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Original Research Article

A clinical study on the surgical management of intestinal obstruction

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ABSTRACT

Background: Intestinal obstruction remains one of the common emergencies encountered by general surgeons all over the world. Acute intestinal obstruction occurs when there is a disruption in the frontward flow of intestinal contents.
Methods: This study is a prospective study conducted in Dr. D Y Patil Medical College and Hospital, Pimpri, Pune. Patients coming to the hospital with signs and symptoms suggestive of intestinal obstruction and willing for surgical management in our hospital were included after taking written and informed consent.
Results: In our study, pain abdomen and abdominal distension was the most common presenting complaints in 90% and 92% of the patients respectively. On palpation, 96% of the patients had abdominal tenderness, 72% of the patients had guarding and 12% of the patients had rigidity. On auscultation, all patients had some abnormality with regard to bowel sounds. It has been noted that intestinal strictures and abdominal adhesions were amongst the most common causes of intestinal obstruction in our study.
Conclusions: Prompt clinical assessment aided by radiological imaging is of crucial importance in reaching the diagnosis of intestinal obstruction. Decision regarding surgical intervention is taken based on the initial presentation of the patient, and his/her response to first line conservative management and fluid resuscitation.

Keywords: Intestinal, Obstruction, Radiological, Imaging, Surgical, Intervention

INTRODUCTION

Intestinal obstruction remains one of the common emergencies encountered by general surgeons all over the world. Acute intestinal obstruction occurs when there is a disruption in the frontward flow of intestinal contents. This interruption can occur at any point along the length of the gastrointestinal tract, and clinical symptoms differ based on the level of obstruction. Causes often cited for the same include intra-abdominal adhesions, or obstructed hernias, causing an external compression over the bowel loops. The clinical picture varies- the patient may present with a stable, fair general condition complaining of only slight abdominal discomfort, or with features of hypovolemic, or septicaemic shock (or both, in some instances).[1,3,4,6,7] Presenting symptoms may include these cardinal features like nausea, vomiting, colicky abdominal pain, and failure to pass flatus or faeces. The characteristic examination findings of abdominal distension, tympanic note (on percussion) and hyperperistaltic bowel sounds (on auscultation) suggest the diagnosis. Radiologic imaging can confirm the diagnosis, or may serve as a valuable adjunct when the diagnosis is uncertain. Although plain abdominal radiography is often the initial study, computed tomography (CT) is recommended if the index of suspicion is high or if suspicion persists despite negative radiography. Management of uncomplicated intestinal obstruction includes fluid resuscitation with correction of metabolic derangements, intestinal decompression, and

bowel rest. Evidence of vascular compromise or perforation, or failure of symptoms to resolve with adequate bowel decompression is an indication for immediate surgical intervention.

Although the mortality due to acute intestinal obstruction is decreasing due to better understanding of its pathophysiology and timely surgical management, as well as the judicious use of antibiotics, the mortality still ranges from 5-10%, more so in developing countries.[2,3]

Aim

The aim of this study was to evaluate the various etiological factors, types of imaging studies and outcome of surgical intervention in patients admitted with intestinal obstruction. This study will be designed and conducted with the following objectives to study the various etiological factors causing intestinal obstruction, to study the symptamatology of intestinal obstruction, to study the various surgical modalities of treatment and to study the role of imaging studies in determining the etiology and intervention in intestinal obstruction.

METHODS

A prospective study was conducted at the Department of General Surgery, Dr. D. Y. Patil Medical College, Pimpri, Pune between May 2017 and September 2019. Institutional ethics committee clearance was obtained before the start of the study. Written and informed consent was obtained from all patients taking part in this study.

Inclusion criteria

Patients coming to hospital with signs, symptoms, and diagnosis of Intestinal obstruction and willing for surgical management in our hospital were included after taking written and informed consent were included in the study.

Exclusion criteria

Patients managed conservatively, patients who were not fit for surgery or not willing to be a part of this study and a dynamic intestinal obstruction due to peritonitis, electrolyte imbalance and diabetes.

Method of data collection

Patients admitted with symptoms and signs suggestive of intestinal obstruction during the period of evaluation (from May 2017 to September 2019) at Dr. D Y Patil Medical College were taken up for study with the help of relevant history and clinical examination after obtaining due written and informed consent. Statistical analysis was performed using the SPSS software version 20.0. Descriptive statistics in terms of frequency and percentage were taken.

RESULTS

The mean age of the study participants was 46.02 years with standard deviation of 24.103 years. The ranges of age for participants were from 6 months of age to 85 years of age.

Figure 1 depicts distribution of patients based on age. There were 5 toddlers less than 2 years of age. Elderly patients (>60 years) were 15 in number constituting 30% of the study subjects. 20 patients were aged between 40-60 years of age constituting 40% of the study subjects.

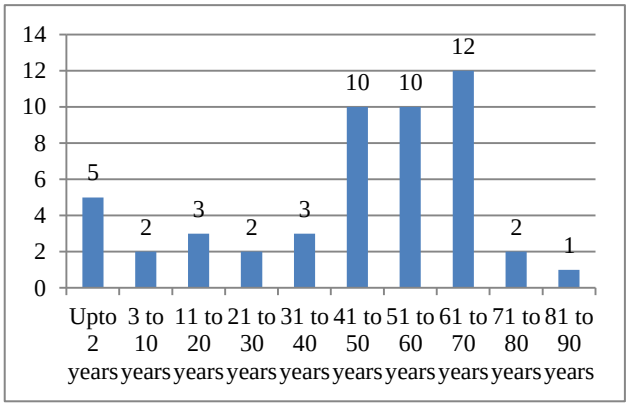

Figure 1: Representation of age of the patients.

The study participants were predominately males (64%) whereas females were 36%.

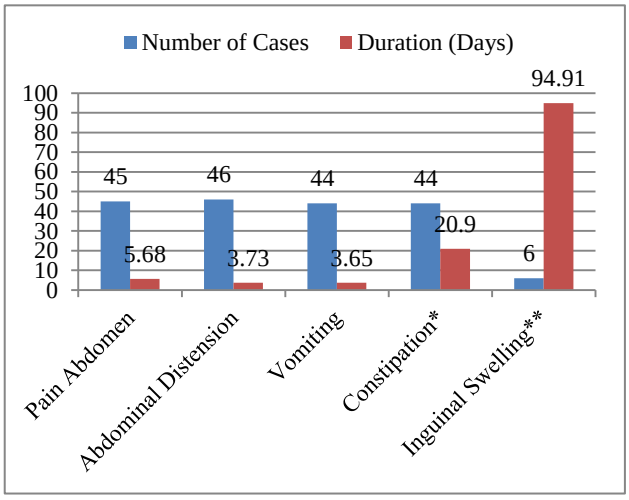

Figure 2: Representation of presenting complaints with mean duration (in days).

*: One patient had constipation for 2 years. One infant was constipated but the duration was not determined; **: One patient had Inguinal swelling for 1.5 years.

As depicted in Figure 2, pain abdomen and abdominal distension were the most common presenting complaints in 90% and 92% of the patients respectively. The other symptoms which were significantly present in the

patients were vomiting and constipation in 88% of patients each and inguinal swelling in 12% of the subjects.

Figure 2 also depicts duration of symptoms in the study participants. There can be considerable deviation in mean values of constipation as 1 patient had constipation for 2 years and 1 infant was constipated but the duration was not determined. Similarly one patient had inguinal swelling for duration of 1.5 years.

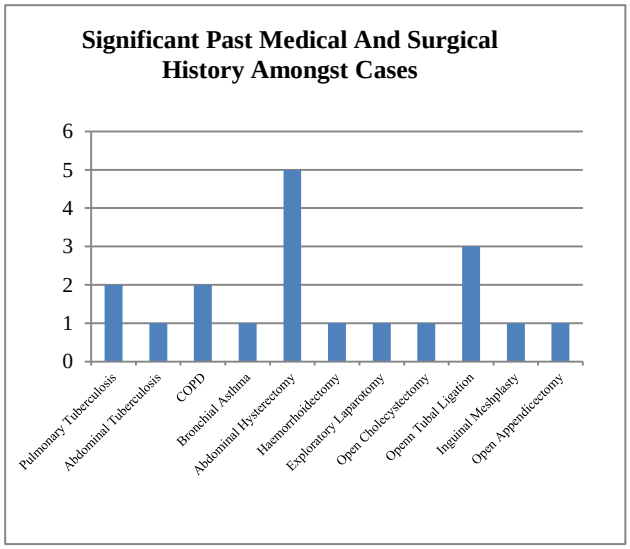

Figure 3: Past medical and surgical history.

Figure 3 depicts significant underlying medical conditions and past surgical history of the patients. Some of these conditions can as well predispose to certain surgical conditions currently seen in the patients. Chronic obstructive pulmonary disease and bronchial asthma can lead to development of hernia from increased intra-abdominal pressure due to coughing. Abdominal tuberculosis can be associated with development of intestinal obstruction amongst several other complications if not adequately treated. It can be observed that the most common surgeries performed were abdominal hysterectomy followed by tubal ligation amongst the women (and overall).

Table 1 depicts the findings on clinical examination of the abdomen. Abdomen was distended on inspection in 90% of the patients highlighting the importance of a thorough examination and also that most of the cases of obstruction can have concurrent abdominal distension. On inspection, 24% of the patients had visible scars from previous surgeries. On palpation. 96% of the patients had abdominal tenderness. 72% of the patients had guarding and 12% of the patients had rigidity. On auscultation, all patients had some or other abnormality with regard to bowel sounds; 36% of the patients had borborygmi sounds, 26% had decreased bowel sounds and 38% had absent bowel sounds.

Table 1: Clinical examination findings (abdominal examination).

Clinical examination	Present	Absent
	N (%)	N (%)
Inspection		
Distension	45 (90)	5 (10)
Scars	12 (24)	38 (76)
Visible peristalsis	0 (0)	50 (100)
Hernia	6 (12)	44 (88)
Palpation		
Abdominal tenderness	48 (96)	2 (4)
Guarding	36 (72)	14 (28)
Rigidity	6 (12)	44 (88)
Auscultatory findings		
Borborygmi	18	36
Bowel sounds decreased	13	26
Bowel sounds absent	19	38

Table 2: Per rectal examination.

Per rectal examination findings	Frequency	%
Empty	45	90
Stool	2	4
Blood stained	3	6

Table 2 highlights the findings on per rectal examination. 6% of the patients had blood stained stool on per rectal examination.

Table 3: Erect abdomen X-ray findings.

X-ray finding	N	%
Mutiple air fluid level- small bowel	40*	80
Mutiple air fluid level- large bowel	9**	18
No air fluid level	1***	2

*: 1 patient each had dilated small bowel loop, small bowel obstruction and step-ladder pattern; **: 3 patients had dilated large bowel loops; ***: CT showed dilated jejunal and ileal loops, collapsed colon.

Table 4: Age wise distribution of most common diagnoses in the patients.

Range of age distribution (in years)	Common diagnosis	N	%
Upto 8	Intussusception	6	12
22-58	Inguinal hernia	6	12
42-70	Adhesions	8	16
13-70	Strictures	9	18
50-79	Volvulus	3	6
14-70	Infections (including tuberculosis)	3	6
12-55	Intestinal bands	3	6

Erect abdomen X-ray is one of the important investigation in patients presenting with intestinal

obstruction. Multiple air fluid levels in small bowel were noted in most of the patients (80%). Multiple air fluid levels in large bowel were noted in 18% of the patients. One patient had no air fluid level.

Table 4 denotes the ranges of age of common diagnoses determined in our study for intestinal obstruction. It is to be noted that some of the causes are more common across some of the age groups- intussusception is seen more commonly in paediatric patients. Infectious causes may be occurring at any age group depending upon the underlying immune function of the patients. Adhesions are usually subsequent to abdominal surgeries and tend to happen after a while in postoperative period and hence more common in middle and older age groups (as shown in age wise patient distribution). Inguinal hernia-direct is more common in middle age groups. Similarly strictures can occur at any age group but underlying etiology might differ.

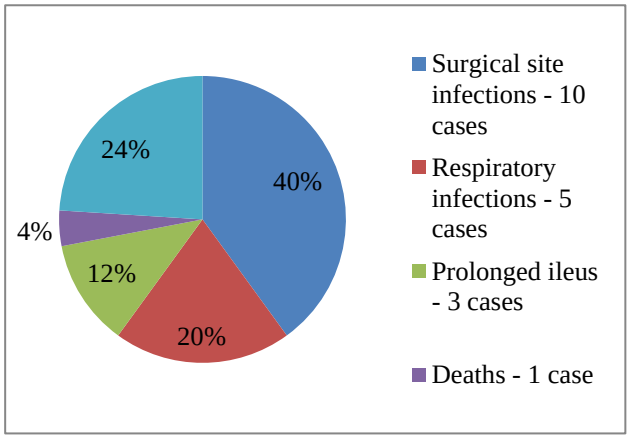

Figure 4: Percentage of each type of postoperative complication observed.

Figure 4 represents the different types of postoperative complications observed in the patients included in this study, along with the percentage wise distribution of each type of complication.

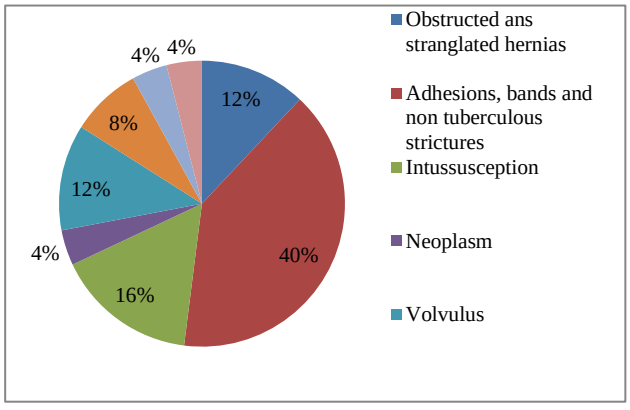

Figure 5: Percentage of complications contributed by each etiology amongst the total number of complications included in this study.

Figure 5 depicts the percentage of complications contributed by each etiology amongst the total complications seen in this study. As observed in this study, amongst the cases that developed postoperative complications, 40% of the cases had adhesions, bands or non-tuberculous strictures, followed by the cases of intussusception (16%).

Of the 50 cases included in this study, CT was required to assess the etiology and site of obstruction in 10 cases, as described in the table below. The preoperative CT findings were accurate in the diagnosis of obstruction, the site and the cause in 80% of these cases.

Table 5: Diagnostic ability of CT scan in this study.

Total number of preoperative CT scans done	10
Corroboration intraoperatively	8
Diagnostic accuracy	80%
Inconsistent CT findings	2
Diagnostic inaccuracy	20%

It should be noted that diagnostic accuracy of CT scan was 80% when this was corroborated intra-operatively. However, clinical acumen should be applied in diagnosis wherever necessary and higher investigations such as CT scan should be used only whenever necessitated.

DISCUSSION

The mean age of subjects in our study was 46.02 years. We included patients irrespective of age of presentation for intestinal obstruction. Pediatric patients ranging from 6 months, up to 12 years of age predominately presented with intestinal intussusception. As per literature it is one of most common abdominal emergency in early childhood.[8] Also rota-virus vaccine which is commonly given these days is a risk factor for development of intussusception.[9] Inguinal hernia can commonly be seen in middle aged or older patients due to relaxation of abdominal wall musculature and thinning of the fascia.

In a study by Adhikari et al they evaluated cases of acute intestinal obstruction.[10] Of 367 patients males were 75.20% grossly outnumbering the females. In our study as well 64% of the participants were males and remaining 36% were females.

The clinical presentation of intestinal obstruction generally includes nausea and vomiting, colicky abdominal pain, and inability to pass flatus or bowel movements.[11] Intestinal obstruction accounts for approximately 15% of all emergency department visits for acute abdominal pain.[12] In our study, pain abdomen and abdominal distension was the most common presenting complaints in 90% and 92% of the patients respectively. The other symptoms which were significantly present in the patients were vomiting and

constipation in 88% of patients each and inguinal swelling in 12% of the subjects.

Reddy et al conducted a systematic review to evaluate small bowel obstruction. Incidence of small bowel obstruction is about 3,50,000 on an yearly bases in the USA. Etiologies of small bowel obstruction include adhesions (65%), hernias (10%), neoplasms (5%), Crohn's disease (5%), and other uncommon causes (15%).

Past medical history can be one of the significant determinants of intestinal obstruction. Abdominal adhesions develop in more than 9 out of every 10 people who have had an abdominal surgery. However, a majority of people with abdominal adhesions do not develop any complications.[14]

Abdominal adhesions are one of the most common causes of intestinal obstruction.[15] 10% of the patients in our study had abdominal hysterectomy, 6% had open tubal ligation, 2% each had previous exploratory laparotomies, open cholecystectomy, open appendicectomy and inguinal meshplasty earlier. These earlier conducted surgical procedures can lead to formation of adhesions and subsequently this can lead to intestinal obstruction. Intestinal tuberculosis is one of the uncommon causes of intestinal obstruction.[16] 4% of the patients had pulmonary tuberculosis and 2% patients in our study had intestinal tuberculosis. Considering a high prevalence of tuberculosis in India, this rare cause should be kept in mind. Moreover classical signs of tuberculosis such as weight loss, evening rise of temperature and night sweats should be inquired to rule out intestinal tuberculosis.

The classic physical examination findings in cases of intestinal obstruction include abdominal distension, tympany to percussion, and high-pitched bowel sounds suggest the diagnosis.[11] Abdomen was distended on inspection in 90% of the patients highlighting the importance of a thorough examination and also that most of the cases of obstruction can have concurrent abdominal distension. 24% of the patients had visible scars from previous surgeries.

On palpation, 96% of the patients had abdominal tenderness, 72% of the patients had guarding and 12% of the patients had rigidity. On auscultation, all patients had some abnormality with regard to bowel sounds - 36% of the patients had borborygmi sounds, 26% had decreased bowel sounds and 38% had absent bowel sounds. Breum et al investigated the accuracy and inter-observer variation of bowel sound assessment in patients with clinically suspected bowel obstruction.[15] The median sensitivity and specificity was 0.42 and 0.78 respectively.

Arnbjörnsson remarked that the most interesting finding in mechanical obstruction of intestine was the regular occurrence of clustered bowel sounds.[17] These bowel sounds were defined as 3-10 regular sounds, occurring 1 every 5 seconds and these are preceded and followed by at least a minute of no sound.

The associated periods of quiescent motor activity may account for the unexpectedly reduced frequency and motility index after a meal in obstructed patients compared with those who do not have any obstruction. The different bowel sound patterns occurred in the subjects with sub-total obstruction before and after a regular meal respectively i.e., infrequent and low-amplitude bowel sounds and clustered bowel sounds as well.

X ray of the erect abdomen is one of the important investigations in patients presenting with intestinal obstruction. In our study, multiple air fluid levels in small bowel were noted in most of the patients (80%) and in large bowel in 18% of the patients.

The use of erect abdomen X ray in management of intestinal obstruction has contrary views. Ashindoitiang et al suggested use of abdominal X-ray including erect abdomen X-ray in cases bowel obstruction and intestinal perforation as they help in improving the diagnostic value.[18] However some workers such as Geng et al and Simpson et al did not find any significant use of abdominal x ray in improving diagnosis of the underlying etiology.[19,25]

Treatment of adhesions included laparoscopic adhesiolysis which was carried out in some of our patients. It is to be noted that as per meta-analysis by Li et al.[21] There was no statistically significant difference in open laparotomy procedure vs laparoscopic procedure with regard to postoperative complications. However, laparoscopic procedure is safer in hands of an experienced surgeon and in selected patients.[21]

For inguinal hernia the common procedure carried out in our patients included Lichtenstein's inguinal meshplasty. Worldwide, compared to herniorrhaphy, meshplasty usually reduces the rate of recurrence of hernia, reduces visceral or neurovascular injuries, making meshplasty a common repair approach in various types of hernia. This may result in a reduced length of hospital stay and time to return to activities of daily living for patients suffering from hernias. Hence, this is a preferred option worldwide.[22]

Eraki conducted a study in patients with intussusceptions and its management.[23] 6 patients in our study had this condition. Eraki performed ultrasound-guided hydrostatic reduction of intussusceptions in 50 such patients. 30 were successful. Manual reduction was done in 40 patients and resection anastomosis was done in 30 patients. Manual reduction was done in 5 patients in our study whereas one patient had to undergo resection of intestine.

Range of age for intussusception was 6 months to 8 years with a frequency of 6 patients, as noted in this study.

Inguinal hernia was noted between 22-58 years with a frequency of 6 patients. Non tuberculous strictures were noted in 9 patients whose ages ranged from 12-70 years. Adhesions were seen in 8 patients between 42-70 years of age. 3 patients each had volvulus, abdominal Koch's and intestinal bands, and were seen within the ages of 50-79 years, 14-70 years and 12-55 years respectively.

It is to be noted that some of the causes are commoner across some of the age groups such as intussusception commonly happening in pediatric patients.[8] Infectious causes of Intestinal obstruction including tuberculosis may occur at any age group depending upon the underlying immune function of the patients.

Abdominal tuberculosis as such is common in India with 23% of global burden of active cases of tuberculosis.[24] Adhesions are usually observed as a sequel to abdominal surgeries and tend to happen within 2 years of postoperative period and hence are more common in middle and older age groups (as seen in age wise patient distribution).[14]

Direct Inguinal hernia is more common in middle age groups whereas indirect inguinal hernia can occur earlier in life.[15]

Surgical site infections are the most common infections in the post-operative period. They constituted a total of 40% of all the complications observed in our study. This was followed by respiratory infections in 20%. One death was noted in the post-operative period. Prolonged ileus was observed in 12% cases (amongst all the complications observed.)

As observed in this study, amongst the cases that developed postoperative complications, 40% of the cases had adhesions, bands or non-tuberculous strictures, followed by the cases diagnosed with intussusception (16%).

Soressa et al evaluated the outcomes of intestinal obstruction.[27] They evaluated 262 patients, of which 94% of the patients underwent surgical management; 24.6% of the patients developed complications in the post-operative period. Of all the complications, 39.3% had wound infections post operatively which matches with our study. 17.8% had facial dehiscence, 12.5% had anastomotic leak, 10.7% developed pelvic complication or pneumonia and 8.9% developed septic shock.

Similar to the study conducted by Soressa et al, infective complications are high in number in our study as well.[27] This is in part due to handling of the bowel loops which contains normal commensal gut flora. Hence, there is a higher chance of infections if these organisms percolate to the structures where they normally do not inhabit. Hence, specific care should be taken in bowel surgeries and adequate antibiotic prophylaxis should be provided.

In this study, it should be noted that diagnostic accuracy of CT scan was 80% when this was corroborated with the findings intra-operatively. However, clinical acumen should be applied for the diagnosis of all cases presenting with features of intestinal obstruction, and higher investigations such as CT scan should be reserved for those cases posing with a diagnostic dilemma, or when necessary.

Maglinte et al, evaluated the diagnostic accuracy of CT scan in cases of intestinal obstruction.[26] They noted that the overall diagnostic accuracy of CT scan was 65% in their study, as compared to 80% in our study. When obstructions were classified into low & high-grade partial obstruction, CT scan results correctly identified 81% of high-grade small bowel obstructions and 48% of low grade obstructions.

Halepota et al evaluated the diagnostic accuracy of CT scan in children presenting with clinical features of intestinal obstruction.[28] They noted that the sensitivity, specificity, positive predictive value, negative predictive value and accuracy of CT scan was 97.4%, 81.8%, 94.9%, 90.0% and 93.9% respectively in the patients aged between 2 and 16 years of age.

CONCLUSION

Prompt clinical assessment aided by radiological imaging is of crucial importance in reaching the diagnosis of intestinal obstruction. Decision regarding surgical intervention is taken based on the initial presentation of the patient, and his/her response to first line conservative management and fluid resuscitation. As noted in this study, intestinal obstruction remains predominant in the male gender, and this finding is consistent with previous research done with regard to this topic. The most common cause of intestinal obstruction requiring surgical intervention in this study was obstruction due to non-tuberculous strictures, closely followed by adhesions. The type of surgical management required is specific to each case and its intraoperative findings. Careful intraoperative as well as postoperative evaluation is compulsory for the management of complications that may arise during these periods.

Overall, each case of intestinal obstruction is a source for profound learning and tremendous knowledge, which helps to raise the clinical and surgical acumen of a surgeon to great heights.

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