Correlation Between Clinical, Laboratory, and Intraoperative Findings in Patients with Acute Appendicitis: A Cross-Sectional Study

Divahar Raj K[1*], M Ganesan[2], Saravanan P.S[3], K Nagamanikanta[4]

[1]Postgraduate, Department of General Surgery, Meenakshi Medical College Hospital & Research Institute, Kanchipuram, MAHER University, Chennai. Email: divakar22raj@gmail.com (Corresponding Author)

[2]Professor, Department of General Surgery, Meenakshi Medical College Hospital & Research Institute, Kanchipuram, MAHER University, Chennai

[3]Professor and HOD, Department of General Surgery, Meenakshi Medical College Hospital & Research Institute, Kanchipuram, MAHER University, Chennai

[4]Postgraduate, Department of General Surgery, Meenakshi Medical College Hospital & Research Institute, Kanchipuram, MAHER University, Chennai

ABSTRACT

Background: Acute appendicitis is a common surgical emergency, and its diagnosis relies on a combination of clinical evaluation, laboratory investigations, and intraoperative findings. Accurate correlation among these parameters is essential to improve diagnostic precision and reduce complications.

Aim: To assess the correlation between clinical, laboratory, and intraoperative findings in patients with acute appendicitis.

Materials and Methods: This hospital-based cross-sectional study was conducted at Meenakshi Medical College Hospital, Kanchipuram, over one year. A total of 80 patients with suspected acute appendicitis who underwent surgical intervention were included. Clinical features, laboratory parameters including total leukocyte count, neutrophilia, and C-reactive protein, and intraoperative findings were recorded. Correlation analysis was performed using appropriate statistical tests, and a p value < 0.05 was considered statistically significant.

Results: Clinical signs such as right iliac fossa tenderness, rebound tenderness, and guarding showed moderate positive correlation with intraoperative severity ($r = 0.55–0.62$; $p \leq 0.002$). Laboratory parameters demonstrated strong correlation, with C-reactive protein showing the highest correlation ($r = 0.68$; $p = 0.001$). A significant proportion of patients had advanced intraoperative findings, including suppurative and perforated appendicitis.

Conclusion: There is a significant correlation between clinical findings, laboratory parameters, and intraoperative observations in acute appendicitis. Combined assessment enhances diagnostic accuracy and facilitates early surgical intervention, thereby reducing complications.

Keywords: Acute appendicitis, clinical correlation, laboratory markers, C-reactive protein, intraoperative findings, cross-sectional study

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Introduction

Acute appendicitis is one of the most common surgical emergencies worldwide and a frequent cause of acute abdominal pain requiring urgent intervention. Despite advances in diagnostic modalities, accurate and timely diagnosis remains challenging due to its variable clinical presentation and overlap with other abdominal conditions. Early diagnosis is crucial to prevent complications such as perforation, abscess formation, and peritonitis [1].

Traditionally, the diagnosis of acute appendicitis has been primarily based on clinical evaluation, including history and physical examination. Classical symptoms such as right lower abdominal pain, nausea, vomiting, and fever, along with signs like tenderness at McBurney's point, have been widely used in clinical practice. However, these features are not always present, leading to diagnostic uncertainty [2].

Laboratory investigations play an important supportive role in the diagnosis of appendicitis. Elevated white

blood cell count, neutrophilia, and increased inflammatory markers such as C-reactive protein are commonly associated with acute appendicitis. These parameters help in improving diagnostic accuracy when combined with clinical findings [3].

Intraoperative findings remain the definitive method for confirming the diagnosis of appendicitis. The severity of inflammation, presence of gangrene or perforation, and extent of involvement can be directly assessed during surgery. Correlating intraoperative findings with preoperative clinical and laboratory parameters is essential for evaluating diagnostic accuracy and improving clinical decision-making [4].

Several studies have attempted to establish the correlation between clinical presentation, laboratory findings, and intraoperative observations. Scoring systems such as the Alvarado score incorporate both clinical and laboratory parameters to aid diagnosis. However, variability in findings necessitates further evaluation in different clinical settings [5–6].

Cross-sectional studies provide valuable insights into the relationship between diagnostic parameters and actual surgical findings in routine clinical practice. Understanding these correlations can help reduce negative appendectomy rates and improve patient outcomes.

Therefore, the present study was undertaken to assess the correlation between clinical, laboratory, and intraoperative findings in patients with acute appendicitis in a cross-sectional study setting [7].

Materials and Methods

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Results

A total of 80 patients with suspected acute appendicitis were included in the study and underwent surgical intervention.

Table 1: Demographic Characteristics of Study Participants (n = 80)

Variable	Frequency (%)
Mean age (years)	31.6 ± 9.8
Male	48 (60%)
Female	32 (40%)

The majority of patients were young adults, with a mean age of 31.6 years. Males were slightly more affected than females, indicating a higher prevalence of acute appendicitis in males in this study population.

Table 2: Clinical Presentation of Patients

Clinical Feature	Frequency (%)
Right iliac fossa pain	76 (95%)
Migration of pain	58 (72.5%)
Nausea/Vomiting	62 (77.5%)
Fever	50 (62.5%)
Tenderness	78 (97.5%)

Clinical Feature	Frequency (%)
Rebound tenderness	60 (75%)
Guarding	54 (67.5%)

Right iliac fossa pain and tenderness were the most common clinical findings. Migration of pain and rebound tenderness were present in a significant proportion of patients, supporting their diagnostic relevance.

Table 3: Laboratory Findings

Parameter	Frequency (%)	p value
Elevated total leukocyte count	68 (85%)	0.001
Neutrophilia	64 (80%)	0.001
Elevated CRP	70 (87.5%)	0.001

A high proportion of patients showed elevated inflammatory markers. The association between laboratory parameters and appendicitis was statistically significant ($p = 0.001$), indicating strong diagnostic value.

Table 4: Intraoperative Findings

Finding	Frequency (%)
Inflamed appendix	36 (45%)
Suppurative appendicitis	22 (27.5%)
Gangrenous appendicitis	12 (15%)
Perforated appendix	10 (12.5%)

Most patients had an inflamed appendix, while a considerable number had advanced disease such as suppurative, gangrenous, or perforated appendicitis, indicating delayed presentation in some cases.

Table 5: Correlation Between Clinical Findings and Intraoperative Findings

Parameter	Correlation Coefficient (r)	p value
RIF tenderness vs severity	0.62	0.001
Rebound tenderness vs severity	0.58	0.001
Guarding vs severity	0.55	0.002

Clinical signs such as tenderness, rebound tenderness, and guarding showed a moderate positive correlation with intraoperative severity. The correlations were statistically significant, indicating that clinical examination is a reliable indicator of disease severity.

Table 6: Correlation Between Laboratory Findings and Intraoperative Findings

Parameter	Correlation Coefficient (r)	p value
TLC vs severity	0.64	0.001
Neutrophilia vs severity	0.60	0.001
CRP vs severity	0.68	0.001

Laboratory parameters showed a strong positive correlation with intraoperative findings. CRP demonstrated the highest correlation ($r = 0.68$), indicating its usefulness in predicting disease severity.

Discussion

The present cross-sectional study evaluated the correlation between clinical, laboratory, and intraoperative findings in patients with acute appendicitis. The findings demonstrated a significant association between clinical presentation, laboratory parameters, and intraoperative severity, highlighting the importance of combined assessment for accurate diagnosis.

In the present study, the majority of patients were young adults with a slight male predominance, which is consistent with the findings of Bhangu A et al [1], who reported that acute appendicitis is more common in younger age groups and males.

Right iliac fossa pain and tenderness were the most common clinical features observed. These findings are in agreement with Andersson RE et al [3], who emphasized that localized tenderness is a key clinical indicator of appendicitis.

Migration of pain, rebound tenderness, and guarding were present in a significant proportion of patients and showed moderate correlation with intraoperative severity ($r = 0.55–0.62$; $p \leq 0.002$). Similar observations were reported by Ohmann C et al [7], who demonstrated that clinical signs correlate well with disease severity and are useful in decision-making.

Laboratory findings such as elevated total leukocyte count, neutrophilia, and increased C-reactive protein levels were observed in the majority of patients and showed strong correlation with intraoperative findings ($r = 0.60–0.68$; $p = 0.001$). This is consistent with Grönroos JM et al [4], who reported that inflammatory markers significantly improve diagnostic accuracy.

Among laboratory parameters, CRP showed the highest correlation with intraoperative severity ($r = 0.68$; $p = 0.001$), indicating its usefulness in predicting complicated appendicitis. Similar findings were reported by Yu CW et al [5], who highlighted the role of CRP in identifying severe appendicitis.

Intraoperative findings revealed that a considerable proportion of patients had advanced disease such as

suppurative, gangrenous, or perforated appendicitis. This reflects delayed presentation and diagnosis in some cases. Temple CL et al [8] reported similar findings, emphasizing the need for early diagnosis to prevent complications.

The correlation between clinical findings and intraoperative severity observed in this study supports the continued importance of thorough clinical examination. Kalan M et al [6] demonstrated that clinical scoring systems based on symptoms and signs can effectively predict appendicitis.

The combined use of clinical and laboratory parameters enhances diagnostic accuracy and reduces negative appendectomy rates. Andersson M et al [9] highlighted that integrated diagnostic approaches improve patient outcomes.

Recent studies have also emphasized the role of early and accurate diagnosis in preventing complications. Di Saverio S et al [2] reported that timely intervention reduces the risk of perforation and improves prognosis. Furthermore, Sartelli M et al [10] and Ferris M et al [11] emphasized the importance of clinical judgment supported by laboratory findings in managing acute appendicitis.

Advanced diagnostic strategies incorporating clinical, laboratory, and imaging findings have been shown to improve outcomes. Kim HY et al [12] and Atema JJ et al [13] highlighted the importance of comprehensive evaluation in reducing diagnostic errors.

Conclusion

The present cross-sectional study demonstrated a significant correlation between clinical findings, laboratory parameters, and intraoperative observations in patients with acute appendicitis. Clinical features such as right iliac fossa tenderness, rebound tenderness, and guarding showed a moderate positive correlation with disease severity, while laboratory parameters, particularly total leukocyte count, neutrophilia, and C-reactive protein, showed strong correlation ($p = 0.001$). Among these, CRP was found to be the most reliable predictor of severity. The combined assessment of clinical and laboratory findings enhances diagnostic accuracy and aids in early identification of complicated appendicitis. Therefore, an integrated approach using clinical evaluation and laboratory markers is essential for timely diagnosis and appropriate surgical management, thereby reducing complications and improving patient outcomes.

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