

Research Article



INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

EFFICACY OF COMPUTED TOMOGRAPHY TO ULTRASONOGRAPHY IN SUBJECTS WITH ACUTE APPENDICITIS

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How to cite: Kathale S. Efficacy of computed tomography to ultrasonography in subjects with acute appendicitis. International Research Journal of Pharmacy. 2024;15:6:27-30.

Doi:10.7897/2230-8407.110331

ABSTRACT

Background: A common cause of severe abdominal pain that commonly presents as an emergency is appendicitis. On a clinical basis, ruling out acute appendicitis can be difficult because of the many conditions that mimic the illness. This highlights how important imaging is to the diagnosis process.

Aim: to assess the diagnostic performance of ultrasonography and computed tomography (CT) for acute appendicitis, and to determine if the radiologic findings were associated with surgical and histological results.

Methods: A comparison was made between computed tomography and ultrasonography for 65 female and aged volunteers who had been clinically diagnosed with acute appendicitis. Ultrasonography and contrast-enhanced computed tomography (CECT) were done under the same circumstances on every subject. Each patient's main complaint was discomfort in the lower abdomen, with fever and vomiting coming up less frequently. The outcomes of both radiographs were correlated with the histology specimens after the appendectomy.

Results: Normal results indicated that 84.61% (n=550) of the study subjects had both positive histology and ultrasonography, whereas 9.23% (n=6) of the patients had both negative ultrasonography and histopathology, and 86.15% (n=56) of the research subjects had both characteristics. Histology and ultrasonography revealed that 6.15% (n=4) of the study participants had negative results, 4.61% (n=3) had positive results, and 1.53% (n=1) of the participants had appendicitis.

Conclusion: According to the current study, an ultrasound should be done on every patient who presents with acute appendicitis. Nonetheless, CECT offers the benefits of precise identification, assistance in surgical planning based on anatomical landmarks and presentations, and elimination of other diagnoses linked to right iliac fossa discomfort in patients with unrecognised or ambiguous findings.

Keywords: CT scan, ultrasound, acute appendicitis, and abdominal discomfort

INTRODUCTION

Acute appendicitis is a frequent cause of acute abdominal pain in children and younger people, and surgery is the only effective therapy for this condition. Approximately 7% to 9% of the participants had an increased risk of death due to acute appendicitis. Acute appendicitis seldom manifests as a chronic or sub-acute condition; instead, it most frequently manifests as an acute condition within 24 hours in around 75% of individuals.

Acute appendicitis can occur at any age, with a mean age of 28 years and an onset age of around 5 years to 45 years. According to published research, the incidence of acute appendicitis is higher in men than in women, with estimates of 9% and 6.7%, respectively, and a female to male ratio of 1:1.3.1

Approximately 100 out of 1 lakh participants worldwide exhibit an incidence of appendicitis or appendectomy. About 2% of instances of acute appendicitis result in rupture within 36 hours, and 5% within 12 hours. Ultrasonography is less accurate and precise than computed tomography because of related issues including obesity,

excess intestinal gas, and operator dependence. Ultrasonography is the initial imaging method used in people with acute appendicitis since it involves less radiation exposure and is safe for use in children and pregnant women.²

The benefits of computed tomography are numerous and include accuracy, 100% specificity, high sensitivity, and non-operator reliance. Additionally, because ultrasonography cannot conduct the necessary compression due to obesity, excess intestinal gases, or abdominal pain, CT is suggested over ultrasonography. Nevertheless, CT is also linked to a number of drawbacks, such as severe responses to contrast agents, accessibility, expense, and exposure to ionising radiation.³ The goal of the current study was to evaluate the diagnostic performance of computed tomography (CT) and ultrasonography for acute appendicitis, as well as the link between radiologic findings and surgical and histological outcomes.

MATERIALS AND METHODS

The goal of the current prospective clinical study was to evaluate the diagnostic performance of computed tomography (CT) and ultrasonography for acute appendicitis, as well as the link between the radiologic findings and surgical and histological outcomes. A total of 65 participants, both male and female, who were clinically suspected of having acute appendicitis and had been sent to the Department of Radiodiagnosis for CT and ultrasonography, surgery, and a histopathologic evaluation, were included in the current study. Participants with a conservatively handled chronic appendicular lump, participants without any histology, and subjects without surgical treatment were excluded from the research.

One subject-matter expert performed the ultrasonographic examinations of all the research participants utilising the same machine, a linear high-frequency transducer of 5–13 Hz, and a curvilinear probe of 1.6–4.6 MHz with graded compression method. A thorough medical history was obtained for each participant, and then a general examination was conducted. Following final inclusion, individuals initially had CT, and then ultrasonography. For every individual, an abdomen CT scan was performed with identical equipment and settings, including 5 mm thick slices, 80–120 KVp, variable mAs, and 0.625–1.5 mm reconstruction. All subjects gave their informed consent after being fully informed about the study's intricate design.

A non-contrast investigation was performed on each individual, and then an intravenous, rectal, and oral contrast intake was used to perform a contrast-enhanced study. Bowel opacification was achieved by mixing 30ml of (60%) trazograff combined with 1.5 litres of water and 1.5 litres of diluted iodinated contrast. An intravenous injection of 70 ml (1 ml/Kg body weight) of non-ionic contrast (omnipaque or iopamidol at 370 mg%) was administered. This was followed by 30 ml of normal saline infused at a rate of 2 ml/sec.

Using SPSS software version 21 (Chicago, IL, USA) for statistical assessment and one-way ANOVA and t-test for result formulation, the gathered data were examined. The data were presented as a mean, standard deviation, percentage, and number. At $p < 0.05$, the significance threshold was maintained.

RESULTS

The goal of the current prospective clinical study was to evaluate the diagnostic performance of computed tomography (CT) and ultrasonography for acute appendicitis, as well as the link between the radiologic findings and surgical and histological outcomes. A total of 65 participants, both male and female, who were clinically suspected of having acute appendicitis and had been sent to the Department of Radiodiagnosis for CT and ultrasonography, surgery, and a histopathologic evaluation, were included in the current study. Table 1 contains a list of the research individuals' demographic details. The research participants ranged in age from 20 to 60, with a mean age of 36.4 ± 4.26 years.

The age range of 21–30 years old included the majority of research participants (49.23%; $n = 32$), followed by 32.30% ($n = 21$) in the age range of 31–40 years, 12.30% ($n = 8$) in the age range of 41–50 years, and 6.15% ($n = 4$) in the age group of 51–60 years. In the current study, there were 50.76% ($n=33$) men and 49.23% ($n=32$) females (Table 1).

When the correlation between the results of the ultrasonography and the histopathologic findings was evaluated, it was observed that in normal results, 84.61% ($n=550$) of the subjects had positive results for both ultrasonography and histopathology, whereas 9.23% ($n=6$) of the subjects and 86.15% ($n=56$) of the study subjects had negative results for both.

6.15% ($n=4$) of the study patients had negative findings, 4.61% ($n=3$) had positive results, and 1.53% ($n=1$) of the individuals had appendicitis as determined by histology and ultrasonography. As indicated in Table 2, a total of 86.15% ($n=56$) patients showed positive findings, while 13.84% ($n=9$) subjects showed negative association.

The current research's results also shown that, when it came to the positive association between CT findings and histology, 1.53% (n=1) of the participants had normal findings, and 92.30% (n=60) and 93.84% (n=61) of the study subjects had appendicitis. 4.61% (n=3) of the participants with normal results, 1.53% (n=1) of the subjects with appendicitis, and 6.15% (n=4) of the subjects overall showed negative association.

Table 3 shows that of the entire individuals, 93.84% (n = 61) had normal results, while 6.15% (n = 4) had appendicitis. Results were seen in 86.15% (n=56) of the subjects, and 13.84% (n=9) of them showed a negative correlation. According to the findings of the current study, there was a positive correlation between the histology and CT findings. Of the study individuals, 92.30% (n=60) and 93.84% (n=61) had appendicitis, whereas 1.53% (n=1) of the participants had normal findings. Among the subjects, 6.15% (n=4) had an overall unfavourable relationship, 1.53% (n=1) had appendicitis, and 4.61% (n=3) of the patients had normal outcomes. While 6.15% (n=4) of the participants developed appendicitis, the remaining 93.84% (n=61) of the people had normal outcomes overall.

DISCUSSION

The goal of the current prospective clinical investigation was to evaluate the specificity and sensitivity of computed tomography (CT) and ultrasonography for the diagnosis of acute appendicitis, as well as the association between the radiologic findings and surgical and histological findings. A total of 65 participants, both male and female, who were clinically suspected of having acute appendicitis and had been sent to the Department of Radiodiagnosis for CT and ultrasonography, surgery, and a histopathologic evaluation, were included in the current study. The research participants ranged in age from 20 to 60, with a mean age of 36.4±4.26 years.

The age range of 21–30 years old included the majority of research participants (49.23%; n = 32), followed by 32.30% (n = 21) in the age range of 31–40 years, 12.30% (n = 8) in the age range of 41–50 years, and 6.15% (n = 4) in the age group of 51–60 years. In the current study, there were 50.76% (n=33) men and 49.23% (n=32) females. These results were in line with research conducted in 2010 by Hlibczuk V et al. and in 2012 by Petroianu A5, whereby the individuals had comparable demographics to those of the current study.

When it came to the correlation between the results of ultrasonography and histopathologic findings, it was observed that, in normal results, 84.61% (n=550) of the subjects had both positive and negative results from both ultrasonography and histopathology, whereas 9.23% (n=6) of the subjects and the total of 86.15% (n=56) of the study subjects had both positive and negative results. participants with an appendicitis diagnosis based on histology and ultrasonography showed positive findings in 1.53% (n=1), negative results in 4.61% (n=3), and a total of 6.15% (n=4) of the research participants showed negative results. Overall, 13.84% (n=9) of the participants showed negative association, whereas 86.15% (n=56) of the subjects showed positive findings. The present study's results aligned with the research conducted by Kadhem AH et al6 in 2020 and Hwang ME7 in 2018, which found a comparable association between ultrasonography and histology.

The current research's results also shown that, when it came to the positive association between CT findings and histology, 1.53% (n=1) of the participants had normal findings, and 92.30% (n=60) and 93.84% (n=61) of the study subjects had appendicitis. 4.61% (n=3) of the participants with normal results, 1.53% (n=1) of the subjects with appendicitis, and 6.15% (n=4) of the subjects overall showed negative association. 93.84% (n=61) of the individuals had normal results overall, whereas 6.15% (n=4) of the subjects had appendicitis. These findings were consistent with research published in 2020 by El-Horbity MA et al. and in 2017 by Wu J et al., in which the authors reported a comparable connection between CT and histopathological findings to that of the current investigation.

CONCLUSION

Within its limitations, the present study concludes that ultrasound should be initially done in all the subjects presenting with acute appendicitis. However, in subjects with undetected and equivocal results, CECT has associated advantages of accurate detection with help in planning surgery depending on anatomical landmarks and presentations and ruling out the differential diagnoses associated with pain in the right iliac fossa. However, the present study had a few limitations including small sample size, short monitoring period, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

REFERENCES

1. Mostbeck G, Adam EJ, Nielsen MB. How to diagnose acute appendicitis: ultrasound first. *Insights Imaging*. 2016;7:255-63.

2. Zhang H, Liao M, Chen J, Zhu D, Byanju S. Ultrasound, computed tomography or magnetic resonance imaging-which is preferred for acute appendicitis in children? A Meta-analysis. *Pediatric radiology*. 2017;47:186-96.
3. Sayed AO, Zeidan NS, Fahmy DM, Ibrahim HA. Diagnostic reliability of pediatric appendicitis score, ultrasound, and low-dose computed tomography scan in children with suspected acute appendicitis. *Therapeutics and Clinical Risk Management*. 2017;13:847.
4. Hlibczuk V, Dattaro JA, Jin Z, Falzon L, Brown MD. Diagnostic accuracy of non-contrast computed tomography for appendicitis in adults: a systematic review. *Ann Emerg Med*. 2010;55:51-59.
5. Petroianu A. Diagnosis of acute Appendicitis. *International Journal of Surgery*. 2012;10:115-9.
6. Kadhem AH, Khalid SY, Al-Sewadi WH. The accuracy of abdominal ultrasonography in the diagnosis of acute appendicitis. *Basrah Journal of Surgery*. 2020;26:61-4.
7. Hwang ME. Sonography and computed tomography in diagnosing acute appendicitis. *Radiologic technology*. 2018;89:224-37.
8. El-Horbity MA, El-Naggar MA, Zaitoun MA, Tabl HA. Evaluation of Multislice- CT compared with Ultrasound Abdomen and Pelvis in Diagnosis of Acute Appendicitis in Female of Reproductive Age. *J Univer Surg*. 2020;8:3.
9. Wu J, Zhang T, Zhu Y, Gong N. Diagnostic value of ultrasound compared to CT in patients with suspected acute appendicitis. *Int J Clin Exp Med*. 2017;10:14377-85.

TABLES

S. No	CT	Histopathology		Total % (n)
		Normal % (n)	Appendicitis % (n)	
1.	Positive	1.53 (1)	92.30 (60)	93.84 (61)
2.	Negative	4.61 (3)	1.53 (1)	6.15 (4)
3.	Total	93.84 (61)	6.15 (4)	100 (65)

Table 3: Correlation of histopathology and Computed Tomography (CT) in the study subjects

S. No	Characteristics	Percentage (%)	Number (n=65)
1.	Mean age (years)	36.4±4.26	
2.	Age range (years)		
a)	21-30	49.23	32
b)	31-40	32.30	21
c)	41-50	12.30	8
d)	51-60	6.15	4
3.	Gender		
a)	Females	49.23	32
b)	Males	50.76	33

Table 1: Demographic characteristics of the study subjects

S. No	Ultrasonography	Histopathology		Total % (n)
		Normal % (n)	Appendicitis % (n)	
4.	Positive	84.61 (55)	1.53 (1)	86.15 (56)
5.	Negative	9.23 (6)	4.61 (3)	13.84 (9)
6.	Total	93.84 (61)	6.15 (4)	100 (65)

Table 2: Correlation of histopathology and ultrasonography in the study subjects