

“An Analytical Study of Causes, Clinical Presentation and Prognosis of Intestinal Obstruction in Tertiary Care Hospital”

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Abstract

Original Research Article

Introduction: Intestinal obstruction is one of the common acute abdominal emergencies in surgical practice. Early recognition and prompt intervention can prevent irreversible ischemia and thereby decrease the mortality and long-term morbidity. The most common causes of intestinal obstruction are obstructed hernia, post-operative adhesions and tumors in rural population: **Aims and objectives:** To study the causes and clinical presentations of intestinal obstruction. To study the prognosis of surgery for intestinal obstruction including procedure, complications, morbidity and mortality. Materials this is a prospective observational study of 100 cases of intestinal obstruction who are admitted in surgical wards at PESIMSR Hospital, kuppam between August 2017 to November 2018. **Inclusion Criteria:** All patients between the age of 18-80 years admitted in department of general surgery with signs and symptoms of intestinal obstruction. **Exclusion Criteria:** Patients who are not willing to be a part of this study. Patients with pseudo obstruction, paralytic ileus are excluded. **Results:** In our study, obstructed hernia (39%) was the most common cause of intestinal obstruction followed by adhesions and bands (36%). **Conclusion:** Obstructed hernias are the common cause of intestinal obstruction in our study due to lack of awareness among rural population followed by adhesions and bands with pain abdomen as the most common presenting symptom. Majority of patients with intestinal obstruction needs surgical relief of obstruction.

Keywords: Intestinal obstruction, Obstructed Hernia, Post-operative adhesions.

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INTRODUCTION

Intestinal obstruction is one of the most common surgical emergencies which should be diagnosed urgently and promptly treated. It is defined as an obstruction in forward propulsion of the contents of the intestine either due to dynamic, adynamic or pseudo-obstruction. Common causes of intestinal obstruction are obstructed hernias, postoperative or tuberculous adhesions, neoplasms, foreign bodies, inflammatory bowel disease, faecal impaction and volvulus. Intestinal obstruction can be of either small bowel or large bowel; small bowel obstruction accounts for majority of cases [1]. Mortality varies widely according to cause and any associated complications, being 100% in patients with untreated strangulated obstructions [2].

Although mortality was reduced with better understanding of patho- physiology, improvement in

diagnostic techniques, fluid and electrolyte correction, much potent antibiotics, intestinal tube decompression, introduction of new surgical techniques and improvement in the field of anesthesia, still mortality ranges from 3 % for simple obstruction to 30% when there is perforation of obstructed bowel or vascular compromise. This is further influenced by clinical setting and related comorbidities [3].

Success in treatment of patients with intestinal obstruction depends largely on early diagnosis, timely fluid resuscitation, skillful operative management, proper surgical technique and intensive postoperative treatment.

METHODOLOGY

This is a prospective observational study of 100 cases of intestinal obstruction who are admitted in

surgical wards at PESIMSR. Hospital, kuppam between August 2017 to November 2018.

Inclusion Criteria

- All patients between the ages of 18-80 years admitted in department of general surgery with signs and symptoms of intestinal obstruction.
- Patient giving written informed consent.

Exclusion Criteria

- Patients who are not willing to be a part of this study.
- Patients with pseudo obstruction, paralytic ileus are excluded.

Soon after the admission, clinical data was recorded according to the proforma. All the cases studied were subjected to surgery and the diagnosis was established. The diagnosis was mainly based on clinical examination and often supported by radiological examinations.

The investigations done in the cases for study were Blood

Routine examination includes hemoglobin percentage, WBC count and differential count, ESR and blood urea, serum creatinine, serum electrolytes, blood grouping and typing.

Radiology Imaging

Plain x-ray erect abdomen to detect fluid gas levels and ultrasound abdomen was done in all cases. CT scan abdomen done in selected cases.

Immediately after admission, resuscitation with IV fluids especially Ringer's lactate and normal saline infusion was given till hydration and urine output become normal. Nasogastric decompression with Ryle's tube carried out and IV antibiotic prophylaxis started. Close observation of all bedside parameters like pulse rate, blood pressure, respiratory rate, abdominal girth, bowel sounds, and tenderness and guarding was looked for.

Patients with clear-cut signs and symptoms of intestinal obstruction were managed by appropriate surgical procedure after resuscitation. Findings were recorded and photographs were taken.

The postoperative period was monitored carefully and all parameters were recorded hourly or four hourly basis depending upon the patients general condition and toxemia. Intermittent oxygen inhalation was instituted in patients having strangulation of the bowel to reduce the damage induced by ischemia.

Postoperative follow up after the discharge of patients was done in majority of the patient's upto 6 months. Most of the patients did not come for follow up after one or two visits.

STATISTICAL ANALYSIS

Microsoft word and excel have been used to generate tables, graphs etc,

RESULTS

The study of 100 cases of intestinal obstruction who admitted in surgical wards during August 2016 to November 2017 is as follows:

Table-3: Age and Sex Distribution of Cases with Intestinal Obstruction

S.No	Age group (years)	Male	Female	Total	Percentage
1	18-20	1	1	2	2%
2	21-30	5	3	8	8%
3	31-40	13	6	19	19%
4	41-50	11	7	18	18%
5	51-60	17	12	29	29%
6	61-70	13	6	19	19%
7	71-80	1	4	5	5%
	Total	61	39	100	100%

Out of 100 cases studied, maximum incidence was seen in the age group 51 to 60 years followed by 31-40 years and 61-70 years age group. 61% of cases

are males and 39% are females. Thus males outnumbered females.

Table-4: Levels of Intestinal Obstruction

S.No	Level of obstruction	No of cases	Percentage
1	Small bowel obstruction	73	73%
2	Large bowel obstruction	27	27%
	Total	100	100%

In the present study, small bowel obstruction constituted for 73% and large bowel obstruction 27%.

Table-5: Presenting Symptoms and Signs

S.No	Clinical features	No of cases	Percentage
1	Pain abdomen	100	100%
2	Vomiting	81	81%
3	Constipation	75	75%
4	Distension of abdomen	85	85%
5	Groin swelling	31	31%
6	Tenderness	89	89%
7	Guarding & rigidity	59	59%
8	Absent bowel sounds	47	47%

In the present study, pain abdomen was the most common symptom followed by distension of abdomen, vomiting and constipation.

Table-6: Etiology of Intestinal Obstruction

S.No	Cause	Male	Female	No of cases	Percentage
1	Adhesions and bands	20	16	36	36%
2	Obstructed hernias	27	12	39	39%
3	Tumours	3	5	8	8%
4	Volvulus	3	2	5	5%
5	TB abdomen	5	3	8	8%
6	Meckels diverticulum	2	-	2	2%
7	Intussusception	-	1	1	1%
8	Mesenteric ischemia	1	-	1	1%
Total		61	39	100	100%

In our study, obstructed hernia (39%) was the most common cause of intestinal obstruction followed by adhesions and bands (36%). Other causes were

tumours, TB abdomen, volvulus, meckels diverticulum, intussusception and mesenteric ischemia in decreasing order of frequency.

Table-7: Management of intestinal obstruction

S.No	Type of obstruction	procedure	No of cases
1	Adhesive obstruction	1.Adhesiolysis	22
		2.Resection & anastomosis	5
		3.Release of band	6
		4.Ileostomy	3
2	Obstructed hernias	1.Release & repair	30
		2.Resection & anastomosis	9
3	Tumours	1.Colostomy	6
		2.Resection & anastomosis	1
		3.Rt hemicolectomy	1
4	TB Abdomen	1.Resection & anastomosis	6
		2.Ileostomy	2
5	Volvulus	1.Resection & anastomosis	3
		2.Colostomy	1
		3.Volvulus detorsion	1
6	Meckels diverticulitis	Meckels diverticulectomy	2
7	Mesenteric ischemia	Resection & anastomosis	1
8	Intussusception	Rt hemicolectomy	1

Table-8: Previous Surgeries

S.No	Previous surgery	No of cases	percentage
1	Appendectomy	7	7%
2	Hysterectomy	4	4%
3	Tubectomy	5	5%
4	Gastrojejunostomy	1	1%
5	LSCS	3	3%
6	Laparotomy for peritonitis	2	2%
7	Incisional hernia repair	1	1%
Total		23	23 %

Out of 100 cases, 23 cases had previous history of surgery. Among previous surgeries most common surgery was appendectomy followed by tubectomy, hysterectomy, and lower segment caesarian section,

laparotomy for peritonitis, gastrojejunostomy and incisional hernia repair in decreasing order of frequency.

Table-9: Postoperative Complications

Post-operative complication	No of cases	Percentage
Wound infection	11	11%
Respiratory infection	3	3%
Prolonged ileus	4	4%
Faecal fistula	2	2%
Deaths/septicemia	8	8%

Wound infection was the most common postoperative complication observed in this study followed by septicemia, pulmonary infection, prolonged

ileus and faecal fistula. Out of 100 cases, 8 cases died due to septicemia.

Table-10: Mortality

Outcome	No of cases	Percentage
Cured	92	92%
Deaths	8	8%

Table-11: Cause of Death

Case no	Age&sex	Operative findings	Operative procedure	Cause of death
5	45Y/F	Intestinal obstruction due to adhesions	Resection & ileoileal anastomosis	Septicemic shock
13	60 Y/M	Sigmoid volvulus	Colostomy	MODS+ Septicemia
42	76Y/F	Strangulated femoral hernia	Resection & anastomosis	MODS + Septicemia
53	65Y/F	Strangulated inguinal hernia	Resection & anastomosis	ARDS due to RTI
57	46Y/M	Mesenteric ischemia	Resection & anastomosis	MODS+Septicemia
76	60Y/M	Descending & sigmoid colon carcinoma	Colostomy	ARDS due to RTI
78	50Y/F	Strangulated incisional hernia	Resection & colocolic anastomosis	Septicemic shock
98	52Y/M	TB Stricture colon	Resection & colocolic anastomosis	RTI+Septicemia

Table-12: Association of Etiology with Postoperative Complications

Etiology of intestinal obstruction	Postoperative complications		No of cases
	Yes	No	
Adhesions & bands	6	30	36
Obstructed hernias	10	29	39
Tumours	2	6	8
TB Abdomen	4	4	8
Volvulus	3	2	5
Meckel's diverticulum	-	2	2
Mesenteric ischemia	1	-	1
Intussusception	-	1	1



Fig-3: Erect X-Ray Abdomen Showing Multiple Air Fluid Levels



Fig-6: Spontaneously Ruptured Obstructed Incisional Hernia

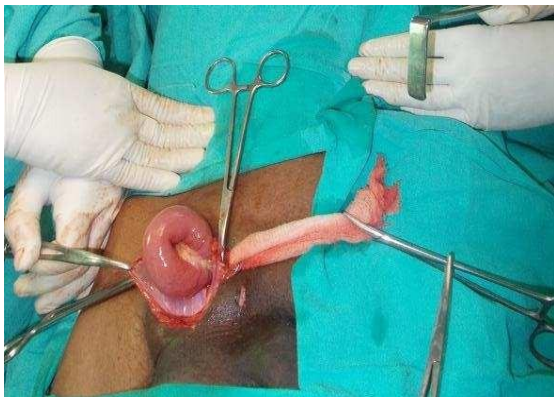


Fig-4: Obstructed Inguinal Hernia



Fig-7: Gangrenous Sigmoid Volvulus



Fig-5: Omental Band Causing Obstruction



Fig-8: Gangrenous Small Bowel Secondary to Mesenteric Vascular Ischemia

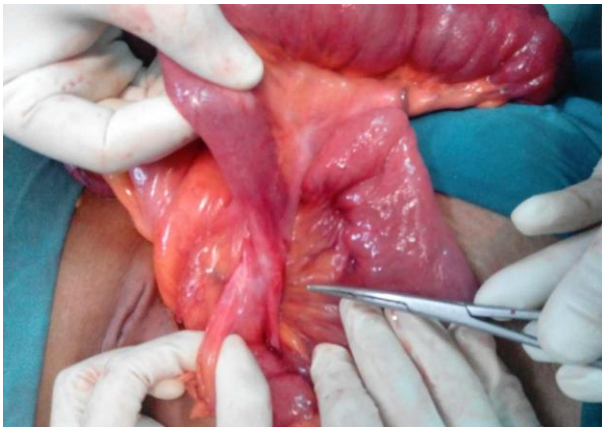


Fig-9: Stricture Ileum



Fig-10: Meckel's Diverticulum

presenting as acute abdomen and requiring surgical intervention. 100 patients between 18 to 80 years of age admitted to the surgical wards with provisional diagnosis of intestinal obstruction were taken for this study.

Age Incidence

Intestinal obstruction occurs in all age groups. Here the youngest patient was 18 years old and the oldest patient was 80 years old. The present study showed maximum incidence in the age group 51-60 years (29%) followed by 31-40 years (19%) and 61-70 years age group (19%).

In a study conducted by Deshmukh SN and Maske AN [26], peak incidence was seen in the age group 51-60 years (22%) followed by 61-70 years (18%) of age which is similar to our study.

Studies reported by Gill and Eggleston [27] has reported 17% of cases in the age group of 50-54 years and 60% of cases of intestinal obstruction occur in the age group of 30-60 years.

Adhikari S *et al.* [28] and Khan JS *et al.* [29] series shows maximum incidence in the age group of 31-40 years. Studies reported by Harban Singh [30] and C S Ramachandran [31] says that the maximum no of cases occur in the age group of 21-40 years, of these the etiological factors were obstructed hernia.

DISCUSSION

Acute intestinal obstruction is a common life threatening surgical emergency all over the world

Table -13: Comparison of Age Incidence in Different Studies

Age group	Cole GJ[23]	SS Gill[27]	Play forth[3]	Souvik Adhikari[28]	Harban Singh[30]	Present study
18-20	10%	12%	4%	9%	10%	2%
21-30	10%	12%	5%	11%	16%	8%
31-40	18%	13%	13%	15%	18%	19%
41-50	16%	13%	18%	24%	15%	18%
51-60	15%	16%	14%	13%	10%	29%
61-70	16%	9%	28%	20%	20%	19%
71-80	6%	4%	11%	8%	5%	5%

Sex Distribution

The study included 61 male patients and 39 female patients with male to female ratio being 1.56:1. Males were more commonly affected as compared to females. Male predominance in this study may be because large number of our patients had obstructed or strangulated hernia, and in our country males as compared to females suffer more from inguinal hernias.

Budharaja *et al.* [34] and Harban Singh *et al.* [30] reported ratio of 4:1 and shakeed35 found equal incidence. Fuzan36 and Lee 37 reported 2:1 male to female ratio.

The present study is similar to study conducted by Ullah *et al.* [38] who reported ratio of 1.6:1.

Table-14: Comparison of sex incidence in various studies

STUDIES	MALE: FEMALE RATIO
Harban Singh <i>et al.</i> [30]	4:1
Shakeed <i>et al.</i> [35]	1:1
Fuzan36 and Lee37	2:1
Ullah <i>et al.</i> [38]	1.6:1
Present study	1.56:1

Etiology of Intestinal Obstruction

Etiology of intestinal obstruction varies in different geographical locations. In the present study small bowel obstruction contributed to 73% and large bowel obstruction 27%. This is comparable with reports of Ojo EO *et al.* [39] where small bowel obstruction constituted to 77% and large bowel obstruction 22%.

Michel [40] and Becker [41] studies reported that small bowel obstruction constituted to 80% and large bowel obstruction 20%.

The most common etiological factor in the present study was obstructed hernia (39%) followed by adhesions (36%). Other causes are neoplasms (8%), TB abdomen (8%), volvulus (5%), meckel's diverticulum (2%), intussusceptions (1%) and mesenteric ischemia (1%).

Table-15: Comparison of Etiology of Intestinal Obstruction in Various Studies

Author	Year published	Total cases	Most common cause	Second common cause	Others
GJ Cole[32]	1965	436	Hernia (35%)	Intussusception (12%)	Adhesions & bands(10%), Tumours(9%), Volvulus(3%), TB(3%)
Ramachandran CS[31]	1982	417	Volvulus (26.6%)	Adhesions (23%)	Hernias(13.6%), Tumours(9%), TB(8%), Intussusception(7%)
Jahangir Sarwar Khan[29]	2005	100	Adhesions & bands (49%)	Hernias(34%)	Intussusception (6%) Volvulus (5%), Tumours (3%),TB (1%)
Markogiannakis[42]	2007	150	Adhesions & bands (64%)	Hernias (14%)	Tumours (13%) Volvulus(0.6%)
Arshad M Malik[43]	2010	229	Adhesions & bands (46%)	TB (24%)	Hernias (23%) Mesenteric ischemia (10%), Volvulus (4%), Tumours (2%)
Souvik Adhikari[28]	2010	367	Hernias (35%)	Tumours (16%)	Adhesions(15%), TB(14%), Volvulus (6%)
Kapan M[44]	2012	148	Adhesions (48.6%)	Tumours (20.9%)	Sigmoid volvulus (15.5%), Hernias (5.4%)
Ojo EO[39]	2014	217	Adhesions (51.6%)	Tumors (18%)	Hernias (12.9%), Volvulus (10.17%)
Deshmukh SN[26]	2016	50	Hernias (50%)	Adhesions (30%)	Tumours (8%) Volvulus (6%),TB(2%), Meckel's diverticulum (1%), Intussusception. (1%)
Present study	2016-2017	100	Hernias (39%)	Adhesions & bands (36%)	Tumours (8%),TB(8%) Volvulus (5%), Meckel's diverticulum (2%), Intussusception (1%), Mesenteric ischemia (1%)

Obstructed hernia

In the present study obstructed hernia is the common cause of intestinal obstruction accounting for 39%. Among obstructed hernias, 29 cases are due to obstructed inguinal hernia, 5 cases are due to obstructed incisional hernia, 2 cases due to obstructed umbilical hernia, 2 cases due to obstructed femoral hernia and 1 case due to internal hernia.

Among previous studies, Jahangir sarwar khan [29] and Souvik Adhikari[28] showed similar incidence i.e, 34% and 36%.

Budharaja[34] studies revealed the etiology for acute intestinal obstruction secondary to obstructed hernia accounted for 33%. In his study, the incidence of gangrene was upto 22%. Ramchandran[31] reported 38.6% of incidence of strangulated small bowel obstruction with 21.4% of obstructed hernia in adults.

Table-16: Comparison of Hernia Causing Intestinal Obstruction in Various Studies

Studies	Incidence
G.J.Cole[32]	27%
Playforth[33]	35%
Brooks and Butler[45]	25%
Khan JS <i>et al.</i> [29]	34%
Adhikari S <i>et al.</i> [28]	36%
Present study	39%

Adhesions and Bands

A total of 36% of cases attributed to adhesions and bands in the present study. Among adhesions and bands 52.7% are due to postoperative adhesions and 30.5% due to inflammatory adhesions and 16.6% due to congenital bands.

Fuzan *et al.* [36] found that the adhesions contributed upto 42.2% for intestinal obstruction. Ti and Young [46] reported that postoperative adhesions and bands contributed upto 23.8% as cause of intestinal obstruction in 62 cases with only postoperative adhesions in 52 cases (19.2%).

Jain and Prasad [47] found that the adhesions contributed upto 25.5% for intestinal obstruction. Similar incidence was also reported by Duron JJ[48]. A study series by Gill and Eggleston[27] of 147 cases showed that 6.8% of small intestinal obstruction is due to bands.

Table-17: Comparison of Adhesions and Bands Causing Intestinal Obstruction in Different Studies

Studies	Incidence
Gill and Eggleston[27]	15%
C.S.Ramchandran[31]	23%
Duron JJ[48]	25.5%
Fuzan[36]	42.2%
Ti and Young[46]	23.8%
Present study	36%

Malignancy

Malignancy constituted 8% of cases of intestinal obstruction in the present study. Out of 8 cases, 2 cases are due to recto-sigmoid growth, 2 cases due to growth in rectum, and 2 cases due to descending colon growth, 1 case due to ileocaecal growth and 1 case due to ascending colon growth.

Ramchandran[31] in his study found that the sigmoid colon cancer accounted for 6.6% of intestinal obstruction. Thompson [49] in his series recorded the incidence of obstructing carcinoma of right colon equals 26% and left colon 69%.

Harban *et al.* [30] reported an incidence of 15% of large bowel obstruction due to malignancy. Fuzan[36] revealed the cause of malignant large bowel obstruction of which ascending colon constituted 3.38% and sigmoid colon constituted upto 27%.

Table-18: Comparison of Malignancy Causing Intestinal Obstruction in Various Studies

Studies	Incidence
Playforth[33]	9%
Adhikari S <i>et al.</i> [28]	17%
Harban <i>et al.</i> [30]	15%
Present study	8%

Tuberculosis

The present study accounted for 8% of tubercular stricture as a cause for intestinal obstruction. It is similar to studies done previously.

Kapoor *et al.* [50] in series managed 109 cases of abdominal tuberculosis out of which 9 cases (8.2%) were purely had acute intestinal obstruction. Sircar[51] series reported to have 5% of cases of abdominal tuberculosis presents with acute intestinal obstruction.

Ismail *et al.* [52] in their study of 75 cases, found tuberculosis in 36% patients, as the main cause of dynamic intestinal obstruction followed by carcinoma of large gut and postoperative adhesions.

Table-19: Comparison of Intestinal Tuberculosis Causing Intestinal Obstruction in Different Studies

Studies	Incidence
C.S.Ramchandran[31]	8.6%
Sircar[51]	5%
Kapoor [51]	8.2%
Adhikari S <i>et al.</i> [28]	14%
Present study	8%

Volvulus

In the present study, intestinal obstruction related to volvulus constituted for 5%. All of these 5 cases are sigmoid volvulus.

Incidence in the present study is similar to studies done by Jahangir sarwar khan [29] (5%) and Souvik Adhikari[28] (6%). Ramchandran *et al.* [31] in his study quoted that the volvulus is the second commonest cause of small bowel obstruction which accounted for nearly 24%. Gill [27] reported that incidence of volvulus was 25%.

A study conducted by Sankaran[53] reported 24 cases of volvulus in South india among which sigmoid volvulus accounted for 50% of cases.

Table-20: Comparison of Volvulus Causing Intestinal Obstruction in Different Studies

Studies	Incidence
Budharaja <i>et al.</i> [34]	18.2%
Khan JS <i>et al.</i> [29]	5%
Arshad M.Malik [43]	4%
Adhikari S <i>et al.</i> [28]	6%
Present study	5%

Meckels diverticulum

In our study of 100 cases of intestinal obstruction, Meckel's diverticulum constituted for 2 % of cases. It is comparable to study conducted by Deshmukh SN and Maske AN[26] in 50 cases, where incidence of meckel's diverticulum was 2%.

Budharaja[34] reported to have incidence of 1.23% of Meckel's diverticulum causing intestinal obstruction. Ramchandran[31] in his series stated that 4.2% of acute intestinal obstruction was due to Meckel's diverticulum.

Table-21: Comparison of Meckel's Diverticulum Causing Intestinal Obstruction in Various Studies

Studies	Incidence
Budharaja <i>et al.</i> [34]	1.23%
Ramchandran [31]	4.2%
Deshmukh SN and Maske AN [26]	2%
Present study	2%

Intussusception

In the present study of 100 cases of intestinal obstruction, intussusception accounted for 1% which is similar to study done by Adhikari S *et al.* [28](2%).

Ti [46] revealed in his study of 261 patients the incidence of intussusception accounted for 6.3% of intestinal obstruction. In these 17 cases, 3 were adults. Kuruvilla [54] in his series found that the incidence of intussusception was 6.3%.

Table-24: Comparison of Clinical Features with other Studies

Studies	Pain abdomen	Vomiting	Abdominal distension	Constipation
Budharaja[34]	95%	75%	82%	50%
Asbun[56]	82%	88%	56%	28%
Jahangir Sarwar Khan[29]	100%	92%	97%	97%
Ojo EO <i>et al.</i> [39]	100%	86%	82%	75%
Deshmukh SN [26]	100%	90%	94%	74%
Present study	100%	81%	85%	75%

Surgical management

The surgical management in the present study included release of adhesions, release of band, resection and anastomosis, release of constricting ring and hernia repair, resection and ileostomy, colostomy, right hemicolectomy, volvulus derotation and meckel's diverticulectomy.

Table -22: Comparison of Intussusception in Different Studies

Studies	Incidence
Kuruvilla[54]	6.3%
Adhikari S <i>et al.</i> [28]	2%
Present study	1%

Mesenteric ischemia

Mesenteric ischemia accounts for 1% of total intestinal obstruction in the present study which is similar to study done by Jahangir Sarwar Khan [29].

Table -23: Comparison of Mesenteric Ischemia in Various Studies

Studies	Incidence
Biaraj <i>et al.</i> [55]	26%
Playforth [33]	6%
Adhikari S <i>et al.</i> [28]	9%
Khan JS <i>et al.</i> [29]	2%
Present study	1%

Clinical features

In the present study of 100 cases of intestinal obstruction, the most common presenting symptom was pain abdomen (100%) followed by distension of abdomen (85%), vomiting (81%) and constipation (75%).

Pain abdomen was present in 100% of cases in the present study which was comparable with Jahangir Sarwar Khan [29] study group. 81% of cases presented with vomiting which was comparable with Asbun[56] studies.

Budharaja[34] in his study reported that symptoms in order of frequency were pain abdomen (95%), followed by distension of abdomen (82%), vomiting(75%) and constipation(50%).

Adhesiolysis was done in 20 cases which include postoperative adhesions and inflammatory adhesions. Release of bands was done in 6 cases.

Anatomical hernia repair with resection and anastomosis was done in 9 cases of which 4 cases were strangulated inguinal hernia, 3 cases were strangulated incisional hernia, 1 case of strangulated femoral hernia

and 1 case of internal hernia. Only hernia repair was done in 30 cases.

Resection and end to end ileo-ileal anastomosis was done in 7 cases which includes 1 case of mesenteric ischemia, 3 cases of stricture and 3 cases of adhesive obstruction with gangrenous ileum. Resection and jejunio-ileal anastomosis was done in one case of TB stricture and 2 cases of gangrenous small bowel. Ileostomy was done in 2 cases.

Resection and ileo-transverse anastomosis was done in ileocaecal growth and TB abdomen. Colostomy was done in 7 cases which includes malignancies and sigmoid volvulus. Resection and colo-colic anastomosis was done in sigmoid volvulus and stricture colon. Volvulus derotation was done in one case of volvulus. Right hemicolectomy was done in ascending colon growth and ileocolic intussusceptions. Meckel's diverticulectomy in 2 cases.

Complications

Postoperative complications are commonly noted in obstruction patients. In the present study of 100 cases of intestinal obstruction, wound infection

noted in 11 cases, deaths in 8 cases, respiratory infection in 3 cases, prolonged ileus in 4 cases and enterocutaneous fistula in 2 cases.

In the present study, wound infection was the most common post-operative complication similar to what was seen in the study done by Jain *et al.* [57].

Deaths occurred due to septicaemia in mesenteric ischemia, strangulated hernia, those who presented late with sepsis and other comorbidities.

Mortality

Out of 100 cases, 8 died following surgery for intestinal obstruction. The causes of death were

1. Septicemia
2. Multiorgan failure
3. ARDS due to respiratory tract infection

In the present study, mortality rate was 8% which is comparable to studies reported by Khan JS *et al.* [29] (7%) and Adhikari *et al.* [28] (7.35%). Mortality rate is much less when compared to study done by C.S.Ramachandran [31].

Table-25: Comparison of mortality with various studies

Study group	No of cases	Mortality
Gill and Eggleston [27]	147	16%
Sufian Matsumoto [58]	171	19%
CS Ramachandran [31]	417	12.7%
Chedale <i>et al.</i> [59]	300	9%
Khan JS <i>et al.</i> [29]	100	7%
Adhikari S <i>et al.</i> [28]	367	7.35%
Kapan M <i>et al.</i> [44]	148	12.8%
Present study	100	8%

Out of 8 deaths, 3 cases were strangulated hernias; remaining 5 cases were gangrenous sigmoid volvulus, TB stricture colon, Descending colon carcinoma, rectal growth and adhesive obstruction. Mortality was more in patients who develop strangulation and gangrene of bowel, elderly age group, those who presented late to hospital and in those having preexisting diseases like COPD, respiratory tract infection and diabetes mellitus which led to septicemia and death.

The decrease in overall mortality is due to better understanding of patho-physiology of obstruction, improvement in resuscitative and supportive management, early and aggressive surgical therapy in combination with improved technique in anaesthesia.

CONCLUSION

Obstructed hernias are the common cause of intestinal obstruction in our study due to lack of awareness among rural population followed by

adhesions and bands with pain abdomen as the most common presenting symptom. Majority of patients with intestinal obstruction needs surgical relief of obstruction

Clinical, radiological and operative findings put together can bring about the best and accurate diagnosis of intestinal obstruction. Plain x ray is the single most important diagnostic tool for intestinal obstruction early recognition and aggressive treatment is needed to prevent gangrenous changes. Prognosis was poor in elderly patients. The most common cause of morbidity and mortality was septicemia, anastomotic leak, wound infection and pulmonary infection. Patients who presented with strangulation had poor outcome. In our study the most common cause of death was septicemia

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