

RESEARCH ON DESCRIPTION OF ACUTE APPENDICITIS OF ULTRASONOGRAPHIC CHARACTERISTICS

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ABSTRACT

Background: Acute appendicitis is one of the most common causes of lower abdominal pain leading patients to admit the emergency department. Besides those developed paraclinical tests, ultrasound is the priority to support the diagnosis. **Objectives:** To survey and update the ultrasonographic characteristics of acute appendicitis in diagnosis at Can Tho University of Medicine and Pharmacy Hospital. **Materials and methods:** A cross-sectional descriptive study of 115 acute appendicitis patients diagnosed at Can Tho University of Medicine and Pharmacy Hospital from December 2021 to July 2022, using SPSS 20 software to analyze data. **Results:** Among 115 patients that were diagnosed with acute appendicitis by ultrasound, the right iliac fossa was the most frequent location of the appendix (98.3%) and 1.7% of patients with acute appendicitis located behind the cecum. The direction signs suggested acute appendicitis on ultrasound were described by target sign and finger sign at 100%, appendiceal diameter ≥ 6 mm at 97.4% and the average appendiceal length was $7\text{cm} \pm 2\text{cm}$. The indirection signs were fluid around the appendix (9.6%), fluid around right iliac fossa (4.3%), fecal stones in the appendix (8.7%), fluid in the appendix (16.5%), infiltrating around the appendix (74.8%) and lymph nodes response (7.8%). **Conclusion:** Our study updates data about acute appendicitis ultrasonographic image characteristic figures as well as a reference for clinical doctors to diagnose acute appendicitis by ultrasonography.

Keywords: acute appendicitis, direction signs, indirection signs, ultrasound.

I. INTRODUCTION

Acute appendicitis is a common surgical emergency, accounting for the majority of patients admitted to emergency department. It can be appeared in any age with the highest incidence from 10 to 20 years old and in both genders with a male-to-female ratio of 1:4 [1]. As medicine grows, acute appendicitis can be diagnosed through examination and laboratory investigation. However, the clinical presentation is diverse and symptoms are often atypical and nonspecific because it can be seen in many other diseases. To diagnose, ultrasound is preferred to be the first radiologic method, due to its benefits compared to the alternatives. Research related to ultrasonographic on acute appendicitis has been studied for a long time in many countries.

In Can Tho, the investigation of ultrasound's role in diagnosing appendicitis was not updated frequently in recent years. In the field of medicine, researchers usually surveyed gender, age, direction and indirection signs. Our study will report the variables in the ultrasound of acute appendicitis and compare to the previous studies.

- Objectives:

The value of ultrasound in diagnosing acute appendicitis has been proven in many studies and clinical practice. According to the description of acute appendicitis image on ultrasound, we will provide the update data to support clinical doctors and researchers in finding a new document.

II. MATERIALS AND METHODS:

- Research subject

The patient came to Can Tho University of Medicine and Pharmacy Hospital for examination and was diagnosed with acute appendicitis from December 2021 to July 2022.

Inclusion criteria

Criteria included pre-operative clinical diagnosis is acute appendicitis, ultrasound results for acute appendicitis.

Exclusion criteria

Acute appendicitis patients are not included in the study period, the patient was diagnosed with acute appendicitis before surgery but did not have ultrasound results and the patient did not consent to participate in the study.

- Research method

Research design: a cross-sectional descriptive study.

Sample size and sampling method: cluster sampling [3]

$$N = Z^2_{1-\alpha/2} \frac{p(1-p)}{(p\varepsilon)^2} \Rightarrow N=90$$

Sampling method

We collected all information of patients diagnosed with acute appendicitis coming to Can Tho University of Medicine and Pharmacy Hospital from December 2021 to July 2022 including administrative information and ultrasound results on Medical records made by a doctor of the Radiology Department (at the Department of Diagnostic Imaging). After

that, we filled in the questionnaires and forms. Finally, we used SPSS 20 software to calculate the percentage of research variables and compare the typical imaging results of acute appendicitis.

- Research content:

- + General characteristics of patients: age and gender.
- + Ultrasound imaging features in diagnosis:
 - Location of the appendix (right iliac fossa, behind the cecum, under the liver, pelvic and non-observation).
 - Size, diameter of the appendix (mm).
 - Characteristics of appendix wall thickness (thickness, unthickness).
 - The "target sign" or "finger sign": yes or no.
 - Fluid around the appendix: yes or no.
 - Fluid in the right iliac fossa: yes or no.
 - Fecal stones in the appendix: yes or no.
 - Compressibility of the appendix: yes or no.
 - Presence of infiltrating around the appendix: yes or no.
 - Lymph node response: yes or no.
 - McBurney sign (+): yes or no.
 - Ultrasound's conclusion: acute appendicitis and complications of acute appendicitis.

III. RESULTS

Participants included 115 patients diagnosed with appendicitis.

3.1. General characteristics

Table 1. Distribution of study subjects by gender

Gender	Frequency	Rate (%)
Male	57	49.6
Female	58	50.4
Total	115	100

Table 2. Distribution of study subjects according to age

Age	Frequency	Rate (%)
16-50	72	62.6
50-65	29	25.2
>65	14	12.2
Total	115	100

3.2. Characteristics of superior images of study subjects

Table 3. Location of the appendix on ultrasound

Location of the appendix	Frequency	Rate (%)
Right iliac fossa	113	98.3
After the cecum	2	1.7

Location of the appendix	Frequency	Rate (%)
Under the liver	0	0
Sub-frame	0	0
Total	115	100

Table 4. Appendiceal diameter on ultrasound

Diameter	Frequency	Rate (%)
<6mm	3	2.6
>=6mm	112	97.4
Total	115	100

Table 5. Direction signs of acute appendicitis

Direction signs	Frequency	Rate (%)
Target sign, finger sign	115	100
Appendiceal compression	82	71,3
Diameter >=6mm	112	97.4

Table 6. Indirection signs of acute appendicitis

Indirection signs	Frequency	Rate (%)
Fluid around the appendix	11	9.6
Fluid around right iliac fossa	5	4.3
Fecal stones in the appendix	10	8.7
Fluid in the appendix	19	16.5
Infiltrating around the appendix	86	74.8
Lymph node response	9	7.8
McBurney sign (+)	33	28.7

3.3. Conclusion of ultrasound

Table 7. Conclusion on ultrasound

Conclusion of ultrasound	Patient	Rate (%)
Acute appendicitis	103	89.6
Acute appendicitis festering	3	2.6
Acute appendicitis necrosis	1	0.8
Appendiceal abscess	8	7
Total	115	100

IV. DISCUSSION

4.1. General characteristics of study objects

Our research survey the percentage of male and female patients approximately equal (1.01/1), which male accounted for 49.6% and female accounted for 50.4%. We compare

the studies of Tran Dao Minh Ngoc (2022), Tran Thi Giang (2018) and Pham Minh Duc (2017) with the same data. According to Tran Dao Minh Ngoc's research, there were 77 patients, including 40 male patients, accounting for 51.9% and 37 female patients accounted for 48.1% and the ratio of men and women is 1.1/1 [7]. That result is roughly equivalent to research by Tran Thi Giang (male: 52.5%, female: 47.5%) [5]; research by Pham Minh Duc (male: 52.9%; female accounted for 47.1%) [2]. However, there is a slight difference for the ratio of men and women in the research of Le Thi Kim Truc (2014), Tran Thi Thu Ha (2018) and Balthazar (1994). The study of Le Thi Kim Truc (2014) showed the ratio of males and females was 1/1.85 [8]. In addition, Tran Thi Thu Ha demonstrated acute appendicitis in men with 56.76% and women with 43.24% [4]. The proportions of men and women in Balthazar's study were 52% and 48% respectively [9]. Therefore, it can be due to the difference in the selection criteria and the number of subjects depending on the study.

As can be seen at any age, in this study, the youngest patient was 16 years old, the oldest patient was 96 years old and the age group with the most prevalence was 16-50 years old with 62.6%. The group with the lowest rate is the group >65 years old with 14 patients out of 115 patients studied (equivalent to 12.2%). In the study of Tran Thi Giang (2018), the youngest patient was 13 and the oldest was 92. However, the 15-30 age group of acute appendicitis was 52.5% and the lowest rate was the group under 15 years old (2.5%) [5].

4.2. Ultrasonographic characteristics on acute appendicitis

The most common location of acute appendicitis in clinical practice is located in the right iliac fossa, but there are also some special types located in the pelvic region or behind the cecum. However, our study also had 1.7% of patients with acute appendicitis located behind the cecum, although this number is not significant, it also shows the value of ultrasound in contributing to the diagnosis. In the study of Tran Thi Giang (2018), the percentage of patients with ultrasound determined the appendix in the normal position accounted for a high rate of 92.5%, only 2.5% of acute appendicitis is in an abnormal position (behind the cecum), 5% was unidentified on the ultrasound image, so the location cannot be confirmed clearly [5].

Our research about the appendix diameter ≥ 6 mm accounts for 97.4%, higher than the study of Tran Dao Minh Ngoc (2022) with the rate of 92.6% [7]. However, according to Le Thi Kim Truc (2014), the direction sign found in 100% of patients is ≥ 6 mm in diameter [8].

Our report has been showed that all patients with the clinical diagnosis of appendicitis were recorded 100% of cases with target sign and finger sign.

In the study of Mai The Khai (2012), appendiceal compression was found in all patients [6], however, research by Tran Dao Minh Ngoc (2022) accounted for 92.6% of patients [7]. Our study and Tran Thi Giang showed approximately equivalent data in appendiceal compression with 71.3% and 77.5% respectively [5].

According to the literature, there is also a wall thickness of >3 mm on ultrasound, but during the sampling process, we did not record this factor in the study for some objective reasons.

In this study, we have been recorded the infiltrating around the appendix accounted for the highest proportion of other indirection signs with data reported 74.8%. The percentage of fluid around the appendix, the fluid around the right iliac fossa and the fluid in the appendix accounts for 9.6%, 4.3% and 16.5% respectively. However, in the study of

Tran Thi Giang (2018), there was 37.5% fluid around the appendix, 10% fluid in the right iliac fossa [5].

According to our study, we also investigated many other indirection signs. Some patients with acute appendicitis had fluid in the abdomen, some cases had fecal stones in the appendix, lymph node reaction and Mc Burney's sign (+).

4.3. Results

According to our study, ultrasound images showed the highest percentage of acute appendicitis at 89.6% and necrotizing appendicitis was the lowest rate at 0.8%. Thus, ultrasonography is one of the most important techniques in determining whether or not appendicitis is true, and the progression of appendicitis, so that clinicians can compare clinical and laboratory diagnoses to have appropriate treatment.

V. CONCLUSION

Our research has been conducted a research on 115 patients who were diagnosed initially with acute appendicitis in clinical examination and ultrasound. The percent of genders accounted for 50.4% of women and 49.6% of men. As can be seen, the most common location of acute appendicitis is the right iliac fossa (98.3%). In addition, among the direction signs of acute appendicitis on ultrasound, target sign and finger sign accounted for a remarkable proportion of 100%. The infiltrating around the appendix is the most common indirection sign at 74.8%.

Ultrasound is the first choice that clinical doctors use for acute appendicitis suspension due to the rapidity, sensitivity and price to help them confirm the diagnosis. According to the description of acute appendicitis in ultrasound, our research has been reported some cases of acute appendicitis that had complications with a rate of 10.4%.

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(Received: 09/02/2023 – Accepted: 13/3/2023)
