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EVALUATING THE DIAGNOSTIC EFFICACY OF C-REACTIVE PROTEIN AND LEUCOCYTE COUNT IN ACUTE APPENDICITIS

General Surgery

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ABSTRACT

Acute appendicitis is among the most prevalent surgical emergencies worldwide. Despite its frequency, accurately diagnosing the condition- especially in atypical presentations- remains a clinical challenge. C-reactive protein (CRP) and total leucocyte count (TLC) have shown promise as supportive laboratory indicators that can enhance the diagnostic accuracy. This study assesses the diagnostic utility of CRP and TLC individually and together, using histopathology as the gold standard. While each marker test has limitations when used alone,, their combined interpretation significantly enhances the diagnostic reliability and contributes to reducing negative appendectomy rates. [1][3].

KEYWORDS

INTRODUCTION

Acute appendicitis is a leading cause of emergency abdominal surgeries,especially in younger individuals. Although symptoms like right iliac fossa pain and fever are characteristic , diagnosis can be difficult in cases with atypical signs. The occurrence of negative appendectomy continue to pose as both clinical and economic challenges. Biomarkers like C-reactive protein (CRP) and total leucocyte count (TLC) have been recognised as helpful diagnostic tools. [5].

CRP is an acute-phase reactant produced by the liver in response to systemic inflammation. It rises proportionally with the severity of inflammation, making it useful in identifying and differentiating between uncomplicated and complicated appendicitis. [10].

CRP testing offers several advantages over imaging techniques such as CT scans, which involve exposure to potentially harmful ionizing radiation. CRP is non-invasive, safe, inexpensive and repeatable, making it particularly suitable for use in children, young adults, and pregnant women—populations in which minimizing radiation exposure is critical. Additionally, it can be used in resource-limited settings to support early diagnosis when imaging is unavailable or impractical. This study evaluates the independent and combined effectiveness of CRP and TLC in diagnosing acute appendicitis using histopathological analysis as the benchmark. [11].

MATERIALS AND METHODS

This prospective observational study included 154 patients and was conducted over a period of two years. Participants were selected based on a clinical suspicion of acute appendicitis, having undergone surgical removal, and having available preoperative CRP and TLC results. Patients with known comorbid conditions affecting CRP levels, those managed without surgery, and pregnant individuals were excluded. The study measured diagnostic accuracy through sensitivity, specificity, PPV, NPV, and correlation with final histopathology.

Table 1: Inclusion And Exclusion Criteria

Inclusion Criteria

- Patients with clinical symptoms of acute appendicitis
- Conditions altering CRP
- Preoperative CRP and TLC tested

Exclusion Criteria

- Conservative management
- Pregnancy
- Chronic or interval appendicitis cases

RESULTS

Among the 154 patients, the male-to-female ratio was around 1.5:1, with individuals aged 11–30 years being the most affected. Right iliac fossa pain was reported across all the cases consistently. Histopathology confirmation of acute appendicitis was found in 112 patients.

Table 2: Gender Distribution [15].

Gender	Number of Patients	Percentage
Male	92	59.7%
Female	62	40.3%

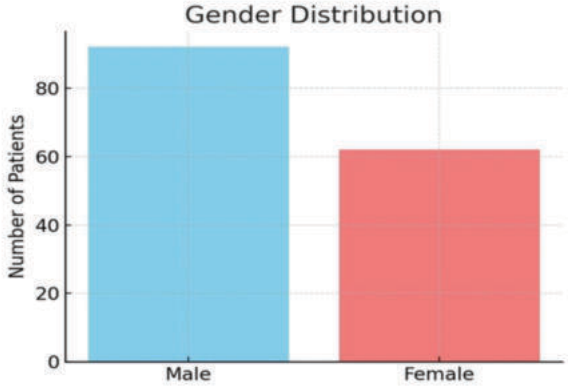
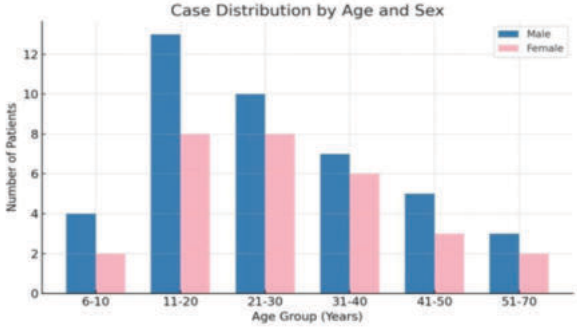


Figure: Case Distribution By Age And Sex

Table 3: Diagnostic Accuracy Of CRP, TLC, And Combined

Parameter	Sensitivity	Specificity	PPV	NPV	Accuracy
CRP	91.6%	81.8%	91.6%	81.8%	88.5%
TLC	87.5%	77.2%	89.2%	73.9%	84.2%
CRP + TLC	93.1%	88.2%	95.3%	78.9%	90.3%



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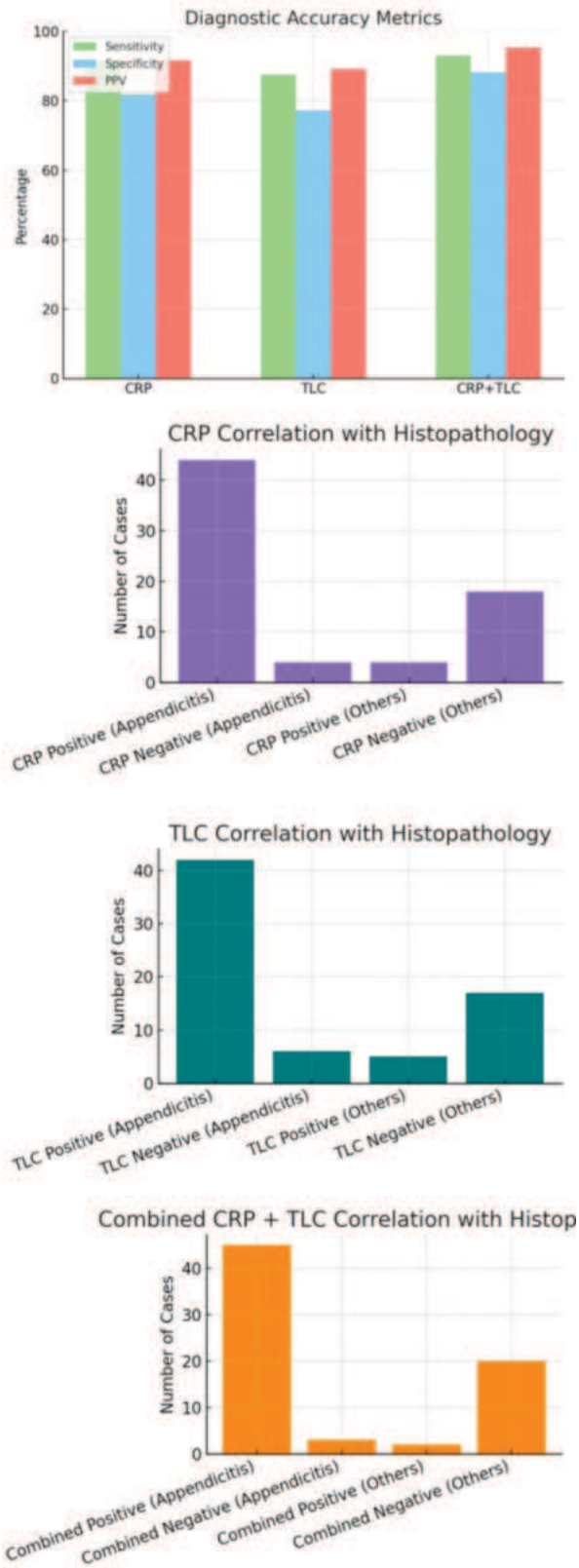

Figure: CRP, TLC and Combined Test Correlations

Table 4: Correlation Between HPE, CRP, TLC, And Neutrophils

Test	Sensitivity	Specificity	PPV
Total Count + Neutrophil Count + CRP	65.6%	95%	97.7%
Total Count + Neutrophil Count	67.2%	90%	95.6%
Neutrophil Count	75%	90%	96%
Total WBC Count	76.6%	80%	92.5%
CRP	96.9%	75%	92.6%

DISCUSSION

The present study reinforces the utility of CRP and TLC as effective adjuncts in diagnosing acute appendicitis, with combined use yielding higher diagnostic accuracy than either marker individually. Our findings are consistent with previous literature that emphasizes CRP's high sensitivity and TLC's moderate specificity in identifying inflammatory processes. The improved accuracy of 90.3% when both markers are used together underscores their synergistic value. Moreover, this approach may help reduce negative appendectomy rates, particularly in equivocal clinical presentations. Numerous studies including the present one, highlight the diagnostic and predictive value of CRP and TLC in acute appendicitis. CRP alone demonstrated a sensitivity of 91.6% and specificity of 81.8%, while TLC showed sensitivity of 87.5% and specificity of 77.2%. When interpreted together, diagnostic performance improved significantly- with combined sensitivity reaching 93.1% and accuracy 90.3%. These findings are supported by prior research, including meta-analysis and prospective studies, which emphasise that combined interpretation of CRP and TLC increases diagnostic confidence and supports better clinical decision-making.[1][3].

Furthermore, recent investigations have explored whether CRP and TLC levels can predict the severity of appendicitis or the likelihood of complications. Elevated CRP values have been associated with complications such as gangrenous or perforated appendicitis- as CRP levels tend to rise proportionally with both the intensity and duration of inflammation. Similarly, markedly elevated TLC might signal a more aggressive immune response indicating progression to complicated appendicitis. Several studies favor the use of CRP and TLC thresholds to stratify patients into risk categories, benefiting clinicians in identifying those in need of urgent surgical intervention from those that can be managed conservatively. Thus, beyond aiding in diagnosis these markers also offer prognostic value which guide treatment decisions and resource prioritisation also. [21][22].

While histopathology remains the definitive diagnostic tool, the integration of these biomarkers into clinical assessment can enhance early decision-making. Notably, the study population's demographic distribution, primarily young adults, aligns with global trends in appendicitis incidence. Overall, CRP and TLC can serve as accessible, cost-effective diagnostic tools in resource-limited settings. In addition to their diagnostic value, CRP and TLC offer practical advantages over radiological investigations like CT scans, which are while effective, carry the risk of ionizing radiation exposure. This is concerning particularly in pediatric and reproductive-age groups. CRP, being a simple blood test, poses no such risks and can also be safely repeated to monitor disease progression. Its accessibility, costeffectiveness and safety profile make it an attractive diagnostic adjunct, especially in primary care or rural settings where advanced imaging may not be readily available. Thus, CRP contributes not only to improved diagnostic accuracy but also to safer and more equitable patient care. [8][9].

Limitations

This study excluded non-surgical cases of suspected appendicitis, which may have introduced selection bias. Additionally, imaging findings such as ultrasound or CT scan were not evaluated, limiting the comparison between laboratory and radiological diagnostics.

CONCLUSION

The combination of CRP and TLC substantially improves diagnostic confidence in suspected cases of acute appendicitis, thereby helping reduce the frequency of negative appendectomy rates. While these laboratory parameters should not replace clinical evaluation, they serve as valuable adjuncts in decision-making.[3][4].

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