ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 04 | April - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ROLE OF BIOMARKER LEVEL IN PREDICTING BOWEL ISCHEMIA IN BOWEL OBSTRUCTION- A STUDY AT TERTIARY CARE CENTRE

General Surgery

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ABSTRACT

Background: acute intestinal obstruction is an surgical emergency which needs early diagnosis and treatment accordingly. Intestinal obstruction may further proceed to intestinal ischemia/ gangrene which if untreated causes multiple organ failure due to septicemia and shock and whereas if treated causes bowel segment loss.This study was conducted to emphasize the significance of early estimation of rise in serum C- reactive protein, D- lactate, ALP and LDH levels followed by early intervention which helps in reducing the morbidity and mortality caused by bowel gangrene following obstruction.**aim:** To evaluate role of biomarker level in predicting bowel ischemia in bowel obstruction.**Result:** Trend of CRP to predict bowel ischemia having Sensitivity=59.26% and Specificity=72.73%. D- lactate to predict bowel ischemia having Sensitivity=86.67% and Specificity=73.33%. ALP to predict bowel ischemia having Sensitivity=94.44% and Specificity=80.95%.And LDH to predict bowel ischemia having Sensitivity=67.74% and Specificity=86.21%.**Conclusion:** There is increase in biomarkers more in ischemia or potential ischemic conditions. Preoperative mean CRP level was highest in patients suffering from sigmoid volvulus. While in case of D-lactate and LDH biomarkers, highest value was seen in abdominal koch's. Highest ALP findings was notified in internal hernia.

KEYWORDS

ALP, BIOMARKERS, BOWEL ISCHEMIA, BOWEL OBSTRUCTION , CRP, LDH

INTRODUCTION

Acute Intestinal Obstruction is the commonest surgical emergencies encountered in a surgical practice. There are various causes of acute intestinal obstruction from more common causes like adhesions, malignancy, hernia to uncommon conditions like intussusception. Though the common clinical presentation is abdominal pain, vomiting, obstipation and abdominal distension, it needs a thorough understanding of surgical anatomy, pathophysiology, signs and symptoms of obstruction and necessary investigations to confirm the diagnosis.

Intestinal obstruction may further proceed to intestinal ischemia/ gangrene which if untreated causes multiple organ failure due to septicemia and shock and whereas if treated causes bowel segment loss.

There are certain biomarkers and acute phase reactants released due to the inflammatory process.

Various biochemical markers, such as values of serum C-reactive protein (CRP), D- lactate, lactate dehydrogenase (LDH), alkaline liver phosphatase (ALP), tumor necrosis factorα (TNFα) ,interleukin 6, D-dimer, alpha glutathione S transferase, intestinal fatty acid binding protein (I-FABP), creatine kinase B, isoenzymes of procalcitonin and urinary phosphate have been studied in the past in cases of intestinal obstruction and/or intestinal ischemia/strangulation mainly in animal models or tissues, with relatively few studies in humans on finding a biomarker of preoperative ischemia/ strangulation.

This study was conducted to emphasize the significance of early estimation of rise in serum C- reactive protein, D- lactate, ALP and LDH levels followed by early intervention which helps in reducing the morbidity and mortality caused by bowel gangrene following obstruction. Not only these biomarkers can serve as early indicators of bowel gangrene, they are also comparatively less costly than other investigations like computer tomography (CT) which in fact may not give an idea about ischemic changes.

Here in this study we are trying to bridge a gap between the relevance of these biomarkers and prediction of bowel ischemia in bowel obstruction patients.

This when used appropriately along with signs and symptoms can help to guide a surgeon in decision making of operative management of the patient.

Aim:

To Evaluate Role Of Biomarker Level In Predicting Bowel Ischemia In Bowel Obstruction.

Objective:

To Find Out Sensitivity And Specificity Of Different Biomarkers (cro. D- Lactate, Alp, Ldh) For Evaluation Of Intestinal Ischemia/ Strangulation.

To Find Out Sensitivity And Specificity Of Combined Crp And D-Lactate Biomarkers Together For Evaluation Of Intestinal Ischemia.

Methodology

The study was conducted among indoor patients admitted at tertiary care hospital, Surat.

Study type: longitudinal study

Study duration: patients admitted and undergoing surgical intervention for obstruction from
MAY 2021 to October 2022

Inclusion criteria:

All patients aged 18-60 years with suspicion of acute intestinal obstruction and underwent Exploratory Laparotomy in the operation theatre FOR INTESTINAL OBSTRUCTION in emergency setting.

Biomarker analysed are CRP, D- lactate, LDH and ALP, these are available the biochemistry laboratory.

Patients giving consent to be part of the study.

Exclusion criteria:

Patients with coexisting medical illnesses, such as chronic kidney disease, any myocardial disease, diabetes mellitus and coagulopathy. Since these illnesses can alter the course of obstruction strangulation sequence in patients with acute intestinal obstruction. They can also lead to false-positive results, especially diabetes and chronic kidney disease.

Patients with any intra-operative finding apart from simple or strangulated bowel obstruction i.e. presence of any other pathology

exclusively apart from bowel obstruction or strangulation.
Paediatric patients (less than 18years) as the cut off levels of biomarkers would vary and would be different.

Geriatric patients above 60 years as the cut off levels of biomarkers are different and altered.

Patients planned or electively operated i.e. not in emergency setting. 58

Sampling size: 60 All patients giving consent to participate and fitting the inclusion criteria will be included in the study.

Sampling technique: Purposive technique

RESULTS

A study was conducted in 60 patients admitted in surgery ward of tertiary care hospital at Surat.

Age

In our study, mean age of the patients was 43.03±13.28 years with range of 18-68 years.

currents study involved more than 50% male patients (58.3%) while 41.7% patients were female.

In current study, more than one-fourth patients had obstructed hernia (26.7%) followed by adhesions in 20.0% patients and band in 11.7% patients. Stricture was diagnosed in 10.0% patients and 8.3% patients had mesenteric Ischemia with mesenteric twisting and mesenteric trauma individually. In about 3.3% patients, mesenteric ischemia and sigmoid volvulus were found while abdominal koch's was seen in only 1.7% patients.

More than one-fourth patients was manages with anastomosis (36.7%) followed by primary repair in 18.3% and adhesinolysis in 16.7% patients. In about 8.3% patients, band release had to done. Stroma and stricturoplasty were performed in 5.0% patients individually while in only 3.3% patients, sigmoidoplexy was done.

More than half of the patients were suffering from abdominal pain. (58.3%), Only 18.3% patients had fever. About one-third of the patients had vomited out. (36.7%) Obstipation was complained by 65.0% of patients. Tenderness was seen in one-third of the patients. Guarding was found in 31.7% patients. About three-fourth of the patients showed abdominal distension. (71.7%)

Past history was positive in 20.0% of the patients.

According to these tables, though mean preoperative CRP was high in males compared to females, statistically it was not significant. (p=0.63)

According to this table, Preoperative mean CRP level was highest in suffering from sigmoid volvulus followed by abdominal koch's and mesenteric ischemia. While in case of D-lactate and LDH biomarkers, highest value was seen in abdominal koch's followed by internal hernia and mesenteric trauma. Highest ALP findings was notified in internal hernia followed by mesenteric ischemia with mesenteric twisting.

Paired t-test was statistically significant for all biomarkers which shows significant difference between means of all biomarkers before and after surgery. (<0.05)

Significant mean difference was found in case of all biomarkers between non-viable and viable bowel.

DISCUSSION

Age and Gender

Recent study found mean age of the patients 43.03±13.28 years with 58.3% male and 41.7% female patients participated.

Similarly, a study by Ajju Kumar et al[1] shows mean age of patients is 52.21±11.5 year and males made up the majority of the patients (n=23, 62%), while females made up the rest (n=14, 38%) in this study.

On same page, a study conducted by Vengateshwar[2] in 2020 shows mean age of participants 51.13 years with a standard deviation of 12.2 years and majority male patients involved (n=53, 53%)

Diagnosis

In current study, more than one-fourth patients had obstructed hernia (26.7%) followed by adhesions in 20.0% patients and band in 11.7% patients. Stricture was diagnosed in 10.0% patients and 8.3% patients had mesenteric Ischemia with mesenteric twisting and mesenteric trauma individually. In about 3.3% patients, mesenteric ischemia and sigmoid volvulus were found while abdominal koch's was seen in only 1.7% patients while in a study by Dileep Singh Thakur et al[3], most common cause of obstruction was adhesions (39.8%) followed by obstructed hernia (18.1%), bands (16.9%), volvulus (8.4%), stricture (4.8%) and miscellaneous (8.4%).

Symptoms

In our study, obstipation was complained by 65.0% patients followed by abdominal pain in 58.3%, vomiting in 36.7% and fever in 18.3% patients. On contrary side, Ajju Kumar et al[1] study found abdominal pain in 81.0%, vomiting in 62.0% and obstipation in 45.0% patients.

Signs

Recent study found tenderness in 33.3%, guarding in 31.7% and abdominal distension in 71.7% patients while Ajju Kumar et al[1] study found abdominal swelling in 40.0% and guarding in 60.0% patients.

Similarly, Vengateshwar et al[2] study instituted abdominal distension in 48.0% and guarding in 60.0% patients.

Bowel viability

In this study, about 42.0% patients developed gangrene while it was 32.4% in a patients of Ajju Kumar et al[1] study and likely to that gangrene of the bowel was present in 31% patients in a research by Vengateshwar et al[2].

Past history

Near to our study (20.0%), Vengateshwar et al[2] study found positive past history in 19.0% of the patients.

Biomarkers

In present study, mean CRP of patients having non-viable bowel was 54.92±17.40 which is not that much high while on other side, serum CRP was really high in a studies conducted by Ajju Kumar et al[1] (mean=126.8, S.D.=38.92) and Vengateshwar et al[2] (mean=126, S.D.=29.87).

bowel while a study by Ajay Kumar Pal et al[4] established serum CRP and D-lactate as a useful and reasonable marker for predicting strangulation in cases of acute intestinal obstruction in an emergency setting.

Significant difference in mean CRP between viable and non-viable bowel Dr. Dileep Singh Thakur et al[3] found that the preoperative CRP level in patients with non-gangrenous bowel was 12.68 while with gangrenous gut was 20.80 which was statistically significant with a p value of 0.01. Similarly, in present study, mean preoperative CRP for viable bowel was 37.29 while on contrary in non-viable bowel it was 54.92. Thus, difference was statistically significant (p=0.001).

All preoperative mean biomarker level was high in male patients compared to females.

Preoperative biomarker level was highest in patients suffering from sigmoid volvulus followed by abdominal koch's and mesenteric ischemia.

CONCLUSION

Our study with mean age of the patients 43.03±13.28 years with 58.3% male and 41.7% female patients with most common presenting symptoms were obstipation (65.0%) followed by abdominal pain in (58.3%) and vomiting in (36.7%).

Whereas most common clinical signs being tenderness (33.3%) and guarding (31.7%). more than one quarter patients had obstructed hernia (26.7%) followed by adhesions in 20.0% patients and band in 11.7% patients.

Stricture was diagnosed in 10.0% patients and 8.3% patients had mesenteric Ischemia with mesenteric twisting and mesenteric trauma individually.

In about 3.3% patients, mesenteric ischemia and sigmoid volvulus

were found while abdominal koch's was seen in only 1.7% patients.about 42.0% patients developed gangrene and rest were normal viable bowel. trend of CRP to predict bowel ischemia having Sensitivity=59.26% and Specificity=72.73%.

Positive Predictive Value=64% and Negative Predictive Value=68.57% trend of D- lactate to predict bowel ischemia having Sensitivity=86.67% and Specificity=73.33%.

Positive Predictive Value=52% and Negative Predictive Value=94.29% trend of ALP to predict bowel ischemia having Sensitivity=94.44% and Specificity=80.95%.

Positive Predictive Value=68% and Negative Predictive Value=97.14% trend of LDH to predict bowel ischemia having Sensitivity=67.74% and Specificity=86.21%.

Positive Predictive Value=84% and Negative Predictive Value=71.43%.

There is increase in biomarkers more in ischemia or potential ischemic conditions. Preoperative mean CRP level was highest in patients suffering from sigmoid volvulus. While in case of D-lactate and LDH biomarkers, highest value was seen in abdominal koch's. Highest ALP findings was notified in internal hernia.

Acknowledgements
Authors would like to thank Dr Jitendra Darshan (superintendent SMIMER) and Dr. Archana Nema (HOD General Surgery Department, SMIMER) for guidance and general support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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