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A Prospective Study on Clinico-Pathology, Management and Outcome of Acute Mechanical Bowel Obstruction in a Tertiary Care Centre in Jharkhand

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Abstract: *Acute mechanical bowel obstruction is a common surgical emergency and a frequently encountered problem in abdominal surgery. It constitutes a major cause of morbidity and financial expenditure in hospitals around the world and a significant cause of admissions to emergency surgical departments. This was a prospective observational study of patients admitted to the Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India with a diagnosis of acute mechanical bowel obstruction between April 2015 and October 2016. 157 patients included in the study. Mean age of the patients was 58.8 years. Constipation (86.0%) and absence of passage of flatus (77.1%) were the most common presenting symptoms, and abdominal distension (89.2%) was the most frequent physical finding on clinical examination. In the total study group of patients with small or large bowel obstruction- adhesions, incarcerated hernias, and malignancies constituted the most frequent causes (64.8%, 14.8%, and 13.4%, respectively). 84 patients (53.5%) of the total study group were treated conservatively. 7 patients died (mortality-4.5%); and mostly died due to multiple organ failure.*

Keywords: *Acute mechanical obstruction, adhesion, malignancy, tuberculosis, perforation.*

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I. Introduction

Acute mechanical bowel obstruction is a common surgical emergency and a frequently encountered problem in abdominal surgery[1,2]. It constitutes a major cause of morbidity and financial expenditure in hospitals around the world[3] and a significant cause of admissions to emergency surgical departments[2,4]. Intestinal obstruction belongs to highly severe conditions, requiring a quick and correct diagnosis as well as immediate, rational and effective therapy[5,6]. Surgeons are concerned about bowel obstruction cases because strangulation, causing bowel ischemia, necrosis and perforation might be involved, and it is often difficult to distinguish simple obstruction from strangulation. Accurate early recognition of intestinal strangulation in patients with mechanical bowel obstruction is important to decide on emergency surgery or to allow safe non-operative management of carefully selected patients[1,2,7,8].

Although close and careful clinical evaluation, in conjunction with laboratory and radiologic studies, is essential for the decision of proper management of patients with acute mechanical bowel obstruction[1], a preoperative diagnosis of bowel strangulation cannot be made or excluded reliably by any known parameter, combinations of parameters, or by experienced clinical judgement[7-9]. Mechanical bowel obstruction is an old and common surgical emergency[1,2]. Immediate and correct diagnosis of this condition and its etiology is essential[5,6,9-11], and appropriate treatment is of utmost importance[5,6,9-11]. The clinical picture, however, of these patients[6,12,13] along with the etiology of obstruction[1,3,11,14-16] and strangulation prevalence are variable[8,17,18], while appropriate management remains controversial[1-3,10,17,19]. We, therefore, conducted this prospective study to identify and analyze the clinical presentation of patients with acute mechanical bowel obstruction in our institute, the etiology of obstruction as well as management and outcome of these patients.

Aims & Objectives

1. To evaluate the incidence of acute mechanical bowel obstruction.
2. To analyse clinicopathology, management and outcome of acute mechanical bowel obstruction.

II. Materials and Methods

This was a prospective observational study of patients admitted to the Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India with a diagnosis of acute mechanical bowel obstruction between April 2015 and October 2016. After approval from Institutional Ethics Committee of Rajendra institute of Medical Sciences, Ranchi, Jharkhand, India, 157 patients were included in the study. Informed written consent was obtained from the patients.

Inclusion criteria:- Patients admitted in the Department General Surgery with acute mechanical bowel obstruction for e.g. adhesions, obstructed hernia, volvulus etc.

Exclusion criteria:

a. Patients under 10 years of age.
b. Patients with adynamic intestinal obstruction.

Methodology:- Data collection (including pre-hospital, emergency department and in-hospital information) was started immediately after patient's arrival at the Surgical Emergency Department and continued on a daily basis.

Collected data included:-

a. Detailed history
b. General and systemic examination findings
c. Laboratory findings (WBC count, CBC, RFT, Sr. Electrolytes, Serological tests for HIV and HBsAg)
d. Radiological tests (e.g. plain abdominal X-ray finding, USG- whole abdomen, CT scan- abdomen & pelvis)
e. Types of management
f. Time between arrival and operation
g. Etiology of obstruction
h. Incidence and causes of bowel ischemia, necrosis, and perforation
i. Complications
j. Final outcome.

Statistical Methods:- Chi-square and Fisher Exact test was used to find the significant of proportion of postoperative complications in association with etiology of intestinal obstruction. The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis of the data.

III. Result

During the one and half years study period, 157 patients with acute mechanical bowel obstruction were admitted and composed the study group.

Table 1- Age incidence

Age (years)	Male	Female	Total
10–20	0	1	1
21–30	5	1	6
31–40	5	4	9
41–50	8	6	14
51–60	19	25	44
61–70	28	25	53
71–80	15	12	27
81–90	3	0	3
91–100	0	0	0

Mean age of the patients was 58.8 years. Majority of the patients (33.8%) belonged to the age group 61-70 years.

Table 2: Gender

Gender	No. of cases	Percentage
Male	83	52.9%
Female	74	47.1%

Males comprised 52.9% of the group.

Table 3: Clinical data of the total study group on arrival at the emergency department (n=157)

Systolic arterial blood pressure (mm Hg)	131-Mean (range: 80–170)
Diastolic arterial blood pressure (mm Hg)	82-Mean (range: 40–90)
Heart rate (/min)	90-Mean (range: 60–130)
Breathing rate (/min)	18-Mean (range: 11–22)
Fever (temperature > 38^0C)	11 (7.0%)
Constipation	135 (86.0%)
Absence of passage of faeces	121 (77.1%)

Vomiting	101 (64.3%)
Nausea	89 (56.7%)
Abdominal distension	140 (89.2%)
Colicky abdominal pain	135 (86.0%)

Constipation (86.0%) and absence of passage of flatus (77.1%) were the most common presenting symptoms, and abdominal distension (89.2%) was the most frequent physical finding on clinical examination.

Table 4: Etiology of acute mechanical bowel obstruction in small bowel (n = 102)

Cause	No. of cases	Percentage
Adhesions	67	65.7%
Hernia	19	18.6%
Tuberculosis	12	11.8%
Malignancy	3	2.9%
Intussusception	1	1.0%

Adhesions, incarcerated hernias and tuberculosis were the most frequent causes of obstruction (65.7%, 15.7%, and 11.8% respectively).

Table 5: Etiology of acute mechanical bowel obstruction in large bowel (n=55)

Cause	No. of cases	Percentage
Malignancy	21	38.2%
Adhesions	16	29.1%
Hernia	11	20.0%
Volvulus	5	9.1%
Tuberculosis	1	1.8%
Intussusception	1	1.8%

Malignancies, adhesions and hernias were the most frequent causes of obstruction (38.2%, 29.1%, and 20.0% respectively).

Table 6: Etiology of acute mechanical bowel obstruction in total study group (n=157)

Site of obstruction	Small bowel	Large bowel
No. of cases	102	55
Percentage (%)	65.0	35.0

Finally, in the total study group of patients with small or large bowel obstruction- adhesions, incarcerated hernias, and malignancies constituted the most frequent causes (64.8%, 14.8%, and 13.4%, respectively).

Table 8: Management and outcome of the patients

Value	Small bowel obstruction (n = 102)	Large bowel obstruction (n = 55)	Total study group (n = 157)
Operative treatment	32 (31%)	41(75%)	73 (46.5%)
Non-operative treatment	70 (69%)	14 (25%)	84 (53.5%)
Time between arrival and operation (h)	31 [range:2-96]	72 [range: 4-164]	48 [range: 2-164]
Operation on the 1st day	21 (20.6%)	11 (20%)	32 (20.4%)
Operation on the 2nd day	5 (4.9%)	5 (9.1%)	10 (6.4%)
Operation on the 3rd day	5 (4.9%)	3 (5.5%)	8 (5.1%)
Complication	8 (7.8%)	6 (10.9%)	14 (8.9%)
Mortality	5 (4.9%)	2 (3.6%)	7 (4.5%)

84 patients (53.5%) of the total study group were safely and effectively treated conservatively. Non-operatively treated patients composed the highest proportion (69%) of the patients with acute mechanical small bowel obstruction, while they only accounted for the minority (25%) in the large intestinal obstruction group. Of the 73 patients (46.5%) of the total study group who were operatively treated, a substantial portion 32 patients (20.4%) required surgical intervention on the first day. 14 cases (8.9%) sustained complications; 8 suffered from septic shock along with acute respiratory and renal failure, 1 suffered from pneumonia, 1 had urinary tract infection, and 4 was reoperated because of an anastomotic leakage. 7 patients died (mortality-4.5%); and all of them died due to multiple organ failure attributable to sepsis.

IV. Discussion

Acute mechanical bowel obstruction remains a frequently encountered problem in abdominal surgery and a common surgical emergency[1,2], which is a frequent cause of admissions to hospital emergency surgical departments[2,4]. The majority of our study group presented with acute mechanical small bowel obstruction. This has also been found in other studies with small bowel obstruction accounting for about 80% of total obstruction cases[9,20,21].

Regarding clinical presentation of our patients, constipation and absence of passage of flatus were the most frequent presenting symptoms, and abdominal distension was the most common physical finding on clinical examination. Additionally vomiting, nausea, colicky abdominal pain and abdominal distension were frequent symptoms on arrival.

Our results, even though some differences are noticed, are in accordance with the literature[6,12,13,22,23]. Particularly, Cheadle *et al* reported abdominal pain (92%), vomiting (82%), abdominal tenderness (64%), and dissention (59%) as the most frequent symptoms and signs [6], whereas abdominal distension, bilious vomiting, absolute constipation and abdominal pain were the main signs and symptoms in another series[12].

In a study of patients with bowel obstruction due to large bowel volvulus, the most common sign of sigmoid volvulus was distension (79%) and the most frequent symptoms were pain (58%) and absolute constipation (55%), whereas most patients with caecal volvulus presented with pain (89%)[22]. Furthermore, in a review of cases with obstruction because of small and large bowel intussusception, abdominal pain, nausea, vomiting, and abdominal distension were the commonest symptoms and signs, respectively[23].

Malignancy, incarcerated hernias and adhesion constitute the most frequent causes of obstruction[3,4,9,11,14,16,17, 20,21,24-30]. This finding was also noticed in our study.

Moreover, adhesions were the most prevalent etiology of obstruction in the small bowel obstruction group and the total study group and the second most common etiology in the large bowel group. Several studies postulate that adhesions are responsible for 32%-74% of bowel obstruction and are the leading cause of small intestinal obstruction representing 45%-80% of it[1-4,7,9,14,17,20,24-26,28-30].

As it was also observed in our study, large bowel malignancy, is the most common etiology of obstruction in patients with large intestinal obstruction with a prevalence of 40%-90%[9,10,14,21].

The majority of such patients in our study were treated non operatively. Moreover, incarcerated hernias were the second most common etiology of obstruction as well as the predominant cause of bowel ischemia, necrosis, and perforation. It should also be emphasized that bowel ischemia was reversible in half of our cases with obstruction due to incarcerated hernias justifying, thus, immediate surgery in these patients. Since abdominal hernias continue to account for 8%-25% of all cases of intestinal obstruction[1,4,14,17,20,24,26,30], while in a few series represent the most common cause of intestinal obstruction accounting for 30%-55%[11,16,21,27], and, moreover, they still remain the most common cause of strangulation[1,4,11,17,21,24,27], surgeons should continue their aggressive attitude towards elective repair of all abdominal hernias as well as towards immediate operative intervention in patients with acute mechanical bowel obstruction secondary to incarcerated hernias.

Other less common causes of obstruction reported in the literature are Crohn's disease[3,17,20] and gallstones[21], accounting for 3%-7% and 2% of small bowel obstruction cases, respectively, and bowel volvulus[14,15,20,24] and intussusception[14,20,25], accounting for 4%-15% and 4%-8% of total obstruction cases, respectively. In our series, no case of obstruction due to gallstone and Crohn's disease .An important share of our patients was successfully non-operatively treated. This was more prevalent regarding adhesive small bowel obstruction. This has also been noticed in other studies[2,3,9,12,16-19,24,28-30].

Similar to other studies[12,24], of those patients that were operated, a substantial proportion required immediate operation. Much attention should be paid to the treatment of these patients since the incidence of bowel ischemia, necrosis, and perforation is significantly high. Strangulation rate in the literature ranges from 7% to 42%[4,8,12,17,24,26,28].

Moreover, the incidence of bowel ischemia, necrosis, and perforation in adhesive obstruction was very low. These results have been also described in other studies[1,4,11,17,21,24,27].

In our study, complication and mortality rate were relatively low. In the literature, complication rate ranges from 6% to 47%[6,20,25,27,31,32] whereas mortality ranges from 2% to 19%[4,6,11,14,17-20,24-27,31,32].

In general, appropriate treatment of acute mechanical bowel obstruction as well as timing of surgery for patients selected to undergo operative intervention still remain controversial[1-3,10,17,19]. Management of this condition requires careful assessment and awareness while the appropriate treatment needs to be tailored to the individual situation[10,19]. Furthermore, no specific factors that may predict success of conservative or surgical management have been identified[19]. Although modern surgical management continues to focus appropriately on avoiding operative delay whenever surgery is indicated, not every patient is always best served by immediate operation. As it was also proved in the present study, certain entities, such as bowel obstruction secondary to incarcerated abdominal wall hernia, and patients with clinical signs and symptoms suggestive of strangulation do require prompt operative intervention[1,3,16,17]. Other conditions, however, such as postoperative adhesions, particularly in patients with numerous previous abdominal procedures or concomitant medical problems, often justifiably benefit from a trial of non-operative management[1-3,9,16-18,28-30]. A substantial portion of these patients was successfully conservatively treated in our study. As it was also shown in this study, the risk of strangulation with adhesive bowel obstruction is significantly lower as compared to incarcerated hernia[1,4,17,24].

Strangulated obstruction requires emergency surgery, and early recognition is often life-saving since delay in treatment is an independent predictive factor of mortality and, in addition, bowel strangulation is an

independent predictor of complication and, even more, of mortality while the mortality rates of patients with strangulated obstruction are two to 10 times higher than those of patients with non-strangulated obstruction[4,6, 10,11,12,14,16,17,31]. Moreover, accurate early recognition of intestinal strangulation in patients with mechanical bowel obstruction is important to allow safe non-operative management of carefully selected patients[1,2,7,8]. Traditionally, such recognition is based on the presence of one or more of the classical signs: vascular compromise, continuous abdominal pain, fever, tachycardia, peritoneal signs on physical examination, leukocytosis, and metabolic acidosis[7,8]. Close and careful clinical evaluation, in conjunction with laboratory and radiologic studies, is essential for the decision of proper management of patients with acute mechanical bowel obstruction; if any uncertainty exists, prompt operative intervention is indicated[1]. It should be emphasized, though, that great caution should be taken for the management of these patients since studies have shown that preoperative diagnosis of bowel strangulation cannot be made or excluded reliably by any known clinical, laboratory, or radiologic parameter, combinations of parameters, or by experienced clinical judgement[7-9].

V. Conclusion

Absolute constipation and abdominal distension are the most common symptom and physical finding of patients with acute mechanical bowel obstruction respectively. Adhesions, hernias and malignancies are the most common causes of obstruction and bowel ischemia, necrosis, and perforation are the most common complications encountered. Most patients were safely and effectively treated non-operatively, a substantial portion required immediate operation. This study also concludes that the risk of strangulation is significantly higher in incarcerated hernias compared to other causes of mechanical bowel obstruction and early intervention reduces the incidence of morbidity and mortality.

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