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Original Research Paper

General Surgery

HYPERBILIRUBINEMIA AS A PREDICTOR OF GANGRENOUS BOWEL IN CASES WITH DYNAMIC INTESTINAL OBSTRUCTION

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ABSTRACT

Background: The study aims to evaluate hyperbilirubinemia in cases with dynamic intestinal obstruction and its role in predicting gangrenous bowel in these cases. **Methodology** : This prospective observational study was conducted on 50 patients with dynamic intestinal obstruction admitted to Dr. Rajendra Prasad Government Medical College from April 2023 to March 2024. After applying inclusion and exclusion criteria, patients' clinical and investigative data were compiled and analyzed using statistical software. **Results:** Among 50 patients, 20 (40%) had gangrenous bowel. Hyperbilirubinemia (>0.8 mg/dL) was significantly associated with gangrenous bowel with 17 (85%) of gangrenous cases showing elevated bilirubin levels, compared to 15 (50%) in non-gangrenous cases. Elevated bilirubin levels, alongwith other markers like WBC, CRP and LDH suggest a need for urgent surgical intervention. **Conclusion** : This study highlights hyperbilirubinemia as a potential early indicator of gangrenous bowel in dynamic intestinal obstruction, underscoring the need for further research in this area.

KEYWORDS : Dynamic intestinal obstruction, Gangrenous bowel, Hyperbilirubinemia.

INTRODUCTION:

Acute intestinal obstruction (AIO) is a critical surgical emergency necessitating immediate diagnosis and intervention due to its potential severity. It occurs when a blockage impedes the normal flow of intestinal contents and is broadly categorized into dynamic and adynamic types. Dynamic obstructions involve mechanical blockages, while adynamic obstructions, or paralytic ileus, result from a lack of peristalsis without a physical blockage[1].

AIO can further be classified into small bowel obstruction (SBO) and large bowel obstruction (LBO). SBO, the most common form, results from blockages in the small intestine caused by adhesions, hernias, or tumors. LBO, affecting the large intestine, is typically linked to colorectal cancer, volvulus, or diverticular disease. The nature of dynamic obstructions varies, ranging from simple blockages that do not affect blood supply to strangulated obstructions that compromise blood flow, potentially leading to bowel ischemia and necrosis[2][3].

Clinical presentations of AIO include abdominal pain, distension, nausea, vomiting, and altered bowel habits. Diagnosis relies on clinical evaluation, imaging studies such as radiographs, CT scans, and ultrasound, and laboratory tests. Imaging is crucial for confirming the diagnosis and pinpointing the obstruction's location and cause[4][11].

Management of AIO involves both conservative and surgical approaches. Conservative treatment includes bowel rest, intravenous fluids, nasogastric decompression, and electrolyte correction, suitable for partial or uncomplicated obstructions. Surgical intervention is necessary for complete or complicated obstructions, with laparoscopic surgery preferred for its minimally invasive nature, though open surgery may be required in complex cases[3][4][7].

The prognosis worsens significantly with the presence of gangrenous bowel, a condition where compromised blood supply leads to tissue death, increasing the risk of sepsis, multiorgan failure, and death. Early diagnosis and surgical intervention are crucial. Symptoms indicating gangrene include severe abdominal pain, tenderness, tachycardia, bloating, vomiting and diarrhea with laparotomy being the definitive diagnostic tool[3].

Biochemical markers such as elevated WBC, CRP, LDH, and bilirubin levels can indicate gangrene with hyperbilirubinemia showing particular promise as a predictive marker. In bowel obstruction, hyperbilirubinemia may result from bacterial translocation, leading to systemic infection and liver dysfunction. where cytokines like IL-6 and TNF depress liver excretory function, raising serum bilirubin levels[5][6].

This study aims to evaluate the role of hyperbilirubinemia as a predictor of gangrenous bowel in cases of dynamic intestinal obstruction. Identifying hyperbilirubinemia early can facilitate timely surgical intervention, potentially reducing the risk of severe complications. Thus, understanding and monitoring bilirubin levels in patients with AIO could significantly improve outcomes by enabling prompt and appropriate treatment.

Methodology:

This hospital-based, prospective observational study was conducted over one year in the Department of Surgery at Dr. RPGMC Kangra at Tanda. Ethical approval was obtained and informed consent was secured from all participants. The study included consecutive patients with acute intestinal obstruction undergoing emergency laparotomy, excluding those with pre-existing jaundice, congenital hyperbilirubinemia, chronic alcoholism, hemolytic diseases, viral hepatitis, obstructive jaundice, patients managed conservatively, those under 12 years of age, and pregnant females.

The study involved detailed clinical examination, history-taking, and laboratory tests, including serum bilirubin measurements. Bilirubin levels above 0.8 mg/dl were

considered significant for predicting gangrenous bowel. Additional diagnostics included ultrasonography, X-rays, CT scans, and measurements of CRP, WBC, and LDH levels. Intra-operative findings were recorded, and data were analyzed using EPI Info software. Statistical significance was set at a p-value of less than 0.05.

RESULTS:

Among the 50 patients studied, 20 (40%) had gangrenous bowel, with the highest incidence in patients over 60 years old. Males were more frequently affected (60%) than females (40%), with a male-to-female ratio of 3:2. The small bowel was more commonly involved in gangrene (80%) than the large bowel (15%).

Elevated serum LDH levels (>300 IU) were observed in 25% of gangrenous cases, compared to 13% in non-gangrenous cases. A higher total leukocyte count (TLC >10,000) was noted in 80% of gangrenous cases versus 60% in non-gangrenous cases, though the difference was not statistically significant. Elevated CRP levels (>1.0 mg/dL) were found in 75% of gangrenous cases and 63% of non-gangrenous cases. Tachycardia and absent bowel sounds were present in all gangrenous cases (100%) compared to 80% and 70%, respectively, in non-gangrenous cases.

Significantly, elevated serum bilirubin (>0.8 mg/dL) was associated with gangrenous bowel, present in 85% of gangrenous cases compared to 50% of non-gangrenous cases ($p = 0.026$). The mean serum bilirubin level was significantly higher in gangrenous cases (1.512 ± 0.961) than in non-gangrenous cases (0.788 ± 0.389).

Table : 1 Reperesents The Parameters Between Non-gangrenoous And Gangrenous Bowel.

PARAMETERS	NON-GANGRENOUS BOWEL	GANGRENOUS BOWEL
NUMBER OF PATIENTS	30(60%)	20(40%)
MALE	17(56%)	12(60%)
FEMALE	13(34%)	8(40%)
LDH(>300 IU)	4(13%)	5(25%)
TLC (>10000)	18(60%)	16(80%)
CRP (>1.0 mg/dl)	19(63%)	15(75%)
TACHYCARDIA	24(80%)	20(100%)
ABSENT BOWEL SOUNDS	21(70%)	20(100%)
BILIRUBIN(>0.8mg/dl)	15(50%)	17(85%)

Table :2 Reperesents mean values and p-values of Bilirubin LDH TLC AND CRP

	Serum bilirubin (Mean±SD)	LDH (Mean± SD)	TLC (Mean± SD)	CRP (Mean± SD)
Non Gangrenous Bowel	0.788±0.389	244.91±172.37	11435.00 ±6185.48	15.31±1.46
Gangrenous Bowel	1.512±0.961	246.941± 139.639	16439.50 ±8889.34	16.00±13.96
p value	0.026	0.499	0.240	0.578

DISCUSSION:

The incidence of gangrenous bowel in this study was 40%, higher than the 44.4% reported by Nateson et al. (2020)[2]. The highest incidence was in patients over 60 years, consistent with findings from Ceylan et al. (2022)[2]. Male predominance (60%) was also observed, aligning with previous studies. Elevated TLC was noted in 80% of gangrenous cases, similar to findings by Ceylan et al. (2022)[2] and Bera and Roy (2023)[12]. CRP levels were elevated in 75% of gangrenous cases, while LDH was elevated in 25%, similar to previous studies done by Ceylan et al.,(2022)[2] and Nateson et al., (2020)[9]. Serum bilirubin as an indicator of gangrenous bowel has not been extensively studied, though Atahan et al. (2011)[10] identified total bilirubin as a significant factor in diagnosing gangrenous appendicitis. In the present study, elevated serum bilirubin (>0.8 mg/dl) was associated with gangrenous bowel in 85% of cases, significantly higher than in non-gangrenous cases (50%). Khan and Bhargava (2021)[11] and Chaudhary et al. (2013)[7] similarly reported raised bilirubin levels in gangrenous appendicitis cases.

The mean serum bilirubin in gangrenous bowel cases was 1.51 ± 0.96, significantly higher than in non-gangrenous cases (0.78 ± 0.38), with a p-value of 0.026. Khan and Bhargava (2021)[11] also reported higher mean total bilirubin in gangrenous appendicitis cases compared to uncomplicated ones. This study underscores the potential role of serum bilirubin as an early indicator for gangrenous bowel in dynamic intestinal obstruction.

CONCLUSION:

Preoperative diagnosis of gangrenous bowel in dynamic intestinal obstruction is challenging but crucial. This study identifies tachycardia and absent bowel sounds as significant clinical signs. Among biochemical markers, serum bilirubin levels above 0.8 mg/dl were significantly elevated in gangrenous bowel cases, suggesting its potential as an early indicator. While the role of hyperbilirubinemia in predicting gangrenous bowel requires further research, this study highlights its importance in early diagnosis and intervention.

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