



RESEARCH ARTICLE

A STUDY OF ACUTE INTESTINAL OBSTRUCTION

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ABSTRACT

Objectives

- 1.To evaluate the common causes of acute intestinal obstruction in this region.
- 2.To identify the etio-pathogenesis
- 3.To evaluate the various modes of presentation.
- 4.To study the various modalities of treatment in this centre.
- 5.To evaluate the morbidity and mortality of acute intestinal obstruction

Methods

Study design: Retrospective

Study centre: Department Of General Surgery, Thanjavur Medical College Hospital, Thanjavur, Tamil Nadu, India

Study period: May 2007 – November 2009

Duration of study: 30 months

Total number of cases studied :229

Inclusion criteria: both men and women > 12 years of age

Exclusion criteria: pediatric patients are not included

Conclusion: Majority of acute intestinal obstruction is contributed by small bowel; major cause being external hernias; strangulation rate is comparatively much lower; adhesive obstruction accounts for most; sigmoid volvulus ranking fourth; plain X-ray abdomen is a valuable and minimal investigation before surgery; early diagnosis and early surgical intervention is the key to reduce mortality

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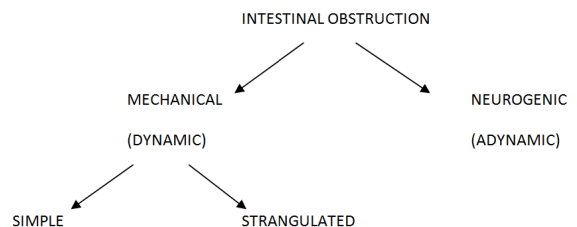
INTRODUCTION

Acute intestinal obstruction continues to be a frequent emergency till date. It is one of the gravest emergencies that reveal the talents of surgeon in all aspects. It was said by Berkeley Moynihan's in 1926 "when called upon to deal with a case of acute intestinal obstruction the surgeon is confronted with of the gravest and most disastrous emergencies. The patient may be and often is a man or woman in the prime of life in full enjoyment of vigorous health, who, without, is suddenly seized with the most intolerable pain in the abdomen..... " Physical signs and their importance reach a high pinnacle of importance in the diagnosis. Frequently an urgent and all important decision has to be reached by their aid alone. It is one of the emergencies where as quickly as possible we act, the result will be remarkable. This fact indicated by Sir Heneage Ogilvie that "in the acute abdominal emergencies the difference between the best and worst surgery is infinitely less

than that between early and late surgery, and greatest sacrifice of all is the sacrifice of time" more apt in the present context.

Classification and etiology of acute intestinal obstruction

Intestinal obstruction is divided into two main types



In mechanical obstruction, the intestinal contents are prevented from passing along the bowels by acute obstruction of the lumen of the gut. In Neurogenic obstruction, the peristalsis ceases and no true propulsive waves occur and so the intestinal contents do not traverse the bowel.

Mechanical obstruction is further classified:

According to site of obstruction it is classified into

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- Small bowel obstruction
- Large bowel obstruction

According to etiology: this is the most useful type of classification which reveals the underlying cause for obstruction

- Causes in the lumen gall stone, food bolus, fecal impaction, barium, bezoars, worms, etc.
- Causes in the wall congenital atresia, bowel neoplasms, inflammatory strictures, etc.
- Causes outside the wall strangulated internal hernia, external hernia, Obstruction due to adhesions, volvulus, intussusceptions

The etiological factors for intestinal obstruction are diverse and show variation from country to country, decade to decade.

Age incidence

As per world literature, intestinal obstruction may occur at any age. Its incidence rises in middle age and reaches a plateau in those over 50. It's comparatively rare in children and in young adults.

Common causes of intestinal obstruction at each age group

Neonate	-	congenital atresia, volvulus neonatorum, meconium ileus, Hirschsprungs disease, ano rectal anomalies
Infant	-	strangulated inguinal hernia, intussusceptions, Complication of meckels diverticulum, hirschsprungs disease
Young age	-	adhesions and bands, strangulated inguinal hernia
Middle age	-	adhesions and bands, strangulated femoral hernia, Strangulated inguinal hernia, carcinoma of colon
Elderly	-	adhesions and bands, strangulated inguinal hernia, strangulated femoral hernia, carcinoma of large bowel, diverticulitis, impacted feces

Sex incidence: Intestinal obstruction is roughly equal in male and female

Site: About 70 percent incidence of intestinal obstructions occurs in the small bowel and about 30 % in the large bowel in the western world.

Pathophysiology

Though, simple mechanical obstruction, strangulated obstruction and ileus have much in common, there are important differences in pathophysiology and management. Also, colonic obstruction differs in some aspects from small bowel obstruction.

A). Simple mechanical obstruction of the small intestine

The principal physiological derangements of the mechanically obstructed intestine with intact blood supply are

- Accumulation of fluid and gas above the level of bstruction
- Altered bowel motility

Fluid and electrolyte disturbances

The bowel immediately above the obstruction is the most affected initially. The ileum above the obstruction ceases to

absorb sodium and water. So these substances get accumulated in the intestinal lumen and as time passes, the rates of their secretion increase. Potassium, normally secreted by ileum, was secreted at an even greater rate after gut had been obstructed. In early stages there is accumulation of water, K⁺, Na⁺ due to retarded absorption. After 48 hours, water, K⁺, Na⁺ get accumulated into the lumen above the obstruction at an increasing rate due to accelerated secretion of those substances. Prostaglandin release in response to bowel distension is thought to be a mechanism by which secretion into obstructed loop is increased. The ileum below the obstruction showed only moderate changes in its absorptive and secretory capacity. The most striking change was a two fold increase in K⁺ secretion into the lumen. Since the fluid lost into the intestinal lumen was isotonic with the body fluids, the concentration of electrolytes in the serum was not altered until later in obstruction. The fluid is made up by whatever fluids the patient ingest as well as the various digestive juices – 8000 ml per 24 hours

Above pylorus 4000 mlsaliva 1500 ml

Gastric 2500 ml

Below pylorus 4000 ml bile and pancreatic 1000 ml

Succus entericus 3000 ml

In obstruction, absorption from the gut is retarded but the exact concentration of excretion of water and electrolytes especially sodium, potassium, chloride, bicarbonate, varies depending on the particular site of intestinal obstruction. The severity of depletion and the speed with which it manifests depends upon the level of obstruction. It is most severe and occurs early in high intestinal obstruction, later in ileal obstruction and is slow to appear in colonic obstruction. The second route of fluid and electrolyte loss is into the wall of the involved bowel, accounting for the boggy edematous appearance of the bowel. Thirdly some of this fluid exudes from the serosal surface of the bowel, resulting in free peritoneal fluid. Fourthly, and most obvious route of fluid and electrolyte loss is by vomiting or nasogastric tube aspiration after treatment is initiated. Above said causes rapidly depletes the extra cellular fluid space, leading progressively to hemo-concentration, hypovolemia, metabolic acidosis, renal insufficiency, shock and death unless treatment is prompt and resolute

Intestinal gas

This is also responsible for distension of bowel above the obstruction. This consists of swallowed atmospheric air (68%) diffusion from blood into the bowel lumen (22%) and the products of digestion and bacterial activity (10%). The O₂ and CO₂ (8%) has been absorbed into blood stream, the resultant mixture is made up of nitrogen (90%) and hydrogen sulphide. The enormous increase in the intestinal gas is mainly due to the marked increase in the gut bacteria both anaerobes and aerobic organic organisms.

Bowel motility

Initially the bowel proximal to the obstruction shows increase in the peristaltic activity to account for the severe colicky abdominal pain. Increased peristalsis continues for a period

from 48 hours to several days. The more distal the point of obstruction, the longer does it remains vigorous. If the obstruction is not relieved, the increasing distension causes peristalsis to become feebler; finally the peristalsis ceases, and the obstructed intestine becomes flaccid and paralyzed. The intestine below the point of obstruction exhibits normal peristalsis and absorption from it continues for 2 to 3 hours following the obstruction, until the residue of its contents has been passed onwards. Then the distal empty intestine becomes immobile, contracted and pale

Strangulated obstruction

Occlusion of blood supply to a segment of bowel in addition to obstruction of the lumen is usually referred to as strangulated obstruction. The first effect of strangulation is to compress the veins, and its involved mesentery to become blue and congested. When the venous return is completely occluded, the colour of the intestine turns from purple to black. There is marked increase in the capillary pressure that results in escape of intravascular fluid and RBCs to the bowel wall, its lumen and the hernial sac or peritoneal cavity. About this time, owing to increased edema at the point of obstruction, the arterial supply is jeopardized. The peritoneal coat loses its glistening appearance, mucous membrane becomes ulcerated and gangrene is imminent. Large amount of blood get sequestered in the strangulated segment which is proportional to the length of the segment. Unlike non-strangulating obstruction, early distension of the proximal intestine is absent. For a time varying from a few minutes to several hours, vigorous peristalsis in the proximal segment but is still unaccompanied by distension. By the time gangrene of the strangulated segment is imminent, retrograde thrombosis proceeds along the related tributaries of the mesenteric vein. Distension occurs, when the venous return is completely obstructed while the arterial supply remains unimpaired. When the wall of the intestine becomes partly devitalized, both bacterial toxins and products of tissue autolysis pass into the peritoneal cavity, there to be absorbed into the circulation. This is followed by the migration of bacteria and peritonitis follows. Delay in the recognition and treatment of intestinal strangulation significantly enhances the mortality.

Bacteriology

The normal upper small intestinal contents are virtually sterile. The distal small gut fluid may yield a scanty growth of fecal flora. The situation is quite different in the presence of obstruction. The bowel above the level of obstruction contain profuse bacterial colonies, predominantly fecal in type (both aerobic and non aerobic) an increase in the anaerobic organisms especially Bacteriodes. Experimental studies demonstrate that Clostridium perfringens exotoxin contributes to the lethal activity of filter-sterilized strangulation fluids but direct clinical evidence is lacking. The longer the period of obstruction, the higher up the bowel this contamination extended. The major threat to life in intestinal obstruction is the possible absorption of toxins, mainly from Gram Negative organisms in the presence of damaged bowel, particularly when strangulation is present.

Clinical features and diagnosis

Four main complaints

- Pain

Insidious or abrupt

- Vomiting

Usually occurs after obstruction of bowel. This early vomiting is reflex vomiting. The quiet interval is short in high intestinal obstruction. As low obstruction progresses, the vomit begins to assume feculent character.

- Constipation / obstipation

Absolute constipation (obstipation) occurs in complete intestinal obstruction, after the contents of the bowel below the obstruction have been evacuated.

- Abdominal Distension

Clinical signs

The presence of an abdominal scar, whether recent or old, always suggests an underlying band or adhesions. In the early stage the vitals are normal. At a late stage, the patient becomes anxious and pale, with a feeble rapid pulse, falling temperature and blood pressure and typical signs of dehydration. Shock may be more marked in strangulated case. Palpation reveals tenderness and rebound tenderness. Guarding may occur. Mass may be detected on palpation such as carcinoma colon, diverticulitis or intussusceptions. Typically in an intestinal obstruction the rectum is ballooned.

Borborygmi: Obstruction is indicated by high pitched splashing, rushing or tinkling sounds lasting at least a second and having a characteristic gurgling quality.

Diagnostic studies

Labaratory tests

1. Urine - Mild proteinuria or acetonuria
2. Hb% and PCV- Elevated due to hemoconcentration
3. WBC Count - Increased
4. Blood urea - Increased
5. Serum electrolytes- Lowered

Radiological studies

X- ray abdomen erect

Gas shadows

Obstruction of small intestine is revealed by relatively straight loops that generally lie more or less transversely in a step ladder fashion. Jejunum is characterized by its valvulae conniventes giving rise to concertina effect. Ileum is characterless.

Air fluid levels (Harlow *et al.*, 1993)

The number of fluid levels is proportionate to degree of obstruction and to its site in the small intestine. The nearer the obstruction to the ileocaecal valve, the larger the number of fluid levels

Table 1. Treatment modalities for external hernia with morbidity and mortality

S. No.	Type of hernia	Total no. of cases	Type of obstruction		Procedure done		Complications	Death
			Simple	Strangulated	Herniorraphy	Resection & anastomosis		
1	Inguinal	90	78	12	78	12	21	8
2	Femoral	3	1	2	1	2	3	-
3	Para umbilical	7	6	1	6	1	3	-
4	Incisional	10	9	1	9	1	5	2

Table 2. Small bowel obstruction other than external hernia procedure done with morbidity and mortality

S. No.	Etiology	Total no. of cases	Type of obstruction		Procedure done		Complications	Death
			simple	Strangulated	Conservative	adhesiolysis		
1	Post surgical	19	18	1	6	12	1	7
2	Post inflammatory	6	4	2	-	4	2	3
3	Congenital bands	18	17	1	-	17	1	3
4	Tb abdomen	15	15	-	-	5	10	8
5	Small bowel volvulus	2	1	1	-	-	2	1
6	Meckels	1	1	-	-	-	1	1
7	Intussusception	2	2	-	-	-	2	2
8	Ileosigmoid knotting	1	1	-	-	-	1	1
9	Miscellaneous	5	2	3	-	1	4	4
	TOTAL	69	61	8	6	39	24	30

Table 3. Large bowel neoplasm – treatment modalities with morbidity and mortality

S. No.	Site of neoplasm	No. of cases	Modalities of treatment			Complications	Death
			Staged procedures	One stage	Hartmann's		
1	Caecum	4	3	1	-	2	1
2	Ascending colon	3	1	2	-	1	1
3	Splenic flexure	1	1	-	-	1	-
4	Descending colon	2	1	1	-	1	1
5	Sigmoid colon	2	-	1	1	2	-
6	Recto sigmoid	12	10	-	2	9	-
	TOTAL	24	16	5	3	16	3

Table 4. Morbidity and mortality in acute intestinal obstruction

S. No.	Type of bowel	Total no. of cases	Total no. of		Percentage %	
			Complications	Death	Complications	Death
1	Small bowel	179	62	13	34.64	7.26
2	Large bowel	50	26	7	64	14

Table 5. Acute intestinal obstruction – etio pathological, sex incidence of 229 cases with morbidity and mortality

S. No.	Etiology	No. of cases	SIMPLE		Strangulated		Treatment		Complication		Death	
			Male	Female	Male	Female	Conservative	Surgery	No. of cases	%	No. of cases	%
I	Small bowel obstruction	179	119	35	19	6	6	173	62	34.64	13	7.26
A	External hernia	110	81	12	12	5	-	110	32	29.09	10	9.09
i	Inguinal	90	76	2	12	-	-	90	21	23.33	8	8.89
ii	Femoral	3	1	-	-	2	-	3	3	100	-	-
iii	Para umbilical	7	2	4	-	1	-	7	3	42.86	-	-
iv	Incisional	10	2	6	-	2	-	10	5	50	2	20
B	Adhesions	43	22	17	4	-	-	37	13	30.23	1	2.32
i	Post surgical	19	8	10	1	-	6	13	7	36.84	-	-
ii	Post inflammatory (excluding Tb)	6	2	2	2	-	6	6	3	50	-	-
iii	Congenital band	18	12	5	2	-	-	18	3	16.67	1	5.55
C	Tuberculous abdomen	15	12	3	-	-	-	15	8	53.33	1	6.67
D	Small bowel volvulus	2	-	1	1	-	-	2	1	50	1	50
E	Meckel's Diverticulum	1	-	1	-	-	-	1	1	100	-	-
F	Intussusception	2	1	1	-	-	-	2	2	100	-	-
G	Ileo sigmoid knotting	1	1	-	-	-	-	1	1	100	-	-
H	Miscellaneous	5	2	-	2	1	-	5	4	80	-	-
II	LARGE BOWEL OBSTRUCTION	50	29	18	2	1	-	50	26	52	7	14
A	Sigmoid volvulus	22	11	8	2	1	-	22	8	36.36	3	13.63
B	Caecal volvulus	1	1	-	-	-	-	1	-	-	1	100
C	Malignant growth of large bowel	24	15	9	-	-	-	24	16	66.67	3	12.5
D	Miscellaneous	3	2	1	-	-	-	3	2	66.67	-	-

SMALL bowel mortality - 7.26 % (13 CASES); Large bowel mortality - 14% (7 CASES)

Strangulation

Occlusion of the blood supply to a segment of bowel in addition to obstruction of the lumen is usually referred to as strangulated obstruction

Etiology: secondary to external hernias, intra abdominal hernias, adhesive band obstruction, volvulus

Clinical features: symptoms begin suddenly. Shock occurs early in severe strangulation. Colicky pain is present. Fever, elevated WBCs and tachycardia are present. Metabolic acidosis occurs after 12 hours. Rebound tenderness is a distinctive sign.

Mortality is still high in case of strangulated obstruction which can be reduced by

- Adopting immediate resuscitative measures
- Pre and post operative naso gastric suction
- Early surgeries
- Resection of dead segment of bowel and adequate lavage of peritoneal cavity with normal saline with or without antibiotics

Small bowel obstruction

In this series the following are major causes of small bowel obstruction (Mark Evers, 2003)

External Hernia (Robert *et al.*)

A hernia is the protrusion of whole or part of a viscus through an abnormal opening in the wall of its containing cavity.

Etiology: presence of preformed sac; increase in intra abdominal pressure; weakening of body muscles and tissues

Clinical features: sudden pain occurs initially over the hernia followed by generalized abdominal pain, paroxysmal in character. Vomiting is forcible and repeated. The hernia is extremely tender, tense and not reducible. In obstructed / strangulated hernia, operative treatment is mandatory.

Adhesions

They are the most common cause of intestinal obstruction in western world (Edward *et al.*)



Figure 1. Sigmoid volvulus with distended sigmoid colon

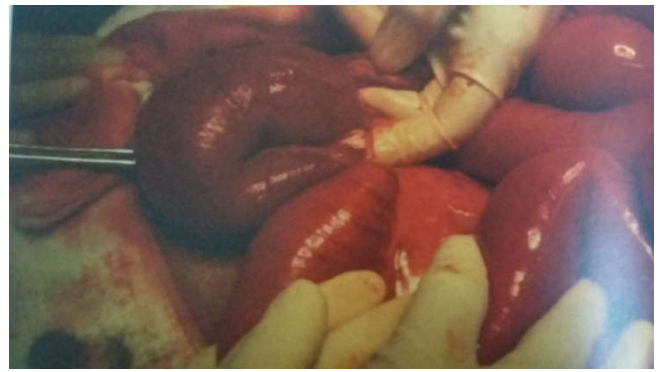


Figure 2. Congenital ileal band



Figure 3. Strangulated umbilical hernia



Figure 4. X Rays in acute intestinal obstruction with multiple air fluid levels

Etiology:

1. Ischemic areas -Sites of anastomosis
Reperitonealisation of raw areas
2. Foreign bodies -Talc, starch granules, gauze lint, cellulose
3. Infective disease -Peritonitis, Tuberculosis
4. Inflammatory disease-Crohn's disease

5. Radiation enteritis
6. Sclerosing peritonitis

Treatment:

1. Non operative treatment with naso-gastric tube drainage combined with iv fluids
2. Adhesiolysis (enterolysis)
3. In cases of recurrent adhesions
 - a. Noble's plication operation
 - b. Child's – Philip's transmesenteric plication

Prevention

1. Meticulous technique
2. Washing the peritoneal cavity with saline or dextran
3. Avoidance of excessive packing with gauze
4. Covering anastomosis and raw peritoneal surface with greater omentum
5. Leaving raw peritoneal areas unsutured

Obstruction by a band

A band (usually one band only is culpable) is occasionally the cause of acute obstruction.

1. Congenital – obliterated vitello intestinal duct
2. String – thin and fragile, following previous bacterial peritonitis
3. A portion of greater omentum, adherent to the parietes, constituting an obstructive band

Obstruction by abdominal tuberculosis (Pujari, 2003)

Main source of infection is swallowed sputum
Pathology: commonly the fibrous (plastic) form present as acute intestinal obstruction characterised by production of widespread fibrous adhesion (Das, 1976).

Treatment

1. Anti tuberculous drugs
2. Division of band or adhesiolysis
3. Limited resection of terminal ileum and caecum
4. Strictureplasty

Volvulus of small intestine (Rebekah *et al.*)

Meckel's Diverticulum

It is present in 2% of persons, situated in the anti mesenteric border of small intestine, commonly 2 feet from the ileo caecal valve and it is usually 2 inches long

Intussusception (Iko Bo *et al.*, 1984)

Submucous lipoma is the most frequent benign lesion causing intussusception. It is also due to polyps, papilliferous growth, Meckel's diverticulum, leiomyoma, etc.

Treatment is invariably surgical

ILEO sigmoid knotting: A loop of ileum wraps around the base of an elongated sigmoid colon or vice versa. It is a variant of midgut volvulus.

Large bowel obstruction Sigmoid volvulus (Kelly *et al.*)

Volvulus is defined as twisting or torsion of a loop of bowel around its related attachments in such a way as to obstruct the lumen of both proximal and distal loop of the segment and a varying degree of impairment of its circulation.

Caecal volvulus (Kelly *et al.*)

The volvulus is nearly always in a clockwise direction. The first twist obstructs the ascending colon; if a second twist occurs, it obstructs the ileum also.

Large bowel Neoplasms

25% cases of carcinoma from left side of colon present with features of chronic or acute on chronic obstruction because

1. Neoplasms in this situation are of stenosing variety
2. Faecal content is relatively solid
3. Comparatively narrow lumen

Treatment

1. Three staged procedure
2. One stage resection and anastomosis
3. Hartmann's operation
4. Caecostomy alone

Treatment

1. Naso gastric or gastro intestinal suction drainage (Brolin, 1983)
2. Replacement of fluid and electrolytes
3. Antibiotics
4. Relief of obstruction by surgery
 - a. Exploratory laparotomy
 - b. Enterostomy, caecostomy, colostomy
 - c. Anastomosis entero enteral, ileo colic
 - d. Resection of bowel
 - e. Lysis of band or adhesions
 - f. Enterotomy for gall stones, bezoars

DISCUSSION

In our study of 229 patients with acute intestinal obstruction, about 179 cases of Small Bowel obstruction and 50 cases of Large Bowel obstruction were recorded contributing 78.16 % and 21.84 % respectively, in contrast to western literature, where 70% of obstruction occurs in small bowel and 30 % in large bowel. The difference of contribution of large bowel obstruction is due to prevalence of large bowel neoplasms, diverticulitis and inflammatory bowel disease in our part as compared to Western countries. In case of small bowel obstruction, about 86% (154 cases) were simple obstruction and 14 % (25 cases) strangulated obstruction. In this study,

External hernia contributes to 61.45% (110 cases) of acute intestinal obstruction. Inguinal hernia contributes to 81.82% (90 cases) of external hernia and 50.2 % of total small bowel obstruction. It ranks FIRST among the causes of acute intestinal obstruction. This is contrast with the world literature, where adhesive obstruction is the principal cause (40 %), and hernia becomes the second cause of obstruction (25%). We have encountered only 3 cases of femoral hernia and 7 cases of par aumbilical hernia and 10 cases of incisional hernia which together contributes only 18.18% of external hernia and 11.17% of total. The high prevalence of inguinal hernia causing obstruction is attributed to

- Inadequate knowledge about the disease proper because of low literacy
- Reluctance of patient to undergo Elective repair of hernia
- High prevalence of Chronic cough (viz. tuberculosis, etc.)

Even though the prevalence of Inguinal hernia causing obstruction is high, the strangulation rate has come down dramatically to 13.33% (12 cases) due to

- Early arrival of patient once obstruction occurs, even though he doesn't care it before
- Early recognition and immediate treatment

In our study, Adhesive obstruction accounts for 18.78% (43 cases) of acute intestinal obstruction ranks second. Among this 44% (19 cases) were due to post-surgical adhesion, 13.95% (6 cases) due to post inflammatory adhesion and 41.86% (18 cases) due to congenital band. Among this strangulation occurred in 9.30% (4 cases) involving the small bowel only. Increased incidence of Cesarean section, hysterectomies and P.I.D accounts for more incidence of adhesive obstruction in females. Still the Abdominal tuberculosis account for 8.38% (15 cases) in total as a cause of small bowel obstruction. Even with advent of potent anti-tuberculous drugs, the reason for failure of improvement of situation is not known to certain. In our study, adhesiolysis could be contemplated in 3 cases because of extensive adhesions. The occurrence of small bowel volvulus was 1.12% (2 cases) in contrast to Agarwal and Misra's observation who reported 20%. Surprisingly we have come across 2 cases of intussusception and 1 case of Meckel's diverticulum causing obstruction. One case of small bowel tumour was encountered. Large bowel obstruction, accounted for 21.84% (50 cases) of acute intestinal obstruction. In this series, sigmoid volvulus contributes for large bowel obstruction accounting for 44% (22 cases) and neoplasm of large bowel contributes to 48% (24 cases). The high incidence of Sigmoid volvulus in our place is due to

- Diet containing large amount of vegetables, roughages that overloads the colon causing chronic dragging and lengthening of the loop.
- Thickened, hypertrophied sigmoid colon
- Long freely movable sigmoid loop on a long and freely movable redundant mesosigmoid

The high incidence of neoplasm of large bowel causing obstruction is attributed to

- Diet containing fewer amounts of vegetables, fibre.
- High fat diet and decreased calcium intake.

The clinical parameters like continuous pain, fever (>37.2°C), tachycardia (>100/min), palpable abdominal mass enable us to detect the presence of strangulation in about 38% of cases, that too mainly in external hernias. Plain x ray abdomen is still useful in diagnosing bowel obstruction. In our study, we were able to get multiple air fluid levels in about 73% cases. We haven't got positive air fluid level in early stage of obstruction in cases of inguinal hernia. Early recognition by the patient and prompt treatment by surgeon gives good reward and decreases the mortality.

Conclusion

1. Among the causes of acute intestinal obstruction, 78.16% is contributed by Small bowel obstruction and 21.84% by Large bowel obstruction
2. The major cause of acute intestinal obstruction is still External hernia (48.03%) here. Among this, inguinal hernia alone accounts for 81.82% in total.
3. Even though the inguinal hernia causing obstruction is highly prevalent, the strangulation rate comes down dramatically to 13.33% (12 cases).
4. Adhesive obstruction accounts for 18.78% in total, of which the post-surgical adhesion is the major cause
5. Sigmoid volvulus ranks fourth in etiology of acute intestinal obstruction contributing 9.61%, next only to large bowel neoplasms contributing 10.48%
6. Sigmoid volvulus contributes to large bowel obstruction accounting for 44% and neoplasm contributes to 48%
7. Clinical parameters fail to differentiate between simple and strangulated obstruction exactly
8. Plain x-ray abdomen is a valuable in the diagnosis of the acute obstruction (73%) and hence is considered as minimal investigation before surgery
9. Early surgical intervention and antibiotics has reduced the mortality of the simple bowel obstruction
10. In strangulated obstruction, the mortality rate is still significantly more, due to age, associated diseases and late arrival to hospital
11. Mortality associated with large bowel obstruction is 14% compared to 7.26% with small bowel obstruction
12. Early diagnosis and early surgical intervention is the key to reduce the mortality

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