

SIGNIFICANCE OF TOTAL LEUCOCYTE COUNT IN THE DIAGNOSIS OF ACUTE APPENDICITIS IN CHILDREN

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ABSTRACT

Background: Clinical presentation of acute appendicitis in children is usually not typical and needs supportive laboratory tests. The aim of this study was to evaluate the significance of total leucocyte count in the diagnosis of acute appendicitis in children.

Material & Methods: This study was conducted at Paediatric Surgery Unit, Lady Reading Hospital Peshawar, from January 2008 to December 2008. Five hundred & eighty-four children with clinically suspected acute appendicitis were included. Preoperatively total leucocyte count was estimated. Postoperatively histopathology was performed to confirm the diagnosis.

Results: Leucocyte count was raised in 468(80.1%) patients with acute appendicitis, 20(3.4%) had raised leucocyte count with normal appendix, 38(6.5%) had normal leucocyte count but inflamed appendix and in 58(9.9%) both histopathology and leucocyte count were normal.

Conclusion: Raised total leucocyte count is an important diagnostic test for acute appendicitis in children.

KEY WORDS: Acute appendicitis, Total leucocyte count, Children.

INTRODUCTION

Acute appendicitis represents the most common abdominal emergency in children.¹ Clinical diagnosis in paediatric patients is often challenging. In classic description of acute appendicitis, the first symptom is periumbilical pain, followed by nausea, right iliac fossa pain and later on vomiting and fever. This sequence of events is noted in only 50% adults and even less commonly in children. The classic symptoms are often not present in children, making the diagnosis difficult which may lead to missed diagnosis with significant mortality and morbidity. Delay in diagnosis or misdiagnosis have important medical and legal implications. The risk of progression to perforation in children ranges from 20 to 50%,² and the rate of unnecessary appendectomies is as high as 40%.³

Most literature regarding childhood acute appendicitis extrapolates the presenting signs and symptoms from adult patients. Presenting signs and symptoms will vary by age and the ability to achieve a reliable, but often limited examination. The accuracy of diagnosis has increased just marginally in the recent times in spite of development of various scoring systems^{4,5} and diagnostic laboratory investigations like c-reactive protein.⁶⁻⁸

The aim of the present work was to study the significance of raised total leucocyte count (TLC) in the diagnosis of acute appendicitis.

MATERIAL AND METHODS

This descriptive study was conducted at Paediatric Surgery Unit, Lady Reading Hospital Peshawar, from January 2008 to December 2008. Five hundred & eighty-four patients were operated for acute appendicitis during the study period at Casualty Department at Lady Reading Hospital Peshawar.

TLC was checked preoperatively and acute appendicitis was confirmed by histological examination postoperatively. Patients with complicated acute appendicitis like appendicular mass, abscess or peritonitis were excluded from the study.

All the patients were admitted at Paediatric surgery unit and were given preoperative intravenous fluids and antibiotics covering aerobic and anaerobic bacteria. All the patients underwent open appendectomy.

RESULTS

Five hundred & eighty four patients were operated for acute appendicitis during the study pe-

riod at Lady Reading Hospital Peshawar. Out of these 324 (55.45%) were males and 258 (44.1%) females, with male to female ratio of 1.34:1. The age range of the patients is shown in Table 1.

Table 1: Age range of patients.

S No	Age in years	Number of patients
1	Below 5 years	15 (2.5%)
2	5-10 years	391 (67%)
3	10-14 years	178 (29.5%)

Two hundred & forty-eight (41%) patients presented with classical symptoms and signs of acute appendicitis. Pain abdomen was the main symptom which occurred in 564 (96.5%) patients. Among them 264 (43.5%) had localized pain in right iliac fossa. TLC was estimated in all patients and count above 8000/mm³ was taken as standard. The results are shown in the Table 2.

Postoperatively all the patients were kept in pediatric surgery unit Lady Reading Hospital Peshawar. The hospital stay ranged from 2 days to 5 days, with an average of 2.34 days.

Data analysis was performed through SPSS version 10. Frequencies and percentages were computed for presentation of all categorical variables like patient presenting signs/symptoms, Total leucocyte count and histopathological results. Sensitivity analysis was performed to compute sensitivity, specificity, accuracy, positive and negative predictive values of Total leucocyte count in the diagnosis of acute appendicitis in children on the basis of histopathology as gold standard criteria.

Out of 584 patients operated for acute appendicitis during the study period, 468 had TLC raised and inflammation was confirmed by histopathology. These were true positive cases, While 20 confirmed negative on histopathology (False positive).

The specificity of TLC in our study was 74% and sensitivity 92%. The positive predictive value was 95%, negative predictive value 60% and accuracy 76.8%.

DISCUSSION

Acute appendicitis is characterized by the development of inflammation at a local level, followed by a more generalized inflammatory response. The rationale of laboratory tests in the diagnosis of acute appendicitis is based on the possibility of detecting signs of systemic inflammation as a diagnostic tool.⁹ Although over the last few decades several markers of inflammation have been proposed to increase the diagnostic accuracy in acute appendicitis including phospholipase A₂,¹⁰ serum amyloid A,¹¹ leukocyte elastase, neutrophil count,¹² several interleukins and cytokines.¹³ TLC is certainly the most commonly used. It can provide complementary information during the early phase of acute appendicitis.

TLC has been evaluated in many studies and was found helpful in increasing the diagnostic accuracy in patients with suspected acute appendicitis.^{14,15} Yang et al reported that TLC and C-reactive protein are helpful in the diagnosis of acute appendicitis and patients with normal values of these tests are highly unlikely to have acute appendicitis in adults.¹⁶ Wu et al reported that TLC may serve as predictive parameter for early diagnosis of acute appendicitis in children.⁵

Total Leucocyte count although a helpful tool in the diagnosis of acute appendicitis has a few limitations, like it has low specificity in adults and children.¹⁷ This is because many conditions mimicking acute appendicitis are also associated with inflammatory response. Secondly serum inflammatory markers are age dependent.¹⁹ Gronross¹⁸ reported that normal values of both TLC and C-reactive protein can reliably exclude acute appendicitis in adults but not in children. However if performed at the end of diagnostic pathway in patients with a high clinical suspicion of acute appendicitis, TLC plays a role in increasing diagnosis.

Table 2: Distribution of patients on the basis of total leucocyte count (n=584)

Total leucocyte count	Appendix on histopathology	Number of patients	Percentage
Increased	Inflamed	468	80.1
Increased	Normal	20	3.4
Normal	Inflamed	38	6.5
Normal	Normal	58	9.9
Total	584	100	

tic accuracy. About 80-85% patients with clinical suspicion of acute appendicitis have TLC of more than 10,000/mm³.²⁰ The sensitivity (92%) and specificity (74%) determined in this study is comparable with various national and international studies in which the sensitivity ranges from 80-88.7% and specificity from 61.5-87%.²¹ Furgussan et al recommended the measurement of TLC in equivocal cases and if the count is more than 15000/mm³ should proceed to appendectomy.²² If TLC is less than 11000/mm³ then further investigation with abdominal CT should be performed. Birchley et al found that TLC, neutrophil count and C-reactive protein are effective in supporting a clinical diagnosis of acute appendicitis in patients with typical features than in excluding the diagnosis.⁸

In this study we found accuracy of total leucocyte count in the diagnosis of acute appendicitis in children as 76%. Yaldrim et al also found positive and negative predictive values of TLC in the diagnosis of acute appendicitis as 92.5% and 50% which is comparable to our study.²³ The sensitivity (92%) and specificity (74%) determined in our study is comparable to studies done by Malik et al²⁴ and Eryilmaz et al in which sensitivity ranged from 81 to 90% and specificity from 61.5 to 87%.

The diagnostic value of Total leucocyte count is increased when it is combined with neutrophil count and C-reactive protein. When neutrophil count and total leucocyte count are combined only 4% patients with acute appendicitis will have normal values.²⁵

CONCLUSION

Total leucocyte count although not a diagnostic criteria for acute appendicitis due to its low specificity and sensitivity is still a helpful investigation in diagnosing acute appendicitis in children as it is readily available and affordable for the patients.

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