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COMPARATIVE STUDY OF C-REACTIVE PROTEIN IN CASES OF ACUTE ABDOMINAL PAIN

General Surgery

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ABSTRACT

Background: C - reactive protein (CRP) has varied implications in different clinical presentation. Role of C - reactive protein in acute abdomen is a disputable matter. This study was undertaken to evaluate the usefulness of measuring the value of CRP in the plasma in the cases of acute abdominal pain.

Patients & Methods: Eighty patients were included in the study presenting with abdominal pain which comprised of study group (40 patients) and control group (40 patients). Patients included in study group were those who presented with acute abdominal pain of less than 12 hours duration, needing injectable analgesics. Patients in control group were those who presented with history of abdominal pain of less than 12 hours of duration and pain resolving with oral analgesics. Patients in both groups presented to Dr Baba Saheb Ambedkar Medical College and Hospital, Rohini, Delhi from January 2015 to June 2016. CRP was measured by immune-turbidimetry (quantitative assay) at 0- hours and 12 hours.

Results: C-reactive protein has various implications as diagnostic and prognostic tool in patients with acute abdomen. Its role as a diagnostic tool remains questionable. However, as per our results, high CRP level helps in substantiating a diagnosis of acute abdomen, thereby, enabling early intervention/ management. It is, however, not helpful in the diagnosis of specific causes of acute abdomen. CRP levels also failed to determine whether the patient should undergo operative or conservative management.

Conclusion: Moderate to severe elevated levels of CRP (>6mg/ml) helps in substantiating the diagnosis of acute abdomen. CRP levels do not help in diagnoses of specific cause for acute abdomen. In view of small sample size in the study, it would be desirable to have large multi-centric study to confirm the findings.

KEYWORDS

C - reactive protein (CRP), Acute abdomen, Surgical, Abdominal pain

INTRODUCTION

An experienced emergency physician might compare the painful abdomen to the dark side of the moon—a terrain both indistinct and enigmatic. Abdominal pain is one of the most frequent emergency department (ED) complaints, accounting for approximately 4-8% of all adult ED visits. [1,2] In up to 40% of patients, the origin of abdominal pain is never determined.1There is a great deal of error in the diagnosis of abdominal pain. When initial and final diagnoses are compared, accuracy is no better than 50% and 65%, respectively. [3-4]

A raised serum C-reactive protein (CRP) is one entity of the body response to acute inflammation known as the "acute phase response". This may be the result of many immunological reactions and inflammatory processes. C-reactive protein (CRP) is a non-specific inflammatory marker that is used routinely in evaluating various conditions associated with acute abdomen.[3,4,5,6] CRP plasma levels can be detected as early as 4 hours after injury and peak (1000-fold increase) between 24 and 48 hours after injury.[7,8]Therefore this study was undertaken to evaluate the usefulness of measuring the value of CRP in the plasma in diagnosing the cases of acute abdomen of surgical importance.

AIMS AND OBJECTIVES

Prospective study on the role of C - reactive protein (CRP) in cases of abdominal pain presenting to the emergency department.

MATERIAL AND METHODS

A total of 80 patients were enrolled in this study which included 40 patients in study group and 40 patients in the control group who were admitted from Jan. 2010 to June 2011.

- Study Group (40 patients): These were patients who presented with acute abdominal pain requiring injectable analgesics.
- Control Group (40 patients): These were patients who presented with history of abdominal pain and pain resolving on oral analgesics only.

History and Physical examination was done in all patients. Blood samples of all patients were collected and C-reactive protein levels were measured at the time of presentation (0 hours) and at 12 hours after sending the previous sample. Additional investigations were also done were done as per the diagnostic and management requirements i.e Haematological and biochemical profile, Chest X-ray, USG abdomen and CECT abdomen, etc.

Based on the history, physical examination and investigations, a working diagnosis was made for the management purpose which was subsequently confirmed by appropriate means. Per-operative findings were also included for the diagnostic purpose wherever applicable.

The laboratory methodology for C-reactive protien used in our study was a quantitative (immune-turbidimetric) test, which directly measures the amount of agglutination or precipitation caused by the presence of CRP-antibody complexes. **CRP levels<2mg/L are considered normal.**

ANALYSIS AND RESULTS

The data was collected and analyzed for all patients. We assessed the role of C-reactive protein in different conditions encountered during this study and we assessed the role of C-reactive protein in the diagnosis of acute abdomen of surgical significance.

Statistical Methods:

Data was expressed as mean ± SD for parametric data or median with a minimum and a maximum value for nonparametric data. Since the distribution of data was not normal so medians (min-max) were used for analysis except age. Categorical variables are expressed as frequencies and percentages. Student's t test or Mann Whitney U test was used for comparison of continuous variables between the two groups as appropriate. Student's t test was used for comparison of Age between the two groups. Wilcoxon Signed Rank test has been used to compare within the groups from 0 hrs to 12 hrs. Differences between groups were assessed with Fisher's exact test for categorical variables. P value of <0.05 was taken as significant.

RESULTS:

Mean age for the study group was 42.57 years with standard deviation of 14.87, whereas the mean age for control group was 40.13 years with standard deviation observed of 15.97.The age was comparable in the two groups (p value > 0.05).

C – Reactive Protein values were recorded at the time of admission ("0" hours) and at 12 hours. The CRP values at 0 and 12 hours and the pattern of change were analyzed both in study and control groups. Lab range varied from 0 to 150 mg/lit. In the study group, the median CRP level was 20mg/lit at 0 hours and 83mg/lit at 12 hours. At 12 hrs, the

study group had statistically higher median value than 0 hrs (p<0.0001). In the control group, the median value was 1.8mg/lit at 0 hours and 4.5mg/lit at 12 hours. At 12 hrs, the control group also had statistically higher median value than 0 hrs (P=0.008).The median CRP levels at 12 hrs were statistically significantly higher in study group as compared to control group. The CRP values at 12 hrs in both groups were raised significantly compared to base line levels (0 hours). However, the rise in CRP values at 12 hrs was significantly more in the study group (2-150 mg/lit) compared to the control group (0-78 mg/lit). (Table-1)

Table 1: CRP values in the study and control groups

	0 hrs		12 hrs		P value
	Median	(Min-Max)	Median	(Min-Max)	
Study group	20	(0-150)	83	(2-150)	<0.0001
Control group	1.8	(0-39)	4.5	(0-78)	0.008

In our study, Pancreatitis (14), Acute cholecystitis (7), Perforation peritonitis (7), Acute appendicitis (6), and Acute intestinal obstruction (5) were more common in the study group.

On the other hand, Biliary colic (15), Gastroduodenitis (14), Non-specific abdominal pain (8), Colonic pseudoobstruction (3) were more common in the control group.

CRP values were measured at 0 hours and 12 hours in study group to see whether there was a correlation for operative vs. conservative management.

CRP values were categorized in four ranges –normal to mild (0-5mg/lit), moderate (6-50mg/lit), severe (51-100mg/lit) and very severe (>100mg/lit).urs

	Total	Operative	Conservative
0 to 5	14	6	8
6 to 50	15	7	8
51 to 100	2	2	0
>100	9	4	5

Distribution was analyzed for CRP values at 0-hours.
In the study group, normal to mild elevation was observed in 14 patients at 0 hours. Of these 6 underwent operative management while 8 were treated conservatively. Moderate rise was observed in 15 patients, of whom 7 underwent operative management and 8 were managed conservatively. Severe rise was observed in 2 patients, both of whom underwent operative management. Of the remaining 9 patients with very severe rise of CRP, 4 underwent operative management while 5 were managed conservatively.

At 12 hours
Table III: CRP values in study group at 12-hours

	Total	Operative	Conservative
0 to 5	3	0	3
6 to 50	7	2	5
51 to 100	14	9	5
>100	16	8	8

CRP levels at 12 hours were further analyzed in the study group for operative vs. conservative manageeverely elevated CRP levels of whom, 9 underwent operative management while 5 patients were managed conservatively. [16] patients had very severe elevation of CRP level. [8] of these patients were managed by operative means while remaining 8 were managed conservatively.

Thus, CRP levels at 0 hours or 12 hours does not determine whether the patient will receive surgical or conservative management during the same hospital stay.

DISCUSSION

Acute abdomen remains quite a diagnostic challenge. Acute abdomen includes many clinical entities which may be present alone or sometimes altogether. An early accurate diagnosis & appropriate management is of utmost importance to prevent complications. Clinical appraisal remains the most critical initial phase in assessing patients with an acute abdomen. In any case, clinical examination has been observed to be just exact in 47– 76% of patients with intense abdominal pain.[10,11,12] Even the most experienced specialist will influence amend finding in just 4 to out of 5 cases. This drops to half with junior specialists and specialists working in the community.[13] Delay in finding may build bleakness and mortality in these patients.

C-receptive protein (CRP) is a inflammatory marker that is utilized routinely in numerous conditions as a guide to evaluate the patients with an acute abdomen. Generally studies on the estimation of CRP in patients with an acute abdominal pain have concentrated mainly on acute appendicitis.[14,15,16,17] Few investigations have surveyed the indicative part of CRP in patients of acute abdomen with various other causes. We tried to evaluate comparative role of C- reactive protein levels in two groups of patients with abdomen pain by measuring C-reactive protein levels at the time of admission (0-hours) and at 12-hours.

There was statistically significant rise in CRP levels in both study and control groups. However, the median CRP levels in control group were either normal or only mildly elevated. In comparison to this, the median values of CRP levels at 0 hours and 12 hours in the study group were higher (moderate to severe range). Therefore, the presence of moderate to severely high levels of CRP helps in the diagnosis or substantiation of acute abdomen. This is not surprising because being an acute phase reactant, the CRP levels are expected to rise in acute abdominal conditions. The CRP levels were assessed with different abdominal conditions causing acute abdomen and no correlation was found in the study. Hence, CRP levels are not a useful diagnostic tool for specific cause of acute abdomen.

Pancreatitis (14) was the commonest diagnosis in study group, followed by acute cholecystitis with cholelithiasis (7), perforation peritonitis (7), acute appendicitis (6) etc. On the other hand, biliary colic (15) was the commonest diagnosis in control group followed by gastroduodenitis (14), non-specific abdominal pain (8), colonic pseudo- obstruction (3) etc. When both groups were studied for operative versus conservative management on the basis of 0 hours and 12 hours CRP levels, there was no statistically significant result. Comparison of the CRP values on the basis of severity in four categories (normal to mild, moderate, severe and very severe) showed no correlation of CRP level with management modality, i.e. operative or conservative in either group. Thus, the modality of management i.e. operative or conservative was not dependent on the CRP levels. Rather it is the merit of the diagnosis which dictates the management plan.

CONCLUSION

To summarise, we conclude that C- reactive protein has various implications in patients with acute abdomen. Its role as a diagnostic tool remains questionable. However, as per our results, high CRP level helps in substantiating a diagnosis of acute abdomen. It is however not helpful in the diagnosis of specific causes of acute abdomen. CRP levels also failed to determine whether the patient should undergo operative or conservative management.

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