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A STUDY ON ROLE OF C-REACTIVE PROTEIN IN PROGNOSIS AND MANAGEMENT OF ACUTE INTESTINAL OBSTRUCTION

General Surgery

Dr. (Prof) I. S. Thakur Professor, Department Gen. Surgery, PMCH, Patna
Dr. Prity Kumari* Junior Resident, Department of Gen. Surgery, PMCH, Patna *Corresponding Author
Dr. Madhu Kumari Junior Resident, Department of Gen. Surgery, PMCH, Patna

ABSTRACT

Background: Intestinal obstruction is one of the most common and challenging clinical conditions encountered in surgical practice. The potentially serious life threatening complication of intestinal obstruction is strangulation which leads to bowel gangrene and needs emergency exploratory laparotomy. Serum CRP have been proposed as a marker of intestinal ischemia. In this study we would evaluate the role of CRP in diagnosing ischemia of the bowel in cases of acute intestinal obstruction. **Materials And Methods:** Hospital based prospective study was performed on 100 patients admitted in P. M. C. H. Patna in surgical emergency with diagnosis of acute intestinal obstruction and had emergency exploratory laparotomy. **Results:** for predicting strangulation, Cut Off value of 40 mg/l for CRP was used and sensitivity, specificity, positive predictive value and negative predictive value from the study were 83%; 80.67%, 73.82% and 86.89% respectively. **Conclusions:** serum CRP can be useful as a marker of strangulation in cases of acute intestinal obstruction.

KEYWORDS

CRP, intestinal obstruction, strangulation

INTRODUCTION

Intestinal obstruction is one of the most common and challenging clinical conditions encountered in surgical practice. A potentially serious life threatening complication of intestinal obstruction is strangulation in which the blood supply is compromised leading to gangrenous bowel. The rapid onset of ischemia and bowel infarction explains the lethality of this condition. Overall mortality rate in strangulated bowel obstruction is 30% as compared to 3% in Simple obstruction. The most common cause of intestinal obstruction is strangulated hernia in India and post-operative adhesions in developed countries.

Pre-operative assessments of presence or absence of strangulation from available parameters are correct in only 70% cases, rest 30% comes out as a surprise but early resuscitation and surgical exploration minimise its morbidity and mortality. Therefore early recognition of strangulation is important. Classical signs of strangulation include sudden onset of pain, i.e., continuous pain, the early appearance of shock, fever, tachycardia, leukocytosis and abdominal tenderness.

The role of various biochemical markers have been studied to find the early indicator of intestinal strangulation. Some of these markers includes serum tumour necrosis factor Alfa, CRP, interleukin-6, D-lactate, D-dimer, alpha glutathione s-transferase, intestinal fatty acid binding Protein, lactate dehydrogenase etc.

C-reactive protein is a member of pentraxin Protein family which was discovered in 1930 by Tillet and Francis as a protein reaching with polysaccharide of cell wall of streptococcus pneumonia.it is an acute phase reactant synthesised in liver. It has a half life of 19 hours and there is no diurnal variation as compared to other acute phase reactants. Its level rapidly increases within hours in response to stress, tissue injury, ischemia other inflammatory conditions. CRP also have the ability to activate the classical pathway of complement systems, that may contribute to the exacerbation of inflammatory is chemic injury. C-reactive protein have been to be helpful in early diagnosis of ischemic condition.

The aim of this study was to evaluate the role of CRP as a predicting marker of bowel strangulation in cases of acute intestinal obstruction.

MATERIALS AND METHODS

A prospective study was conducted on patients presenting to PMCH, Patna from October 2020 to October 2022. 100 patients with diagnosis of acute intestinal obstruction and underwent emergency exploratory laparotomy were taken for study.

Inclusion Criteria

- All patients more than 14 years of age presenting with acute intestinal obstruction and underwent emergency exploratory laparotomy.
- Patients who are wiling to participate in the study

Exclusion Criteria

- Any chronic illness like rheumatoid arthritis, connective tissue disorder, active liver disease, known case of malignancy, chronic kidney disease.
- A known case of Koch's abdomen.
- Cardiac disease like myocardial infarction, coronary artery syndrome etc.
- Known infections
- Trauma – spinal injury, orthopaedic procedure on spine or pelvis
- Patients not wiling to participate

Laboratory Tests

Blood samples (venous) from 100 patients were taken at the time of admission in the emergency and had the diagnosis of intestinal obstruction.

Blood was collected and sent for measurement of serum CRP levels and total leukocyte count.

Measurement Of CRP

Quantitative assessment of S. CRP was done in laboratory and data was analysed to find any significant association between CRP and strangulation of intestine in cases of intestinal obstruction.

Statistical Analysis

Data were analysed in comparison of clinical features, blood tests (WBC, CRP) at the time of admission and intra-operative findings. Tables were prepared using Pearson's chi square test to compare the clinical characteristics, Operative finding and blood tests between the patients with strangulation and patients without strangulation. The p-value of <0.05 were considered significant.

RESULTS

Based on intra-operative findings causing acute intestinal obstruction all patients were divided into two categories:

1. Group A- Obstruction with strangulation
2. Group B- obstruction without strangulation

The mean age in group A was 47.15 +/-17.52 years and mean age in group B was 48.20+/-19.23 years.

Table1: Patient Features

Patient characteristics	Obstruction with strangulation (n=40)	Obstruction without strangulation (n=60)	Total (n=100)
Age (mean, year)	47	48	

Duration of symptoms (Mean, days)		3.6	5.2	
Diffuse pain(%)		70	55	
Generalised distension(%)		48	40	
Vomiting(%)		52	48	
Obstipation(%)		45	40	
History of previous surgery(%)		42	40	
Shock(%)		68	43	
Tenderness(%)		52	44	
Guarding/ rigidity (%)		61	56	
Bowel sound	Exaggeration (%)	43	61	
	Absent(%)	57	39	

Table 2: S. CRP level

	Group A (Obstruction with strangulation)		Group B Obstruction without strangulation)	
	Mean	SD	Mean	SD
S.CRP level	90.5	26.17	36.87	16.6
P value	0.001			

Group a (intestinal obstruction with strangulation) had mean and SD 90.5 and 26.17 and group B intestinal (obstruction without strangulation) had mean and SD 36.87 and 16.6 respectively with p value of 0.001. The mean CRP level differences in both groups were statistically significant.

Table 3: Sensitivity And Specificity For Elevated CRP Level

CRP level	Group A (obstruction with strangulation)	Group B (obstruction without strangulation)
Increased	34	12
Normal	6	48
Total	40	60
P value	0.001	
Sensitivity	83.00%	
Specificity	80.67%	
Positive predictive value	73.82%	
Negative predictive value	86.89%	

For predicting strangulation cutoff value of 40 mg/l for CRP was used and sensitivity, specificity, positive predictive value and negative predictive value from the study were 83%; 80.67%, 73.82% and 86.89% respectively.

Table 4: Total Leukocytes Count

	Group A (Obstruction With strangulation)		Group B (Obstruction without strangulation)	
	Mean		Mean	
TLC,	16042		10240	
P value	0.21			

In the above table, mean TLC of group A was 16042 and mean TLC of group B was 9460. The p-value was > 0.05 between TLC and strangulated bowel obstruction that shows positive but weak correlation and statistically insignificant.

The study showed that serum CRP values were significantly higher in strangulated bowel obstruction as compared to obstruction without strangulation. It also showed TLC was also higher in strangulated bowel obstruction but with higher P value. The cutoff value for serum CRP was 40 mg/L.

In this study sensitivity and specificity of serum CRP were 83% and 80.67% respectively with positive predictive value of 73.82% and negative predictive value of 86.89 %. So P value between the level of CRP and gangrenous bowel was 0.001 showed positive correlation and also statistically significant.

The study had also shown that patients with strangulated bowel obstruction came early within a week with a mean duration of 3.6 days. So, it appears that early diagnosis and management can reduces the mortality and morbidity in cases of acute intestinal obstruction.

Serum CRP was significantly increased in patients with gangrenous bowel. So, it appears that serum CRP can be used as objective indicator to diagnose strangulated bowel.

DISCUSSION

The potentially serious life threatening complication of intestinal obstruction is strangulation and it requires prompt diagnosis. Mortality rate in cases of intestinal obstruction have found association with delay in management with progression to strangulation. Due to strangulation mortality increases up to 30% as compared to 3% in simple bowel obstruction. Therefore intestinal obstruction requires early diagnosis and management. Delay in the diagnosis and intervention may leads to mortality of the patients. Therefore immediate and accurate diagnosis of acute intestinal obstruction is essential for effective management and good prognosis. Earlier is the diagnosis and intervention, better is the prognosis. This study had shown that serum CRP can be useful biomarker in prediction of bowel gangrene in cases of acute intestinal obstruction.Also, in our study, serum CRP were significantly higher in cases of strangulated bowel obstruction as compared to bowel obstruction without strangulation. With regard to serum CRP, various animals and human studies have shown that it is raised in mesenteric ischemia and strangulation.In the study by Demir et al, done for identifying factors predicting the need for surgery, elevated CRP was significantly associated with bowel gangrene and an underlying predictive value for the need of Surgery. Another study done by Mehmet Haken Cevikel et, to know the identifying factors for strangulation, a experimental study on rats with intestinal obstruction. The study had shown that level of CRP and rates of bacterial translocation were higher in intestinal obstruction groups. They concluded that CRP levels increases with the severity of bacterial translocation in acute intestinal obstruction. But this study did not show difference with strangulated bowel and simple bowel obstruction. Also this study was done on rats for experiment. Another study done by Yu-Pi Lin et al to know the risk factors for intestinal gangrene in children with small-bowel volvulus. In analysis, non-bilious vomiting, Leukocytosis and elevated CRP were associated with gangrenous bowel. They concluded that elevated CRP level was associated with bowel gangrene in children with small-bowel volvulus. This study included only children, other group of age were not included in this study. Ajay K Pal et al observed that serum CRP significantly increased in cases of strangulation in Intestinal Obstruction as compared with obstruction without strangulation. Their study demonstrated that 14 patients who had strangulated bowel had higher values of CRP as compared to rest patients who had simple obstruction (116 vs 40 mg/l and). With cut off value of 60 mg/L for CRP, sensitivity specificity, positive predictive value and negative predictive value were 87.5, 58.3, 48.3 and 91.3% respectively. Our studies results were very close to this study. Serum CRP level does not required more time, is also cheap for developing countries and can be obtained in emergency setting. This study was done on small number of patients, and there was no separation of patients requiring resection of bowel due to strangulation whereas our study included large number of patients in compare to this study. The age group for the study were same in our and above study.

CONCLUSION

Serum CRP can be a useful biomarker in prediction of strangulation in the cases of acute intestinal obstruction in emergency settings.

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