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Original Research Article

ROLE OF TOTAL LEUKOCYTE COUNT IN PREDICTING INTRAOPERATIVE SEVERITY OF ACUTE APPENDICITIS

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Abstract: ***Background:*** This cross-sectional study aimed to evaluate the sensitivity of total leukocyte count (TLC) in predicting the severity of acute appendicitis based on intraoperative findings. The study included 250 patients (153 males, 97 females) who underwent appendectomy at a tertiary care hospital from June 2018 to October 2020. The mean age of the patients was 24.76 years (range: 3-58 years). Intraoperative findings revealed 2 cases of gangrenous appendicitis, 146 inflamed appendicitis, 8 perforated appendicitis, 33 phlegmon, and 61 suppurative appendicitis. The median TLC increased as the disease severity progressed: inflammatory < suppurative < phlegmonous < perforated ≈ gangrenous ($p = 0.007$). Variability in TLC also widened in more severe groups, with very low outliers (≈4–5 $\times 10^3$ cells/μL) appearing only in mild inflammatory and suppurative categories and gangrenous and perforated cases clustering above 14 $\times 10^3$ cells/μL. The study demonstrates that TLC serves as a significant predictor of acute appendicitis severity, with higher TLC levels correlating strongly with more advanced intraoperative findings. The progressive rise in median TLC across different stages supports its utility in preoperative risk stratification, with perforated and gangrenous cases consistently exhibiting TLC levels above 14 $\times 10^3$ cells/μL, reinforcing its potential as a marker for severe disease.

Keywords: Acute appendicitis, TLC, Perforated appendicitis

INTRODUCTION

Acute appendicitis is a common surgical emergency characterized by inflammation of the appendix, often necessitating prompt diagnosis and treatment to prevent complications. Understanding the factors that predict the severity of acute appendicitis is crucial for improving patient outcomes and optimizing surgical interventions1.

Previous studies have explored various clinical and laboratory parameters, including total leukocyte count (TLC), as potential indicators for assessing the severity of acute appendicitis2.

Several clinical risk scores have been developed, the purpose of which is to identify low, intermediate and high risk patients for appendicitis. The most widely used score so far is the Alvarado score. A systemic review and pooled diagnostic accuracy study showed that the score has good sensitivity especially in men but low specificity. Recently, the appendicitis inflammatory response score has been developed, and seems to outperform the Alvarado score in terms of accuracy3.

Despite existing research, there remains uncertainty regarding the sensitivity of TLC count alone in predicting the severity of acute appendicitis in relation to intraoperative findings. This study aims to evaluate the sensitivity of TLC count as a predictor of acute appendicitis severity in correlation with intraoperative observations.

MATERIAL AND METHODS

This study employs a cross-sectional design to evaluate the sensitivity of total leukocyte count (TLC) alone in predicting the severity of acute appendicitis based on intraoperative findings. A quantitative approach was utilized, involving the collection of numerical data related to TLC and intraoperative observations. The research was conducted in a tertiary care hospital from June 2018 to October 2020, focusing on patients diagnosed with acute appendicitis who underwent surgical intervention. To ensure the accuracy of findings, patients with previous abdominal surgeries or other inflammatory conditions were excluded from the study. Ethical considerations were addressed through approval from the Institutional Review Board and obtaining informed consent from all participants prior to their inclusion.

The study's methodology involved collecting data on TLC levels and intraoperative observations of appendicitis severity. This data was then analyzed to determine the relationship between these two variables, aiming to assess the predictive value of TLC in determining the severity of acute appendicitis using SPSS V 20. By focusing on this specific relationship, the research sought to provide valuable insights into the potential use of TLC as a diagnostic tool for assessing appendicitis severity prior to surgery. This information could potentially aid clinicians in making more informed decisions regarding patient management and surgical planning in cases of acute appendicitis.

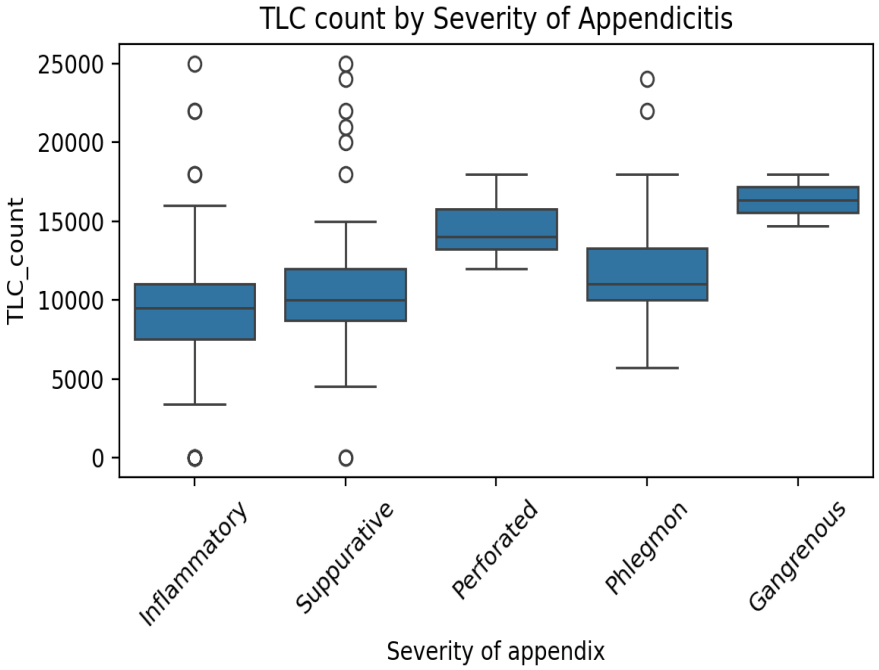
RESULTS

The study included 250 patients who had undergone appendectomy. Out of 250 patients 153 were males and 97 were females with the male : female ratio of 1.6:1. The mean age of the patients was 24.76 (Range 03-58 years). Majority of our patients were between 10-19 years, constituting 25.6% followed by age group 20-29 with 25.2%. 30-39 age group with 18.4%; < 10 age group with 13.2%; 40-49 age group with 11.2% & 6.4% of patients between 50-59 as shown in Table 1.

Table 1 showing age distribution of patients

Age Group (Year)	Frequency	Percent
< 10	33	13.2
10-19.	64	25.6
20-29	63	25.2
30-39	46	18.4
40-49	28	11.2
50-59	16	6.4

In our study 2 patients had gangrenous appendicitis, 146 had inflamed appendicitis, 8 had Perforated appendicitis, 33 had phlegmon and 161 had Suppurative appendicitis. Median TLC rises as the disease becomes more destructive: inflammatory < suppurative < phlegmonous < perforated ≈ gangrenous as shown in Graph 1 and Table 1. In our study p value was 0.007 which was statistically significant between TLC count and Severity of Acute Appendicitis. Variability (IQR and range) also widens in the more severe groups. Very low outliers (≈4–5 $\times 10^3$ cells/μL) appear only in the mild inflammatory and suppurative categories, never in perforated or gangrenous disease. In our small sample gangrenous and perforated cases cluster above 14 $\times 10^3$ cells/μL.



Graph 1: Depicting relationship of TLC and Severity of appendicitis

Table 2: Depicting relation of TLC and Severity of Acute Appendicitis

TLC	Severity of Acute Appendicitis					
	Gangrenous	Inflammatory	Perforated	Phlegmon	Suppurative	p Value
≤5000	0	8	0	0	4	0.007
5001-10000	0	86	0	13	29	
10001-15000	1	42	6	15	21	
15001-20000	1	6	2	3	3	
>20000	0	3	0	2	4	

DISCUSSION

The diagnostic value of Total Leucocyte Count (TLC) and other inflammatory markers in acute appendicitis has been extensively studied, as evidenced by the reviewed literature3-5. My findings align with several key observations from these studies, while also highlighting areas of divergence and potential clinical implications.

My results demonstrate a significant correlation between TLC levels and the severity of acute appendicitis, with median TLC rising progressively from inflammatory to suppurative, phlegmonous, perforated, and gangrenous stages ($p = 0.007$). This is consistent with the findings of Mir et al. (2016)3, who reported that TLC had high specificity (83.54%) for acute appendicitis and even higher sensitivity (100%) for perforated appendicitis at a cutoff of 9000/mm³. Similarly, Vig et al. (2021)4 identified a TLC cutoff of 17,930 cells/mm³ as predictive of perforated appendicitis, with 84.8% sensitivity and 97.3% specificity. My data also support this trend, as perforated and gangrenous cases clustered above 14 $\times 10^3$ cells/μL, reinforcing the utility of TLC in distinguishing severe cases.

However, the variability in TLC cutoffs across studies (e.g., 9000/mm³ in Mir et al., 12.95 $\times 10^3$ cells/L in Khattab et al. [5], and 17,930 cells/mm³ in Vig et al.) suggests that TLC alone may not be universally reliable. For instance, Chanderbhan et al. (2023)6 noted that TLC was elevated in only 46% of histopathologically confirmed appendicitis cases, indicating limited specificity. This discrepancy underscores the need for combining TLC with other markers to improve diagnostic accuracy.

My study shares limitations with others, such as retrospective design and single-center data. The variability in TLC cutoffs across populations (e.g., pediatric vs. adult) highlights the need for context-specific thresholds. For example, Vig et al. (2021)4

focused on children, whereas Mir et al. (2016)3 included adults, potentially explaining differences in optimal cutoffs.

CONCLUSION

This study demonstrates that total leukocyte count (TLC) serves as a significant predictor of the severity of acute appendicitis, with higher TLC levels correlating strongly with more advanced intraoperative findings, such as perforation and gangrene. The progressive rise in median TLC across inflammatory, suppurative, phlegmonous, perforated, and gangrenous stages ($p = 0.007$) supports its utility in preoperative risk stratification. Notably, perforated and gangrenous cases consistently exhibited TLC levels above 14×10^3 cells/μL, reinforcing its potential as a marker for severe disease.

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