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A Clinical Study of Mechanical Small Intestinal Obstruction In Adults

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Abstract: *Intestinal obstruction remains one of the most common intra-abdominal problems faced by general surgeons. Intestinal obstruction of either the small or large bowel continues to be a major cause of morbidity and mortality.As acute small intestinal obstruction is a surgical emergency and it is fatal in many cases, it is necessary to know and analyse its aetiologies, clinical parameters and its treatment outcomes. Hence, the present study was taken up to analyse and assess the outcome of small intestinal obstruction in patients in deparment of general surgery between 1st August 2017 to 31st July 2019.A total of 157 patients were included in the studywith a mean age of 49±15 years. The most common presenting symptom was obstipation (97.5%), followed by abdominal pain (83.4%), distension (74.5%) and vomiting (64.3%). The main physical findings include increased bowel sound in 78.3% cases, collapsed rectum on DRE in 57.3% cases, abdominal tenderness in 52.2% cases and previous abdominal surgical scars in 31.8% cases.In this study, six aetiologies were identified which were adhesions, hernia (complicated and uncomplicated), ileocaecal TB, malignancy, volvulus and intussusception. Adhesion was found to be the most common cause which was seen in 45.2% of the cases. Hernia and ileocaecal TB were the second most common with a frequency of 17.2% each. Other causes were malignancy (16.2%), volvulus (10.2%) and intussusception (7.6%). The overall mortality rate was 12 (7.6%) of the 157 cases. There was a significant association between mortality and the development of sepsis.*

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I. Introduction

Intestinal obstruction remains one of the most common intra-abdominal problems faced by general surgeons. Intestinal obstruction of either the small or large bowel continues to be a major cause of morbidity and mortality. They account for 12% to 16% of surgical admissions for acute abdominal complaints.[1]

Intestinal obstruction can be classified into two types, dynamic and adynamic. In dynamic obstruction in which peristalsis is working against a mechanical obstruction, caused by faecal impaction, foreign bodies, bezoars**,** gallstones**,** malignancy, intussusception**,** volvulus intramurally. Dynamic obstruction may be due to extramural cause like bands/adhesions**,** hernia, neoplasm and intra-abdominal abscess.

In adynamic intestinal obstruction, there is no mechanical obstruction; peristalsis is absent or inadequate. The causes may include metabolic and electrolyte derangement, drugs, intestinal ischemia, sepsis. Irrespective of etiology or acuteness of onset, in dynamic obstruction the bowel proximal to the obstruction dilates and the bowel below the obstruction exhibits normal peristalsis.

The hallmarks of intestinal obstruction include colicky abdominal pain, nausea and vomiting, abdominal distension, and a cessation of flatus and bowel movements. It is important to differentiate between true mechanical obstruction and other causes like ascites, mesenteric ischemia, perforated viscous post-operative paralytic ileus etc. The presence of hypotension and tachycardia is an indication of severe dehydration. Patients with early obstruction have high-pitched bowel sounds, whereas late obstruction may present with minimal bowel sounds as the intestinal tract becomes hypotonic.

Treatment of small intestinal obstruction (SIO) may involve immediate surgery, a trial of non operative management followed by surgery, or non operative management leading to resolution of the obstruction.

The most common causes of death in SIO are intra-abdominal sepsis, myocardial infarction and pulmonary embolism.

In view of plethora of etiologies, small intestinal obstruction needs an intense study and clinical evaluation. In the management of small intestinal obstruction it was once said, "never let the sun rise and set in" in cases of small intestinal obstruction because about 5.5% of small intestinal obstruction is ultimately fatal if treatment is delayed.

The aim of this study was to find out the modes of presentation, various causes, diagnosis, management and outcome of mechanical small intestinal obstruction.

As acute small intestinal obstruction is a surgical emergency and it is fatal in many cases, it is necessary to know and analyse its aetiologies, clinical parameters and its treatment outcomes. Hence, the present study was taken up to analyse and assess the outcome of small intestinal obstruction in patients, who were admitted in Department of Surgery.

II. Material And Methods

This Cross-sectional study was conducted in the Department of Surgery, Regional Institute of Medical Sciences, Imphal, Manipur during a period of two calendar years with effect from 1st August 2017 to 31st July 2019 which included all patients (>12 years of age) admitted from casualty and OPD to the Department of Surgery, Regional Institute of Medical Sciences, Imphal, with mechanical small Intestinal obstruction

Study Design: Prospective cross sectional study

Study Location: This was a tertiary care teaching hospital based study done in Department of General Surgery, at Regional Institute of Medical Sciences, Imphal

Study Duration: 1st August 2017 to 31st July 2019.

Sample size: 157 patients.

Subjects & selection method:Patient admitted in the surgical ward with mechanical small intestinal obstruction at Department of Surgery, RIMS were enrolled in the study after informed consent.

A complete history, physical/clinical examination and investigations according to the proforma were done for all patients.

Inclusion criteria:

1. Adult age group (>12 years) patients presenting with mechanical small Intestinal obstruction.
2. Patients giving consent for the study.

Exclusion criteria:

1. Cases with functional/ non mechanical small intestinal obstruction
2. Pediatric age group(upto 12 years)
3. Patients who were not willing to participate in the study

Procedure methodology

Patient admitted in the surgical ward with mechanical small intestinal obstruction at Department of Surgery, RIMS were enrolled in the study after informed consent.

A complete history, physical/clinical examination and investigations according to the proforma were done for all patients.

Data Collection- Data of the patient was recorded in a pre-designed proforma. The particulars, investigations, examinations, history was recorded at the relevant time.

Statistical analysis

After thorough checking of the data obtained, statistical analysis was done using SPSS version 21.0 IBM for WINDOWS. Descriptive statistics like mean, percentage, SD was used. Chi-square test, t- test were used for inferential statistics. The P value of <0.05 was taken as the cut off value for statistically significant.

III. Results

One hundred fifty seven patients with diagnosis of mechanical small intestinal obstruction were admitted during the study period of august 2017 to July 2019 in Department of General Surgery, Regional Institute of Medical Sciences Hospital (RIMS), Imphal, Manipur on which study was conducted prospectively.

All cases of small intestinal obstruction fulfilling the inclusion criteria were studied and recorded in the prescribed proforma for thesis data collection with prior written consent from the patients in case of adults and parents or guardians in case of minors.

A detailed history of patients was taken with reference to the duration of onset and associated symptoms. A detailed physical examination was undertaken in the presence of female attendant in case of patient is female. Relevant laboratory and radiological investigation like CBC (complete blood count), LFT (liver function test), KFT(kidney function test), serum electrolytes, Urine R/E, Blood sugar, ultrasonography and x-ray chest and erect abdomen were done.

Total number of surgical procedures performed on patients with mechanical small intestinal obstruction in General Surgery Department, RIMS during this period were 132 while rest 25 patients were managed conservatively. The outcomes of my study as follows:

1. Age distribution:

The age range was between 17 years to 86 years.

Mean age was 49±15 years.

Most of the patients were 31-60years accounting for 64.9% while least group was above the age of 80 years (1.9%). The youngest patient was 17 years old boy whereas the oldest was 86 years old male patient.

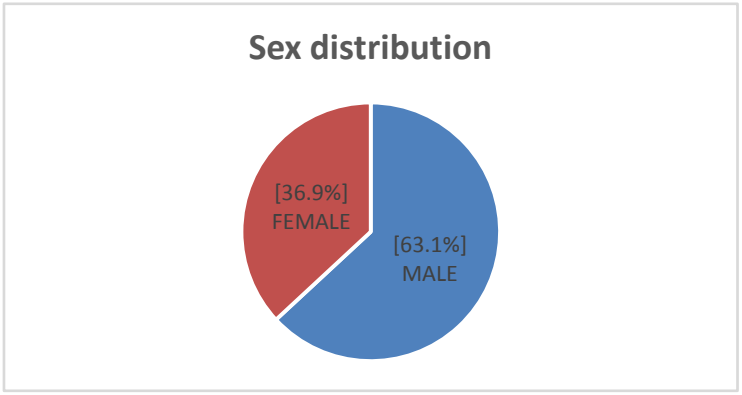
Table 1: Age of study population (n=157):

AGEGROUP		
RANGE	**NO. OF PATIENTS**	**PERCENTAGE**
13 - 20 YEARS	6	3.8
21 - 30 YEARS	10	6.36
31 - 40 YEARS	27	17.19
41 - 50 YEARS	34	21.65
51 - 60 YEARS	41	26.1
61 -70 YEARS	24	15.3
71 -80 YEARS	12	7.6
81 - 90 YEARS	3	1.9

2. Sex distribution:

There were 99(63.1%) male patients and 58(36.9%) female giving a male to female ratio of 1.7:1.

Figure 1: Sex distribution



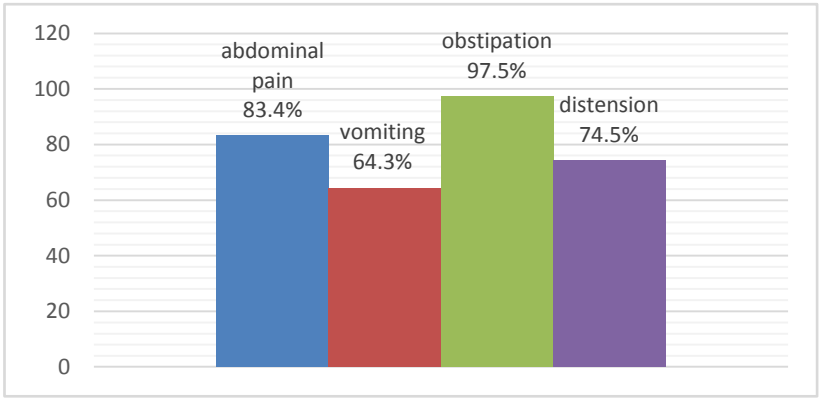
3.Distribution of symptoms:

Table 2: Distribution of symptoms

Symptoms	**Percentage (%)**
Obstipation	97.5%
Abdominal pain	83.4%
Distension	74.5%
Vomiting	64.3%

The pattern of frequencies of the common presenting was as follow obstipation 97.5%, abdominal pain 83.4%, Distension 74.5%, Vomiting 64.3%of cases. None of the symptoms was found in isolation, they co-existed.

Figure 2: Distribution of symptoms



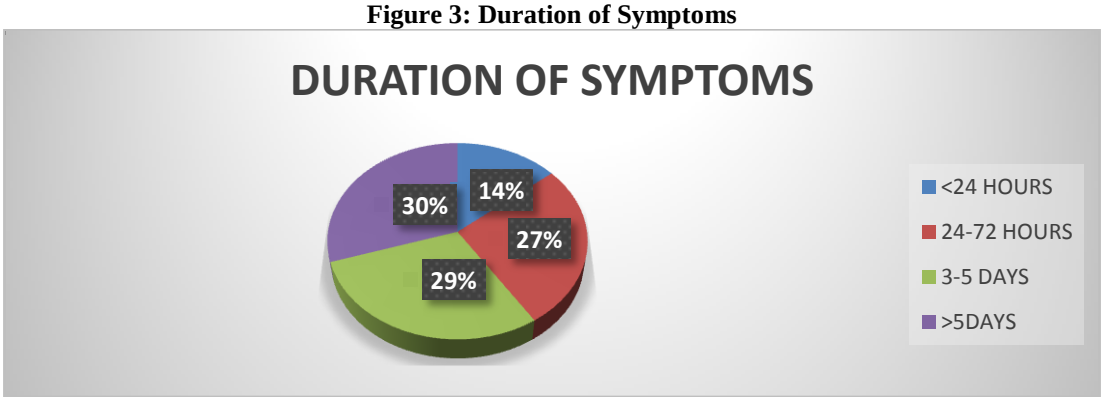
4. Duration of symptoms:

Table 3: Duration of symptoms

Duration of Symptoms	Percentage (%)
< 24 hours	14
24-72 hours	27
3-5 days	29
>5 days	30

The duration of symptoms was as shown in figure below. Most of the patient 93(46.3%) came after 3 days

Figure 3: Duration of Symptoms



5. Physical findings:

The frequencies of various physical findings were as shown in the table below. No single findings were found in isolation they co-existed.

Increased bowel sound was commonest finding 78.3%, collapsed rectum on DRE were 57.3%, abdominal tenderness 52.2%, abdominal scar 31.8%. Other less frequent signs were as shown in the table.

Table 4: Physical findings:

FINDING	Number of patients	Percentage
Abdominal Tenderness	82	52.2
Bowel Sound	123	78.3
Abdominal Scar	50	31.8
Dehydration	46	29.3
Fever	26	16.6
Guarding and rigidity	15	9.6
Abdominal mass	30	19.1
Visible peristalsis	4	2.5
Tachycardia	29	18.5
Hypotension	32	20.4
DRE normal	49	31.2
Collapsed rectum	90	57.3
Ballooned out rectum	18	11.5

6. Aetiological patterns:

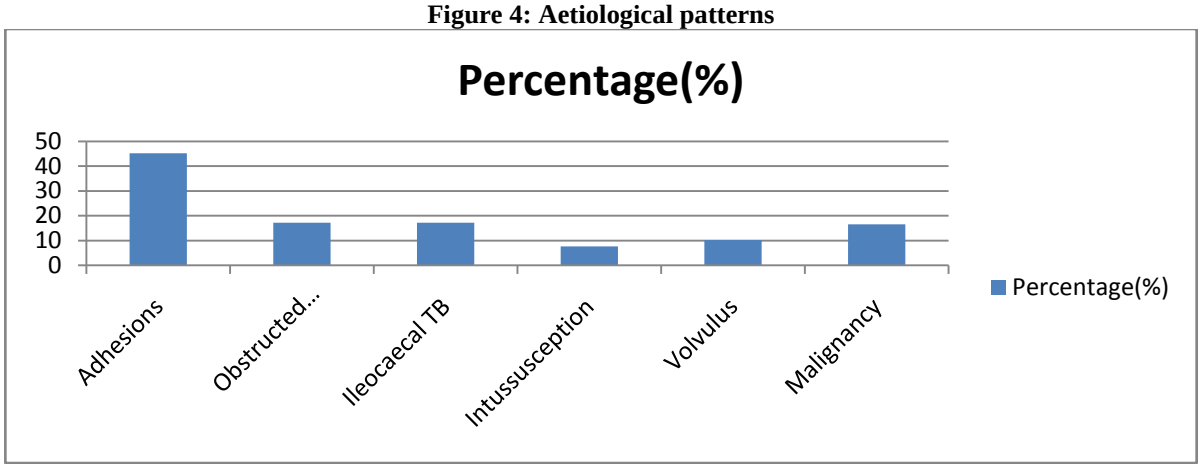
The various causes of mechanical small intestinal obstruction found in this study are summarized in table below.

Table 5: Aetiological patterns of mechanical small intestinal obstruction

Causes	No. of Patients	Percentage
ADHESIONS	71	45.2
HERNIA COMPLICATED	17	10.8
HERNIA UNCOMPLICATED	10	6.4
ILEOCAECAL TB	27	17.2
INTUSSUSCEPTION	12	7.6
VOLVULUS	16	10.2
MALIGNANCY	26	16.6

Overall, adhesions were the commonest cause of obstruction found in 71(45.2%) patients followed by ileocecal TB and obstructed hernia each in 27(17.2%) patients and malignancy in 26(16.6%) patients was the main cause of mechanical small intestinal obstruction.

Figure 4: Aetiological patterns



7. Investigations:

Table 6: Total Leukocyte Count

TLC		
RANGE	**NO. OF PATIENTS**	**PERCENTAGE**
3000 - 7000	30	19.1
7000 - 11000	85	54.1
11000 - 15000	27	17.1
15000 - 19000	13	8.2
>19000	2	1.2

Among 157 the patients, 115 (73.2%) were within normal range (4000-11000).Leukocytosis (TLC >11000) was seen in 42(26.5%) of the patients.

Table 7: Radiological findings

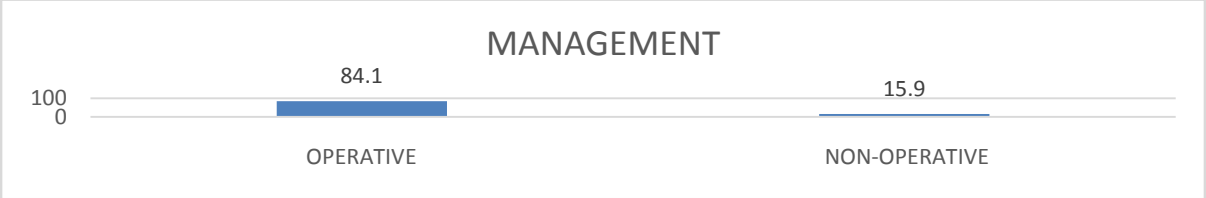
	No. of patients	Percentage
XRAY CHEST NORMAL	147	93.6
XRAY CHEST FREE AIR UNDER DIAPHRAGM	10	6.4
MULTIPLE AIR FLUID LEVEL	122	77.7
DILATED BOWEL LOOP	136	86.6

In X-ray chest PA view among the 157 patients 10 (6.4%) were having free air under the diaphragm due to bowel perforation. In X-ray abdomen erect and supine 122 (77.7%) patients were having multiple air fluid level and 136 (86.6%) patients were having dilated bowel loop. None of the X-ray finding was count in isolation, they co-existed.

8. Management:

Overall operative management was instituted in 132 (84.1%) patients, while the rest 25 which is 15.9% of total patients were managed conservatively.

Figure 5: Management



Overall, surgery was performed in 84.1% of all the patients. The type of surgery performed was decided according to the cause of small intestinal obstruction and intra-operative findings. The rest of patients, 15.9% were managed conservatively.

9. Post-operative complications

Table 8: Post-operative Complications

	FREQUENCY	PERCENTAGE
WOUND INFECTION	39	29.5
BURST ABDOMEN	22	16.7
FISTULA FORMATION	14	10.6
NONE	57	43.2
TOTAL	132	100

Among the 132 patients 39(29.5%) patients had wound infection, which was the most common complication. 22(16.7%) patients had burst abdomen, 14 (10.6%) had fistula formation.

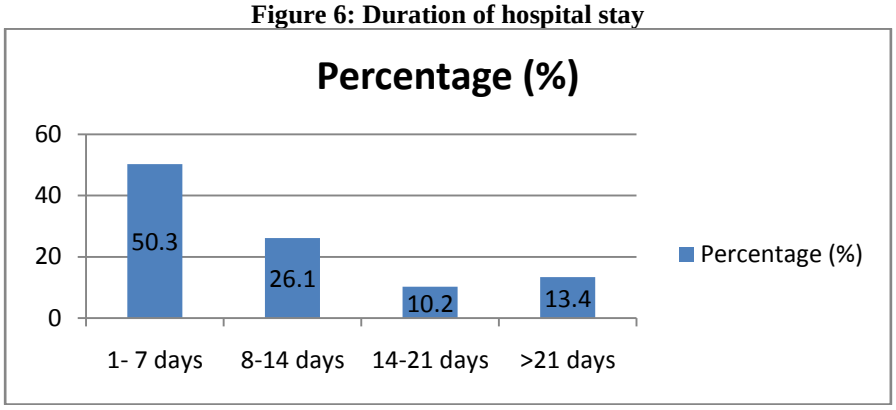
10. Hospital Stay

Table 9: Duration of hospital stay

HOSPITAL STAY	No. of patients	Percentage
1 - 7 days	79	50.3
8 -14 days	41	26.1
14 -21 days	16	10.2
> 21 days	21	13.4

Majority of the patients, 79 (50.3%) were discharged with in the first week of admission, 41 (26.1%) patients were discharged within the second week of admission, while 37 (23.6%) stayed in hospital for more than 2 weeks.

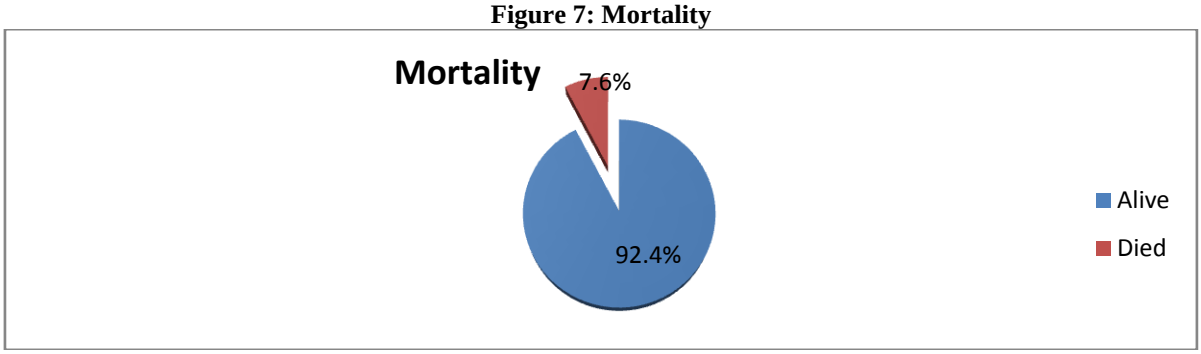
Figure 6: Duration of hospital stay



11.Mortality

Mortality rate was 12(7.6%) patients of the 157 cases.

Figure 7: Mortality



12. Mortality versus Presence of Sepsis

Table 10: Mortality versus Presence of Sepsis

SEPSIS	ALIVE	DEAD	TOTAL
PRESENT	21	12	33
ABSENT	124	0	124
TOTAL	145	12	157

The data shows that there was increased mortality in patients with sepsis. The association between mortality and presence of sepsis is shown in table above.

Level of Significance P <0.05

Pearson Chi-square = 0.000

This shows a significant association between sepsis and mortality.

There is an increase in mortality with presence of sepsis.

13.Post operative complication versus duration of symptoms

Table 11: Post operative complication versus duration of symptoms

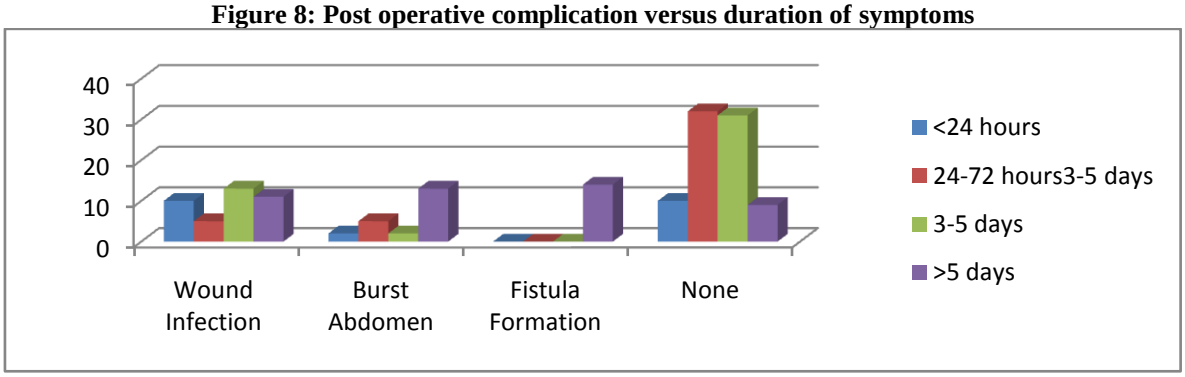
	<24 HOURS	24-72 HOURS	3-5 DAYS	>5 DAYS
Wound infection	10	5	13	11
Burst abdomen	2	5	2	13
Fistula formation	0	0	0	14
None	10	32	31	9
Total	22	42	46	47

The data shows that there was increase chance of post-operative complications with increase duration of symptoms. The association between increase chances of post-operative complication with increase duration is shown in above table.

Level of Significance P <0.05.Pearson Chi-square = 0.000

This shows a significant association between increase chances of post-operative complication and duration of symptoms. There is an increase chance of post-operative complication with increase duration of symptoms.

Figure 8: Post operative complication versus duration of symptoms



IV. Discussion

Acute intestinal obstruction is one of the commonest surgical emergencies in all age groups. Mode of presentation varies with underlying etiology. In earlier part of century mortality and morbidity was very high. Now with better understanding of pathophysiology, improvement in radiological techniques of diagnosis and high degree of refinement in correction of fluid and electrolyte imbalance, introduction of antibiotics to effective bacteriological control, introduction of techniques in gastrointestinal decompression, new surgical principles, as in large bowel obstruction introduction of on table lavage and resection and primary anastomosis has replaced staged procedures and number of days in hospital stay. With all the advanced technical investigations, we can predict the obstruction is involving the small bowel or large bowel. Improvement in field of anesthesia has all contributed to lowering the morbidity and mortality

The present cross sectional studywhichincluded 157 cases admitted in surgical ward of RIMS Hospital with the diagnosis of mechanical small intestinal obstruction over a two years period of August 2017 to July 2019attempted to look at the clinical patterns in patients with mechanical small intestinal obstruction during the study period compared to some other previous studies locally and elsewhere.

Age distribution:

The mean age in this study was 49 ± 15 years which is similar to the study made by Adhikari S et al[27] in their study on the etiology and outcome of acute intestinal obstruction: a review of 367 patients in eastern India in 2008. The age group most affected was 51- 60yrs which is in agreement with Priscilla SB et al [6] who also found the major age group to be affected was 51- 60yrs. In our study the youngest patient was 17yrs and the oldest was 86yrs.

Sex distribution:

Our study included 99 (63.1%) males and 58 (36.9%) females. The male to female ratio was 1.7:1. This is in agreement with the study done by Priscilla et al [6] in whose study 64% were males and 36% were females with a male: female ratio of 1.77:1. Another study done by Nechadet M al[28] in their study on acute intestinal obstruction general review of 100 cases had 62% males and 38% females similar to our study.

Clinical presentation:

The pattern of frequencies of the common presenting clinical features in our study was as follows obstipation 97.5%, abdominal pain 83.4%, distension 74.5%, vomiting 64.3%of cases. None of the symptoms was found in isolation, they co-existed.

Similar to our study Kumar S et al[1] in their study found the frequencies of clinical presentation was as follows pain abdomen 88%, vomiting 78%, distension 66% and constipation 54%.

In the study conducted by Prasad M et al[29] pain abdomen was seen in 92.7%, vomiting and distension in 95.1% and constipation in 90.2%.

In a study done in Benin city pain was seen in 100%, vomiting in 90% and obstipation in 96%.[30]

In another study conducted in New York abdominal pain was seen 96%, vomiting in 76% and obstipation in 75% cases.[31]

Duration of symptoms:

In our study most of the patient 93(46.3%) came after 3 days of the onset of symptoms which was similar to the study done by Prasad M et al[29] on the incidence of acute intestinal obstruction in adults in eastern India where the majority of the patients presented between 2nd to 5th day. The maximum duration of presentation in their study was on 3rd day.

Physical Findings:
We found increased bowel sounds to be the most common finding seen in 78.3% cases. The other physical findings were collapsed rectum on DRE seen in 57.3%, abdominal tenderness in 52.2% , abdominal scar in 31.8% cases.

Aetiological pattern:
In this study, six aetiologies were identified namely, adhesions, hernia (complicated and uncomplicated), ileocaecal TB, malignancy, volvulus and intussusception.
Adhesion was found to be the most common cause of mechanical small intestinal obstruction in our study which was 45.2% of the cases. Hernia and ileocaecal TB being the second most common with a frequency of 17.2% each. Then comes malignancy (16.2%), volvulus (10.2%) and intussusception (7.6%).

Investigations:
Total Leukocyte Count
Among 157 the patients, 115 (73.2%) were within normal range (4000 – 11000). Leukocytosis (TLC > 11,000) was seen only in 42(26.5%) of the patients.

Radiological findings:
The erect abdomen X-Rays help us in the diagnosis of intestinal obstruction as well as in differentiating the small bowel from large bowel obstruction. Multiple air fluid levels can be seen in small bowel obstruction whereas only gas shadows are seen in large bowel obstruction until the ileocecal valve is competent.
Other radiological findings in our study were dilated bowel loops suggesting intestinal obstruction seen in 86.6% cases and free air under the diaphragm suggesting bowel perforation seen in 6.4% cases.

Management:
Treatment options for intestinal obstruction include medical management or surgical intervention, but determination of the necessity and timing of surgery remains somewhat subjective.
In our study the mode of treatment was determined by the underlying condition. Overall surgery was performed in 84.1% of all the patients. The type of the surgery depended on the cause and the intraoperative findings. The rest of the patients (15.9%) were managed conservatively.

Post operative complications:
Postoperative complications commonly occur in obstruction patients. Wound infection, burst abdomen, bowel fistula and death due to respiratory tract infection, septicaemiaetc are a few common complications encountered.[37] In our study among the 132 patients who were operated, 39(29.5%) had wound infection , which was the most common complication. 22(16.7%) patients had burst abdomen and 14 (10.6%) had fistula formation.

Hospital Stay:
Majority of the patients, 79 (50.3%) were discharged with in the first week of admission, 41 (26.1%) patients were discharged within the second week of admission, while 37 (23.6%) stayed in hospital for more than 2 weeks. Hospital stay was seen to be prolonged in cases with postoperative complications.

Mortality:
The mortality rate was 7.6% in our study.

Mortality versus Presence of Sepsis:
Our study showed a significant association between sepsis and mortality. There was an increase in mortality with presence of sepsis. Of the 12 patients with sepsis who died, 4 patients had malignancy as the cause of intestinal obstruction and the rest had volvulus, adhesions, hernia and ileocaecal tuberculosis 2 each.
The fact that the majority of the patients to develop sepsis resulting in death had malignancies can probably be explained by their older age group and also the unprepared bowel surgeries that were done on them.

Post operative complication versus duration of symptoms:
Out of the 93 patients who presented after 3 days of the onset of symptoms, 53(56.9%) developed post operative complications. Our study showed a significant association between increase chances of post operative complication and the duration of symptoms.

V. Conclusion

- The commonly affected age group as found in the study was 31 to 60 years accounting for around more than half of the patients and is predominantly present in males, with a male to female ratio of 1.7:1.
- Most common symptom in our study was obstipation followed by abdominal pain and most of them presented after 3 days of the onset of symptoms.
- The most common cause of small intestinal obstruction was found to be adhesions followed by obstructed hernia and ileocaecal tuberculosis.
- Plain abdominal X-Ray was the main imaging investigation carried out and found to be diagnostic in most of the cases.
- More than two third of the patients were managed surgically and the type of surgery performed was decided according to the cause of small intestinal obstruction and intra-operative findings.
- Around half of the patients who were admitted with small intestinal obstruction were discharged within the first week. And approximately one forth of them stayed in hospital for more than 2 weeks. It was noted that the patients who presented late to the hospital were more prone to develop post-operative complications, hence delaying their hospital stay.
- The major post-operative complication was wound infection. Other complications seen were burst abdomen and fistula formation.
- A significant association was found between mortality and the presence of sepsis.

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