Original Research Article

Acute intestinal obstruction: small intestine vs. large intestine: an analysis

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ABSTRACT

Background: Bowel obstruction is one of the most common causes of acute abdomen and also a common surgical emergency. The causes of IO vary significantly depending on geographical location. The aim of this study was to identify the etiology, clinical presentation, management and outcomes of patients with acute mechanical IO presenting in Jodhpur, Rajasthan.

Methods: A prospective study was conducted at Mahatma Gandhi Hospital and Mathura Das Mathur Hospital (associated with Dr. SN Medical College), Jodhpur, Rajasthan. 100 patients with acute intestinal obstruction were admitted and evaluated. Blood routine, X-Ray abdomen, USG abdomen and CECT (if required) were done. A pre-operative diagnosis was made. Intra-operative findings and Post-operative complications were noted and follow up was done till the patient was discharged from the hospital.

Results: A total of 69 male and 31 female patients, presented with acute mechanical IO during the period of the study. Mean patient age was 48.5 years with peak incidence in those aged 31-45 years. The foremost signs and symptoms were abdominal distension (88%), obstipation (87%), abdominal pain (81%) and nausea/ vomiting (47%). Adhesions and bands (29%), hernia (13%), neoplasm (9%) and pseudo-obstruction (8%) were the leading causes of intestinal obstruction. The sensitivity of X-ray and USG in present study was 67% and 75% respectively. Most common complication associated was wound infection (17%) followed by paralytic ileus (7%) and respiratory tract infections (6%). Late presentation was associated with poor prognosis. 4 patients expired before surgery. Post-operative mortality was associated with 6 patients and was more common in cases which presented with gangrenous bowel.

Conclusions: The most common causes of IO in this study were adhesions and bands, hernia, neoplasm and pseudo-obstruction. Presence of bowel gangrene was associated with higher morbidity and mortality.

Keywords: Acute intestinal obstruction, Bowel obstruction, Bowel gangrene, Clinical presentation, Etiology, Management, Outcomes

INTRODUCTION

Intestinal obstruction is defined as a partial or complete interference with the forward flow of small or large intestinal contents.[1]

Bowel obstruction is one of the most common causes of acute abdomen and also a common surgical emergency.[2,3] Bowel obstruction may be functional, due to bowel wall or splanchnic nerve dysfunction, or mechanical, due to a mechanical barrier.

Mechanical SBO may be due to a luminal, mural, or extra-mural mechanical barrier. Mechanical SBO may be proximal (high SBO) or distal (low SBO), closed loop or open-ended obstruction. In closed loop obstruction the lumen of the bowel is occluded at two points thus preventing prograde and retrograde movement of bowel contents. In open-ended obstruction a one-point obstruction interferes with the prograde propulsion of bowel contents.[4]

Bowel obstruction may be partial or complete, simple or complicated. Partial obstruction allows some liquid contents and gas to pass through the point of obstruction, whereas complete obstruction impedes passage of all bowel contents. Unlike simple obstruction, complicated obstruction indicates compromise of the circulation to a segment of bowel with resultant ischemia, infarction, and perforation.[4]

Aims and objectives of present study were to study the etiology and clinical presentation of acute intestinal obstruction and to compare the small and large bowel obstruction. To study the role of imaging studies in determining the etiology and intervention in acute intestinal obstruction. To study the various modalities of treatment and their outcome in acute intestinal obstruction.

METHODS

The present work includes the investigation of 100 cases of acute intestinal obstruction admitted in the Mahatma Gandhi Hospital and Mathura Das Mathur Hospital (associated with Dr. S. N. Medical College, Jodhpur), Rajasthan from January 2015 to December 2016. Children <12 years of age, terminally ill cases and patients who refused admission or surgery were excluded.

Details of cases including history and clinical examination were recorded. Blood routine, X-Ray abdomen, USG abdomen and CECT (if required) were done. A pre-operative diagnosis was made. Intra-operative findings and Post-operative complications were noted and follow up was done till the patient was

RESULTS

Table 1: Age distribution with sex.

Age (years)	Male	Female	Total
12-30	15	7	22
31-45	13	13	26
46-60	14	7	21
61-75	18	3	21
>75	9	1	10
Total	69	31	100

In the present study, on the basis of age distribution, acute intestinal obstruction mainly occurs in age group of

31-45 years with mean age 48.48 years. In present study, on the basis of sex distribution, acute intestinal obstruction had a significant preponderance in male population (69%) as compared to female (31%).
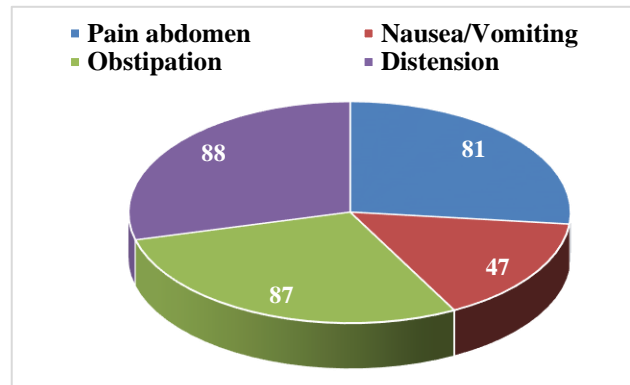

Figure 1: Distribution on the basis of clinical features.

Among the four cardinal features, abdominal distension was the most common symptom (88%) followed by obstipation (87%), abdominal pain (81%) and nausea/vomiting (47%). Only 28% of the patients had all the four cardinal features of acute intestinal obstruction in present study.
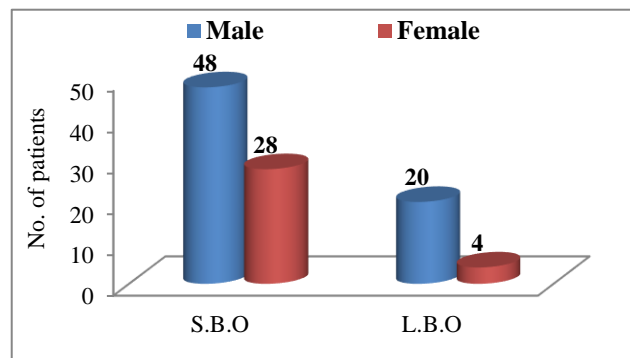

Figure 2: Sex distribution of the type of bowel obstruction.

Table 2: Age distribution of the type of bowel obstruction.

Age (years)	S.B.O.	L.B.O.	Total
12-30	20	2	22
31-45	24	2	26
46-60	16	5	21
61-75	11	10	21
>75	5	5	10
Total	76	24	100

In present study, 76 cases were of small bowel obstruction (64.4% male and 35.6% female) and 24 were of large bowel obstruction (83.3% male and 16.7% female). It was observed that the incidence of large bowel obstruction increases with the age with maximum number

of cases above 60 years of age. However, most of the cases of small bowel obstruction were in the age group of 31-45 years.

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Table 3: Age distribution with sex.

Causes	Age (in years)					Total
	12-30	31-45	46-60	61-75	>75	
Adhesions and bands	9	14	4	1	1	29
Hernia	0	1	7	4	1	13
Neoplasm	0	1	3	3	2	9
Volvulus	0	0	1	3	2	6
Meckel's diverticulum	3	2	0	0	0	5
Intestinal TB	5	1	1	0	0	7
Mesenteric ischemia	0	0	2	1	1	4
Intussusception	0	2	1	0	0	3
Duodenal stricture	0	0	0	1	0	1
Gallstone ileus	0	0	1	0	0	1
Pseudo-obstruction	2	0	1	4	1	8
Miscellaneous	2	4	0	3	1	10
Expired before surgery	1	1	0	1	1	4
Total	22	26	21	21	10	100

In present study, the most common cause of acute intestinal obstruction was adhesions and bands (29%) with the most common age group being 31-45 years followed by hernia (13%), neoplasm (9%), pseudo-obstruction (8%), intestinal tuberculosis (7%) and volvulus (6%). Few patients also presented with pseudo-obstruction (8%), mesenteric ischemia (4%) and intussusception (3%). 4 cases expired before surgery and the exact cause of bowel obstruction couldn't be identified.

Table 4: Distribution of the patients with poor prognosis on the basis of day of presentation.

Day of presentation (days)	Total no. of patients	Patients with poor prognosis	Percentage
1-2	61	24	39.34
3-4	33	22	66.67
5-6	5	4	80.00
≥7	1	1	100.00

On the basis of day of presentation to the hospital, it was observed that patients presenting late had high rate of having poor prognosis. Most of the patients presented within 2 days of developing symptoms of acute intestinal obstruction (61%) and they had the lowest rate of

developing complications (39.34%) as compared to those presenting after 5 days or more (80 -100%).

In the present study, X-ray abdomen was able to diagnose 67% of the cases of acute intestinal obstruction and USG abdomen diagnosed 75% of the cases. So, the sensitivity of X-ray and USG in present study was 67% and 75% respectively. However, both the imaging studies together were 91% sensitive.
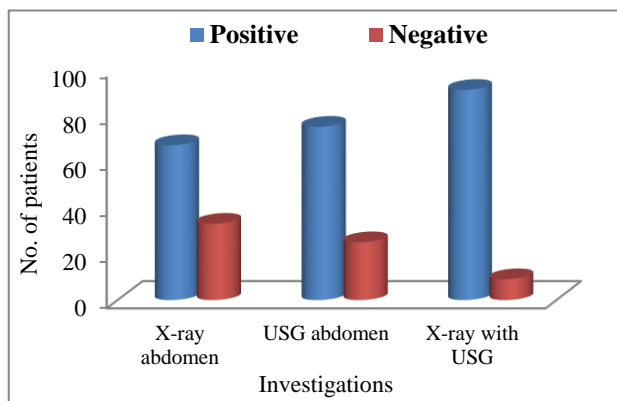

Figure 3: Sensitivity of imaging studies.

CECT abdomen was done in 16 cases out of which 4 cases were operated. CECT was able to diagnose as well as detect the cause of bowel obstruction in all the 4 cases. The other 12 cases were managed conservatively and CECT was done after the acute intestinal obstruction got relieved. CECT revealed no significant finding in those cases.

Table 5: Morbidity.

Complications	No. of patients	Percentage
Wound infections	17	17
Paralytic ileus	7	7
Respiratory tract infections	6	6
Urinary tract infections	5	5
Anastomotic leak and fecal fistula	3	3
ARDS	3	3
Burst abdomen	3	3
Dyselectrolytemia	2	2
Fecal peritonitis	1	1
Total	47	47

In present study, 4% cases expired before surgery and 19% cases were managed conservatively. Rest 77% cases were operated, out of which 6 cases expired post-operatively. The most common procedure performed was adhesiolysis/ band release (29%) followed by hernia repair (with resection-anastomosis if strangulated) (13%), bypass/ diversion/ resection procedures for malignancy and resection/ fixation procedures for volvulus.

Mortality was associated with 10 patients. 4 patients expired before surgery in whom the cause of acute intestinal obstruction could not be identified. Post-operative mortality was associated with 6 patients and was more common in cases which presented with gangrenous bowel.

Table 6: Mortality.

Diagnosis	Surgery	Cause of mortality
Adhesion SBO with perforation peritonitis	E.L. with R.A. with adhesiolysis	Anastomotic leak with septic shock
Mesenteric ischemia (gangrenous jejunum and ileum)	E.L. with Resection of gangrenous gut and exteriorization of jejunum	Dyselectrolytemia with septic shock
Mesenteric ischemia (gangrenous ileum)	E.L. with resection of gangrenous gut and end ileostomy	Dyselectrolytemia with septic shock
CA anal canal with perforation peritonitis	E.L. with sigmoid loop colostomy with primary repair of cecal perforation and peritoneal lavage	Fecal peritonitis with septic shock
Mesenteric ischemia (gangrenous Ileum)	E.L. with resection of gangrenous gut and end ileostomy	ARDS with septic shock
Cecal volvulus	E.L. with cecopexy	ARDS

DISCUSSION

The diagnosis and management of the patient with intestinal obstruction is one of the most challenging emergencies that a general surgeon can come across. Although the mortality due to acute intestinal obstruction is decreasing with better understanding of pathophysiology, improvement in diagnostic techniques, fluid and electrolyte correction, much potent antimicrobials and surgical management, still mortality ranges from 3% for simple obstruction to as much as 30% when there is vascular compromise or perforation of the obstructed bowel.

This is further influenced by the clinical setting and related co-morbidities. Early diagnosis of intestinal obstruction and strangulation, skilful operative management, proper technique during surgery and intensive postoperative treatment reduce morbidity and mortality and yield gratifying results.

In present study on the basis of age distribution acute intestinal obstruction mainly occur in age group of 31-45 years with mean age 48.48±19.59 years. This was in concordance with the studies conducted by Saravanan P. S. et al, Philip Blasto Ooko et al, Adhikari et al and E. O. Ojo et al in which the cases of acute intestinal obstruction

occur most commonly in the age group of 30-50 years, 31-40 years, 30-50 years and 20-40 years respectively.[5-8]

On the basis of sex distribution there is significant difference in the incidence of acute intestinal obstruction, 69% in male as compared to 31% in female. The results were similar in the studies conducted by Philip Blasto Ooko et al and Adhikari et al in which male and female proportion was 68.1% vs 31.9% and 75.2% vs 24.8% respectively.[6,7]

Most of the patients presented with abdominal distension (88%) followed by obstipation (87%), abdominal pain (81%) and nausea/ vomiting (47%). Similar results were found in the study conducted by Adhikari et al in which the most common presenting feature was abdominal distension (99.92%) followed by obstipation (76.02%), abdominal pain (71.66%) and nausea/ vomiting (24.8%).[7]

In the present study 76% cases were of small bowel obstruction while 24% were of large bowel obstruction. It was also observed that incidence of large bowel obstruction increases with age with maximum number of cases above 60 years of age. The studies conducted by Soressa U et al and Chen XZ et al concluded that the proportion of small and large bowel obstruction was 71.1% vs. 28.9% and 64% vs. 36%.[9,10]

The most common cause of acute intestinal obstruction in present study was adhesion sand bands (29%) followed by hernia (13%), neoplasm (9%), pseudo-obstruction (8%), intestinal tuberculosis (7%) and volvulus (6%). Few patients also presented with pseudo-obstruction (8%), mesenteric ischemia (4%) and intussusception (3%). Studies conducted by Saravanan PS et al, Ojo EO et al and Chen XZ et al showed similar results.[5,8,10]

In the present study, most common cause of small bowel obstruction was adhesions and bands followed by hernia while the most common cause of large bowel obstruction was colorectal cancer followed by pseudo-obstruction and volvulus. This is in concordance with the studies conducted by Ojo EO et al, Chen XZ et al and Mohamed AY et al.[8,10,11]

On the basis of day of presentation to the hospital, it was observed that patients presenting late had high rate of having poor prognosis. Patients presenting within 2 days had the lowest rate of developing complications (39.34%) as compared to those presenting after 5 days or more (83.3%). A study conducted by Soressa U et al concluded that patients who presented within 24 h of symptom presentation are less likely to develop an unfavourable outcome, compared with patients who presented after 24h.[9] Similarly, a study conducted by Heis HA et al showed that delayed presentation and/or surgical intervention frequently results in relatively poor surgical outcomes and/or longer hospital stays.[12]

In the present study, sensitivity of X-ray and USG in present study was 67% and 75% respectively. However, both the imaging studies together were 91% sensitive. CECT was not done in all the acute cases. It was done in 16 cases out of which 4 cases were operated and rest 12 cases were managed conservatively and CECT was done after the acute phase got resolved. This is in concordance with the study conducted by Maglinte DD et al on 78 patients and concluded that the sensitivity of plain film radiography for revealing small-bowel obstruction was 69% and its specificity was 57%.[13] Overall accuracy of plain film radiography was 67%.

A study was conducted by Ogata M et al and concluded that sonography is as sensitive but more specific than plain x-rays in the diagnosis of bowel obstruction.[14] Management based on sonographic findings has the potential to reduce costs of surgical care.

USG is increasingly used in the emergency department in pregnant patients, and critically ill patients for whom the study can be performed at the bedside.[15] Ultrasound is more sensitive and specific than plain films for the diagnosis of small bowel obstruction, but not as helpful for determining the location, cause, and potential complications of bowel obstruction.[16-18]

Criteria for subjecting patients to surgery included increasing pain and distension with gross abdominal tenderness, tachycardia, and other features of toxicity like fever and leucocytosis and failure of non-operative treatment. For patients with intestinal tuberculosis and provisional diagnosis of adhesive intestinal obstruction, there was a higher threshold for surgery and only patients who had increasing distension, tachycardia, and no response to conservative treatment even after 3-4 days of admission were subjected to surgery, apart from those who were toxic on admission and those with evidence of hollow viscus perforation (free gas in radiograph) or intra-abdominal abscess formation.

In present study, 4% cases expired before surgery and 19% cases were managed conservatively. Rest 77% cases were operated, out of which 6 cases expired post-operatively. The most common procedure performed was adhesiolysis/band release (29%) followed by hernia repair (with resection-anastomosis) in 13%. Similarly, Adhikari et al concluded that patients were either subjected to conservative management (79 patients, 21.5%) or to operative intervention (288 patients, 78.5%).[7] A study conducted by Ojo EO et al showed that 77.9% patients were managed operatively with adhesiolysis being the most frequent procedure.[8]

In the present study, morbidity was associated with 47 patients in present study. Most common complication associated was wound infection (17%) followed by paralytic ileus (7%), respiratory tract infections (6%) and urinary tract infections (5%). The results were similar to

the studies conducted by Deshmukh SN et al, Saravanan PS et al, Adhikari et al and Ojo EO et al.[5,8,19]

In present study, mortality was associated with 10 patients. 4 patients expired before surgery in whom the cause of acute intestinal obstruction could not be identified. Post-operative mortality was associated with 6 patients, out of which 50% cases were of mesenteric ischemia. Deshmukh SN et al, Saravanan P. S. et al and Adhikari et al concluded that the mortality rate in their study was 10%, 6% and 7.35% respectively.[5,7,19]

CONCLUSION

In this study, most of the patients were male (69%) and the most common age group was 31-45 years with mean age 48.48±19.59 years. The most common presenting symptom was abdominal distension followed by obstipation, abdominal pain and nausea/vomiting.

Incidence of involvement of small intestine in intestinal obstruction was 76% and of large intestine was 24%. Incidence of large bowel obstruction increases with the age. The most common cause of small bowel obstruction was adhesions and bands followed by hernia and the most common cause of large bowel obstruction was colorectal cancer followed by pseudo-obstruction and volvulus.

Patients presenting late to the hospital had high rate of developing complications during hospital stay as compared to those presenting early.

Imaging studies used to diagnose in present study were X-ray abdomen, USG abdomen and CECT abdomen. The sensitivity of X-ray and USG in present study was 67% and 75% respectively and together they were 91% sensitive.

CECT was done in 16 cases out of which 4 cases were operated and 12 cases were conservatively managed. CECT was able to diagnose as well as detect the cause of bowel obstruction in all the 4 cases.

The most common procedure performed was adhesiolysis/band release (29%) followed by hernia repair (13%).

Morbidity was associated with 47 patients. Most common complication associated was wound infection (17%) followed by paralytic ileus (7%), respiratory tract infections (6%) and urinary tract infections (5%). Few patients also developed anastomotic leak (3%), burst abdomen (3%) and ARDS (3%).

Mortality was associated with 10 patients. 4 patients expired before surgery in whom the cause of acute intestinal obstruction could not be identified. Post-operative mortality was associated with 6 patients and was more common in cases which presented with gangrenous bowel.

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