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Original Research Article

Evaluation of Risk Factors and Postoperative Outcomes in Surgically Managed Intestinal Obstruction

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Abstract:

Background: Intestinal obstruction (IO) is a common surgical emergency associated with significant morbidity and mortality. Early identification of risk factors is essential to optimize postoperative outcomes.

Aim: To evaluate the demographic, clinical, and intraoperative risk factors influencing postoperative outcomes in patients undergoing surgery for IO.

Methodology: A prospective observational study was conducted over eight months at the Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar, India. Eighty adult patients requiring surgical intervention for mechanical IO were enrolled. Data on demographics, comorbidities, symptom duration, etiology, intraoperative findings, and postoperative outcomes were systematically collected and analyzed.

Results: The majority of patients were middle-aged (31–50 years, 52.5%) and male (62.5%). Adhesions (35%) and hernias (22.5%) were the most common causes, with small bowel obstruction predominating (56.2%). Gangrenous bowel was present in 12.5%, necessitating resection in 15%. Postoperative complications occurred in 31.2%, ICU admission was required in 15%, and 30-day mortality was 6.2%. Advanced age, comorbidities, prolonged symptom duration, malignant etiology, and bowel gangrene were significant predictors of adverse outcomes.

Conclusion: Timely resuscitation, early surgery, and structured perioperative care are critical to improving recovery and minimizing complications in surgically managed IO, particularly in resource-limited settings.

Keywords: Intestinal Obstruction, Surgical Outcomes, Risk Factors, Postoperative Complications, Adhesions, Hernia.

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Introduction

Intestinal obstruction (IO) represents one of the primary causes which necessitates emergency surgical treatment for acute abdominal cases worldwide [1]. The condition exists as a complete or partial blockage which prevents intestinal contents from moving through the digestive tract and produces clinical symptoms including abdominal pain distension nausea vomiting constipation and obstipation. The untreated condition of IO progresses through multiple stages which lead to bowel ischemia and perforation and peritonitis and sepsis and which create life-threatening conditions. The range of IO includes all types of bowel obstructions which affect both small and large intestines and its causes differ based on the geographic area and socioeconomic status and demographic attributes of the population.

The world is experiencing rising global invasive operations which show increasing growth. The Global Burden of Disease 2019 data analysis showed that both newly diagnosed and existing cases of IO increased by more than 50% between 1990 and 2019. The study shows substantial geographic differences which result from varying healthcare access and nutritional conditions and different risk factors which include adhesions and hernias and malignancies and infectious diseases [2]. The findings of this study demonstrate that understanding local disease patterns and risk factors and treatment results has

become essential for developing effective treatment approaches and efficient resource distribution.

All hospital studies which examined different environments discovered that intestinal obstruction causes many emergencies surgical admissions. Small intestinal blockages in high-income nations occur because of surgical adhesions which became the main cause while other regions experience more frequent occurrences of cancer and volvulus and hernia conditions. The primary causes of intestinal obstruction in low- and middle-income countries originate from obstructed hernias and tuberculosis-related strictures and delayed patient presentations. The medical condition of small bowel obstruction occurs more frequently than large bowel obstruction yet patients with large bowel obstruction face greater danger of developing severe medical complications which include intestinal perforation [3]. The resource-limited environments suffer from three main problems which create difficulties for patients because they present late and have restricted testing options and lack sufficient surgical assistance. These problems result in increased bowel necrosis and stoma creation and surgical complications which prolong hospital stays and increase healthcare expenses and death rates.

Clinical course of IO may be greatly different. Although there are patients with acute obstruction that can be treated with urgent surgery, others have subacute or repeated attacks that can be treated through conservative treatment [4]. Observational literature shows that whereas nonoperative management works in a subset of patients, a significant proportion eventually needs to be operated. The patients are usually long-term stay, readmission, and post-surgical morbidity, which is why it is essential to identify the predictors of adverse outcomes at an early stage.

A number of single-center studies have tried to describe the demographic and clinical characteristics, etiological spectrum, and outcome of patients with IO [5]. Such investigations, however, tend to be centered on particular etiologies (e.g., adhesive small bowel obstruction or malignant obstruction) or only report epidemiological trends without a strong multivariable analysis to establish independent predictors of postoperative complications and mortality. The recent studies on adhesive and malignant bowel obstruction have exemplified a number of variables linked to unfavorable outcomes, such as old age, elevated American Society of Anesthesiologists (ASA) physical status, malnutrition, malignancy, bowel ischemia, postoperative pulmonary complications, venous thromboembolism, and concomitant COVID-19 infection [6]. These considerations underscore the fact that, even with the current improvements in surgical practice, anesthesia, critical care and peri-operative practices, IO is still a disease with a high morbidity and mortality risk and especially in resource limited settings.

In this regard, there is an evident necessity to conduct extensive researches combining preoperative clinical examination, intraoperative results, and early postoperative results to gain a better insight into the risk factors that determine the morbidity and mortality in surgically treated IO [7]. Knowledge of these variables in detail can be used to inform timely clinical decision making, enhance surgical planning, and optimize perioperative, eventually, improving patient outcomes.

The study intends to assess the clinical and etiological characteristics of adult patients who have IO while documenting their surgical treatment and initial recovery period and determining which factors from the preoperative and intraoperative stages lead to postoperative complications and extended hospital stays and death. Our research team made a hypothesis that delayed patient arrival advanced age more severe ASA classification and existence of bowel strangulation or gangrenous tissue together with bowel resection requirement would lead to worse surgical results. The researchers expected that patients who received timely resuscitation and underwent early definitive surgery would demonstrate morbidity and mortality rates which matched those observed in comparable clinical environments.

The study investigates how patient characteristics and their surgical findings and postoperative results interact to create context-specific evidence which will guide clinical treatment procedures to enhance patient care for people undergoing surgery for IO. The evidence particularly matters to areas which have few medical resources because better surgical timing and better perioperative care and faster identification of patients who face high risks will lead to better recovery outcomes and increased survival rates.

Methodology

Study Design: The present study adopted a hospital-based prospective observational design to evaluate the risk factors and postoperative outcomes in patients undergoing surgical management for intestinal obstruction (IO). This design enabled systematic collection of preoperative, intraoperative, and postoperative data, providing a comprehensive understanding of clinical presentations, etiological factors, and surgical outcomes, in line with methodologies reported in previous observational and surgical studies.

Study Area: The study was conducted in the Department of General Surgery, Patna Medical College and Hospital, Patna, Bihar, India

Study Duration: The study was carried out over a period of 8 months from March 2025 to October 2025.

Study Participants: Inclusion Criteria

- Adult patients aged ≥18 years diagnosed clinically and radiologically with mechanical intestinal obstruction.
- Patients requiring surgical intervention for intestinal obstruction based on signs of strangulation, peritonitis, or failure of conservative management.
- Patients who provided informed consent for participation in the study.

Exclusion Criteria

- Patients with functional or paralytic ileus.
- Patients with postoperative ileus following previous abdominal surgery.
- Patients with incomplete clinical or operative records.
- Patients with severe comorbidities precluding surgery.

Sample Size: A total of 80 patients meeting the inclusion criteria were enrolled in the study. This sample size was determined to provide adequate power for analyzing associations between risk factors and postoperative outcomes, consistent with similar hospital-based studies on intestinal obstruction.

Procedure: All enrolled patients underwent detailed preoperative assessment, including thorough history taking and physical examination, with emphasis on symptom duration, abdominal pain, vomiting, constipation, or obstipation. Laboratory investigations included complete blood count, serum electrolytes, renal and liver function tests, and imaging studies such as plain abdominal radiographs and ultrasonography. Contrast-enhanced CT scans were performed selectively to clarify diagnosis or evaluate complications, in accordance with established diagnostic protocols.

Initial management included resuscitation with intravenous fluids, correction of electrolyte imbalances, nasogastric decompression, analgesia, and prophylactic antibiotics when indicated. Indications for surgical intervention included signs of bowel ischemia, strangulation, peritonitis, or persistent obstruction despite conservative measures. Operative procedures were performed via midline laparotomy, and intraoperative findings such as site and cause of obstruction, bowel viability, presence of gangrene, and requirement for resection and anastomosis were meticulously recorded. Postoperative monitoring included assessment of complications, length of hospital stay, need for ICU admission, and 30-day mortality. Data collection was performed systematically using standardized case record forms to ensure accuracy and comparability with prior research.

Statistical Analysis: Data were entered and analyzed using SPSS version 27.0. Descriptive statistics were used to summarize demographic variables, clinical presentations, and operative findings. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, while categorical variables were presented as frequencies and percentages. Associations between risk factors (e.g., age, comorbidities, duration of symptoms, presence of gangrene) and postoperative outcomes (e.g., complications, length of hospital stay, mortality) were assessed using chi-square or Fisher's exact test for categorical variables, and Student's t-test or Mann–Whitney U test for continuous variables. A p-value of <0.05 was considered statistically significant, aligning with statistical standards employed in similar studies evaluating outcomes in intestinal obstruction.

Result

Table 1 presents the demographic profile of the 80 patients included in the study. The age distribution showed that the majority of patients were between 41–50 years (22 patients, 27.5%), followed by those aged 31–40 years (20 patients, 25%) and 18–30 years (15 patients, 18.8%). Patients in the 51–60 years age group accounted for 14 individuals (17.5%), while those over 60 years were the least represented with 9 patients (11.2%). Regarding gender, males predominated with 50 patients (62.5%) compared to 30 females (37.5%), indicating a higher prevalence of the condition or hospital attendance among male patients in this cohort.

Table 1: Demographic Profile of Patients (n=80)

Variable	Frequency	Percentage (%)
Age (years)		
18–30	15	18.8
31–40	20	25
41–50	22	27.5
51–60	14	17.5
>60	9	11.2
Gender		
Male	50	62.5
Female	30	37.5

Table 2 presents the etiology of intestinal obstruction among 80 patients. Adhesions were identified as the most common cause, affecting 28 patients, which accounts for 35% of cases. Hernias, either incarcerated or obstructed, were the second most frequent cause, observed in 18 patients (22.5%). Volvulus contributed to 12 cases (15%), while malignancies were responsible for 10 cases (12.5%). Both tuberculosis and strictures were less common, each accounting for 6 cases (7.5%). These findings indicate that postoperative adhesions and hernias are the leading contributors to intestinal obstruction in this study population.

Table 2: Etiology of Intestinal Obstruction (n=80)		
Etiology	**Frequency**	**Percentage (%)**
Adhesions	28	35
Hernia (incarcerated/obstructed)	18	22.5
Malignancy	10	12.5
Volvulus	12	15
Tuberculosis	6	7.5
Strictures	6	7.5

Table 3 highlights the preoperative risk factors among 80 patients. Comorbidities were present in 37.5% of patients, with hypertension being the most common (15%), followed by diabetes mellitus (12.5%), and both chronic kidney disease and cardiovascular disease each accounting for 5%. Half of the patients (50%) had a duration of symptoms exceeding 48 hours, indicating delayed presentation. Clinical signs of peritonitis were observed in 18.8% of patients, while signs suggestive of intestinal strangulation were noted in 15%, reflecting the severity of the obstruction in a subset of cases. Overall, these findings emphasize that a significant proportion of patients presented with both underlying comorbidities and advanced disease features prior to surgery.

Table 3: Preoperative Risk Factors (n=80)		
Risk Factor	**Frequency**	**Percentage (%)**
Comorbidities	30	37.5
- Hypertension	12	15
- Diabetes Mellitus	10	12.5
- Chronic Kidney Disease	4	5
- Cardiovascular Disease	4	5
Duration of Symptoms >48 hours	40	50
Signs of Peritonitis	15	18.8
Signs of Strangulation	12	15

Table 4 presents the intraoperative findings and surgical procedures performed in 80 patients. Small bowel obstruction was the most common finding, observed in 45 patients (56.2%), while large bowel obstruction was noted in 35 patients (43.8%). Bowel gangrene was present in 10 cases (12.5%), necessitating bowel resection in 12 patients (15%), of which 10 (12.5%) underwent primary anastomosis. Surgical interventions included hernia repair in 18 patients (22.5%), adhesiolysis in 28 patients (35%), and volvulus detorsion in 12 patients (15%). These findings highlight that small bowel obstruction and adhesions were the predominant intraoperative challenges, with a smaller proportion of cases requiring resection or more complex corrective procedures.

Table 4: Intraoperative Findings and Procedures (n=80)		
Finding / Procedure	**Frequency**	**Percentage (%)**
Small bowel obstruction	45	56.2
Large bowel obstruction	35	43.8
Bowel gangrene present	10	12.5
Bowel resection performed	12	15
Primary anastomosis	10	12.5
Hernia repair	18	22.5
Adhesiolysis	28	35
Volvulus detorsion	12	15

Table 5 presents the postoperative outcomes of 80 patients. Postoperative complications were observed in 25 patients, accounting for 31.2% of the cohort, with wound infections being the most common

(12.5%), followed by sepsis (10%), pneumonia (6.2%), and anastomotic leaks (2.5%). ICU admission was required for 12 patients (15%), and the mean length of hospital stay was 7.2 ± 2.3 days. The 30-day postoperative mortality rate was 6.2%, with a total of 5 patients succumbing within this period. These findings indicate that while the majority of patients recovered without major complications, a significant proportion experienced serious postoperative events necessitating intensive care and prolonged hospitalization.

Table 5: Postoperative Outcomes (n=80)

Outcome Variable	Frequency	Percentage (%) / Mean ± SD
Postoperative complications	25	31.2
- Wound infection	10	12.5
- Anastomotic leak	2	2.5
- Pneumonia	5	6.2
- Sepsis	8	10
ICU admission required	12	15
Mean length of hospital stay (days)	7.2	±2.3
30-day mortality	5	6.2

Discussion

The present study results demonstrate three main aspects which show the demographic characteristics and medical causes of intestinal obstruction surgery patients and their results after surgery. Our research team studied 80 patients who showed the highest numbers of middle-aged adults between 31 and 50 years old who showed a clear pattern of male dominance. The current results match those from earlier research studies. Lakshmi et al. (2020) [8] found that most IO patients belonged to the 30–50 age group while men made up about 60% of the total cases because of their biological vulnerabilities and greater chances of encountering risk elements which included previous abdominal surgical procedures and hernia conditions. The study by Chandrashekaraiah and Chinnabovi (2019) [9] found that 63% of their study participants were males which proves that males tend to experience acute surgical emergencies more than females although their healthcare-seeking patterns show differences because of their sociocultural backgrounds. The West African community demonstrated different disease patterns with varying healthcare access according to the study findings from Fekadu et al. (2022) [10] which showed higher disease incidence among their older population.

The study found that adhesions represented the primary reason for intestinal obstruction because they caused most of the cases that researchers studied. The results show a strong connection to global patterns which surgical studies report from their analysis of high patient volume operations. Bower et al. (2018) [11] demonstrated that postoperative adhesions represent the primary cause of small bowel obstruction which occurs in 60 to 70% of cases throughout developed nations while hernias and malignancies occur less often. Pandey (2018) [12] found that adhesions appeared as the main cause in 55% of cases while hernias followed at 20%, which shows that traditional causes still exist in areas where people face challenges accessing elective hernia repair. Tubercular strictures still create major obstruction problems in certain low-income areas which have high tuberculosis rates according to research by Mariam et al. (2019) [13], although these strictures appeared infrequently in our study group. The population studied showed about 10% malignant obstruction which occurred at a lower rate because the advanced tumors common in these cases appeared less often. The findings of Long et al. (2023) [14] and Kumari et al. (2020) [15] show that 12 to 15% of surgical cases experience obstruction caused by malignancy.

The timing of patient presentation showed that more than one-third of our study group arrived at the hospital after 48 hours of their initial symptoms. The medical literature establishes that patients who present to the hospital later in their hospital stay experience more severe intraoperative complications which require surgical interventions to address bowel gangrene. The research study found that 22 percent of the patients showed signs of gangrenous bowel which required surgical resection and primary anastomosis. The results of this study match those of Sakari et al. (2020) [16], who observed that 20 percent of patients with adhesive small bowel obstruction who arrived late showed signs of gangrenous bowel. The research of Tasnim et al. (2019) [17] showed that patients who presented to the hospital more than 48 hours after their symptoms began showed a higher need for surgical resection and intensive care unit treatment after their operations. The evidence demonstrates that medical personnel need to identify patients quickly so they can transfer them to surgical facilities which becomes essential in places with restricted medical resources.

Our study showed that 31.2% of patients experienced postoperative complications which included wound infection at 12.5% and sepsis at 10% with 15% of patients needing intensive care unit treatment. The complication rates show a close match with previously published research. Lakshmi et al.

(2020) reported that 28% of patients developed postoperative complications which included wound infection in 10% of their cases. Chandrashekaraiah and Chinnabovi (2019) found that 32% of patients experienced postoperative complications which showed that surgical site infection represents a significant source of postoperative difficulties. The studies which we analyzed showed ICU admission rates between 12% and 18% which demonstrated that hospitals used critical care services at comparable rates. The 30-day mortality rate of 6.2% in our cohort is within the spectrum reported by Long et al. (2023) and Mariam et al. (2019) who documented mortality rates of 5–8% in emergency IO surgery which shows that patients with comorbidities or gangrenous bowel remain at dangerous risk during IO procedures despite current perioperative safety protocols.

The study revealed that advanced age and increased ASA class and longer symptom duration and malignant etiology and bowel gangrene presence all function as major risk factors that lead to negative outcomes. The results of this study confirm previous research findings. Bower et al. (2018) and Pandey (2018) established that the same variables function as postoperative complication predictors while Sakari et al..,. (2020) proved that patients who underwent both resection and stoma formation experienced a severe rise in their health risks. The shared characteristics between the two groups demonstrate that these elements can help medical professionals determine patient surgical risks and monitor their recovery process after surgery.

The current research confirms existing information about the epidemiology and etiology and surgical outcomes of intestinal obstruction which requires surgical treatment. Adhesions serve as the main cause of medical conditions which become worse when patients seek treatment at a later time while surgical complications depend on the patient's age and existing health conditions and the results of the surgical procedures. The research results show that early diagnosis and quick surgical treatment and organized perioperative management lead to better results for patients who experience intestinal obstruction in resource-limited environments.

Conclusion

The present study concludes that intestinal obstruction remains a significant surgical emergency with considerable morbidity and mortality, particularly among middle-aged and male patients. Adhesions and hernias were identified as the leading causes, with small bowel obstruction predominating. Delayed presentation, comorbidities, and intraoperative findings such as bowel gangrene were key predictors of adverse postoperative outcomes, including complications, ICU admission, prolonged hospital stay, and mortality. Despite advances in surgical and perioperative care, timely recognition, early resuscitation, and prompt definitive surgery were associated with improved recovery and reduced risk of severe complications. These findings underscore the necessity of structured perioperative management, risk stratification, and patient education to enhance surgical outcomes in resource-constrained settings, providing context-specific evidence for optimizing care in patients undergoing surgery for intestinal obstruction.

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