



ROLE OF LEVEL OF C-REACTIVE PROTEIN MEASUREMENT IN DIAGNOSIS OF ACUTE APPENDICITIS

General Surgery

Dr. Milandeeep

Dr. Vivek Bhasker* *Corresponding Author

Dr. Gajendra
Pandit

Dr. Vinod Bhavi

Dr. M. D. Kerketta

ABSTRACT

INTRODUCTION: acute appendicitis is a common surgical emergency. Measurement of blood CRP level can aid in getting the right diagnosis. **MATERIAL AND METHODS:** 80 patients of acute appendicitis who underwent appendectomy were included in this study. Preoperative CRP was measured in each case and postoperative HPE examination of excised specimen was done. **RESULTS:** acute appendicitis is more common in young females. Clinical diagnosis of acute appendicitis has accuracy of 85%. CRP level measurement can increase the diagnosis of acute appendicitis up to accuracy of 93.7%. **DISCUSSION AND CONCLUSION:** Blood CRP level measurement has been studied in many researches as an aid to clinical methods in diagnosis of acute appendicitis. This study concludes that CRP can help in the diagnosis especially in cases of severe form of acute appendicitis.

KEYWORDS

CRP (C- Reactive Protein), Acute appendicitis, histopathological examination (HPE), gangrenous appendicitis

INTRODUCTION:

Acute appendicitis remains a common surgical emergency in patients presenting with acute abdominal pain. An adequate history and clinical examination is usually enough to make a diagnosis of acute appendicitis. But clinicians often rely on blood tests and imaging to support and improve the accuracy of diagnosis.^{1,2}

Measurement of blood CRP (C - reactive protein) level is one such investigation which can help in diagnosis of acute appendicitis. CRP is an acute phase reactant synthesized by the liver in response to infection or inflammation and rapidly increases within the 1st 12 hours. The rate of CRP production increases with inflammation, infection, trauma, necrosis, malignancy, and allergic reaction. In this study we have tried to find out usefulness of CRP measurement in diagnosis of acute appendicitis.

MATERIAL AND METHODS:

This is a prospective study done in department of general surgery, RIMS, Ranchi over a period of 1 year (august 2017 to July 2018). 80 consecutive patients of acute appendicitis who underwent appendectomy were included in this study. Patients with associated comorbidity which can lead to altered CRP level were excluded from the study.

Patients in study were diagnosed clinically as cases of acute appendicitis. In these clinically diagnosed cases total and differential leukocyte count was done and level of CRP was measured pre-operatively. Imaging investigations like X-RAY of KUB region and Ultrasonography of abdomen were done in some cases to rule out other pathology. Decision of appendectomy was taken based upon clinical findings and leukocyte count. Specimen of appendix obtained after appendectomy was sent for histopathological examination (HPE) in all cases. Patient details, clinical presentation, results of investigation, operative findings and details of postoperative period were recorded in a data collection sheet. Statistical analysis was done using MedCalc software.

RESULTS:

In our study total 80 patients undergoing appendectomy for acute appendicitis were included. Out of 80; 54 were female and 26 were male.

| SEX | MALE | FEMALE | TOTAL |
|--------------------|-----------|-----------|-------|
| number of patients | 26(32.5%) | 54(67.5%) | 80 |

Mean age of patients was 24.98 years with standard deviation of 9.07 years.

Cases were divided in 4 age groups. A maximum of 33 patients included in our study were from <20 years age group, 26 were in 20-30 years age group, 14 were in 30-40 years age group and 7 were in >40 years age group.

| AGE GROUP | NUMBER OF PATIENTS |
|-------------|--------------------|
| <20 years | 33(41.2%) |
| 20-30 years | 26(32.5%) |
| 30-40 years | 14(17.5%) |
| >40 years | 7(8.7%) |

PRESENTATION: Pain abdomen and Tenderness was present in all the 80 cases. Second most common complaint was Fever found in 52 cases. Anorexia was seen in 28 cases and Nausea and Vomiting was present in 27 cases

| CHIEF COMPLAINS | NUMBER OF PATIENTS |
|---------------------|--------------------|
| Pain and Tenderness | 80(100%) |
| Fever | 52(65%) |
| Anorexia | 38(47.5%) |
| Nausea & Vomiting | 37(46.2%) |

HPE was done in all cases showed no features of inflammation in 12 (15%) cases, inflamed appendix in 46 (57.5%) cases and perforated/gangrenous appendix in 22 (27.5%) cases. So, in this study clinical methods can diagnose acute appendicitis with a Positive predictive value as well as Accuracy of 85%.

| HPE EXAMINATION REPORT | NO. OF PATIENTS |
|---|-----------------|
| No inflammation / Negative appendectomy | 12 (15%) |
| Inflamed appendix | 46 (57.5%) |
| Perforated/ Gangrenous appendix | 22 (27.5%) |
| | 80 (100%) |

In 12 cases of appendix without inflammation (HPE finding), mean CRP level was 4.6mg/L, 2 cases had CRP raised (>6mg/L) and 10 cases had CRP level not raised (<6mg/L).

In 46 cases of inflamed appendix, mean CRP was 17.4mg/L. Out of these 46, three cases didn't have raised CRP while rest 43 had raised serum CRP level.

In 22 cases of perforated/gangrenous appendix, mean CRP level was 55.3 mg/L and each case had CRP level > 6mg/L.

| HPE examination report | Mean CRP | No. of patients with raised CRP | No. of patients with normal CRP | Total |
|---|-----------|---------------------------------|---------------------------------|-------|
| No inflammation / Negative appendectomy | 4.6mg/L | 2 | 10 | 12 |
| Inflamed appendix | 17.4mg/L | 43 | 3 | 46 |
| Perforated/ Gangrenous appendix | 55.3 mg/L | 22 | 0 | 22 |

Based on these findings, for the diagnosis of acute appendicitis, clinical methods along with CRP level measurement has Sensitivity of 95.5%, Specificity of 83.3%, Positive predictive value of 97.02%, Negative predictive value of 76.92% and Accuracy of 93.75%.

DISCUSSION:

Although lifetime risk of acute appendicitis shows a male preponderance in western countries³; in our study 67.5% of clinically diagnosed cases of acute appendicitis were female and 32.5% were male.

Common biological markers that have been studied in the diagnosis of acute appendicitis, apart from the WBC, are: The Differential Leukocyte Count (DLC), the C-Reactive Protein (CRP), Erythrocyte Sedimentation Reaction (ESR), Tumor Necrosis Alpha (TNF-alpha), Alpha 1-Glycoprotein (alpha 1gp), leukocyte elastase complex (elastase), Interleukine-8 (IL-8), Interleukine-6 (IL-6), Interleukine-10 (IL-10) and many more.^{4,5} Out of these CRP has been mentioned in many studies as a diagnostic biological marker in abdominal inflammatory conditions. In our study diagnosis of appendicitis was done by clinical method with a Positive predictive value and Accuracy of 85%. In study done by Pruekprasert et al. the Accuracy for the surgeon's assessment was 90%.⁶

In our study mean CRP was 55.3mg/L in *severe* appendicitis (perforated/gangrenous appendix on HPE) cases while mean CRP in *less severe* appendicitis (inflamed appendix on HPE) was 17.5mg/L. This difference is statistically significant. Similar results were seen in study by Xharra et al where they demonstrated that CRP was directly related to the severity of inflammation.⁷

In study done by Joel Mathew John et al they found that CRP levels were found to be highly sensitive and specific for the diagnosis of acute appendicitis.⁸ In another study done by Sijo k. john et al they found that serum CRP level estimation in the diagnosis of acute appendicitis yielded a sensitivity of 98% and specificity of 87%.⁹ In another meta-analysis by chung JL et al sensitivity of 53-88% and specificity of 46-82% was noted.¹⁰ In our study CRP level measurement combined with clinical methods for diagnosis of acute appendicitis, has Sensitivity of 95.5%, Specificity of 83.3%, Positive predictive value of 97.02%, Negative predictive value of 76.92% and Accuracy of 93.75%.

CONCLUSION:

Blood CRP is an inflammatory marker which may be raised in many conditions. In cases of acute appendicitis diagnosis is most commonly done by clinical methods. Blood CRP level can assist in decision making process. It specially is useful in diagnosing severe forms of acute appendicitis (e.g. perforated and gangrenous appendicitis)

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