

ORIGINAL RESEARCH

Correlation of Ultrasound and Computed Tomography Scanning in Diagnosing Acute Appendicitis

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ABSTRACT

Background: Traditionally, the diagnosis of acute appendicitis is mainly based on history, findings at physical examination, and results of laboratory tests. The present study was conducted to correlate ultrasound and computed tomography scanning in diagnosis of acute appendicitis. **Material & Methods:** This study was conducted retrospectively at the using 100 medical records with a clinical picture of acute appendicitis with no history of trauma. The data was collected from the medical and radiological records and analysis was performed. This study was analyzed using SPSS version 23 (IBM Corp., Armonk, NY). **Results:** 100 patients were selected retrospectively for the study who had acute appendicitis. Maximum (42%) patients belong to age group 21-40 years followed by ≤ 20 years (31%). Females (65%) were more than males (35%). 63% of the total population underwent US imaging and CT imaging. The US imaging results revealed that 7% patients were positive, 16% were negative, and 40% had inconclusive data. The CT results revealed that 20% patients were positive, 41% were negative, and 2% patients had inconclusive data. **Conclusion:** The study concluded that the US imaging results revealed that 7% patients were positive, 16% were negative, and 40% had inconclusive data whereas the CT results revealed that 20% patients were positive, 41% were negative, and 2% patients had inconclusive data.

Key words: Acute appendicitis, US imaging and CT imaging.

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INTRODUCTION

Acute appendicitis (AA) is among one of the commonest surgical emergencies. Causes of appendicitis with atypical presentation may be difficult to distinguish from a myriad of gastrointestinal, genitourinary, and gynaecological conditions.^{1,2} The typical presentation includes vague mid-abdominal pain, anorexia, and nausea, followed by, localized right lower quadrant (RLQ) abdominal pain, guarding, and leukocytosis. Such presentation of AA is easy to diagnose. The accuracy of clinical examination has been reported to range from 71% to 97% and varies greatly depending upon the experience of the examiner.³ Patients with typical clinical findings undergo immediate surgery without radiological evaluation. Up to 45% of cases may have atypical symptoms and signs.⁴ The diagnosis of AA is a constellation of history, physical examination coupled with laboratory investigations, supplemented by selective focused imaging. The role of diagnostic imaging; ultrasound (US), computed tomography (CT) or magnetic resonance imaging (MRI) is another

major controversy.⁵ For the past years, the US has been used as an important tool in diagnosing AA among suspected patients and as a basis for a clinical examination continuation.⁶ Meanwhile, CT has been significant in decreasing the percentage of unnecessary appendectomies and was accepted as the standard for the evaluation of patients with suspected AA.⁷ The present study was conducted to correlate ultrasound and computed tomography scanning in diagnosis of acute appendicitis.

MATERIAL & METHODS

This study was conducted retrospectively at the using 100 medical records with a clinical picture of acute appendicitis with no history of trauma. Before the commencement of the study ethical clearance was taken from the Ethical Committee of the institute. All patients who were diagnosed with AA, regardless of their demographic data, such as age and gender were included in the study. The data was collected from the medical and radiological records and analysis was performed. Inclusion criteria were comprised of the

suspected clinical picture of acute appendicitis who underwent either ultrasound imaging, computed imaging, or both, without an alternative diagnosis at discharge. Patients with alternative diagnoses based on imaging or histopathology, perforation on imaging, or treated as perforated acute appendicitis were excluded from the study. This study was analyzed using SPSS version 23 (IBM Corp., Armonk, NY).

RESULTS

100 patients were selected retrospectively for the study who had acute appendicitis. Maximum (42%) patients belong to age group 21-40 years followed by ≤ 20 years (31%). Females (65%) were more than males (35%).

Table 1: Demographic data

Variable	N%
Age groups(years)	
≤ 20	31%
21-40	42%
41-60	18%
Above 60	9%
Gender	
Male	35%
Female	65%

Table 2: Imaging results of patients for US and CT imaging

Imaging technique	Result	N%
US imaging	Positive	7%
	Negative	16%
	Inconclusive	40%
	Not performed	37%
CT imaging	Positive	20%
	Negative	41%
	Inconclusive	2%
	Not performed	37%

63% of the total population underwent US imaging and CT imaging. The US imaging results revealed that 7% patients were positive, 16% were negative, and 40% had inconclusive data. The CT results revealed that 20% patients were positive, 41% were negative, and 2% patients had inconclusive data.

DISCUSSION

AA is the acute inflammation of the vermiform appendix. It is one of the most common causes of abdominal pain that brings a patient to a surgical emergency. Clinically, AA may mimic various conditions leading to misdiagnosis. Clinical acumen, scores, and laboratory tests are not conclusive in the accurate diagnosis of AA. An incorrect diagnosis of appendicitis in patients with other causes of abdominal pain may result in the removal of a normal appendix and has significant clinical and cost implications.⁸

100 patients were selected retrospectively for the study who had acute appendicitis. Maximum (42%) patients belong to age group 21-40 years followed by ≤ 20 years (31%). Females (65%) were more than males (35%). 63% of the total population underwent US imaging and CT imaging. The US imaging results revealed that 7% patients were positive, 16% were negative, and 40% had inconclusive data. The CT results revealed that 20% patients were positive, 41% were negative, and 2% patients had inconclusive data. Raffa A et al 2022 found that out of the total 351 patients included in this study, 83 patients underwent surgical appendectomies and the pathology results revealed that 64 patients were diagnosed with AA while 19 showed a normal appendix. Of the 64 patients, 18 underwent US imaging while 62 underwent CT imaging. Compared to pathology results, US imaging results revealed that 12 out of 14 positive patients (85.7%) and only two out of four negative patients (50.0%) were correctly predicted while two out of 14 positive patients (14.3%) and two out of four negative patients (50.0%) were falsely diagnosed. On the other hand, CT imaging results revealed that 46 out of 49 positive patients (93.9%) and 9 out of 13 negative patients (69.2%) were correctly predicted while only three out of 49 positive patients (6.1%) and only four out of 13 negative patients (30.8%) were incorrectly diagnosed.⁹ Krishnan KKR, et al 2018 found that the sensitivity of Ultrasonography and Computed Tomography was 95% and 93% respectively, and the specificity was 82% and 75% respectively. The positive predictive value was 91% and 87% respectively, and the negative predictive value was 90% and 85% respectively. The accuracy of Ultrasonography was 91% and CT was 87% respectively. Based on the McNemar test results, the calculated 'p' value for sensitivity, specificity and accuracy was not less than 0.05, which indicates that CT was not superior to Ultrasonography in the diagnosis of acute appendicitis. On comparing $Z = 1.43$ it is less than the level of significance value, i.e. 1.96, therefore not significant which concludes that Computed Tomography is not superior to Ultrasonography for diagnosing acute appendicitis.¹⁰ Kumar J, et al 2021 concluded that the sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy of US in diagnosis of AA in our study were 92.6 %, 76.4 %, 95.3%, 71.0% and 88.9 % respectively. The sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy of CT in diagnosis of AA were 99.1 %, 90.5 %, 98.6%, 87.8% and 97.8 % respectively.¹¹

CONCLUSION

The study concluded that the US imaging results revealed that 7% patients were positive, 16% were negative, and 40% had inconclusive data whereas the CT results revealed that 20% patients were positive,

41% were negative, and 2% patients had inconclusive data.

REFERENCES

1. Chaudhari YP, Jawale PG. Prevalence of appendicitis at surgery inpatient department of a tertiary care hospital: a descriptive study. *Int Med J* 2015;2(11):768-770.
2. El-Deek AF, El-Sayaad IM. et al. Ultrasonography versus computed tomography in diagnosis of acute appendicitis. *Al-Azhar Med J* 2017;46(4):981-994.
3. John H, Neff U, Kelemen M. Appendicitis diagnosis today: Clinical and ultrasonic deductions. *World J Surg* 1993;17:243-9. doi: 10.1007/ BF01658936. PMID: 8511921
4. Poole GV. Appendicitis. The diagnostic challenge continues. *Am Surg* 1988;54:609-12. PMID: 3052200
5. Scott AJ (2015): Risk stratification by the Appendicitis Inflammatory Response score to guide decision-making in patients with suspected appendicitis. *Br J Surg.*, 102(5):563–72.
6. Imaging of appendicitis in adults. Karul M, Berliner C, Keller S, Tsui TY, Yamamura J. *Rofo*. 2014;186:551–558.
7. Sensitivity and specificity of computed tomography and ultrasound for the prediction of acute appendicitis at King Fahad Specialist Hospital in Buraidah, Saudi Arabia. Alshebromi MH, Alsaigh SH, Aldhubayb MA. *Saudi Med J*. 2019;40:458–462.
8. Lee SL, Walsh AJ, Ho HS. Computed tomography and ultrasonography do not improve and may delay the diagnosis and treatment of acute appendicitis. *Arch Surg* 2001;136:556-62. doi: 10.1001/archsurg.136.5.556. PMID: 11343547
9. Raffa A, Abduljabbar A, Alharthy A. Comparison of Ultrasound and Computed Tomography Scanning Accuracy in Diagnosing Acute Appendicitis at King Abdulaziz University Hospital. *Cureus*. 2022 Nov 25;14(11):e31880. doi: 10.7759/cureus.31880. PMID: 36440296; PMCID: PMC9693829.
10. Krishnan KKR, Kodumur V, Parthiban N. Diagnostic accuracy of ultrasonography in comparison with computed tomography in diagnosing acute appendicitis. *J. Evolution. Med. Dent. Sci.* 2018;7(16):2033-2037, DOI: 10.14260/jemds/2018/457
11. Kumar J, Komal A. Acute appendicitis - study of role of ultrasound and CT scan in decision making for surgery in a tertiary care Government hospital in eastern India. *J Evid Based Med Healthc* 2021;8(33):3048-3053. DOI: 10.18410/jebmh/2021/556