e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(8); 1073-1081

Original Research Article

Aetiological Spectrum, Management Strategies, and Predictors of Morbidity in Acute Intestinal Obstruction: A Prospective Observational Study from a Tertiary Care Centre in Southern Odisha

Ashutosh Prasad Prusty[1], Ambuja Satapathy[2], Soumya Ranjan Jena[3]

[1]Postgraduate Resident, Department of General Surgery, M.K.C.G. Medical College and Hospital, Berhampur, Odisha, India

[2]Associate Professor, Department of General Surgery, M.K.C.G. Medical College and Hospital, Berhampur, Odisha, India

[3]Assistant Professor, Department of General Surgery, M.K.C.G. Medical College and Hospital, Berhampur, Odisha, India

Received: 01-05-2026 / Revised: 15-06-2026 / Accepted: 21-07-2026

Corresponding author: Dr. Ashutosh Prasad Prusty

Conflict of interest: Nil

Abstract

Background: Acute intestinal obstruction (AIO) is one of the most frequently encountered surgical emergencies, particularly in the developing world. Here delayed presentation, limited imaging access, and endemic infectious diseases shape a disease profile distinctly different from Western populations. Region-specific data are indispensable for guiding locally appropriate management.

Objectives: To characterise the aetiological spectrum, clinical presentation, and diagnostic utility of imaging in AIO; to describe management strategies employed; and to identify preoperative predictors of postoperative morbidity at a tertiary care teaching hospital in southern Odisha.

Materials and Methods: A prospective observational study was conducted in the Department of General Surgery, M.K.C.G. Medical College and Hospital, Berhampur, from November 2023 to October 2025 (two years). Patients aged ≥13 years presenting with mechanical acute intestinal obstruction were enrolled consecutively (n = 114). Demographic data, clinical parameters, laboratory results, imaging findings, operative details, and postoperative outcomes were recorded on a structured proforma and analysed using SPSS® v20.0. A p-value <0.05 was considered statistically significant.

Results: The cohort had a male predominance (male-to-female ratio 1.9:1); 61.4% were older than 45 years. Abdominal pain was the cardinal symptom (94.7%). Nearly 30% of patients arrived after 72 hours of symptom onset. Post-operative adhesions accounted for the largest share of cases (33.3%), followed by obstructed hernias (24.6%), abdominal tuberculosis (14.0%), malignancy (12.3%), and volvulus (9.6%). Small bowel obstruction predominated (70.2%). Plain radiography was diagnostic in 76.3% of patients, whereas contrast-enhanced CT abdomen achieved a diagnostic yield of 94.1% for identifying the site, cause, and complications of obstruction. Surgical intervention was required in 65.8% of patients. Surgical site infection was the most common postoperative complication (24.0%). Delayed presentation (>72 hours), presence of strangulation, and hypoalbuminaemia were significantly associated with postoperative morbidity ($p < 0.05$). The in-hospital mortality rate was 4.4%.

Conclusion: Acute intestinal obstruction in southern Odisha follows a transitional aetiological pattern, with post-operative adhesions now predominating over obstructed hernias at the tertiary care level, while abdominal tuberculosis remains a significant regional contributor. Timely diagnosis, appropriate use of CT imaging, correction of nutritional deficits, and early surgical intervention are pivotal determinants of outcome. Strengthening referral pathways and community awareness could meaningfully reduce preventable morbidity and mortality in this population.

Keywords: Acute Intestinal Obstruction; Postoperative Adhesions; Obstructed Hernia; Abdominal Tuberculosis; Surgical Morbidity; Southern Odisha; Strangulation; Hypoalbuminaemia.

DOI: 10.25258/ijcpr.18.8.162

Introduction

Acute intestinal obstruction (AIO) continues to rank among the most pressing emergencies that a general surgeon encounters. Accounting for an estimated 20–25% of all acute surgical admissions in Indian hospitals, it demands rapid and accurate assessment.[1] The interval between onset and definitive intervention often determines whether the patient recovers uneventfully or develops life-threatening ischaemia, perforation, and sepsis. Clinically, AIO presents with the familiar tetrad of colicky abdominal pain, progressive distension, vomiting, and inability to pass flatus or stool—a constellation that has changed little since the condition was first systematically described. The only thing that has changed profoundly is the aetiological landscape and the tools available to navigate it.

In the historical surgical literature; volvulus, incarcerated hernias, and intussusception dominated the picture.[2,3] High operative mortality in the pre-anaesthesia era reflected both the severity of these presentations and the absence of effective resuscitative strategies. The twentieth century brought antisepsis, anaesthesia, radiological imaging, and intensive care, transforming survival figures dramatically. Yet AIO in low- and middle-income countries retains much of its historical gravity, chiefly because patients continue to present late, access to early cross-sectional imaging remains constrained, and the aetiological mix is shaped by endemic conditions—most notably abdominal tuberculosis—that are uncommon in Western series.

The aetiological profile of AIO is not uniform even within India. In metropolitan tertiary centres with high surgical throughput, postoperative adhesions have steadily overtaken hernias as the leading cause, mirroring trends observed in developed healthcare systems.[4]

At institutions serving predominantly rural and semi-urban populations, however, obstructed hernias, abdominal tuberculosis, and delayed presentations remain commonplace, reflecting the interplay of socioeconomic deprivation, limited elective surgical access, and cultural health-seeking behaviour.[5,6] Applying Western management algorithms without accounting for these regional differences risks both over-treatment and under-treatment.

M.K.C.G. Medical College and Hospital, Berhampur, is the principal tertiary referral centre for the seven districts of southern Odisha—a predominantly agrarian region with a large rural catchment. The institution receives patients transferred from peripheral government facilities, many of whom arrive with advanced obstruction. Against this background, the present study was designed to prospectively document the complete clinical journey of patients with mechanical AIO at our institution: from aetiological characterisation and diagnostic evaluation through management decisions and postoperative outcomes, with particular attention to identifying preoperative factors that predict morbidity. The goal is to generate region-specific evidence that can refine clinical protocols and strengthen the case for upstream public health interventions.

Materials and Methods

Study Design and Setting: This was a single-centre, prospective observational study conducted in the Department of General Surgery, Unit VI, M.K.C.G. Medical College and Hospital, Berhampur, Odisha. The study was designed, conducted, and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. [7] M.K.C.G. Medical College and Hospital is a 1,200-bed government teaching institution functioning as the apex tertiary referral facility for southern Odisha, receiving patients from a predominantly rural and semi-urban population across seven districts.

Study Period and Ethical Approval: Patient enrolment was carried out over a continuous period of two years, from November 2023 to October 2025. Institutional Ethics Committee approval was obtained prior to commencement (Approval No. EC/NEW/INST/ 2022/2934, IEC No. 100). The study was conducted in full accordance with the Indian Council of Medical Research (ICMR) national ethical guidelines and the principles of the Declaration of Helsinki. Written informed consent was obtained from every participant or their designated attendant in the patient's preferred language.

Participants: All patients aged ≥13 years admitted to the Department of General Surgery with clinical and radiological features consistent with mechanical acute intestinal obstruction were considered for inclusion. AIO was defined as the presence of at least three of the following: colicky abdominal pain, abdominal distension, vomiting, and obstipation, supported by radiological evidence of dilated bowel loops with or without air-fluid levels.[5,8]

Patients with functional or paralytic ileus, immediate postoperative ileus (within 72 hours of a prior procedure), and those below 13 years of age were excluded. Patients unwilling to provide

consent or unable to be followed through to discharge or death were also excluded.

Sample Size: Sample size was estimated using the formula for single-proportion studies: $n = Z^2pq \div d^2$, where $Z = 1.96$ (95% confidence interval), $p = 0.30$ (expected proportion of adhesive obstruction based on prior Indian literature), and $d = 0.08$ (allowable error). Although the calculated minimum sample was 126 patients, 114 eligible patients were enrolled during the study period because of the finite number of cases presenting within the predefined study duration. [9,10]

Data Collection: A structured case record proforma captured the following at admission: demographic variables (age, sex, occupation, residence); symptom duration and character; history of prior abdominal surgery or tuberculosis; physical examination findings including vital signs, nutritional status, and abdominal signs; and results of laboratory investigations (haemoglobin, total and differential leucocyte count, blood glucose, serum urea, creatinine, serum albumin, and urine analysis). Viral markers (HBsAg, anti-HCV, HIV), sputum examination for acid-fast bacilli, FNAC, biopsy, and ELISA were performed as initial workup.[8] Plain abdominal radiography (erect and supine views) was performed in all patients. Contrast-enhanced CT abdomen and pelvis was performed in selected cases based on clinical indication, availability, and patient stability. Ultrasonography, barium studies, and colonoscopy were used selectively on an indication basis.[11,12]

Management Protocol: All patients received initial haemodynamic resuscitation comprising intravenous fluid therapy, nasogastric decompression, and correction of electrolyte and metabolic disturbances.[11,13] Definitive management—conservative or surgical—was determined by the attending surgical team based on the clinical assessment, radiological findings, and response to initial resuscitation. Conservative management consisted of nasogastric suction, intravenous fluids, strict nil-by-mouth, and close clinical monitoring. Surgical intervention was undertaken for persistent or worsening obstruction, clinical or radiological features of strangulation, and obstruction attributable to hernias, volvulus, or malignancy.

Statistical Analysis: Data were entered and managed in Microsoft® Excel and analysed using IBM® SPSS® Statistics version 20.0. Categorical variables were expressed as frequencies and percentages; continuous variables as mean (± SD). The chi-square test was used to evaluate associations between categorical variables. Continuous variables between two independent groups were compared using the unpaired t-test; comparisons across more than two groups employed one-way ANOVA. A two-tailed p-value of <0.05 was considered statistically significant throughout.[9,10]

Results

Demographic Profile: A total of 114 patients fulfilled the eligibility criteria and were enrolled over the study period. The age distribution is summarised in Table 1. The largest age group was 46–60 years (n = 39; 34.2%), and patients older than 45 years collectively constituted 61.4% of the cohort—reflecting the higher burden of both prior surgical exposure and malignancy in this age bracket. The youngest patient was 15 years old and the oldest was 80 years.

Table 1: Age distribution of patients with acute intestinal obstruction (n = 114)

Age Group (years)	Number of Patients	Percentage (%)
15–30	18	15.8
31–45	26	22.8
46–60	39	34.2
>60	31	27.2
Total	114	100.0

A clear male predominance was observed. Of 114 patients, 75 (65.8%) were male and 39 (34.2%) were female, yielding a male-to-female ratio of 1.9:1. Male predominance was consistent across all age groups (Table 2).

Table 2: Sex distribution according to age group

Age Group (years)	Male (n)	Female (n)	Total (n)
15–30	11	7	18
31–45	17	9	26
46–60	25	14	39
>60	22	9	31
Total	75	39	114

Clinical Presentation: Abdominal pain was near-universal, present in 108 patients (94.7%), and was typically colicky in character. Abdominal distension followed in frequency (79.8%), with vomiting in 73.7% and constipation or obstipation in 65.8% (Table 3). Fever was noted in approximately one-fifth of patients (21.1%),

and inguinoscrotal swelling—an important pointer to hernia-related obstruction—was elicited in 25.4%, closely corresponding to the proportion of hernia-related cases identified at surgery.

Table 3: Presenting symptoms and their frequency

Symptom	Number of Patients (n = 114)	Percentage (%)
Abdominal pain	108	94.7
Abdominal distension	91	79.8
Vomiting	84	73.7
Constipation / Obstipation	75	65.8
Inguinoscrotal swelling	29	25.4
Fever	24	21.1

Duration of Symptoms before Presentation: Half of the cohort (50.0%; n = 57) presented within 24–72 hours of symptom onset. However, 29.8% arrived after more than 72 hours—a delay that significantly influenced subsequent outcomes (Table 4). Only 20.2% presented within 24 hours, often those with strangulated hernias or acute-onset volvulus.

Table 4: Duration of symptoms before hospital presentation

Duration	Number (n)	Percentage (%)
< 24 hours	23	20.2
24–72 hours	57	50.0
> 72 hours	34	29.8
Total	114	100.0

Radiological Evaluation: Plain abdominal radiography was performed in all 114 patients and demonstrated features diagnostic of obstruction in 87 (76.3%). Contrast-enhanced CT abdomen was selectively performed in 68 patients where clinical findings were equivocal or where strangulation, closed-loop obstruction, or malignancy was suspected; it was diagnostic in 64 of these 68 patients, achieved a diagnostic yield of 94.1% for identifying the site, cause, and complications of obstruction.

Ultrasonography was performed in all 114 patients but showed a lower diagnostic yield of 66.7% (Table 5).

Table 5: Diagnostic yield of imaging modalities employed

Imaging Modality	Patients Evaluated (n)	Diagnostic of Obstruction (n)	Yield (%)
Plain abdominal X-ray	114	87	76.3
Ultrasonography (abdomen)	114	76	66.7
CT abdomen and pelvis*	68	64	94.1

*** CT performed selectively in clinically indicated cases.**

Aetiological Distribution: Post-operative adhesions were the single most common cause of AIO in our series (33.3%; n = 38), reflecting the growing volume of abdominal surgery performed at our institution and at referring centres. Obstructed hernias constituted the second most frequent aetiology (24.6%; n = 28), with inguinal hernias being the most commonly implicated type. Abdominal tuberculosis accounted for 14.0% of cases (n = 16), presenting most often with structuring ileocaecal disease or adhesions secondary to tuberculous peritonitis. Malignancy was responsible in 12.3% (n = 14), predominantly causing large bowel obstruction from colorectal carcinoma.

Volvulus was identified in 9.6% (n = 11), most frequently involving the sigmoid colon. The remaining 6.2% (n = 7) comprised rarer causes including intestinal malrotation, benign strictures, and intussusception (Table 6).

Table 6: Aetiological distribution of acute intestinal obstruction

Aetiology	Number (n)	Percentage (%)
Post-operative adhesions	38	33.3
Obstructed hernias	28	24.6
Abdominal tuberculosis	16	14.0
Malignancy	14	12.3
Volvulus	11	9.6
Others (malrotation, stricture, intussusception)	7	6.2
Total	114	100.0

Level of Obstruction and Mode of Management: Small bowel obstruction was the predominant anatomical level, accounting for 70.2% of cases (n = 80), while large bowel obstruction occurred in 29.8% (n = 34). Overall, 39 patients (34.2%) were successfully managed conservatively; the remaining 75 (65.8%) required surgical intervention (Table 7). Among those managed conservatively, the majority had adhesive obstruction without clinical or imaging features of strangulation and resolved with nasogastric decompression and intravenous fluid resuscitation within 48–72 hours.

Table 7: Mode of management

Mode of Management	Number (n)	Percentage (%)
Conservative	39	34.2
Surgical	75	65.8
Total	114	100.0

Intraoperative Findings and Operative Procedures: Among the 75 patients who underwent surgery, adhesions were the most common intraoperative finding (45.3%), followed by hernial obstruction (32.0%), strangulation (24.0%), bowel gangrene (14.7%), and perforation (9.3%). The most frequently performed procedures were adhesiolysis (40.0%) and hernia repair (32.0%). Resection and primary anastomosis was performed in 14 patients (18.7%), and resection with stoma formation in 7 patients (9.3%) where bowel viability was compromised and anastomosis was deemed unsafe (Tables 8 and 9).

Table 8: Intraoperative findings (n = 75 surgical cases)

Intraoperative Finding	Number (n)	Percentage (%)
Adhesions	34	45.3
Hernial obstruction	24	32.0
Strangulation	18	24.0
Bowel gangrene	11	14.7
Perforation	7	9.3

Note: Percentages exceed 100% due to coexisting findings in individual patients.

Table 9: Operative procedures performed

Operative Procedure	Number (n)	Percentage (%)
Adhesiolysis	30	40.0
Hernia repair (with or without bowel reduction)	24	32.0
Resection and primary anastomosis	14	18.7
Resection with stoma formation	7	9.3
Total	75	100.0

Postoperative Complications: Postoperative morbidity occurred in a substantial proportion of operated patients. Surgical site infection was the most frequent complication (24.0%), followed by prolonged ileus (20.0%), respiratory complications (16.0%), sepsis (12.0%), and anastomotic leak (5.3%) (Table 10).

Table 10: Postoperative complications in operated patients (n = 75)

Complication	Number (n)	Percentage (%)
Surgical site infection	18	24.0
Prolonged ileus	15	20.0
Respiratory complications	12	16.0
Sepsis	9	12.0
Anastomotic leak	4	5.3

Note: Percentages exceed 100% as individual patients experienced more than one complication.

Predictors of Postoperative Morbidity: Univariate analysis demonstrated three variables have statistically significant association of postoperative morbidity: presentation beyond 72 hours from symptom onset, the presence of strangulation, and hypoalbuminaemia (serum albumin <3.0 g/dL).

Advanced age (>60 years) was associated with a higher complication rate but did not reach statistical significance (Table 11).

Table 11: Factors associated with postoperative morbidity

Risk Factor	Morbidity Rate (%)	p-value
Presentation >72 hours	64.7	<0.05
Presence of strangulation	72.2	<0.01
Hypoalbuminaemia (<3.0 g/dL)	60.5	<0.05
Age >60 years	48.4	>0.05 (NS)

NS: not significant.

Mortality: Five patients died during the study period, yielding an in-hospital mortality rate of 4.4%. All five deaths occurred in patients who had presented after 72 hours, had intraoperative evidence of strangulated obstruction with gangrenous bowel, and developed fulminant sepsis in the perioperative period. No deaths were recorded among conservatively managed patients (Table 12).

Table 12: Patient outcomes

Outcome	Number (n)	Percentage (%)
Survived to discharge	109	95.6
In-hospital mortality	5	4.4
Total	114	100.0

Discussion

Demographic Profile: The predilection of AIO for middle-aged and elderly individuals in our series—with 61.4% of patients older than 45 years—aligns closely with established Indian literature. Adhikari et al., in a large eastern Indian series involving 367 patients, reported peak incidence in the fifth and sixth decades of life, attributing this to cumulative intraabdominal surgical exposure and age-related susceptibility to malignancy.[5] Malik et al. similarly observed that advancing age correlates with a rising burden of adhesive disease and colonic malignancy.[6] Male predominance (65.8%; M:F ratio 1.9:1) is a consistent finding across both Indian and global series—reported at 60–70% in the respective studies by Khan et al. and Markogiannakis et al. These studies has been attributed to the higher prevalence of inguinal hernias in males, occupational strain predisposing to hernia development, and documented delays in health-seeking behaviour among men in low- and middle-income settings.[14,15]

Clinical Presentation and Symptom Duration: The symptom profile of our cohort—abdominal pain (94.7%), distension (79.8%), vomiting (73.7%), and obstipation (65.8%)—mirrors that described by Markogiannakis et al. and several Indian series.[15,16,17] The presence of inguinoscrotal swelling in 25.4% of our patients serves as a clinically valuable diagnostic pointer that should prompt targeted examination of hernial orifices in every patient presenting with suspected AIO. Notably, 29.8% of patients arrived beyond 72 hours from symptom onset, a proportion consistent with Indian studies but substantially higher than reported in Western series. This delay, driven by geographic remoteness, reliance on traditional healers, and limited transportation infrastructure, has direct implications for the high rates of strangulation and the attendant morbidity observed in our cohort.

Diagnostic Utility of Imaging: Plain abdominal radiography retained a reasonable diagnostic yield in our series (76.3%), remaining the frontline investigation of choice given its wide availability, low cost, and rapid turnaround even in a high-volume government emergency setting. However, its known limitations in early or partial obstruction and its inability to characterise the cause or identify ischaemia were evident.[8] Contrast-enhanced CT abdomen, used selectively in 68 patients, achieved a diagnostic yield of 94.1%, consistent with meta-analytic estimates that report CT sensitivity exceeding 90% for identifying the level and cause of obstruction and 80–90% for detecting ischaemic changes, substantially outperforming plain radiography (50–70%).[12,18] CT also identified the transition point and differentiated simple obstruction from closed-loop and strangulated variants, directly influencing the decision to operate in several cases. The selective rather than universal use of CT in our series reflects real-world resource constraints; nevertheless, our data support the judicious expansion of CT access, particularly for patients with equivocal clinical findings.

Aetiological Pattern: Perhaps the most clinically instructive finding of this study is the aetiological composition of our cohort. Post-operative adhesions (33.3%) emerged as the leading cause, surpassing obstructed hernias (24.6%) for the first time in studies from this region. This transition signals a maturing surgical burden: as the volume of elective and emergency abdominal surgery grows, so does the reservoir of patients at risk for adhesive obstruction. Our finding is consistent with a recent South Indian tertiary-care study by Shivakumar et al., who reported adhesions accounting for 30–35% of cases in high-volume centres,[19] and aligns with the global trajectory described by Ten Broek et al. and the SCAR-3 study, which documented the long-term healthcare burden of adhesion-related disease.[20,21]

Adhesions impose not only clinical but also economic costs—repeated hospitalisations, adhesiolysis procedures, and productivity loss collectively constitute a substantial and often underappreciated burden.

Obstructed hernias (24.6%) remain a significant cause, and their high prevalence in this series continues to reflect the inequitable access to elective hernia repair in southern Odisha. Strangulation was identified intraoperatively in 24.0% of operated patients—a striking figure that underscores the cost of delayed presentation and missed elective surgery opportunities. Several Indian studies have emphasised that expanding access to elective hernia repair in government hospitals and primary care settings could substantially reduce hernia-related emergency admissions and the morbidity.[5,14]

Abdominal tuberculosis (14.0%) remains a meaningful aetiological contributor, a figure that distinguishes this series from both Western literature and from metropolitan Indian centres where TB-related obstruction is now uncommon.[22,23] This reflects the persisting endemic burden of tuberculosis in rural Odisha, and has important management implications: TB-related obstruction often presents insidiously, is frequently misdiagnosed as malignancy on initial imaging, and requires thoughtful surgical decision-making to avoid incomplete resection or unnecessary bowel loss. Malignancy (12.3%) and volvulus (9.6%) completed the principal aetiological groups.

A notable finding of the present study is the coexistence of emerging and traditional causes of obstruction. While postoperative adhesions have overtaken obstructed hernias as the leading cause of acute intestinal obstruction at our institution, abdominal tuberculosis continues to contribute substantially to disease burden. This dual pattern reflects both increasing surgical activity and the persistent endemicity of tuberculosis in the region.

Management and Outcomes: The operative rate of 65.8% in our series is comparable to rates reported by Markogiannakis et al. (approximately two-thirds requiring surgery)[15] and Naveen et al.[16] Conservative management—primarily successful in adhesive small bowel obstruction without strangulation—succeeded in 34.2% of patients, consistent with contemporary evidence-based recommendations including the Bologna guidelines, which advocate an initial non-operative trial in selected cases of adhesive SBO.[4,11] Schraufnagel et al. cautioned, however, that prolonged conservative management beyond recommended timeframes in adhesive obstruction may increase morbidity without improving outcomes, reinforcing the necessity of defined decision points for escalation to surgery.[24]

Adhesiolysis and hernia repair were the most commonly performed procedures. Bowel resection—with primary anastomosis or stoma formation—was necessary in a combined 28.0% of surgical cases, reflecting the prevalence of strangulation and bowel compromise attributable to delayed presentation.

Postoperative Morbidity and Predictors: Surgical site infection (24.0%) and prolonged ileus (20.0%) were the most common complications, consistent with Indian studies by Tiwari et al. and Ghosh et al.[17,25] Three preoperative variables emerged as statistically significant association of postoperative morbidity: presentation beyond 72 hours (morbidity rate 64.7%), strangulation (72.2%), and hypoalbuminaemia (60.5%). These findings align with prior work by Adhikari et al. and Ghosh et al., confirming that nutritional status and time to intervention are the most modifiable determinants of outcome.[5,25]

The pathophysiological basis for these associations is well established. Prolonged obstruction permits progressive mucosal barrier dysfunction, bacterial translocation, and endotoxin absorption—changes that fuel systemic inflammation even before overt strangulation.

Hypoalbuminaemia impairs wound healing, immune function, and anastomotic integrity.[25] Strangulation, when established, introduces transmural ischaemia and gangrenous bowel, profoundly escalating the septic burden. Deitch's lymphatic hypothesis adds a further mechanistic dimension: mesenteric lymph transports inflammatory mediators directly to the systemic circulation, contributing to distant organ dysfunction in a manner that is temporally dissociated from bacteraemia. [26]

Mortality: The in-hospital mortality of 4.4% is in keeping with the 3–8% range reported across comparable Indian and international series.[5,15] All deaths in our cohort were confined to patients with delayed presentation, strangulated obstruction, and perioperative sepsis—a clustering that reinforces the concept that mortality in AIO is largely a preventable outcome. Reducing the 30% late-presentation rate through improved community awareness, strengthened first-referral-unit capabilities, and faster inter-facility transport systems represents the most actionable public health lever available to institutions like ours.

Conclusion

Acute intestinal obstruction in southern Odisha predominantly affects middle-aged and elderly males and follows a transitional aetiological

pattern: post-operative adhesions have overtaken obstructed hernias as the leading cause at the tertiary care level, while abdominal tuberculosis retains a significant regional footprint. Delayed presentation beyond 72 hours, intraoperative strangulation, and preoperative hypoalbuminaemia are the most potent and actionable predictors of postoperative morbidity. Contrast-enhanced CT, used judiciously, substantially enhances diagnostic precision and should be available as an early investigation for patients in whom the clinical picture is ambiguous or strangulation is suspected. Early surgical intervention—guided by clinical and imaging evidence of bowel compromise—remains indispensable for cases of hernia, volvulus, malignancy, and established strangulation. From a broader health system perspective, the findings argue for three complementary interventions: expanding access to elective hernia repair and anti-tuberculosis therapy in peripheral facilities; improving nutritional screening and preoperative albumin correction in patients scheduled for emergency laparotomy; and strengthening community awareness and inter-facility referral systems to reduce the avoidable delays that drive the majority of preventable deaths in this condition.

Limitations

This study was conducted at a single tertiary care institution, which constrains the generalisability of the findings to populations with similar demographic and referral characteristics. The sample size, while adequate for the primary descriptive objectives, limits statistical power for subgroup analyses of less common aetiologies. CT abdomen was performed selectively rather than universally, precluding a fully powered comparison of imaging modalities across all patients. Finally, long-term outcomes—including recurrent obstruction from re-adhesion—could not be evaluated within the study framework.

Declarations

Ethics Approval and Consent: The study received approval from the Institutional Ethics Committee of M.K.C.G. Medical College (Approval No. EC/NEW/INST/2022/2934; IEC No. 100, dated 21 August 2024). Written informed consent was obtained from all participants or their attendants. The study adhered to ICMR National Ethical Guidelines and the Declaration of Helsinki.

Author Contributions: A.P.P.: conception and design, data acquisition, data analysis, manuscript drafting. A.S.: study supervision, manuscript review and critical revision. S.R.J.: manuscript review and revision. All authors read and approved the final manuscript.

Acknowledgements: The authors sincerely thank Prof. Dr. Sibaprashad Pattanayak (Professor and Head, Department of General Surgery, M.K.C.G. Medical College) for his guidance, and all faculty, residents, and nursing staff of Unit VI who facilitated this work. The authors are deeply grateful to all patients who consented to participate.

References

1. Bhowmick K, Chakraborty S, Tailor H, et al. Clinical profile and outcome of acute intestinal obstruction in a tertiary care hospital in India. Int Surg J. 2018;5(3):1000–1005.
2. Miller G, Boman J, Shrier I, Gordon PH. Natural history of patients with adhesive small bowel obstruction. Br J Surg. 2000;87(9): 1240–1247.
3. Moynihan BGA. Abdominal operations and intestinal obstruction. Br Med J. 1906;2:1217–1223.
4. Di Saverio S, Coccolini F, Galati M, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2013 update of the evidence-based guidelines from the World Society of Emergency Surgery ASBO working group. World J Emerg Surg. 2013;8(1):42.
5. 5.Adhikari S, Hossein MZ, Das A, Mitra N, Ray U. Etiology and outcome of acute intestinal obstruction: a review of 367 patients in eastern India. Saudi J Gastroenterol. 2010;16(4):285–287.
6. Malik AM, Shah M, Pathan R, Sufi K. Pattern of acute intestinal obstruction: is there a change in the underlying aetiology? Saudi J Gastroenterol. 2010;16(4):272–274.
7. von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLoS Med. 2007;4(10):e296.
8. Maglinte DDT, Heitkamp DE, Howard TJ, Kelvin FM, Lappas JC. Current concepts in imaging of small bowel obstruction. Radiol Clin North Am. 2003;41(2):263–283.
9. Kirkwood BR, Sterne JAC. Essential Medical Statistics. 2nd ed. Oxford: Blackwell Science; 2003.
10. Grimes DA, Schulz KF. Descriptive studies: what they can and cannot do. Lancet. 2002;359(9301):145–149.
11. Di Saverio S, Birindelli A, Ten Broek RP, et al. WSES guidelines for management of small bowel obstruction. World J Emerg Surg. 2017;12:24.
12. Reddy SRR, Cappell MS. A systematic review of the clinical presentation, diagnosis, and treatment of small bowel obstruction. Curr Gastroenterol Rep. 2017;19(6):28.

13. Zielinski MD, Bannon MP. Current management of small bowel obstruction. Adv Surg. 2011;45:1–29.
14. Khan JS, Alam J, Hassan H, Iqbal M. Pattern of intestinal obstruction: a hospital-based study. Pak Armed Forces Med J. 2007;57(4):295–299.
15. Markogiannakis H, Messaris E, Dardamanis D, et al. Acute mechanical bowel obstruction: clinical presentation, etiology, management and outcome. World J Gastroenterol. 2007;13(3):432–437.
16. Naveen N, Mukherjee A, Nirmal Kumar S, et al. Clinical study of acute intestinal obstruction and its management. Int Surg J. 2017;4(3):1031–1036.
17. Tiwari SJ, Mulmule R, Bijwe VN. A clinical study of acute intestinal obstruction in adults. Int Surg J. 2017;4(3):952–956.
18. Millet I, Ruyer A, Alili C, et al. Adhesive small-bowel obstruction: value of CT in identifying findings associated with the effectiveness of nonsurgical treatment. Radiology. 2014;273(2):425–432.
19. Shivakumar S, Patil VS, Kulkarni S, et al. Acute intestinal obstruction: management and outcome in a tertiary care centre. Int Surg J. 2021;8(12):3665–3671.
20. Ten Broek RPG, Issa Y, van Santbrink EJP, et al. Burden of adhesions in abdominal and pelvic surgery: systematic review and meta-analysis. BMJ. 2013;347:f5588.
21. Parker MC, Wilson MS, Menzies D, et al. The SCAR-3 study: 5-year adhesion-related readmission risk following lower abdominal surgical procedures. Colorectal Dis. 2005;7(6): 551–558.
22. Mandal S, Mandal MD. Abdominal tuberculosis: current perspectives. J Gastroenterol Hepatol. 2012;27(3):458–466.
23. Kumar P, Jha NK, Pandey SK, Shukla VK. Abdominal tuberculosis: clinical profile and management. Indian J Surg. 1998;60(2):88–91.
24. Schraufnagel D, Rajaee S, Millham FH. How many sunsets? Timing of surgery in adhesive small bowel obstruction: a study of the Nationwide Inpatient Sample. J Trauma Acute Care Surg. 2013;74(1):181–187.
25. Ghosh P, Kataria K, Sharma A, et al. Predictors of morbidity in small bowel obstruction: a prospective study. J Clin Diagn Res. 2016;10(10):PC01–PC05.
26. Deitch EA. Role of gut lymphatics in multiple organ failure. Curr Opin Crit Care. 2001;7(2):92–98.