayed diagnosis in equivocal cases [9].

Imaging with US or CT has become routine for most patients undergoing diagnostic evaluation for appendicitis, with some believing that appendectomy should not be undertaken without imaging to confirm the clinical suspicion [10]. *Berry et al.* found US of the appendix to increase diagnostic accuracy, alter management, and be more sensitive and specific than clinical impression, either alone or in conjunction with laboratory results. There is increasing interest in the use of US for appendicitis, but its use appears limited by concerns related to variable operator experience and overall performance [11].

Our study showed that the ultrasonography has an accuracy of about 84% in detecting acute appendicitis which is acceptable if we compare it to CT scan with having in count the cost and risk of radiations adverse effects especially in children.

The mean WBC count in our study was $14.014 \pm 4.67 \times 10^3$ with lower limit of 3.8×10^3 and upper limit of 22.1×10^3 all measured by cell/microliter which is higher than the average and it understandable due to the immunological changes during the inflammation.

The mean diameter of appendix in patients with positive US findings was 8.23 ± 2.62 millimeters which is higher than the average 6 mm of normal appendix and this mainly to the obstruction and swelling during the inflammation.

Our findings agrees with findings *Mittal et al* [12], who found that US had universally high sensitivity and specificity when the appendix was clearly identified. And the also with findings of *Wade et al* [13], which found that The overall accuracy of ultrasonography in the diagnosis of appendicitis was statistically superior to that of the surgeon's clinical impression.

Our findings contradict with the findings of *Giljaca et al.* [14], who concluded that Abdominal ultrasound does not seem to have a role in the diagnostic pathway for diagnosis of AA in suspected patients. The summary sensitivity and specificity of US do not exceed that of physical examination.

The main limitation of the study was the little compliance from the patients in answering the questions.

Conclusion and recommendations

We concluded that the ultrasonography has high accuracy in confirming the diagnosis of acute appendicitis and we recommend the routine use of the imaging in any suspected case due to low cost ana availability.

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