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DESCRIPTIVE STUDY ON ACUTE APPENDICITIS DIAGNOSIS USING ULTRASONOGRAPHY AS DIAGNOSTIC TOOL AMONG RURAL POPULATION OF KANCHEEPURAM DISTRICT, TAMILNADU

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ABSTRACT:

Introduction: Acute appendicitis stands as one of the most prevalent causes of surgical emergencies globally, with appendectomy serving as the established treatment. A timely diagnosis followed by appendectomy before complications such as gangrene or perforation arise is crucial for a successful outcome. This study assess the efficacy of sonography in diagnosing acute appendicitis in patients with an Alvarado score of 4–7.

Methodology: This retrospective cross-sectional study was conducted at tertiary care Hospital, in Kancheepuram district, Tamilnadu over nine months period. Patients with an Alvarado score of 3–8 were included and categorized into two groups: those who underwent preoperative ultrasound and those who did not undergo any imaging for AA diagnosis. Data including demographics, histopathology, physical examination, laboratory findings, sonography reports, and histopathological reports were collected.

Results: Among 172 patients with Alvarado scores of 3–8 (97 males, 75 females). Sonography demonstrated an overall sensitivity of 78%, specificity of 65% and an accuracy of 73.6%. The rate of negative appendectomy was 24% in patients without sonography and 27% in those with sonography, with a higher incidence among females.

Conclusion: Sonography proves more beneficial in female patients with a positive result; however, its reliability diminishes when the result is negative. Complementary diagnostic modalities such as CT scan may enhance the accuracy of diagnosing acute appendicitis.

Keyword: USG, ACUTE APPENDICITIS, PAIN, ABDOMEN

INTRODUCTION:

Undoubtedly, acute appendicitis (AA) ranks among the most prevalent causes of surgical emergencies globally. Appendectomy stands as the definitive treatment for AA [1], with successful outcomes contingent upon prompt diagnosis and appendectomy before the onset of complications such as gangrene or perforation. Various scoring systems have been utilized worldwide for early AA diagnosis, among which the Alvarado scoring system proves to be one of the most practical. This system relies on patient history, physical examination, and select laboratory investigations, offering a convenient diagnostic approach. However, definitive diagnosis only occurs post-operation through histopathological examination of collected specimens. The Alvarado score comprises 8 parameters [2].

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Patients scoring 9 or 10 on the Alvarado scale almost invariably present with AA, warranting immediate appendectomy without further investigation. Conversely, patients scoring 0-4 have minimal likelihood of appendicitis, negating the need for imaging studies. Scores of 7 and 8 still strongly suggest appendicitis, while scores of 5 or 6 remain inconclusive but may still indicate AA, necessitating additional diagnostic measures. Computed tomography (CT scan), noted in numerous studies for its high sensitivity and specificity in diagnosing AA, presents as less operator-dependent [3]. Graded compression sonography also proven invaluable in AA diagnosis, offering rapid and radiation-free assessment, particularly beneficial in pediatric cases, providing dynamic visualization of abdominal organs. At our institution, ultrasound serves as a commonly utilized tool for diagnosing acute appendicitis [4]. Therefore, evaluating the efficacy of ultrasound in diagnosing AA in equivocal cases within our facility holds significant importance.

Methodology:

This descriptive hospital-based study was focused on acute appendicitis patients who underwent open appendectomy. The study encompassed patients who came with acute abdomen pain in tertiary healthcare center in Kancheepuram district, Tamilnadu. Included were patients with Alvarado scores ranging from 3 to 8, divided into two groups: one receiving abdominal ultrasound as an adjunctive diagnostic modality and the other without any preoperative imaging. Diagnosis of acute appendicitis relied on histopathology results indicating "acute appendicitis" or "gangrenous appendix." Exclusion criteria comprised lack of histopathological reports, Alvarado scores below 3 or above 8, and incomplete information for Alvarado score calculation. Given the retrospective nature of the study, written informed consent was not required. Demographic data, medical history, physical examination findings, and laboratory results, including leucocytosis, ultrasound, and histopathological reports, were retrieved from medical records. Alvarado scores were calculated based on the available patient data. Ultrasound findings indicating "in Favor of appendicitis" were considered positive, while cases labelled "suspicious of appendicitis" were evaluated separately. Statistical analysis was done using SPSS version 17. Descriptive results are presented as mean ± standard deviation for a 95% confidence interval (CI) or proportions, as appropriate.

Results:

A total of 172 patients underwent open appendectomy over the course of one year at our institution. Among them, 106 patients presented with Alvarado scores ranging from 3 to 8. Of these, 101 were male (58.72%) and 71 were female (41.27%), yielding a male-to-female ratio of approximately 2:1. Sixty-seven males and 61 females underwent ultrasound evaluation prior to surgery. The age of patients ranged from 4 to 76 years, with a mean age of 16.86 ±12.46. Specifically, 3.1% patients were under 5 years old, 57% patients were between 5 and 16 years old, 39% patients were aged 16 to 60 years, and 2% patients were over 60 years old.

Among the 172 patients, 98 were confirmed to have acute appendicitis based on histopathological reports (57%), while 12 patients exhibited a normal appendix, and 66 patients were diagnosed with other conditions. Forty of these cases involved lymphoid follicular hyperplasia, while 6 presented with different pathologies. None of the patients were diagnosed with malignancy, resulting in a total negative appendectomy rate of 22.3%. Of the patients who underwent ultrasound evaluation, 98 were diagnosed with acute appendicitis (76.6%) based on histopathology, while 30 exhibited normal pathology or alternative diagnoses (23.4%). Notably, negative appendectomies were more prevalent among females (22 were female and 8 were male).

Among the 98 patients diagnosed with appendicitis, ultrasound findings favored appendicitis in 63 patients (64.3%), were suspicious for appendicitis in 14 patients (14.3%), and were normal in 21 patients (21.4%). In 8 out of 30 patients with normal appendix or alternative pathologies, ultrasound findings indicated appendicitis in 26.7% of cases and were suspicious for appendicitis in 13.3% of cases. Overall, ultrasound demonstrated a sensitivity of 75% and a specificity of 69.2% in diagnosing acute appendicitis. Due to the limited number of patients

in extreme age groups (under 5 and over 60), separate calculations for sensitivity and specificity were not feasible. However, in patients aged 5 to 16 years, ultrasound showed a sensitivity of 76% and a specificity of 66.7%, while in patients aged 16 to 60 years, the sensitivity was 71.8% and the specificity was 72.7%. The overall accuracy of ultrasound in our study was 73.6%, with a positive predictive value of 88% and a negative predictive value of 46.1%.

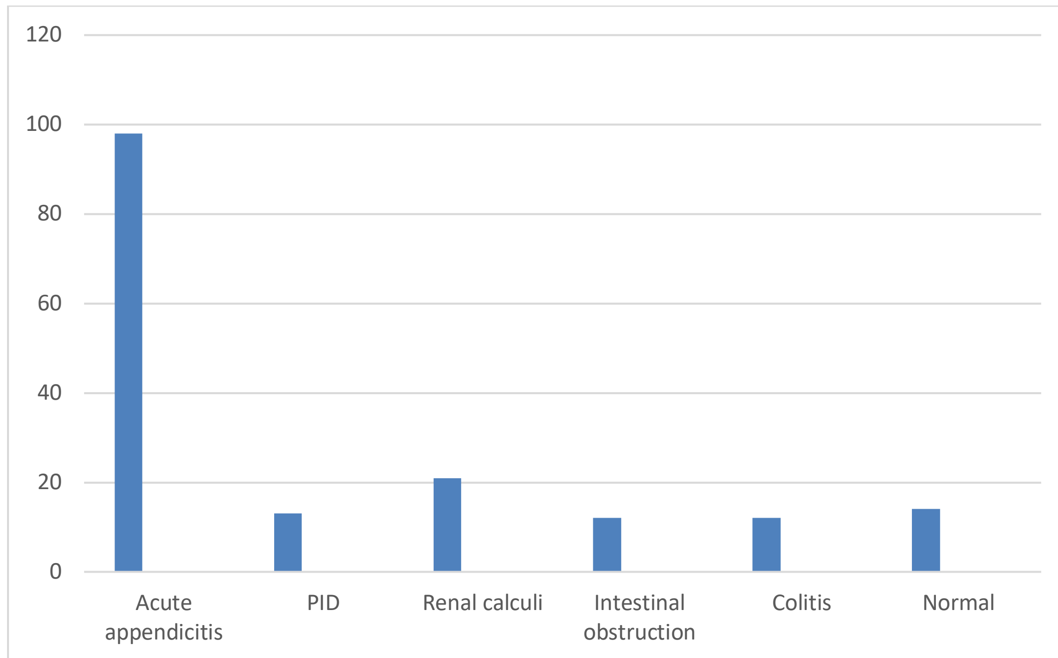

Figure 1: Histopathological outcome of USG

In patients aged 16 to 60, the accuracy of ultrasound was 72%, with a positive predictive value of 88.4% and a negative predictive value of 47%. In patients aged 5 to 16 years, the accuracy of sonography was 73.7%, with a positive predictive value of 87.5% and a negative predictive value of 47.6%. Additionally, the positive predictive value of suspicious ultrasound results for acute appendicitis was calculated at 77.7% (True suspicious: 14 cases, false suspicious cases: 4).Ultrasound was not performed for 110 patients, of whom 93 were male (84.5%) and 17 were female (15.5%). The negative appendectomy rate in this group was 20.9% (n=23). The rate of perforated appendicitis among patients who underwent prior ultrasound was 18% (n=23), compared to 8.2% (n=9) in patients who did not undergo ultrasound.

Discussion:

The results of this study provide valuable insights into the demographics, diagnostic accuracy, and outcomes associated with open appendectomy in a cohort of 172 patients. Understanding these findings can aid clinicians in optimizing diagnostic strategies and patient management for acute appendicitis. The study cohort comprised predominantly young individuals, with a mean age of 16.86 years, reflecting the typical age distribution of appendicitis. Interestingly, the male-to-female ratio was approximately 2:1, aligning with previous epidemiological data suggesting a higher incidence of appendicitis in males. The majority of patients presented with Alvarado scores ranging from 3 to 8, indicating a spectrum of symptom severity commonly associated with acute appendicitis.

Ultrasound evaluation played a crucial role in preoperative assessment, with 67 males and 61 females undergoing ultrasound examination. The findings revealed varying degrees of diagnostic utility, with ultrasound demonstrating a sensitivity of 75% and a specificity of 69.2% in diagnosing acute appendicitis. These results are consistent with existing literature on the diagnostic accuracy of ultrasound for appendicitis, although the sensitivity and specificity may vary across different patient populations and healthcare

settings. Age stratification revealed interesting trends in the diagnostic performance of ultrasound. While separate calculations for sensitivity and specificity were not feasible for extreme age groups, the analysis among patients aged 5 to 16 years and those aged 16 to 60 years showed promising results. Ultrasound exhibited comparable sensitivity and specificity in both age groups, highlighting its potential utility across a wide range of pediatric and adult populations.

The negative appendectomy rate of 22.3% underscores the importance of accurate preoperative diagnosis to avoid unnecessary surgical interventions. Histopathological analysis confirmed acute appendicitis in the majority of cases, while a subset of patients exhibited normal appendices or alternative pathologies, including lymphoid follicular hyperplasia. Importantly, no cases of malignancy were reported, emphasizing the benign nature of most appendiceal pathologies encountered in this study. The findings of this study have several clinical implications. Firstly, ultrasound remains a valuable tool in the diagnostic workup of acute appendicitis, particularly in young and middle-aged individuals. However, its moderate sensitivity and specificity warrant cautious interpretation, necessitating a comprehensive clinical assessment in conjunction with imaging findings. Moreover, the relatively high negative appendectomy rate underscores the need for refined diagnostic algorithms incorporating clinical, laboratory, and imaging parameters to minimize unnecessary surgeries. Despite the strengths of this study, including a relatively large sample size and detailed analysis of diagnostic accuracy, several limitations should be acknowledged. These include the retrospective nature of the study, potential selection bias inherent in single-center studies, and the lack of long-term follow-up data to assess postoperative outcomes and complications.

Conclusion:

In conclusion, the findings of this study provide valuable insights into the demographics, diagnostic accuracy, and outcomes associated with open appendectomy. While ultrasound remains a valuable tool in the preoperative assessment of acute appendicitis, careful consideration of clinical presentation and incorporation of multiple diagnostic modalities are essential to optimize patient management and minimize unnecessary surgical interventions. Further prospective studies are warranted to validate these findings and refine diagnostic algorithms for acute appendicitis.

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