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PROSPECTIVE STUDY OF C-REACTIVE PROTEIN LEVEL IN DIAGNOSIS OF ACUTE APPENDICITIS

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Abstract

Background: Acute abdominal pain is a common complaint among emergency department patients. Diagnosis of one of the most common pathologies behind acute abdominal pain, acute appendicitis, has radically changed over the last decades.

Methods: The source of data was from pretested proforma which takes into account clinical history, general physical examination, relevant investigations imaging modalities. All data were analyzed by Epi-info software.

Results: Mean CRP level in 0-6 mm appendix diameter patients was 1.63±2.32mg/dl, in 6-8 mm diameter cases was 2.89±3.67mg/dl, 8-10 mm cases CRP level was 3.60±3.24 mg/dl and in 10-12 mm diameter cases CRP level was 3.61±2.28 mg/dl.

Conclusion: Raised serum C-reactive protein reducing the rate of negative explorations.

Keywords: CRP, Appendix, Pain

Introduction

Acute abdominal pain is a common complaint among emergency department patients. Diagnostics of one of the most common pathologies behind acute abdominal pain, acute appendicitis, has radically changed over the last decades. Traditionally, the diagnosis of appendicitis was made solely based on clinical symptoms and signs, and later diagnosis included results of inflammatory laboratory variables such as leukocytes, neutrophils and CRP. This practice in diagnostics led to a false positive diagnosis (negative appendectomy) rates in the range of 15-30% [1-3]. So it requires data & correlation to diagnosed appendicitis in time.

C-reactive protein (CRP) together with other acute phase proteins increases in response to tissue injury. Many studies have shown the value of raised serum CRP quantitative measurement in improving the diagnosis of acute appendicitis.[4]

In this study we correlate the quantitative serum levels of CRP with the diameter of appendix in acute appendicitis. This study emphasizes the impact of normal rather than raised serum C-reactive protein in reducing the rate of negative explorations.

Materials and Methods

Source data

The source of data was from pretested proforma which takes into account clinical history, general physical examination, relevant investigations, imaging modalities and follow up of patients which was spread over the study period from July 2019 to June 2020. The study was performed on 100 patients admitted in Department of general surgery , S.P. Medical College and Associated Group of Hospitals, Bikaner. They were diagnosed clinically as to have acute appendicitis after satisfying inclusion and exclusion criteria in this study.

They were included after explaining them about the study and taking their written consent.

Inclusion Criterion

The inclusion criteria were following:

All the patients who admitted to S.P. Medical College and Associated Group of Hospitals, Bikaner, during the study period with diagnosis of acute appendicitis and posted for surgery were included in the study.

Exclusion Criterion

The exclusion criteria were following:

1. Children below 12 years and elderly above 60 years were excluded as the CRP response is not optimal.

2. Patients who managed conservatively or individuals who had undergone appendicectomy excluded from this study.

3. Patients with past history of jaundice, signs and symptoms of liver disease, chronic alcoholic and with other coexisting acute inflammatory conditions were excluded, as CRP is exclusively produced in liver and raised in acute inflammatory condition.

4. Females taking oral contraceptive pill or pregnant were excluded as CRP is elevated in these individuals.

5. Patients, not willing to participate in the study (who refused to give consent).

Measurement of serum CRP level :

Quantitative assessment of serum CRP was done using human CRP kit based on the principle of solid -phase enzyme-linked immunosorbent assay .

Ultrasonography:

Diameter of appendix in acute appendicitis was measured by ultrasonography and correlated with CRP levels.

Statistical analysis:

Data was analysed in terms of demographic , clinical features, blood tests -white blood cells, serum CRP levels and diameter of appendix in acute appendicitis as per ultrasonography reports preoperatively.

Results

Table 1: Diagnostic accuracy of CRP

Sensitivity	97.67%
Specificity	85.71%
Positive predictive value	97.67%
Negative predictive value	85.71%
Diagnostic accuracy	96.00%

In our study CRP test sensitivity was 97.67%, specificity was 85.71%, positive predictive value was 97.67%, negative predictive value was 85.71% and diagnostic accuracy was 96.00%.

Table 2: Association between CRP level and appendix diameter

Appendix diameter	No. of patients	CRP level (mg/dl)
0-6 mm	17	1.66±2.34
6-8 mm	38	2.90±3.61
8-10 mm	39	3.62±3.20
10-12mm	6	3.64±2.31
p-value=0.001		

Mean CRP level in 0-6 mm appendix diameter patients was 1.66±2.34 mg/dl, in 6-8 mm diameter cases was 2.90±3.61 mg/dl, 8-10 mm cases CRP level was 3.62±3.20 mg/dl and in 10-12 mm diameter cases CRP level was 3.64±2.31 mg/dl.

Discussion

In our study serum CRP level was elevated in 86% of the patients and this rate corresponds to study done at Wishaw General Hospital, Lanarkshire UK by Khan MN et al[5] 2004 where CRP levels were elevated in 85.7% of patients with acute appendicitis, also with study done by Vinoth Kumar et al [6] where 90% of patients had elevated CRP levels.

But in contrast to our study according to Mikaelson et al[7] the elevation of serum CRP levels were found in only 47% and 72% of patients respectively.

Serum CRP levels increases after the onset of inflammatory pathology, so the levels might be normal until about 12hrs after the onset of symptoms of acute appendicitis so the time interval between the appearance of symptoms and the actual testing of serum CRP levels had some bearing on the result shown by Mickaelson et al in their studies.

Table 3:

	Sensitivity	Specificity
Khan MN et al, 2004[5]	75.6%	83.7%
Vinoth Kumar et al, 2011[6]	94.4%	95.5%
Shozoyokoyama et al, 2007[8]	84.3%	75.8%
Asfar et al, 2000[9]	93.6%	86.6%
Our study	97.67%	85.71%

According to our study the sensitivity and specificity of serum levels in diagnosis of acute appendicitis is comparable to the results given by other researchers. So it is derived from different studies that serum CRP test is highly sensitive and specific in making diagnosis of patients who truly had acute appendicitis.

Conclusion

No doubt surgeon's clinical diagnosis using time tested clinical signs is effective in diagnosing acute appendicitis. However elevated serum CRP levels and appendix diameter support the surgeon's diagnosis and hence avoids chances of error in diagnosis, due to atypical presentations and may avoid negative appendicectomy.

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