

Original Research Article

A study of surgical management and its outcome in adult patients with intestinal obstruction

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Received: 12 September 2019

Revised: 21 October 2019

Accepted: 02 November 2019

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ABSTRACT

Background: Intestinal obstruction (IO) is one of the most common surgical emergencies, for which the therapeutic strategy has evolved progressively. The aim of this study was to assess the etiology, clinical spectrum and the outcome after surgical management of IO in adult patients.

Methods: A prospective, observational study was conducted in adult patients admitted for IO and undergoing surgical management. All patients underwent routine haematological investigations, urine examination (routine and microscopic) and ultrasonography abdomen and pelvis. Specific investigations like serum amylase levels, X-ray abdomen and pelvis (supine and erect) and computed tomography scan were done, if indicated. Treatment modality was confirmed once definitive diagnosis of IO was made. All treated patients were observed for postoperative complications. They were followed up after 7 days and one month postoperatively.

Results: In this study, the mean age of patients was 45.8 years and 60% were males. The most common cause of IO was found to be postoperative adhesions followed by paralytic ileus. Out of 80 patients of IO, 50 required surgical intervention, majority of which were treated with release of adhesions (38%) and resection anastomosis (44%). Poorer outcomes were observed in cases of malignancy and mesenteric ischaemia. Mortality (14%) was mainly due to complications like septicemia and respiratory tract infection.

Conclusions: The commonest cause of IO in our study was postoperative adhesions. Poor outcome of the disease was associated with late presentation to the hospital, which had high incidence of bowel damage with associated faecal contamination of the peritoneum.

Keywords: IO, Postoperative adhesions, Paralytic ileus, Malignancy, Mesenteric ischaemia, Septicemia

INTRODUCTION

Intestinal obstruction (IO) is defined as “interference in the passage of food, liquids and content of the intestine either due to mechanical or neurological cause”.¹ It is one of the most common surgical emergencies, for which the therapeutic strategy has evolved progressively but till date, it remains a global surgical problem. Various contentious management issues have been continuously debated, with particular attention focusing on how to avoid bowel strangulation or how to detect it as early as possible.

It is difficult to define the different predisposing factors preoperatively. The various etiologies for acute intestinal obstruction range from more common causes like adhesion, hernia, malignancy to uncommon conditions like intussusception.²

Just about 15% of all the emergencies with acute abdominal pain are due to intestinal obstruction.³ Mortality ranges from 3% for simple obstruction to 30% in patients with vascular compromise or perforation of the obstructed bowel, which is further prejudiced by related co-morbidities and clinical settings.^{4,5} Though the

morbidity and mortality rates related to intestinal obstruction have reduced with the introduction of new refined diagnostic tests, fluid and electrolyte correction, more effective antimicrobials and surgical management, the condition still remains a demanding surgical diagnosis.

Bowel obstruction may be complete or partial and complicated or simple. Pseudo-obstruction of the small intestine has been described as a clinical syndrome characterized by symptoms of mechanical bowel obstruction in the dearth of an obstructive lesion. Partial obstruction permits passage of a few liquid contents as well as gas, while in complete obstruction the passage of all the contents of the bowel is hindered. In contrast to simple obstruction, complicated obstruction signifies a compromise in circulation to a bowel segment leading to ischemia, infarction and finally perforation.⁶

Latest investigational studies suggest that many of the pathophysiological changes that arise with bowel obstruction seem to be related to the amplification in blood flow during the early phases, along with an intramural inflammatory reaction.⁷ Recent data show that mucosal production of reactive oxygen species may be one important mediator of some changes seen in simple mechanical bowel obstruction.⁸

The cardinal features of intestinal obstruction are abdominal pain, vomiting, abdominal distension, constipation and dehydration. The non-operative management of intestinal obstruction, which includes fluid and electrolyte replacement with crystalloids and gastrointestinal drainage with nasogastric or nasointestinal tube, has proved to be successful in about 62-85% of patients, depending on the etiology and the type of obstruction, surgeon's threshold for conversion to operative management and practice differences to suspected ischemia.^{7,9-11} Casper et al found recurrence rate of 29% in patients dealt with surgically as compared to 53% recurrence in those treated non-operatively.¹¹ Around 85% of partial small-bowel obstructions resolve with non-operative treatment, while 85% of complete small-bowel obstructions usually entail surgery.¹ Depending on the etiology of intestinal obstruction, the common surgical techniques used include decompression procedures like enterostomy and colostomy, resection and end-to-end anastomosis, release of adhesions and bands, volvulus untwisting, herniorrhaphy, hemicolectomy and ileo-transverse anastomosis.⁷ Zerey and Khakin, in their studies, have demonstrated laparoscopy to be a safe and effective technique, in few small bowel obstruction patients.^{12,13} A review of retrograde clinical trials has shown laparoscopy to display better results with reference to hospital stay and mortality reduction against open surgery.¹⁴

In adults, duodenal obstruction is usually treated surgically by resection or by palliative

gastrojejunostomy. Complete obstruction of the small bowel is preferably treated with early laparotomy, though surgery can be deferred by 2 to 3 hours in order to improve the patient's fluid status and urine output. In case of a gallstone, an enterotomy can be performed instead of cholecystectomy. Prevention of recurrence can be considered by including repairing of hernias, removing foreign bodies, and lysis of the offending adhesions.¹

The clinical spectrum and outcome of patients treated surgically for IO is important for understanding the current strategies and their adequacy in management of this important condition. Since there is not much literature available about intestinal obstruction and its management from India, the current study was designed with the objective to assess the clinical spectrum, etiology and outcome after surgical management of intestinal obstruction in adults admitted to the surgical wards of a tertiary care hospital in Nerul, Navi Mumbai.

METHODS

A prospective observational study was initiated after obtaining approval from the institutional ethics committee from October 2015 to September 2017. Patients attending the Department of General Surgery at D. Y. Patil Hospital, Navi Mumbai and admitted to the surgical ward with a provisional diagnosis of intestinal obstruction were included in the study.

Inclusion criteria

All patients admitted to the surgical ward with intestinal (small and large) obstruction and undergoing surgical management; of both genders and in age group of 18-65 years and willing to give written informed consent and follow study related procedures were included in the study.

Exclusion criteria

Infants with intestinal obstruction due to congenital causes, patients who were treated on outpatient department basis or refused admission or terminally ill cases, pregnant or lactating females and children and patients with any other serious conditions that required hospitalization were not included in the study.

All patients were explained the procedure and risks involved in their local language and a written informed consent was obtained. Clinical data was collected through questionnaires and clinical examinations. All patients underwent routine investigations like complete blood count, erythrocyte sedimentation rate, bleeding time, clotting time, urine for protein, sugar and microscopy, random blood sugar, blood urea, serum creatinine, serum electrolytes, electrocardiograph and ultrasound of abdomen and pelvis. Specific investigations like serum amylase, plain X-ray abdomen and pelvis (supine and

erect) and computerized tomography were done, if required. Treatment modality was confirmed once the definitive diagnosis of IO was arrived at. Interventions were based on decompression procedures- enterostomy and colostomy, resection and end-to-end anastomosis, release of adhesions and bands, untwisting of volvulus, herniorrhaphy, hemicolectomy and ileo-transverse anastomosis. Patients were observed for postoperative complications. The treated patients were followed up after 7 days and 1 month postoperatively and were advised about wound care and medications.

Sample size calculation

The sample size was calculated using method described for descriptive prevalence study based on effect size and absolute precision [Ref 1 and 2].

The data used in the calculation was based on the previously published literature of probable prevalence of common causes of intestinal obstruction in patients undergoing surgical management for intestinal obstruction in a tertiary care hospital. Since most cases of intestinal obstruction were reported to be due to mechanical obstruction with a prevalence of around 72.50% (proportion of 0.72), and the study design effect or estimated effect size (DEFF) of 1 with required 10% absolute precision and 95% level of significance; the minimum sample size for a one proportion cross sectional study is 78 subjects. By rounding off, we took a sample of 80 cases.

$$n = \frac{Z_{\alpha/2}^2 \times p \times (1-p) \times DEFF}{d^2}$$

Where, $\alpha=0.05$; $p=0.083$; $DEFF=1$; $d=0.10$.

Statistical analysis

Data was collected in a preformed structured questionnaire and then transferred to Excel sheet. All analysis was done using SPSS software version 21. The quantitative data was represented as their mean \pm SD. Categorical data was expressed in percentage.

RESULTS

In the present study, the mean age of the patients presenting with intestinal obstruction was 45.8 years, with over half the cases being above 40 years of age. Out of the total 80 cases of intestinal obstruction, 48 patients were males and 32 were females. Among these patients, 56 patients belonged to lower socio-economic strata, while 24 were from middle class. 24 patients gave history of having mixed diet while 56 were vegetarians. The most common presenting complaints encountered in the study were pain in abdomen and vomiting followed by distension and constipation. The presenting complaints along with their duration and most commonly associated

co-morbidities are shown in Table 1. Past history of intestinal obstruction was present in 34 patients.

Table 1: Presenting complaints.

Presenting complaints	N	%
Pain abdomen	68	85.0
Vomiting	67	83.8
Distension	64	80.0
Constipation	51	63.8
Duration of symptoms (days)		
1-3	62	77.5
4-6	16	20.0
>/= 7	2	2.5
Total	80	100.0
Co-morbidities		
None	55	68.8
DM	15	18.8
DM+HTN	4	5.0
HTN	5	6.3
IHD	1	1.3
Total	80	100.0
Past history of IO		
No	46	57.5
Yes	34	42.5
Total	80	100.0

DM: Diabetes mellitus; HTN: Hypertension; IHD: Ischemic heart disease.

Table 2: Examination findings.

General examination findings	N	%
Fever	31	38.8
Tachycardia	37	46.3
High blood pressure	21	26.3
Low blood pressure	4	5.0
Visible intestinal peristalsis	38	47.5
Previous scar	35	43.8
Mass P/A	20	25.0
Per abdominal examination		
Rigidity	9	11.3
Rigidity and tenderness	22	27.5
Rebound tenderness	5	6.3
Tenderness	44	55.0
Total	80	100.0
Digital rectal examination		
Mass per rectal	3	3.8
Red currant jelly stool	4	5.0
No abnormality detected	73	91.3
Total	80	100.0

Incidence of clinical findings on general examination, per abdominal examination and digital rectal examination are presented in Table 2. Relevant haematological investigation findings included anaemia in 14 patients, leucocytosis in 22 patients and hypokalemia in 12

patients. Abdominal X-ray showed air fluid levels in 63.8% cases and single dilated loop in 10% cases. Signs of large bowel obstruction were seen in 2.5% cases.

The most common cause of intestinal obstruction encountered in our study was postoperative adhesions followed by paralytic ileus, carcinoma, intestinal tuberculosis and obstructed hernia in descending order of frequency. Other conditions included volvulus, intussusception, strangulated hernia, pseudo obstruction, and mesenteric ischaemia, obstructed and strangulated umbilical hernia (Table 3).

Table 3: Distribution of cases as per final diagnosis.

Diagnosis	N	%
Postoperative adhesions	30	37.5
Paralytic ileus	17	21.3
Carcinoma	8	10.0
Intestinal TB	8	10.0
Obstructed inguinal hernia	4	5.0
Intussusception	3	3.8
Strangulated inguinal hernia	3	3.8
Pseudo obstruction	2	2.5
Sigmoid volvulus	2	2.5
Mesenteric ischemia	1	1.3
Obstructed umbilical hernia	1	1.3
Strangulated umbilical hernia	1	1.3
Total	80	100.0

In our study, surgical intervention was required in 50 cases (62.5%), while 30 cases were managed conservatively. Out of the 50 cases of IO managed by the surgical procedure, release of adhesions and resection anastomosis were the most common surgical procedures performed (Table 4).

Table 4: Distribution of cases as per type of surgical procedure.

Surgical management	N	%
De-rotation volvular surgery	2	4.0
Hartman's procedure	3	6.0
RA	18	36.0
RA and H	3	6.0
Reduction	1	2.0
ROA	19	38.0
ROA and H	3	6.0
TLC	1	2.0
Total	50	100.0

RA: Resection and anastomosis; RA and H: Resection and anastomosis with herniorrhaphy; ROA: Release of adhesion; ROA and H: Release of adhesion with herniorrhaphy; TLC: Transverse loop colostomy.

The complications observed in the 50 patients managed surgically were septicemia, respiratory tract infection and wound infection (Figure 1).

Distribution of surgical procedure in cases with complications is shown in Figure 2.

Mortality in surgically managed cases was found to be 14% (7 patients). Out of the 7 cases with poor outcome, 6 were of carcinoma and 1 had mesenteric ischemia.

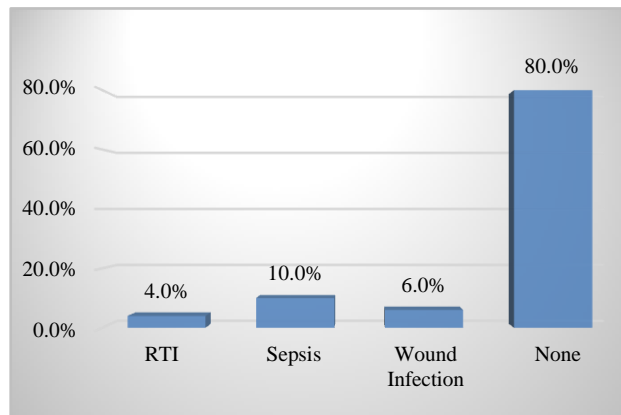


Figure 1: Distribution of cases as per complications.

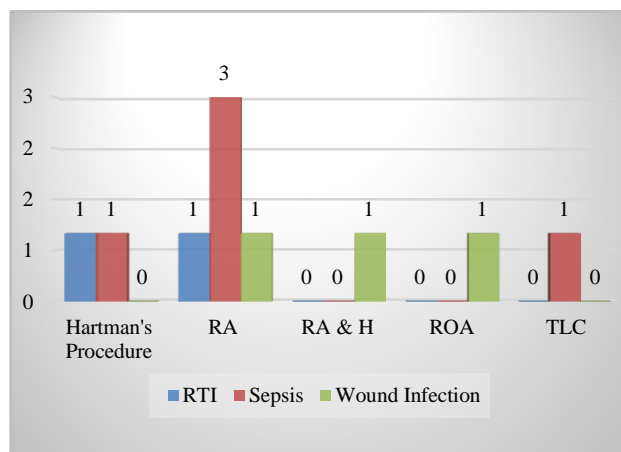


Figure 2: Distribution of surgical procedure in cases with complications.

Surgical procedure related to mortality was as follows: as 2 patients in whom Hartman's procedure was done for carcinoma rectum, 4 cases of resection and anastomosis (for 3 cases of carcinoma colon and 1 case of mesenteric ischaemia) and 1 case of transverse loop colostomy in carcinoma ovary with sigmoid colon infiltration.

Out of the 7 patients who died, cause of death was septicaemia in 5 patients and respiratory tract infection in 2 patients. Detailed analysis of patient characteristics and cause of death in cases with poor outcome is shown in Table 5.

The mortality was observed to increase with increase in the duration of symptoms ($p < 0.05$) as shown in Table 6.

Table 5: Detailed analysis of patient's characteristics and cause of death.

Case no.	Age	Sex	Duration of symptoms (in days)	Finding	Procedure	Cause of death
14	74	F	3	Ca sigmoid colon	RA	Sepsis
20	68	M	8	Ca rectum	Hartman's procedure	RTI
36	65	M	5	Mesentric ischaemia	RA	Sepsis
60	45	M	3	Ca caecum	RA	RTI
61	78	F	5	Ca ovary+colon	TLC	Sepsis Continued.
64	63	M	3	Ca rectum	Hartman's procedure	Sepsis
69	55	M	4	Ca colon	RA	Sepsis

Table 6: Comparison of mortality in relation to duration of symptoms.

Duration of symptoms (days)	No. of cases	No. of deaths	%
1-3	62	3	4.84
4-6	16	3	18.75
≥7	2	1	50.00
Total	80	7	8.75

DISCUSSION

Acute intestinal obstruction continues to be the most common surgical emergency seen in our set-up. It is difficult to define the predisposing factors preoperatively. The etiologies for acute intestinal obstruction range from the more common causes like adhesions, hernia and malignancies to uncommon conditions like intussusception.² Various management issues have been debated continuously, with particular attention focusing on how to avoid bowel strangulation or how to detect it as early as possible. The present work was aimed to study the surgical management of IO and its outcome in adult patients.

Demography

Mean age of the study cases was 45.8 years, with over half of the cases (56.3%) above 40 years of age. Out of the total 80 cases of intestinal obstruction, 60% were

males and 40% were females with male to female ratio of 1.5:1.

Our results are comparable with the previous study by Adhikari et al who observed the mean age in cases with intestinal obstruction as 44 years with male to female ratio of 2:1.¹⁵ Cole et al in their study also observed male predominance with mean age as 45.1 years, whereas Singh et al and Khan et al in their series, observed mean age as 49 and 43 years respectively.¹⁶⁻¹⁸

Presenting complaints

In the present study, the most common symptoms were pain in abdomen (85%) and vomiting (83.8%) followed by distension (80%) and constipation (63.8%). Duration of symptoms was less than 3 days in 77.5% cases.

Our results are comparable with that of observations made in other series as well (Table 7).¹⁵⁻¹⁸

Table 7: Comparison of presenting complaints with other series.

Presenting complaints	Present study	Adhikari et al ¹⁵	Khan et al ¹⁸
	(%)	(%)	(%)
Pain	85	72.0	100.0
Vomiting	83.8	91.0	92.0
Distension	80.0	93.0	97.0
Constipation	63.8	82.0	97.0

The mass per abdomen on palpation was present in 25% of the cases (malignancy and ileocaecal tuberculosis). Visible peristalsis was present in 47.5% of the intestinal obstruction cases. The digital rectal examination did not reveal any abnormality except in 3 cases of intussusception and 2 cases of malignancy (4%), wherein red currant jelly stools and rectal growth was observed.

Investigations

On abdominal X-ray, air fluid levels were seen in 63.8% cases, while single dilated loop was seen in 10% cases.

In the study population, 17.5% of the cases were found to have anaemia; otherwise the basic haematological investigations did not yield much statistical significance.

The erect abdomen X-ray helps us in the diagnosis of intestinal obstruction as well as in differentiating small bowel obstruction from large bowel obstruction. Multiple air fluid levels were seen in small intestinal obstruction (63.8%), whereas only gas shadows were seen in large bowel obstruction (2.5%) till the ileocaecal valve was competent. Taneja et al reported 90% of cases with multiple air fluid levels and Savage et al reported 95% cases with significant findings.^{19,20} Contrast study of barium enema may help to locate the obstruction in the colon, but in our study contrast study was not done.

Etiology

The most common cause of intestinal obstruction in our study was postoperative adhesions (37.5%). The next common cause was paralytic ileus (21.3%) followed by carcinoma (10%), intestinal tuberculosis (10%) and obstructed hernia (5%). Other conditions included volvulus, intussusception, strangulated hernia, pseudo-obstruction, mesenteric ischemia, obstructed and strangulated umbilical hernia in descending frequency.

As more and more abdominal surgeries are performed, with there being no practical means of preventing adhesions intra-operatively, the incidence of adhesive obstruction is on the rise. The incidence increases further with number of procedures performed in the same patient. The results of our study were comparable with the other study groups Playforth et al with 54% and Malik et al with 41% cases with postoperative adhesions.^{21,22} Even though majority of studies indicate that laparoscopy may reduce postoperative adhesion formation relative to laparotomy, laparoscopy, by itself, does not appear to eliminate adhesions completely. A variety of adjuvant materials are available to surgeons, and the most recent investigation has demonstrated significant potential for intra-peritoneal barriers. Newer technologies continue to evolve and should result in clinically relevant reduction in adhesion formation.²³

Intestinal pseudo-obstruction (paralytic ileus) can cause signs and symptoms of intestinal obstruction, but does not involve a physical blockage. In paralytic ileus, muscle or nerve problems disrupt the normal coordinated muscle contractions of the intestines, slowing or stopping the movement of food and fluid through the digestive system. Paralytic ileus can affect any part of the intestine. Causes of paralytic ileus can include abdominal or pelvic surgery and infections. In the present study, a relatively higher proportion of cases had pseudo-obstruction than that observed in previous studies (Table 8).

In the present study, malignancies accounted for 10% of the obstruction cases. The average age of these patients was 62 years with a range of 40-80 years, as reported by most western studies.¹⁵⁻¹⁸

Tuberculosis was found to be the cause of intestinal obstruction in 10% of cases in the study. Similar results

were observed in studies by Bhansali et al (15.5%) and Kochar et al (9%).^{24,25}

Obstructed inguinal or umbilical hernia accounted for 11.3% of all obstruction cases which compares favorably with the series by McEntee et al.²⁶ However, it is lower than some of the old Indian and western studies (Gill et al and Bhansali et al, 74% and 27.2% respectively).^{24,27} The trend of increased awareness and early diagnosis of obstructed hernia has decreased its prevalence considerably.

Surgical management

Surgical intervention was required in 50 cases (62.5%) cases while 30 cases (37.5%) were treated with conservative management. Release of adhesions was done in 38% of cases for postoperative adhesions. Resection anastomosis was done in 44% cases for obstructed or strangulated hernia where bowel was ischaemic or the viability was doubtful. Release of constricting agents and herniorrhaphy was done in 6% of the cases of obstructed or strangulated hernia. Derotation of volvulus was done in 4% of the cases. Resection anastomosis and herniorrhaphy was done in 6% of the cases. Reduction of intussusception was performed in one case. Three cases of Carcinoma rectum were managed with Hartman's procedure and transverse loop colostomy was done for one case of Carcinoma ovary with sigmoid colon infiltration.

Complications

In the present study group, there were 5 cases of septicemia, 2 cases of respiratory tract infection and 3 cases of wound infection. Out of the 5 cases with sepsis, 3 were in patients who underwent resection anastomosis. The 2 cases of respiratory tract infection were in patients undergoing Hartman's procedure and resection anastomosis. Wound infection was seen in total of 3 cases- those with resection anastomosis (2 cases) and release of adhesions (1 case).

Mortality

In the present study, out of the 50 cases treated surgically, 7 patients died. Mortality was due to complications like septicaemia (5 cases) and respiratory infection (2 cases). Out of these 7 cases, 6 cases were of carcinoma and 1 case had mesenteric ischemia.

The mortality rate in the present study is comparable to Ramachandran et al study which had a mortality rate of 12.7% in a study population of 417 patients.²⁹ But it is more when compared to studies of Adhikari et al (7.35%) and Khan et al (7%).^{15,18} Sufian et al reported a mortality rate of 19%.³⁰

Out of the 7 cases that died, 6 cases were due to malignancy. Incidence of malignancy was more in the

aged group, and the surgeries were done in unprepared bowel, which led to septicaemic complications resulting in death. Two patients were chronic smokers, who suffered from respiratory tract infection leading to death. Hence, most of the deaths were due to malignancy which played a significant role in the outcome of the disease.

The mortality in intestinal obstruction is more in patients who develop strangulation and gangrene of the bowel. Operative procedure carries a significant role in progress as well as the mortality.

The mortality also increased with increase in the duration of symptoms, as mortality rate of 4.84%, 18.75% and 50% was observed in cases presenting within 3 days, 4-6 days and after 7 days or later respectively ($p < 0.05$). Similar relation of increase in mortality with duration of symptoms was observed by Adhikari et al and Sufian et al.^{15,30}

CONCLUSION

A hospital based observational study was conducted in 80 patients admitted to the surgical ward with signs and symptoms of intestinal (small and large) obstruction in the Department of Surgery, D.Y. Patil University School of Medicine, Hospital and Research Centre, Nerul, Navi Mumbai with the aim to study the surgical management of intestinal obstruction and its outcome in adult patients.

The commonest cause of IO was post-operative adhesions. Overall 50 cases required surgical intervention. Mortality rate in the surgically treated cases was 14%. Malignancy and mesenteric ischaemia had poorer outcomes compared to simple obstruction caused by postoperative adhesions. The poor outcome of the disease was due to late presentation to the hospital, which had high incidence of bowel damage with associated fecal contamination of the peritoneum. The mortality in the postoperative period was mainly due to fecal peritonitis, bronchopneumonia, respiratory tract infection and advanced malignancies.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Deolekar SR, Mahapatra B, Subudhi S, Singhal P. A study of surgical management and its outcome in adult patients with intestinal obstruction. *Int Surg J* 2019;6:4370-7.