

**A STUDY OF INTESTINAL OBSTRUCTION IN
TVMCH**

**DISSERTATION SUBMITTED FOR M.S. DEGREE
BRANCH – I
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CERTIFICATE

This is to certify that this dissertation titled "**A study of Intestinal Obstruction in TVMCH**" is a bonafide work of **Dr.K. Kannan**, Post Graduate in M.S. General Surgery, Department of Surgery, Tirunelveli Medical College and has been prepared by him under our guidance, in partial fulfillment of regulations of The Tamilnadu Dr. M.G.R. Medical University, for the award of M.S. degree in General Surgery during the year 2006.

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INTRODUCTION

Intestinal obstruction is one of the most common problems faced by the general surgeons. Intestinal obstruction was observed and treated by Hippocrates. The earliest recorded observation for intestinal obstruction was performed by Praxagoras (350 B.C.) who created an enterocutaneous fistula to relieve the obstruction. However non-operative treatment has remained the general rule, including reduction of hernias, opium for pain, orally administered mercury or lead shot in an attempt to open up the occluded bowel, electrical stimulation & gastric lavage.

About 100 years back surgery had been frequently used amid considerable debate. In 1899 Amussat put forward the theory of absorption of an abnormal toxin from the obstructed bowel which resulted in death. Hartwell and Honget in 1912 showed that parenteral administration of saline prolonged the lives of dogs with intestinal obstruction and this has become a cardinal principle in the management of intestinal obstruction today. The second decade of the 20th century saw the development of Radiographic techniques which aided in the diagnosis of intestinal obstruction.

Gamble and associates, as well as Melver and Ross (1925) were able to show the details of the alteration of biochemical parameters, i.e. elevation of non protein nitrogen, decreased blood chlorides and increased affinity of blood for CO₂, with the loss of fluid and electrolytes from the upper gastrointestinal tract. They also documented that saline solution is highly efficient in high obstruction, since it is a good substitute for the sodium, water and chloride lost by vomiting.

In the 1930's nasogastric and intestinal tubes were employed to prevent or relieve abdominal distension in patients with intestinal obstruction. Antibiotics were added in the 1940's and 1950's. Darrow in 1946 said that potassium replacement was essential when there has been loss of gastro intestinal secretions

through vomiting, diarrhoea or a fistula. Fluid replacement, intestinal decompression, antibiotics, improvements in surgical and anesthetic techniques have reduced the mortality rate in intestinal obstruction. But the prompt recognition and early institution of treatment is most important.

In this study an attempt has been made to study those cases of mechanical Intestinal obstruction, especially those cases which required surgery with emphasis on the surgical techniques employed. These cases have been encountered during the period of my post-graduate study from 2003 – 2006.

Other Historical Events

- * Astley Cooper & Jonathan Hutchison – Upside down position of the patient on the attenders shoulder to reduce the hernia.
- * Hydrostatic reduction by Cliebble & Hipsley 1921 to reduce intussusception.
- * Sydenhan's – Horse riding to cause the evaluation of distended bowel and keeping warm kitten on the naked belly in cases of ileus.
- * Marianus Sanctus in 16th century used many pounds of metallic mercury, expecting to pass through the obstruction by its weight.
- * Bigelow 1756 – Suggested percutaneous puncture of the strangulated loop with a needle.
- * Franco (1561) – Divided the constriction ring by Surgical intervention.
- * Pigray (1615) – Used butter on oil to lubricate his probing finger to enter through the constriction ring in hernia.
- * Mery (1701) had excised gangrenous bowel and made colostomy.
- * Necaton (1839) fixed a distended loop to anterior abdominal wall followed by enterostomy.

- * Use of dog's trachea to restore the continuity of bowel done by Durerger(1747), Ramdohr(1927) insinuated the proximal bowel into distal bowel after excising the gangrenous bowel.
- * Savopoulo (1854) – used post operative dressings with 56- 86% alcohol and then others tried warm wine and brandy.
- * Schwarz of Vienna (1911) first pointed out the virtue of scout x-ray films in diagnosing obstruction.
- * Mckittrick (1940) – Used Nasogastric suction by an in dwelling catheter
- * Zollinger 1965 – Used antibiotics and improved the outlook of patients with strangulated hernia.

AIMS OF STUDY

- 1) To study the incidence of Intestinal obstruction due to mechanical causes in the cases admitted in Tirunelveli Medical College Hospital during the period of July 2003 to January 2006.**
- 2) To study the relative incidence of the various causes of intestinal obstruction.
- 3) To find out various etiological factors involved.
- 4) To note the clinical presentations of various types of intestinal obstruction.
- 5) To study the lines of management adopted with special emphasis on surgical technique employed.
- 6) To study the prognosis, morbidity and mortality of the various causes of intestinal obstruction.

MATERIALS AND METHODS

- a) Cases admitted in the Department of Surgery, Tirunelveli Medical College Hospital, between July 2003 to January 2006 forms the materials of this study.
- b) Case sheets of above mentioned cases & their investigations report also forms the materials of this study.
- c) Clinical examinations, biochemical, radiological and other investigations, observations during surgery of above cases and their follow up are methods used in this study.

“Most of the life’s problems are better understood in retrospect than in prospect to which understanding the intestinal obstruction is no exception.

All patients in whom a diagnosis of Intestinal Obstruction was established on admission and confirmed during operation between July 2003 to Jan 2006 were included in this study.

Patients admitted with the diagnosis of Intestinal Obstruction but went against medical advice without any operative intervention and paediatric group were excluded. A total of 123 patients satisfied this criteria.

The diagnosis was established by the admitting surgeon, based on clinical picture and supported by radiological evidence (ultrasonogram, plain abdominal radiograph together with contrast studies if indicated) and confirmed when appropriate at operation.

Surgery was defined as urgent (less than 6 hrs between admission and operation), and delayed (at a later time during the same hospital admission).

Operative details included the cause of obstruction, presence or absence of strangulation and nature of operation performed.

Mortality was defined as death following surgery while post operative morbidity was defined in terms of the duration of hospital stay and associated complications following surgery.

The observer was present in 55 cases through out the initial evaluation, resuscitation and surgical procedure, Information of the rest of 68 cases were obtained from case records.

1. Identification particulars viz, Name, Age, Sex, IP No etc.
2. Clinical features and abdominal findings.
3. Radiological findings and contrast studies.
4. Time of surgery after admission.
5. Operative findings.
6. Procedure done.
7. Postoperative complications.
8. Follow up

Patients were followed up till the time of their discharge from hospital or two years following surgery.

INTESTINAL OBSTRUCTION

DEFINITION

Intestinal obstruction is defined as a failure in the downward passage of intestinal contents either due to a mechanical occlusion or from a fault in propulsive mechanism.

Usually we arrange intestinal obstruction in three groups. Simple occlusion, strangulation and neurogenic obstruction. But these three may be present in varying amounts in all cases of obstruction and there is no clear line of demarcation.

Causes of intestinal obstruction ¹⁹

Dynamic	Adynamic
<u>Intraluminal</u>	Paralyticileus
Impaction	Mesenteric Vascular occlusion
Foreign body	Pseudo Obstruction
Bezoar	
Gall stones	
<u>Intramural</u>	
Stricture	
Malignancy	
<u>Extra mural</u>	
Bands / adhesions	
Hernia	
Volvulus	
Intussusception	

CLASSIFICATION

Intestinal obstruction can be classified on the basis of types, site of obstruction, mechanism involved.

I) Nature of the lesion causing the obstruction

- a. Mechanical/Dynamic
- b. Neurogenic/Adynamic/Paralytic ileus

II) Level of obstruction

- a. High gut – proximal small intestine
- b. Mid gut – distal small intestine
- c. Low gut – Colonic

III Types of obstruction

- a. Simple occlusion of lumen
- b. Strangulation

IV Clinical Classification

- a. Acute
- b. Sub acute
- c. Chronic
- d. Acute on chronic

I. Mechanical Obstruction

a) Obstruction of the lumen

- a. Meconium
- b. Intussusception
- c. Gall stones
- d. Impactions – feces, Barium, Bezoar, Worms, Foreign body etc.

b) Lesions of the bowel

1) Congenital

- a. Atresia
- b. Stenosis
- c. Imperforate anus
- d. Mal rotation
- e. Cysts and reduplication
- f. Meckels diverticulum
- g. Congenital bands.

2) Acquired

(i). Inflammatory

- a) Regional enteritis
- b) Diverticulitis
- c) Chronic Ulcerative colitis

(ii) Vascular

- a) Arterial
- b) Venous

(iii) Neoplastic

- a) Benign tumors
- b) Malignant tumors

(iv) Adhesive bands

- a) Congenital
- b) Inflammatory

(v) Hernia

- a) External
- b) Internal

(vi) Miscellaneous

- a) Radiation induced stricture
- b) Post ischemic Stricture
- c) Stomal / Anastamotic Obstruction – edema / stricture

c) Extra intestinal masses / structures

- 1) Abscesses and hematomas
- 2) Tumours
- 3) Annular pancreas
- 4) Superior Mesenteric artery syndrome

II NEURO MUSCULAR DEFECTS :

1) Mega colon

2) Paralytic ileus

I. Abdominal causes

- a) Intestinal distension
- b) Peritonitis
- c) Retro peritoneal lesions
- d) Tense ascites

II. Spinal cord lesions

III. Head Injury

IV. Fracture pelvis

V. Pneumonia

3) Systemic causes

a) Electrolyte imbalance

b) Toxemias

The clinical manifestations depend on the following factors

a. Site of obstruction

b. Type of obstruction

c. Blood supply of bowel wall

d. Length of obstructed loop

e. Acuteness and completeness of obstruction

Ian Aird has classified intestinal obstruction based on the above parameters

as:

1) Simple occlusion of the lumen

b. Proximal small intestine

c. Distal small intestine

d. Colonic

2) Closed loop occlusion

3) Strangulation

b. Short loop

c. Medium loop

d. Long loop

ETIOLOGY AND PATHOGENESIS

The intestine above the point of obstruction endeavours at the beginning; to overcome the obstruction by vigorous peristalsis. This increased peristalsis continues for a period ranging from two to several days. The more distal the point of obstruction, the longer the period of vigorous contraction. If the obstructions not relieved, the increasing distension causes the peristalsis to become less and less, finally it ceases, and the obstructed intestine becomes flacid and paralysed.

The intestine below the point of obstruction exhibits normal peristalsis and absorption from it continues for two or three hours following the obstruction, Until all the contents has been passed onwards. Then the empty intestine becomes immobile, contracted and pale, and it remains so, till the intervention.

Effect of intestinal obstruction can be local or general. This depends upon:

1. Level of obstruction
2. Degree of increase in intra luminal pressure.
3. Period of time during which the obstruction is maintained.
4. Rate of blood supply to the bowel.

Local Effects

1) Increase in intra-luminal content – Gas and fluid studied by Hibbard and Wangenstein in 1934.

Gas consists of

1. Swallowed atmospheric air (68%).
2. Diffusion from blood into bowel lumen (22%) and
3. Products of digestion and bacterial activity (10%).

When the carbon-di-oxide and oxygen has been absorbed into the blood stream, the resultant mixture is made up of 90% nitrogen and hydrogen sulphide²⁰.

Fluid is made up of various digestive juices 8000 ml in 24 hours.

Above pylorus 4000 ml – Saliva 1500 ml

- Gastric Juice 2500 ml

Below pylorus 4000 ml – Bile and pancreatic juice 1000 ml

- Succus entericus 3000 ml

1. Distension and intestine stasis:

In case of low ileal obstruction, distension occurs prominently.

In case of colonic obstruction, contents of upper gastro intestinal tract are permitted free entry into the colon, but since the ileo caecal valve acts as a check, regurgitation of contents from the distended colon into the terminal small gut does not occur frequently. Therefore in colonic obstruction, distension with development of high intra-luminal pressure occurs. Rarely, one of the lips of the valve is defective, leading to regurgitation of contents into the ileum. The intracolonic and intraenteric pressures are high in closed loop obstruction and this can lead into perforation of the bowel.

2. Raised intraluminal pressure:

Above the site of obstruction the pressure in the bowel raises from a normal of 2-4 mm of Hg to 10 mm or more in the small bowel and up to 25mm of Hg in the colon. The obvious effect of this raised pressure is to cause distension of the bowel, with initially increased peristalsis, giving rise to intestinal colic, though later paresis of the intestinal muscles ensues.

Sustained increase in pressure in the bowel impairs the viability of the bowel wall leading to perforation. For any given pressure in the lumen of the bowel the tension in the bowel wall is proportional to the diameter of the bowel, so

that the greatest distension is seen in the caecum, which is the commonest site of perforation in intestinal obstruction.

(The relationship between the tension and pressure is governed by the law of Laplace which states that $T \propto pr$ where T=tension; P=pressure and r=radius).

4. Multiplication of bacteria

There is a great increase in the number of bacteria above the site of obstruction. The main organisms are coliforms, fecal streptococci and also certain anaerobes such as clostridia and bacteriodes. It has been suggested that the absorption of bacterial toxins play a role in the illness of intestinal obstruction.

GENERAL EFFECTS:

1. Water and electrolyte imbalance

Intra cellular fluid constitutes largest fraction of body fluid. In case of high obstruction, fluid is lost from the body by vomiting and concentration of plasma occurs. Blood is replenished by the interstitial compartment, loss of this fluid results in dehydration. In high obstruction, there is loss of H^+ ions and chloride resulting in alkalosis. In diarrhoea associated with lesions of ileum and colon there is a base loss resulting in acidosis.

In case of low small bowel obstruction, the ileum above the obstruction ceased to absorb sodium and water. These substances accumulate in the intestinal lumen and as time passes, the rates of their secretion increased. Potassium normally secreted by the ileum was secreted at an even greater rate after the gut has been obstructed.

In contrast to these marked alterations in the function of the bowel proximal to the obstruction, the ileum below the obstruction showed only moderate changes in absorptive and secretory capacity. The most striking change was a two fold increase in potassium secretion due to an increased rate of entry of K^+ ions in to the lumen.

Water and cations were secreted into the lumen of the obstructed bowel, since the fluid lost into the intestinal lumen was, for practical purposes isotonic with the body fluids, the concentration of electrolytes in the serum was not altered until later in obstruction.

The losses are principally of water sodium and potassium, but when in addition there is strangulation of a segment of intestine, there is also a significant loss of both red blood cells and plasma.

Changes in the blood

1. Reduction in plasma volume.
2. High PCV
3. Increase in RBC count, plasma protein
4. Increase in Hb%
5. Decrease of chloride
6. Increase in bicarbonate content
7. Increase in carbon-di-oxide combining power
8. Increase in blood urea, due to increased protein metabolism and decreased urine output.
9. Fall in hydrogen ion concentration.

Paralytic ileus:

The bowel becomes filled with fluid and gas, and there is a steady rise in intraluminal pressure, due to the absence of peristalsis. This aggravates the ileus due to stretching and in course of time vascular changes supervene, leading to capillary engorgement, edema, necrosis and perforation.

Pathology of strangulated obstruction

Bryant (1855) differentiated between intestinal obstruction and strangulation. As the pressure within the obstructed loop exceeds the venous pressure in the bowel wall and adjacent mesentery, venous engorgement of these vessels occurs, followed by capillary rupture and hemorrhagic infiltration. This starts in the submucosa, then affects the mucosa and finally spread through all the layers of the bowel wall. Thrombosis in intramural and Mesenteric veins is superadded. Necrosis starts in the mucosa because of relative vulnerability of intestinal epithelium to anoxia. The necrotic segment eventually perforates. Toxic exudation of organisms from the gut into the peritoneal cavity across damaged bowel wall is the most lethal factor in strangulation.

The exact nature of this toxic factor is still disputed. Gram positive and gram negative organisms have been incriminated. Their action is either directly or by the production of exo or endotoxins (Column, 1961). Gram negative endotoxins produce hypotension and hemoconcentration and this may be responsible for occasional unexpected deaths from intestinal obstruction.

The essential factors leading to the death of a patient with acute intestinal obstruction are¹⁹

In simple obstruction.

Fluid loss and consequences of distension of the bowel.

In strangulated obstruction.

Superimposed to these changes are the problems of blood loss and toxemia and in late cases frank peritonitis.

CLINICAL MANIFESTATIONS

The syndrome of intestinal obstruction is characterised by (i) abdominal pain (ii) vomiting (iii) distension of abdomen and (iv) constipation

Pain

The pain in intestinal obstruction is typically crampy, with paroxysms occurring at 4-5 minute intervals in proximal obstruction and less frequently in distal obstruction. In between the attacks patient is often quite comfortable. After a prolonged period the colicky pain subsides due to paralytic ileus¹⁵. When the intermittent colicky pain is replaced by continuous severe abdominal pain, strangulation with peritonitis must be suspected.

Vomiting

In the initial stages, consists of partially digested food and gastric juice. In the later stages bile stained fluid is brought out, finally it becomes faeculent. This is due to proliferation of bacteria in the stagnant fluid. Copious vomiting is seen in high gut obstruction and less frequent vomiting in distal obstruction.

Distension

Proximally, occlusion of jejunum leads to distension of the stomach with gas and accumulated secretions so as to produce a fullness in the epigastric region. Ileal obstruction produces central abdominal distension and distally colonic obstruction produces universal distension of abdomen with bulging flanks. Volvulus generally produces massive distension.

Constipation

In complete intestinal obstruction, after the contents of the bowel below the obstruction have been evacuated, constipation occurs, and usually neither feces nor flatus is passed (i.e.) absolute constipation. Even though common constipation is an unreliable sign of obstruction.

Richters hernia, intussusception, gall stone ileus, Mesenteric vascular occlusion and intestinal obstruction associated with pelvic abscess may not produce constipation.¹⁹

Dehydration

Repeated vomiting leads to dehydration with a dry skin, dry tongue, and sunken eyes, Urine is concentrated and volume is low. Blood urea and PCV are elevated.

Physical Examination

Time should be spent on careful examination of the patient and of the abdomen in particular. A congenital diaphragmatic hernia usually presents with respiratory distress rather than abdominal signs. Pulse and temperature should be charted, the patient in colic will be restless in contrast to the stillness of a patient with peritonitis. Visible intestinal peristalsis should be looked for.

Femoral and inguinal hernial orifices should be looked for carefully. Tenderness, rebound tenderness and muscle guarding will be present in a patient with strangulation. A mass may be felt in carcinoma colon, diverticulitis and intussusception. In mechanical obstruction bowel sounds are increased and borborygmi may be heard. On auscultation, loud splashing, rushing or tingling sounds can be heard. A silent abdomen suggests either paralytic ileus or infarction of the bowel.

The presence of an abdominal scar whether recent or old suggests an underlying band or adhesion.

Per rectal examination

Should be routinely done in all cases of intestinal obstruction. In patients with chronic constipation, impacted fecal matter will be felt. In carcinoma rectum, there may be proliferative growth which could occlude the lumen. A blood stained finger stall is suggestive of intussusception. Ballooning of rectum is suggestive of high obstruction. It can also be seen following a soap and water enema and also in obstruction of the urinary tract.

INVESTIGATIONS AND DIAGNOSIS

1. **Laboratory Tests:**

A full blood count, packed cell volume, serum electrolyte estimation and blood urea level should be obtained as soon as possible. Leucocytosis is suggestive of strangulation. Elevation of Hb% and of PCV is an important indicator of hemo concentration and a valuable guide to fluid replacement. Severe electrolyte depletion will be reflected by lowered serum sodium, potassium, chloride and bicarbonate with a raised blood urea.

2. **Radio Diagnosis:**

X-ray investigation is the most important of all the special methods of investigations. Methods include,

1. Plain X-rays: Erect and Supine postures
2. Barium meal follow through
3. X-ray studies of the suspected site of the lesion after introduction of a opaque medium through an in dwelling intestinal tube¹⁵.
4. Barium enema.

The routine skiagram is plain x-ray of the abdomen. The classic radiological sign is the accumulation of fluid and gas in the intestine above the site of the obstruction. In the erect position, a series of air fluid level may be obtained. In small intestinal obstruction, the distended loops generally lie transversely in a step ladder fashion across the central abdomen. Jejunum is characterised by its valvulae coniventes that traverse the complete width of the bowel, spaced regularly, giving a concertina effect. The distal ileum was described by Wangenstein as “Characterless”¹⁹.

In contrast, in large intestinal obstruction the gas shadows are seen peripherally and here, the haustral folds do not completely traverse the width of the bowel and they are irregularly spaced.

In total obstruction gas is absent in the rectum. The distended caecum is smooth walled and is seen in the right iliac fossa. It takes little time for the gas to separate from the fluid. Consequently fluid levels appear later than gas shadows. Absence of gas is specifically noted in strangulated closed loop obstruction.

Patients suffering from ureteric colic may swallow large amount of air and skiagrams in such patients may show considerable gaseous distension of small bowel. Plain x-rays show characteristic findings in two conditions. A gall stone ileus shows air in the biliary system as a result of cysto-duodenal fistula, direct visualisation of the calcified stone and x-ray evidence of small intestinal obstruction¹⁹. In volvulus of the sigmoid colon a tremendously dilated sigmoid loop may be seen, which could extend up to the diaphragm and may even fill the right side of the abdomen (Coffee bean sign, Inflated tire tube appearance).

Examination of plain film should be done systematically. The margins of the abdominal cavity should be inspected to see if the flank stripe due to preperitoneal fat is maintained. If peritoneal inflammation is present this margin may be obliterated either locally or over a large distance.

The normal diameter of transverse colon is 3 cm, look for distension. Bowel loops will be separated if there is free intra-abdominal fluid, more free air is present in colonic perforation, than in gastric or duodenal perforation.

In case of complete small bowel obstruction, colonic shadow will be absent. Dilated jejunum normally lies in the left upper abdomen and the ileum in the right lower abdomen. In case of obstruction involving the jejunum and ileum a step ladder pattern is seen.

The “string of beads” (a row of small gas bubbles) appearance in erect film is due to entrapment of gas in the dilated folds of the gut and this is believed to be reliable sign of mechanical obstruction. The transverse diameter of caecum should be specially looked for, since if it is more than 10 cms, caecal perforation is possible.

Radiological changes of the bowel in intestinal obstruction takes 4-6 hrs to develop.

Certain conditions may mimic intestinal obstruction.

Patients who are immobilised in plaster casts and those suffering from sclerodema, myotonic dystrophy, and uremia will show both large and small bowel dilatation. Patients suffering from diarrhoea and those who are on cathartics will show air fluid levels on plain x-ray. Characteristic staircase arrangements of short fluid levels in the colon have been described in patients with gastro enteritis.

There are certain characteristic changes in the patients with strangulated obstruction. This usually reflects a closed loop obstruction in which the lumen is blocked in two points by a single constricting lesion.

1. A single gas distended loop, the so called “coffee bean sign”.
2. A fluid filled distended loop which is outlined by gas in the adjacent bowel the “pseudo tumour sign”.
3. Constant position of a loop in repeated films also favours a closed loop obstruction.

CONTRAST X-RAYS:

Radio opaque contrast materials can be given either orally or can be injected via nasogastric tube. The disadvantage of using gastrograffin or other iodinated aqueous media is their radio-opacity due to dilution in gastric and intestinal juices. They also produce a minor shift in the electrolyte level, because

of hygroscopic action. The advantage of using micro-opaque barium sulphate is that it maintains its opacity and there is little chance of impaction above the level of obstruction¹³.

Small bowel obstruction can be definitely diagnosed either by barium enema with reflux into the small bowel to the point of obstruction or by oral barium examination. Barium enema is the initial contrast x-ray of choice. If colonic obstruction is excluded it is perfectly safe to proceed with the oral barium examination of the small bowel for confirmation of the obstruction or for more detailed anatomic definition of the site of the obstruction. The site of obstruction is identified by the transition between the proximally dilated loops and the normal caliber of the more distal small bowel. A tube such as Bibao-Dotter tube can be specifically introduced in to the duodenum for small bowel follow through examination¹⁵.

In the absence of signs of peritoneal irritation, barium enema may be performed for confirming the diagnosis of volvulus sigmoid by demonstrating the characteristic “beaked” termination of the barium column at the point of twist.

Caecal volvulus, is distinguished as a distended caecum folded back on itself and extending into the mid or left abdomen. There is usually associated small bowel distension.

3. Colonoscopy or sigmoidoscopy:

This examination is not routinely done in acute intestinal obstruction. It can be used for confirming the site and cause of obstruction in the large bowel. Gradual deflation of the sigmoid volvulus can be carried out with the sigmoidoscopy under fluoroscopic control. The advantage of sigmoidoscopy is the mucosa can be studied for its viability.

4. Ultrasound scan of the abdomen

It is not of routine use but can be helpful in certain cases of intestinal obstruction due to intussusception and tumours.

5. Paracentesis

Not of much use, but a dark blood stained fluid, if obtained, suggests strangulated obstruction.

6. Radio-isotope study

Tc^{99m} labelled radio-isotope studies are useful in visualising Meckel's diverticulum containing gastric mucosa.

7. Laparoscopy

Urgent laparoscopy can explain the nature of an acute abdominal syndrome associated with signs of ileus by disclosing the presence of adhesions and dilatation of the cephalad portion of the intestine. The viability of the bowel due to volvulus can be assessed.

A significant laparoscope finding is hemorrhagic infarction due to acute or sub acute obstruction of the Mesenteric blood vessels.

Differential diagnosis

Conditions that mimic intestinal obstruction include inflammatory conditions like

1. Cholecystitis
2. Diverticulitis,
3. Pancreatitis
4. Appendicitis.

Other include twisted ovarian cyst and renal colic.

Acute intermittent porphyria, lead colic, sickle cell anaemia and Tabes dorsalis also mimic intestinal obstruction. In case of strangulated bowel perforation causing peritonitis, the accurate diagnosis may be difficult.

METHODS OF TREATMENT OF INTESTINAL OBSTRUCTION

Treatment must be started early as soon as the diagnosis is made.

Aims of the treatment are

1. Restoration of normal bowel function by relieving the obstruction.
2. Adequate decompression, so as to reduce the intraluminal pressure.
3. Replacement of fluid and electrolytes.
4. Antibiotics to prevent complication from infection.

Intestinal obstruction generally requires surgical intervention because it is not possible to distinguish between simple and strangulated obstruction¹⁵.

In early post-operative and late recurrent obstruction due to adhesion and in partial large bowel obstruction a period of conservative treatment can be tried.

The aspiration of gastric contents relieve nausea. Bowel decompression is the hallmark in the management of intestinal obstruction. During the period of conservative management a careful monitoring of clinical and radiological parameters is essential.

Fluid and Electrolyte Balance:

A sound clinical assessment, fluid balance charts, daily serum and urine biochemical estimations are essential for calculation of exact fluid requirements. Sodium ion is responsible for tissue hydration and so adequate amount of sodium chloride must be given. Adequate amount of KCl must be added. Glucose should be given for caloric requirement. Fluid loss to be replaced with Ringer Lactate.

Blood and Plasma:

Intussusception, volvulus and intestinal strangulation produce loss of blood and this must be replaced. Small intestinal obstruction produces loss of plasma and this must be ideally be managed by plasma transfusion.

Surgical Treatment:

The indications for surgical intervention are:

- i. Failure of conservative treatment.
- ii. Established strangulation.
- iii. Mechanical obstruction.
- iv. Acute colonic obstruction.

Pre-operative preparations with nasogastric decompression, intravenous fluids, antibiotics, estimation of Hb%, PCV, blood group and serum electrolytes are essential. Systemic diseases like diabetes mellitus must be looked for.

Specific Operations

- 1) Exploratory laparotomy for obstruction of uncertain origin.
- 2) External drainage by colostomy, caecostomy or enterostomy, proximal to the obstruction.
- 3) Ileo colic or entero anastomosis for intestinal by-pass.
- 4) Resection of bowel, either to remove an obstructing lesion like carcinoma colon or because of irreversible vascular changes.
- 5) Lysis of bands and adhesions.
- 6) Planned operations for specific obstructive lesions (e.g.) a strangulated external hernia , laparotomy for intussusception in a child.

Exploratory Laparotomy

The primary aim of surgery should be to save life by the simplest procedure. The cause of obstruction should be discovered and dealt with and the state of viability of the bowel be looked for.

The abdomen should be explored through a right mid paramedian incision. One third of incision above the umbilicus and 2/3 below the umbilicus. On opening the peritoneal cavity the caecum should be palpated first. If it is distended, the obstruction will be in large bowel, which must be explored, and the lesion dealt with appropriately. If the caecum is collapsed, it indicates a small bowel obstruction. The last loop of ileum is picked up and the collapsed small bowel is examined loop by loop till the distended bowel is reached. The lesion is situated at this point and should be dealt with. If it is considered inadvisable to remove the lesion, a one stage by-pass procedure can be performed. If the small bowel is grossly distended, it should be decompressed by means of tube suction or by using a savage decompressor.

PROGNOSIS

The major factors (Smit et al, 1955), deciding survival rate in intestinal obstruction are,

1. Gangrene of the bowel.
2. Perforation.
3. Severe distension of the bowel.
4. Gross fluid and electrolyte imbalance.
5. Extremes of age.

There has been an important in prognosis in recent years, and this is due to

1. Improved anaesthesia.
2. Better surgical techniques.
3. Better knowledge of fluid and electrolyte replacement.
4. Efficient blood transfusion services.
5. Newer antibiotics.

MAJOR FORMS OF ADULT INTESTINAL OBSTRUCTION

Adhesive obstruction

Solitary band or adhesions are the most common cause of intestinal obstruction. Studies suggest that one in every 3 cases might be due to this. The increasing incidence of band obstruction can be attributed to the epidemic nature of abdominal operations performed in the technically advanced countries.

Adhesions could be either congenital or acquired. Congenital adhesions rarely cause any trouble and those giving rise to intestinal obstruction are almost always post operative or following diffuse intraperitoneal inflammation. Appendicectomy and gynaecological operations figure prominently in statistical analysis of postoperative adhesion. Abdomino perineal excision of the rectum and total colectomy have also got a high incidence of postoperative adhesions.

Post operative adhesion usually implicate small intestine especially ileum. A study conducted by Miller and Winfield (1959) found that 75% of cases of post operative adhesions involved ileum.

Etiology of adhesion

Peritoneal irritation from whatever cause results in the outpouring of fibrin which produced adhesions between opposed peritoneal surfaces. This can either undergo resolution or get organised by the in growth of fibroblasts to form fibrous adhesions.

The factors that cause adhesions are¹⁹

Causes	Examples
Ischaemic Areas	Site of anastomosis, reperitonealisation of raw areas
Foreign bodies	Talc, starch granules, guaze lints, cellulose, non absorbable saltines.
Infective disease	Peritonitis, Tuberculosis
Inflammatory disease	Crohn's disease
Radiation enteritis	Following radio therapy
Sclerosing peritonitis	Usually drug induced (eg) practalol and other beta blockers

Very often these adhesions are useful in preventing an ischaemic appendix or gall bladder from rupturing into the general peritoneal cavity, or in preserving the viability of the anastomoses, and also in reinforcing the integrity of a traumatised section of intestine.

Buckman et al (1976) have shown that peritoneal defects have a high plasminogen activity, which is lost in the peritoneum that has been rendered ischaemic by grafting. Ischaemic tissue inhibit fibrinolysis by normal tissues. This theory has been confirmed by Raffery (1981). Generally the fibrin strands present are localised to those areas, where intense tissue anoxia has occurred. The starch that may be present in an adhesion can be demonstrated by viewing a biopsy specimen, under polarised light which reveals the typical maltose crystals.

Prevention of adhesions:

Pioneering works have been done by Boys (1942) Connolly and Smith (1960) and Ellis (1971). Broadly the methods are

1. Attempts to prevent fibrin deposition by the use of anticoagulants like sodium citrate, heparin, dicoumarol, and dextran.
2. Attempt to remove the fibrin exudate, by intraperitoneal lavage by using enzymes such as pepsin, trypsin and fibrinolytic agents like streptokinase and urokinase.
3. Attempt to separate bowel surfaces like distension of abdominal cavity with oxygen, stimulation of peristalsis with prostigmine and the use of olive oil, liquid paraffin and amniotic fluid.
4. Attempts to inhibit fibroblast proliferation by use of antihistamines, steroids and even cytotoxic drugs.
5. Avoidance of suture re-peritonealisation with exception of mesenteric defects and serosal reapproximation at anastomosis.
6. Manual replacement of the abdominal contents to as near a normal position prior to closure of abdomen.
7. Preservation of greater omentum.
8. Protection of anastomosis and promotion of healing with omentum.
9. Draping greater omentum over the small intestine as a barrier between the intestine and anterior peritoneum.
10. Closure of the abdominal wall fascia without reapproximation of the anterior peritoneum.

It has been now conclusively found that these have no effect, or they produce an actual increase in the amount of adhesions formed, so none of these

methods are used now. Other practically possible simple techniques in prophylaxis against adhesions include,

1. Delicate handling of tissues and organs
2. Avoidance of spillage of visceral contents during surgery.
3. Minimizing operative blood loss.
4. Protection of exposed viscera from drying
5. Avoidance of closure of parietal peritoneal defects.
6. Washing the operative region and peritoneal cavity with isotonic saline at the end of the operation.

Meticulous surgical techniques should be aimed at and must include the prevention of granuloma formation from foreign materials. Peritoneal defects must be left open, rather than being pulled together under tension. Another technique of preventing adhesion in the small bowel is to draw the omentum over other abdominal viscera before closing the incision, and especially over an anastomotic site. If the omentum is not available, falciform ligament or the broad ligament in the female can be used.

Treatment

A number of plication procedures have been devised. The operation was introduced by Winchman, a surgeon in 1934, but was popularised by Noble in 1937. TransMesenteric plication of loops of small intestine was introduced by Childs and Phillips in 1960³⁰. It was safer than Noble's procedure, but studies by Hollender (1971) have shown that further episodes of obstruction can occur.

Baker in 1959 described the technique of threading a tube down the whole length of the small intestine via a jejunostomy so that the stiffness produced will prevent kinking while adhesions develop.

Bands can be congenital or following previous bacterial peritonitis. If the intestine is viable division of the band alone is needed. If the intestine is gangrenous resection and anastomosis must be done.

Groin Hernias:

External hernias are one of the most common causes. It is simple to diagnose, provided the hernial orifices are examined meticulously. Obstructed hernias can result in strangulation. Inguinal hernias are four times more common than femoral hernia, but the later is more likely to get strangulated. Umbilical, incisional, lumbar, spigelian, obturator and sciatic hernias can also undergo complications. Vigorous attempts at reduction of an obstructed hernia must be avoided.

Management

Early surgery is advisable. The sac should be opened. Toxic fluid let out and the constricting ring divided. The viability of the bowel should be assessed and if doubtful or already gangrenous resection of the involved portion and end-to-end anastomosis must be done. A separate abdominal incision is better, since the viability of the rest of the bowel can be assessed without undue manipulation and traction of the bowel. A posterior wall repair is also essential. The combined approach is better in cases of strangulated femoral hernias.

Adult Intussusception

Intussusception accounts for only 5% of the cases of intestinal obstruction in adults. In children it accounts for 80% of cases of intestinal obstruction. In adults the cause is usually a tumour forming the apex of the intussusception. These tumours are mostly benign in the small intestine, but invariably malignant in the large bowel.

Dasgupta and Brasfield (1954) in a study conducted at Memorial Sloan Kettering hospital, New York have noted that intussusception is the most common

finding in patients with metastatic melanoma who have obstructive symptoms¹⁵. Some non-tumourous causes mentioned are granuloma of the appendix stump (Hanson 1967), Inverted Meckel's diverticulum (Harkins 1933), excluded small intestine segment following jejunoileal by pass for morbid obesity (Caverty and Fazio 1978). Adult intussusception is common in some African countries.

Clinical manifestations

The passage of Blood and mucus per rectum and presence of an abdominal mass are suggestive of intussusception. Symptoms and signs are generally those of acute intestinal obstruction. Intermittent obstruction is common in those cases due to tumours of the colon. Repeated incidence of sub acute obstruction and variability of abdominal sign are common.

Radiology

Dilated loops of small intestine with fluid gas inter phase seen in plain X-ray. A chronic small bowel intussusception can be demonstrated by a barium meal follow through. Barium enema reveals a classical filling defect called "**Pincer Sign**".

Treatment

Surgical intervention is invariable in most cases. Since the risk of malignancy is high in large bowel intussusception, resection should be attempted. In case of small bowel intussusception reduction must be done as the first step and should be given up if the lesion is necrotic. The entire length of the bowel should be palpated and resection done in case of suspicion. Benign tumours should be removed locally. Caecopexy should be carried out to anchor the caecum to the lateral abdominal wall. In Peutz-Jegher syndrome further episodes of intussusception may occur, so that, as much of the bowel as possible must be preserved. A simple enterotomy and removal of the offending polyp is all that is required.

Volvulus

Results from axial rotation of a portion of the alimentary tract. It can occur in the sigmoid colon, caecum and small bowel. Volvulus of transverse colon is rare. It is common in Eastern Europe, Soviet Union, Iran and Scandinavia and is rare in Western Europe, North America and Australia.

Predisposing Causes

1. Band of adhesion (Peri diverticulitis).
2. Overloaded pelvic colon – contributed by high vegetable and fiber diet.
3. Long pelvic mesocolon.
4. Narrow attachment of pelvic mesocolon.

Acute volvulus may be precipitated in the late stage of pregnancy or during parturition. (Khon. 1944).

Caecal Volvulus

Halborsen and Semb (1975) pointed out that the adjacent terminal ileum and ascending colon are usually involved and that the torsion may involve the transverse colon. The caecum usually moves upwards and to the left. The twist can vary from 90° to three complete turns. Predisposing factors include previous abdominal operations and history of previous inflammation in the peritoneal cavity with adhesion formation. Pregnancy, Cysts or pelvic tumours can also push the caecum up. It is better to avoid excessive manipulation of the caecum at surgery to avoid development of caecal volvulus later on.

Clinical Features

Majority affected are in the 5th or 6th decade. Sex distribution is almost equal. It usually present as colicky abdominal pain usually in the right lower quadrant, distension, nausea vomiting and absolute constipation. Anderson and Lee (1980) after a careful analysis have suggested that a tympanitic mass

may be found in the right Iliac fossa which can flip over to the left side of the abdomen.

Hinshaw et al (1959) have suggested that volvulus of the caecum can be divided into 2 broad categories – **an acute fulminating type** which can progress to gangrene, associated with high mortality and may require a right hemicolectomy ; and **an acute obstructive type** which is associated with lower mortality and a slower onset, and this may require only detorsion and caecostomy.

Radiology

According to Mc Graw et al, there are certain characteristic radiological features.

- 1) An enormously distended caecum which could also be ectopic in position, so that it may be mistaken for stomach.
- 2) Visualisation of ileocaecal valve when the caecum is outlined by gas.
- 3) Distended loops of small intestine located to the right of the caecal gas shadow.
- 4) Evidence of small intestinal obstruction.
- 5) Presence of single fluid level in the caecum compared to 2 large levels in sigmoid volvulus.
- 6) Spiral distortion of mucus membrane in the colon at the point of obstruction.

Barium enema is helpful in chronic cases, while the situation is too grave in the acute form. there will be an opaque cut off of the medium at the transverse colon or hepatic flexure, beyond which gas filled right colon is seen.

Treatment

Operative treatment is mandatory, colonoscopic detorsion has been tried, but with little success. If detorsion is possible and the gut is visible, reduction plus caecopexy using interrupted non – absorbable sutures is enough. But in the acute form, temporary caecostomy combines the properties of decompression and fixation of the distended and mobile caecum. But if reduction proves to be impossible or if the involved segment is gangrenous, then the choice is right hemicolectomy.

Recurrent episodes are common after caecopexy, but relatively rare after caecostomy.

Sigmoid Volvulus

It is very common in Eastern Europe, Eastern Africa and India. It is often associated with mental retardation.

Pathology

In most of the cases, the upper limit of the loop descends in front of the lower, twisting on it's mesenteric axis, from one half to two turns in a counter clockwise direction¹⁸. Hughes (1980) points out that there might be a important difference in the type of volvulus, seen in the high risk countries, ie. a long thin walled sigmoid loop with a narrow mesentery at it's neck, which is prone for gangrene, whereas in those seen in western countries the bowel is often enormously hypertrophied and the changes persist beyond the neck of volvulus into the rectum. In those of high risk group the bowel is found to be overloaded with faecal matter, whereas in western countries the bowel is found to be distended with gas.

There is a clear association between sigmoid volvulus and mental disease and chronic constipation (Johnstan and Gibson 1960, Khoury 1977 and String 1971).

Clinical Manifestation

Occurs more commonly in middle aged and elderly people. According to Carter and Hinshaw (1961) sigmoid volvulus can occur in children and young adults. There is a specific male preponderance. According to Carter and Hinshaw (1957) there are 2 forms of the disease 1) Acute fulminating type, seen in young individuals, with a sudden onset, rapid course, early vomiting, diffuse abdominal pain, rapid deterioration of general condition and gangrene. 2) Sub acute progressive form, seen in older patients with an insidious onset, recurrent benign course, tremendous distension of abdomen and late vomiting. Gangrene is slow to develop.

Radiological Examination

The “Bent inner tube sign”¹⁸ seen on a Plain X-ray is typical of sigmoid volvulus. Other signs include Inverted coffee bean sign, Bird beak sign, Friedman Dhal Sign. The tremendously distended sigmoid loop may be seen, with two fluid levels one on the proximal and distal limb of the obstructed loop. In advanced cases, the right colon may be distended with gas, and if the ileo-caecal valve is incompetent, small intestinal fluid levels are also seen.

Treatment

The aims of treatment are two fold, first to relieve the torsion and second prevent recurrence.

Conservative Treatment

Spontaneous untwisting is possible by a simple enema or a Barium enema. Passage of a well lubricated soft rubber flatus tube through a sigmoid scope and positioning it as high as possible may be followed by the passage of huge quantity of flatus and liquid faeces. The tube must be left in position for forty eight hours. Colonoscope can also be used for detorsion of sigmoid volvulus, the advantages

being that the mucosa can be inspected and the viability confirmed (O.Connor and Starling1979).

Operative Treatment

It is indicated when conservative treatment fails, or strangulation has supervened, and electively to prevent recurrence. Decompression, followed by resection and end-to-end anastomosis is the ideal treatment¹⁷.

Mesosigmoidoplasty has been tried in some centres.

Laparoscopic fixation of a Recurrent sigmoid volvulus has been reported recently.

Volvulus of the Transverse Colon

Zinker et al in 1979 have reported 44 cases of this rare condition. Anderson and Colleagues in 1981 have reported 7 further cases. Etiology is usually a redundant loop of transverse colon. Clinical picture is that of recurrent episodes of abdominal pain with features of large bowel obstruction. Transverse colectomy is the ideal treatment. But if the bowel is frankly gangrenous, Mikulicz exteriorisation is advisable.

Volvulus of the Splenic Flexure

Lantieri et al (1979) have reviewed 16 cases, of which 11 had undergone previous abdominal surgery. Which may have interfered with the ligamentous attachments around the splenic flexure. The aetiology is usually the presence of a redundant loop on a persistent mesocolon. Detorsion by Barium enema, or the passage of a flatus tube, followed by elective resection 6-8 weeks later is the treatment of choice.

Volvulus of the small intestine

Volvulus neonatorum is a recognised paediatric emergency. Volvulus of the small intestine is uncommon in adult and if found, the cause is tethering of the bowel due to adhesions.

Compound volvulus

Knotting (compound volvulus) is of 2 types – Ileosigmoid and Ileo – ileal. In ileo – sigmoid, a loop of ileum knots around the base of the sigmoid resulting in gangrene of the sigmoid and the ileal loop. In the ileal form, knots are formed between loops of ileum. Both these are indications for emergency surgery. At surgery, for ileo – sigmoid knotting the gangrenous segment is drawn to the right to expose the left side of the mesentery, mobilise descending colon, sigmoid and upper rectum. The large bowel is divided below recto – sigmoid junction. The proximal ileum is divided above the knot. Ileo – caecal junction is inspected and distal end of involved ileum identified. The ileum is divided between clamps, 5 cm distal to the gangrenous area. Direct ileo – ileal anastomosis is possible when 5-10 cm of ileum is preserved, and is viable. If this is not possible, terminal ileum is closed and an ileo – caecal anastomosis is made.

Rare forms of volvulus

a) Appendiceal knotting was described by Hughes (1949) and Mikal and Byers (1956). b) Knotting of Meckel's diverticulum around an adjacent loop of ileum was reported by Dowsw (1961). c) Volvulus following jejuno ileal bypass for obesity has been reported by Ackerman in 1979.

Gall stone ileus

First described by Bartholin in 1659. They account for 1-2% of cases of intestinal obstruction. Majority occur in elderly females between 60-80 years of age. The incidence of carcinoma gall bladder is higher in a case of biliary enteric fistula. The stone should be at least 2.5 cm in size to occlude the lumen of the

intestine. It usually passes via the common bile duct into the duodenum and gets lodged about 60 cm above the ileocaecal valve which is the narrowest portion of the gut.

Clinical features are that of intermittent or complete intestinal obstruction. It gives history of recurrent attacks of biliary colic.

Radiological Examination

1. Air or contrast medium in the biliary system.
2. Direct visualisation of the stone or indirect visualisation by contrast media in the intestine.
3. Change in position of a previously observed stone.
4. X-ray evidence of partial or complete intestinal obstruction.

Treatment

Exploratory Laparotomy and removal of the stone by a longitudinal incision in the bowel, which is closed transversely. If threatened gangrene or perforation is present, resection and end-to-end anastomosis is ideal. If the stone is faceted, has a concave surface, and is fragmented, search should be made for other stones. If a large stone is felt in the gall bladder, it can be removed by a cholecystostomy and elective cholecystectomy carried out latter. Berlinear and Burson (1965) advocate immediate cholecystectomy with repair of the cholecystoduodenal fistula, but the mortality of these procedure is high as the patients are generally of advanced age and presentation is quite late.

Tumours

Tumours causing intestinal obstruction is not uncommon. Left sided colonic growths can present with acute intestinal obstruction due to the annular type of growth and due to the solid nature of the faeces. Small bowel lymphomas are increasing in incidence and can manifest as acute intestinal obstruction²⁰.

Treatment

Previously primary resection of the tumor with end-to-end anastomosis was not carried out for the fear of anastomotic leak and septicemia. Recent studies have concluded that immediate sub total or total colectomy is an acceptable means of managing patients with obstructing carcinoma of the Left colon²⁰. It is associated with a low morbidity and mortality rate and good functional results.

Endoscopic decompression of the Acute colonic obstruction followed by definitive one stage surgery has been described. In carcinoma sigmoid colon, decompression of the bowel was achieved by a tube introduced proximal to the obstruction with an aid of a flexible sigmoidoscope. Bowel wash carried out using this tube and a definitive surgery is done electively. Laser canalisation of the advanced large bowel tumors have been reported.

Small bowel tumors presenting as acute intestinal obstruction can be managed with primary resection and end of end anastomosis. Laparoscopic removal of small bowel tumors after exteriorizing the bowel through a small abdominal incision has been reported.

Obstruction due to Internal Herniation

A portion of the small intestine can pass into one of the retro duodenal fossae, or into a congenital defect of one of the mesenteries and get imprisoned there. The various internal hernias are :

1) The foramen of Winslow

The CBD, hepatic artery and portal vein lie along its free border of lesser omentum ; Blandin in 1834 gave the first post mortem description and Neve in 1982 reported the first surgical cure. Surgical treatment involves stretching of the opening, releasing the loop and closure of the foramen of Winslow by an omental plug.

2) Defects in the mesentry and mesocolon

Jamir has published a review of 57 cases in 1980. Patients present with features of acute intestinal obstruction. A palpable mass may be present in some cases. Treatment is surgical. If the bowel is viable it is reduced and the defect closed if needed by a marlex mesh.

3) A defect in the broad ligament.

4) Congenital or Acquired diaphragmatic hernia.

5) Retroperitoneal herinal fossae¹⁹

- a) Left para duodenal fossa. Inferior mesenteric vein lies along its free border.
- b) Right para duodenal fossa. Superior Mesenteric artery lies along its free border.
- c) Superior ileocaecal fossa.
- d) Inferior ileocaecal fossa.
- e) Inter – sigmoid fossa.

A majority of these are asymptomatic and usually an incidental finding at Laparotomy. Division of the constricting agent is the correct treatment.

Bolus Obstruction

Very common after partial gastrectomy. Timely laparotomy is required. An attempt should be made to squeeze the bolus into the caecum. But if it is impacted, enterotomy and removal must be done.

Intra luminal foreign bodies

Swallowed foreign bodies like Trichobezoars, Phytobezoars, and transmural migration of foreign bodies like missiles may cause intestinal obstruction. Intraluminal obstruction of the rectum by foreign bodies and by faecal impaction can also cause intestinal obstruction.

Rare Causes

Like prolapse of bowel through caecostomy, or colostomy have been reported. Intestinal obstruction has also been reported following abdomino perineal resection due to prolapse of the bowel loops into pelvic cavity, due to failure to reperitonealise the pelvic cavity.

Afferent loop obstruction

Can occur if the stoma is small, due to stomal oedema. A conservative approach must be tried initially by nasogastric suction, and intravenous fluids. If the condition persists, Upper GI endoscopy, Barium meal X-ray can confirm the diagnosis. Re-exploration followed by a ploya gastrectomy is required.

Retrograde Jejuno-gastric Intussusception

It is a rare complication occurring in the immediate or late post operative period following a gastrojejunostomy. It should be suspected if the patient complains of discomfort, distension, and vomiting after meals, in the recumbent position after surgery. Upper GI endoscopy and Barium meal can confirm the diagnosis. The intussusception may reduce following this procedure. But if unsuccessful Laparotomy and manual reduction followed by a Billroth I Gastrectomy must be done to prevent a recurrence.

Paralytic Ileus

The intestine fails to transmit the peristaltic waves, and this is due to a failure of the neuromuscular mechanism. The patient presents with abdominal distension, effortless vomiting, constipation, tachycardia, and high temperature in cases of septicemia or peritonitis. Plain X-ray of the abdomen reveals gas shadow and fluid levels distributed through out large and small bowel in the supine view.

The common causes are

1. General

- a) Circulatory failure due to pneumonia, uraemia, and toxemia.
- b) Neurogenic causes due to Splanchnic irritation or reflex via splanchnic nerve, due to renal colic, trauma, torsion testis, ovary and fibroids.

2. Following Injuries

Fracture spine, ribs, retroperitoneal haemorrhage, and application of plaster jacket.

3. Hypokalemia can cause ileus.

4. Infective causes like, typhoid fever by causing toxemia.

Treatment

This is essentially conservative, by nasogastric aspiration, intravenous fluids and correction of electrolyte imbalance. The cause should be removed. If ileus is prolonged and life threatening, laparotomy should be carried out and the bowel decompressed using a Savage's sucker.

Mesenteric vascular thrombosis and Embolism

Can present as intestinal obstruction. Elderly people are affected and they present with abdominal pain, repeated vomiting, and passage of blood per rectum. Rigidity and rebound tenderness may be present. A predisposing cause like vascular heart disease may be associated. Superior mesenteric arteriogram can confirm the diagnosis. Treatment is surgical. If the bowel is viable, direct vascular surgery like embolectomy or bypass graft can be attempted. However in late stages, resection and end-to-end anastomosis should be done.

Intestinal pseudo-obstruction

The term ‘pseudo-obstruction’ is used to describe obstruction of the small or large intestine in the absence of a mechanical cause or acute intra-abdominal disease. The terms cover a variety of syndromes, which result from damage to the myenteric plexus (neuropathy) or smooth muscle abnormality (myopathy) or both. Small intestinal and colonic pseudo-obstruction are best discussed separately.

Small intestinal pseudo-obstruction

This condition may be primary (idiopathic) or secondary. Familial *hollow visceral myopathy*, which is included in the primary category, is a particularly severe disorder, which involves the smooth musculature of the oesophagus, entire gastrointestinal tract including the colon and often the urinary bladder. The secondary variety results from a neuropathy / myopathy induced by certain systemic disorders or drug misuse (excess phenothiazine administration, laxative abuse)³⁰. The disorders most commonly associated with the development of secondary small intestinal pseudo-obstruction are:

- 1. Diabetes mellitus .**
- 2. Scleroderma**
- 3. Progressive systemic sclerosis**
- 4. Acute intermittent porphyria**
- 5. Hypothyroidism**
- 6. Chagas’ disease**

It has also been reported as a complication of sclerotherapy for esophageal varices. When the underlying abnormality is a neuropathy (eg: diabetes mellitus), the pattern of intestinal motor activity is abnormal with derangements of the myoelectrical migratory complexes, absence of any normal activity or disorganised non-propulsive hypermotility. By contrast in myopathic conditions

(eg: hypothyroidism), the pattern or motor activity is normal but the intensity of contractile activity is reduced.

The clinical picture is that of recurrent episodes of subacute intestinal obstruction with colicky abdominal pain, vomiting and distension. The treatment entails correction of any underlying disorder whenever this is possible. Intestinal prokinetics, eg: metoclopramide and domperidone or cisapride are some times beneficial, especially the last. Cisapride acts by increasing the local concentration of acetylcholine in the intestinal smooth musculature. The synthetic peptide ceruletide which has to be administered intravenously or intramuscularly is also beneficial particularly during acute episodes. Intravenous erythromycin may be effective in some patients. Replacement therapy is necessary in patients with hypothyroidism.

ACUTE COLONIC PSEUDO – OBSTRUCTION

Ogilvie had given initial description in 1948 of this functional obstruction in 2 patients with malignant infiltration of coeliac plexus. Later Dudley (1958) introduced the term pseudo-obstruction and since then the term Ogilvie's syndrome is synonymous with acute colonic pseudo-obstruction (ACPO).

Aetiopathogenesis

The exact pathogenesis is not known but several postulates have been proposed. It was thought that this may be due to disturbances in the autonomic nervous system particularly due to malfunctioning of sacral para-sympathetic nerves (S2-S4) rendering descending colon atony, resulting in a functional obstruction.

Numerous intrinsic agents such as secretin, glucagon, epinephrine anticholinergics precipitate impairment of electrical activity of the intestine as well as a defect in the intestinal motility.

Koac et al found this condition is often associated with decreased colonic concentration of VIP (vasoactive intestinal polypeptide).

Finally the exact pathogenesis of ACPO remains unknown.

Clinical Features

Commonly in sixth decade males are more frequently involved than females. Abdominal distension and abdominal pain are the most common colonic features. Constipation is common. The most dramatic physical sign is massive abdominal distension. Tenderness is usually absent early and its presence over right iliac fossa may herald caecal perforation. Rectal examination usually reveals an empty rectum.

Investigation

Plain X-ray abdomen is the most informative investigation. It usually reveals features of distal obstruction and proximal colonic dilatation, with little faeces or liquid. The haustral and mucosal pattern is often maintained. Perforation is unlikely when caecal diameter is less than 12 cm.

A water soluble contrast enema is the best investigation to rule out mechanical obstruction, being widely available and safe, provided the patient has no evidence of impending perforation.

Management

Once the diagnosis is confirmed, initial management is essential conservative which includes restriction of oral intake, nasogastric intubation and correction of any fluid and electrolyte abnormalities especially hypokalemia. Withdrawal of any opiates or anticholinergics is also important. It is imperative to diagnose and treat-abdominal sepsis if coexistent.

Conservative treatment

The conservative treatment consisted of the above measures of initial treatment along with gentle enema, rectal decompression tube and decreasing the narcotic drug dosage.

Colonoscopy

Colonoscopic decompression is now thought to be the most effective therapeutic modality. However, this procedure is technically demanding and more difficult to perform in patients with ACPO as the colon is full of semisolid or liquid stools.

Successful decompression may be expected in upto 80% of the patients after colonoscopy. Recurrence occurs in up to 15% of the patients, requiring repetition of colonoscopy.

The authors advocate at least one colonoscopic decompression before performing surgery.

Epidural anaesthesia

It is postulated that Ogilvie's syndrome is caused by excessive sympathetic tone. Whether this will ultimately prove to be worth while remains to be determined.

Drug therapy

Another method of treatment is the use of ceruletide, a synthetically produced decapeptide that has been demonstrated to stimulate intestinal motility. The effect of IV neostigmine in the patients with ACPO is satisfactory. Decompression of large bowel was achieved in 11 of 12 patients.

Cisapride has also been used with some success. It acts by enhancing the release of acetylcholine in myenteric plexus of gut wall.

Surgical management

Surgical intervention is performed after failure of colonoscopic decompression or when caecal tenderness is present. This is one of indication for caecostomy. Percutaneous caecostomy under CT guidance have been successfully employed as an alternative to surgical caecostomy for decompressing massively dilated caecum.

If there are signs of perforation or gangrene, a midline laparotomy must be under taken. Excision of gangrenous colon with formal caecostomy is required for localized caecal ischaemia. If there is wide spread peritoneal contamination, exteriorization of bowel ends with delayed anastomosis is carried.

Outcome

Pseudo-obstruction is usually relieved in 3-7 days. Patients undergoing conservative treatment have a mortality rate of 10-15%, while operative mortality is around 30%.

TABLES AND CHARTS

TABLE 1: AGE AND SEX DISTRIBUTION OF PATIENTS WITH
INTESTINAL OBSTRUCTION

Sl. No.	Age Group	Male	Female	Total	Percentage
1.	13-20 Yrs	4	1	5	4.1
2.	21-30 Yrs	6	2	8	6.5
3.	31-40 Yrs	19	8	27	21.9
4.	41-50 Yrs	13	9	22	17.9
5.	51-60 Yrs	12	11	23	18.7
6.	61-70 Yrs	24	4	28	22.8
7.	71-80 Yrs	8	1	9	7.3
8.	81-90 Yrs	0	1	1	0.8
Total		86	37	123	100

CHART 1: AGE AND SEX DISTRIBUTION OF PATIENTS WITH
INTESTINAL OBSTRUCTION

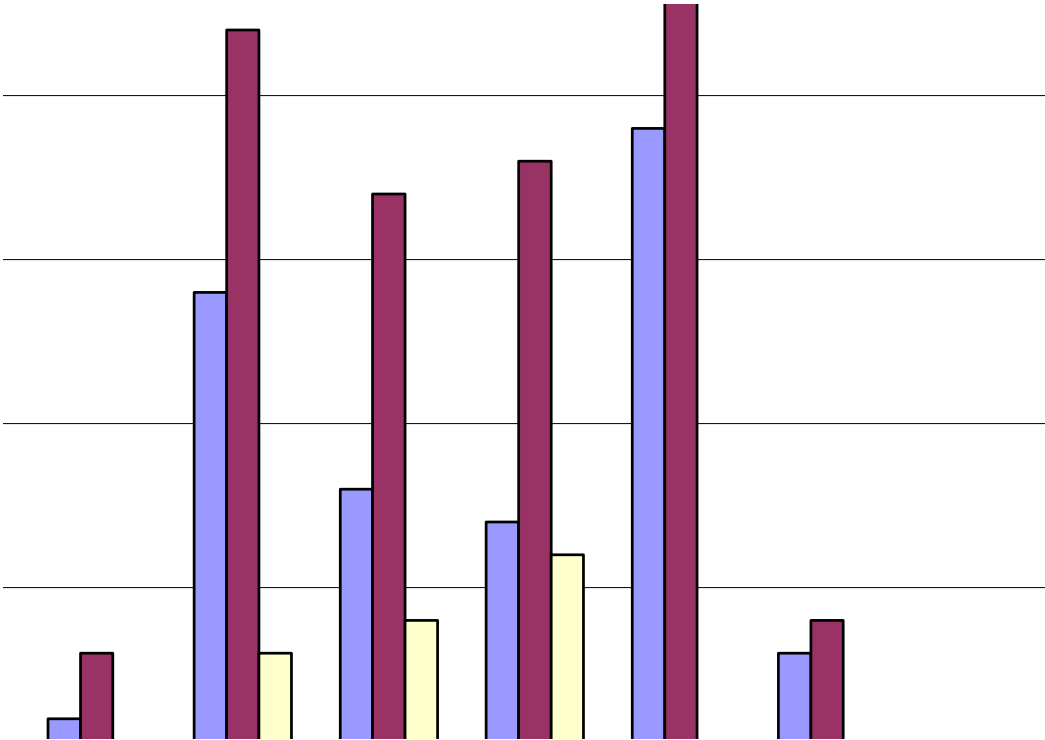


TABLE 2: CLINICAL FEATURES

Sl. No.	Symptoms	No. of cases	%	No. of Cases	%
		IGMC		TVMCH	
		1997		2003 - 2006	
1.	Pain	115	89.8	116	94.3
2.	Distension	50	39.0	101	82.1
3.	Vomiting	90	70.3	90	73.2
4.	Constipation	88	68.7	85	60.1
5.	Inguinal Swelling	12	9.3	23	18.7
6.	Fever	4	3.1	19	15.4
7.	Loose Motion	13	10.2	11	8.9
8.	Bleeding PR	3	2.3	7	5.7
9.	Swelling	3	2.3	4	3.3
10.	Amernorrhea	3	2.3	0	0
11.	Passing Worms	2	1.5	0	0

IGMC – Indra Gandhi Medical College, Shimla

TVMCH – Tirunelveli Medical College Hospital

CHART 2: CLINICAL FEATURES

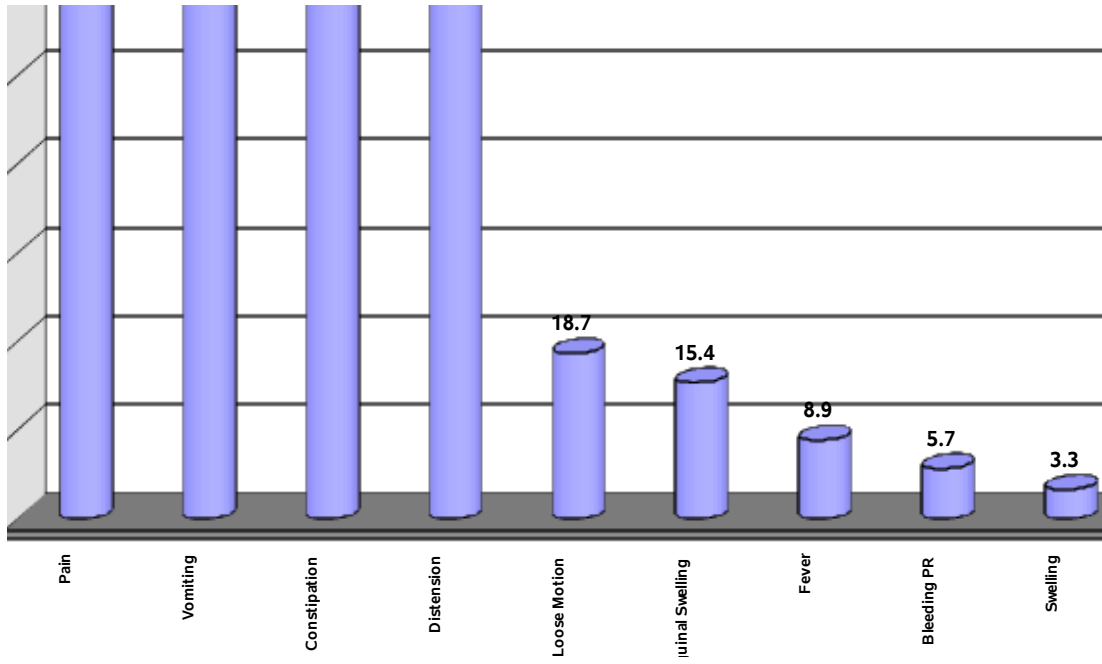


TABLE 3: CAUSES OF INTESTINAL OBSTRUCTION

Sl. No.	Causes	Male	Female	Total
1.	Adhesive Obstruction	27	9	36
2.	Obstructed Hernias	26	9	35
3.	Sigmoid Vovulus	13	4	17
4.	Tumours	9	8	17
5.	Ileo cecal TB	5	2	7
6.	Mesentric Vascular Ischemia	5	1	6
7.	Intussusception	2	2	4
8.	Pseudo obstruction (Uremia)	1	0	1
Total		88	35	123

CHART 3: CAUSES OF INTESTINAL OBSTRUCTION

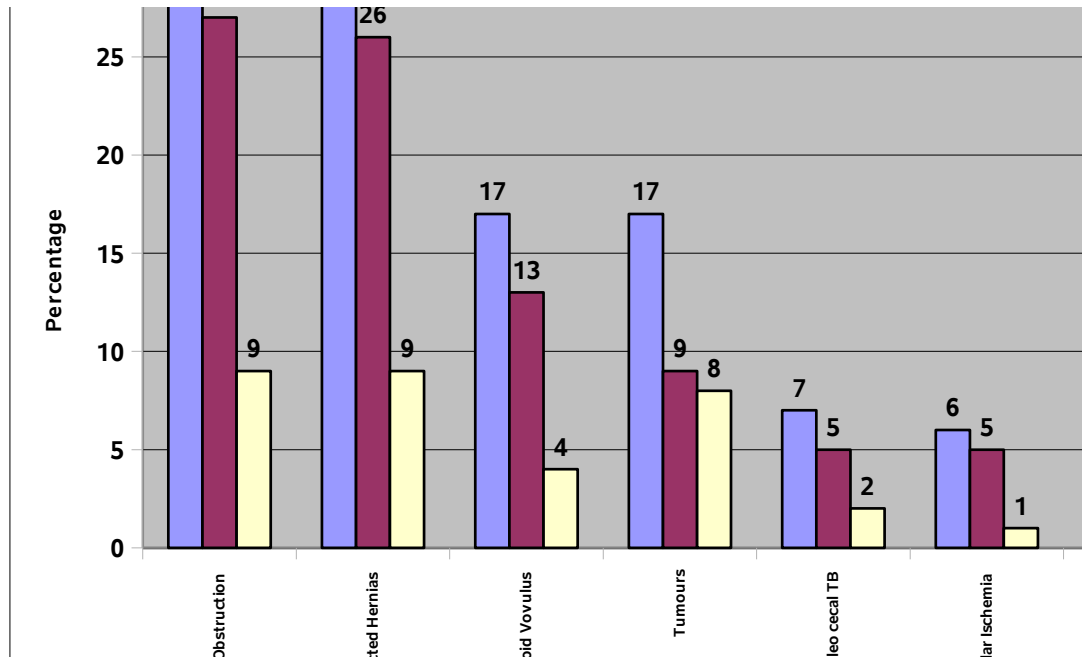


TABLE 4: CAUSES OF INTESTINAL OBSTRUCTION

Sl.No.	Etiology	No. of Cases	Percentage
1.	Adhesive Obstruction	36	29.3
2.	Hernias	35	28.5
3.	Sigmoid volvulus	17	13.8
4.	Tumours	17	13.8
5.	Ileo Cecal Tuberculosis	7	5.6
6.	Mesentric Vascular Ischemia	6	4.8
7.	Intussusception	4	3.3
8.	Miscellaneous	1	0.8
Total		123	100

CHART 4: CAUSES OF INTESTINAL OBSTRUCTION

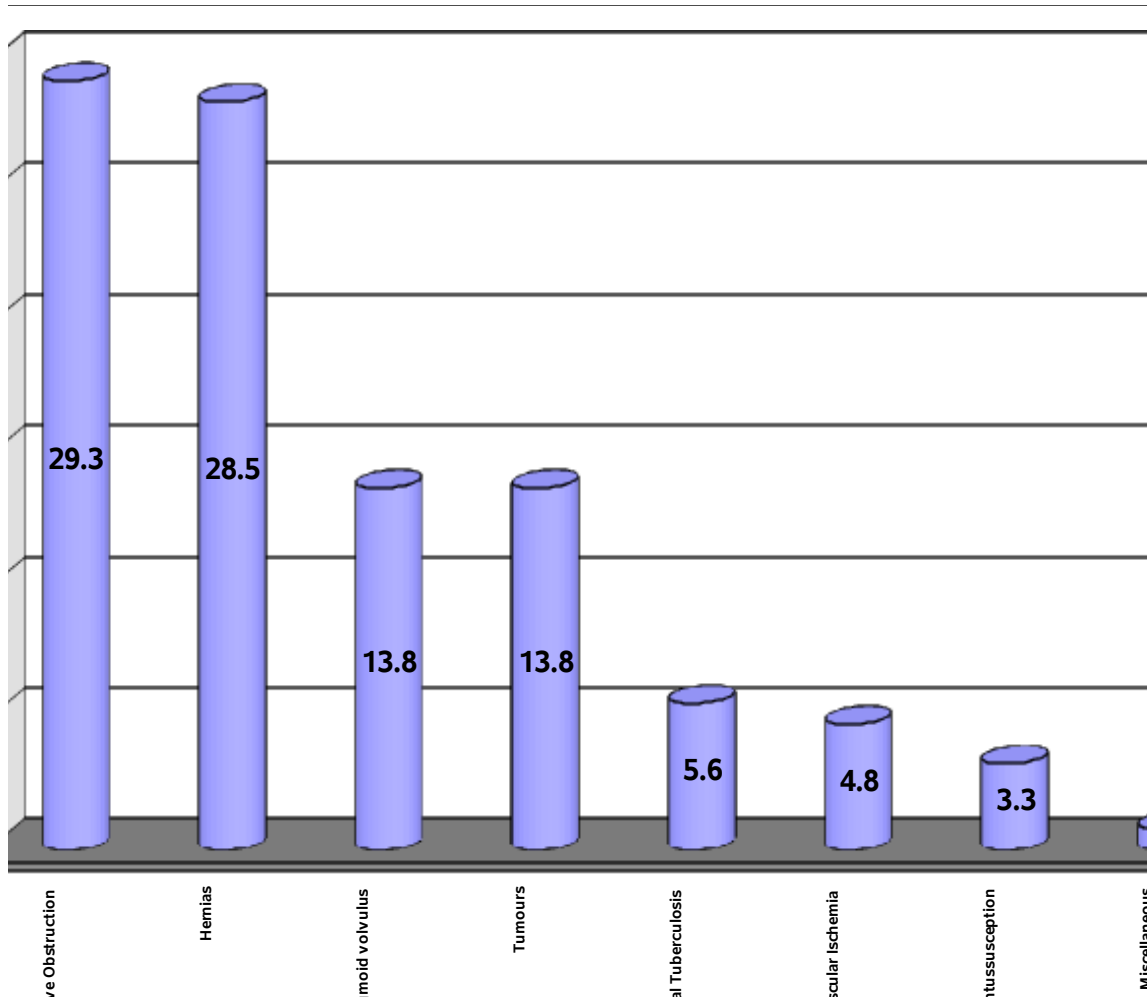


TABLE 5: OBSTRUCTED HERNIAS

Sl. No.	Type	Male	Female	Total	Percentage
1.	Inguinal	22	1	23	65.7
2.	Incisional	0	4	4	11.3
3.	Femoral	1	2	3	8.6
4.	Umbilical	1	2	3	2.9
5.	Internal	1	0	1	2.9
6.	Epigastric	1	0	1	2.9
Total		26	9	35	100

CHART 5: OBSTRUCTED HERNIAS

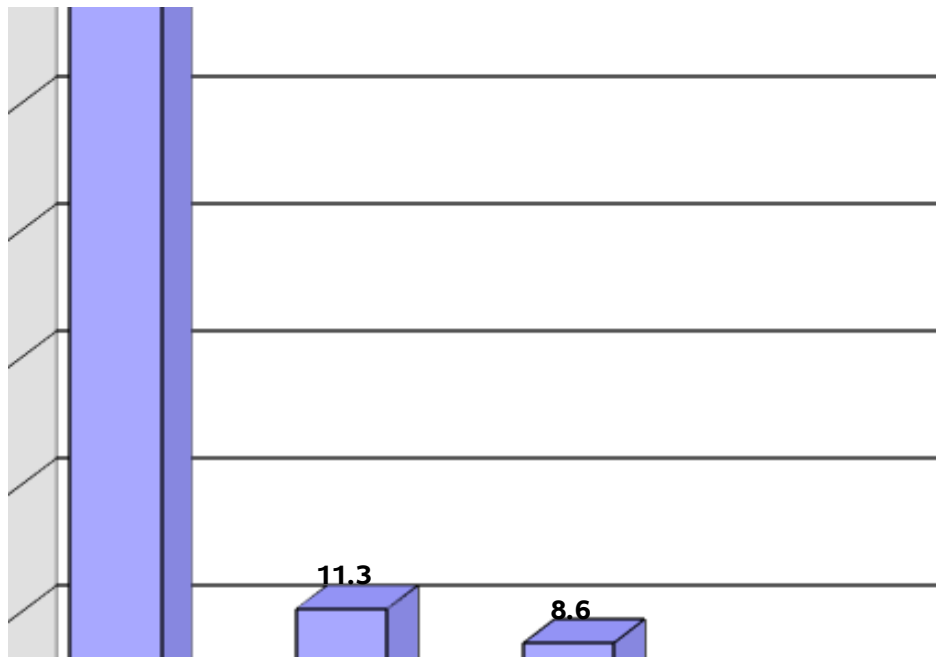


TABLE 6: TYPES OF OBSTRUCTION

Sl. No.	Type of Obstruction	No. of cases	Percentage
1.	Small bowel obstruction	87	70
2.	Large bowel obstruction	37	30
Total		123	100

CHART 6: TYPES OF OBSTRUCTION

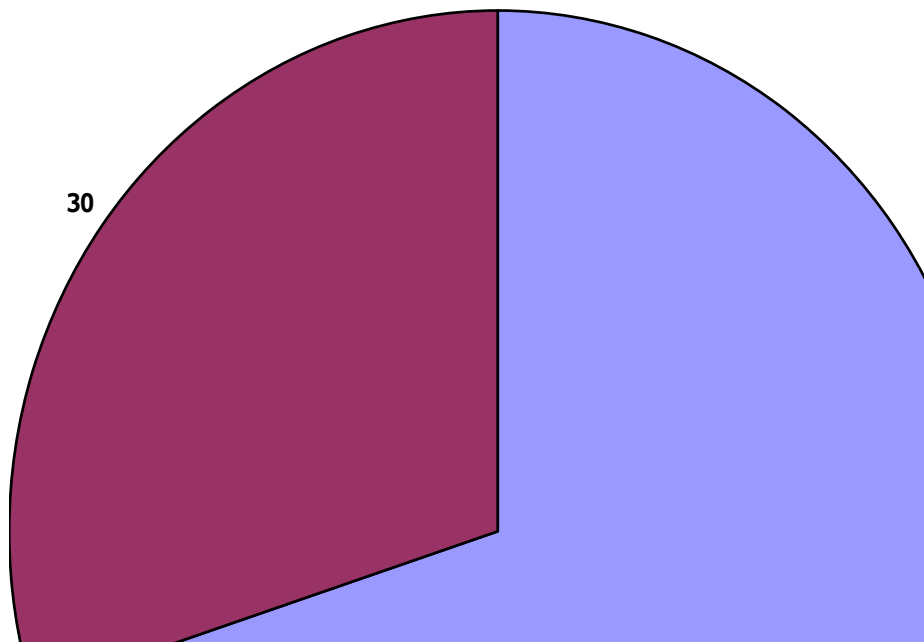


TABLE 7: TYPES OF OBSTRUCTION

Sl. No.	Type	No. of cases	Percentage
1.	Acute Intestinal Obstruction	94	76.4
2.	Sub Acute Intestinal Obstruction	13	10.5
3.	Chronic Intestinal Obstruction	6	4.9
4.	Acute on Chronic Intestinal Obstruction	1	0.8
Total		114	92.6

CHART 7: TYPES OF OBSTRUCTION

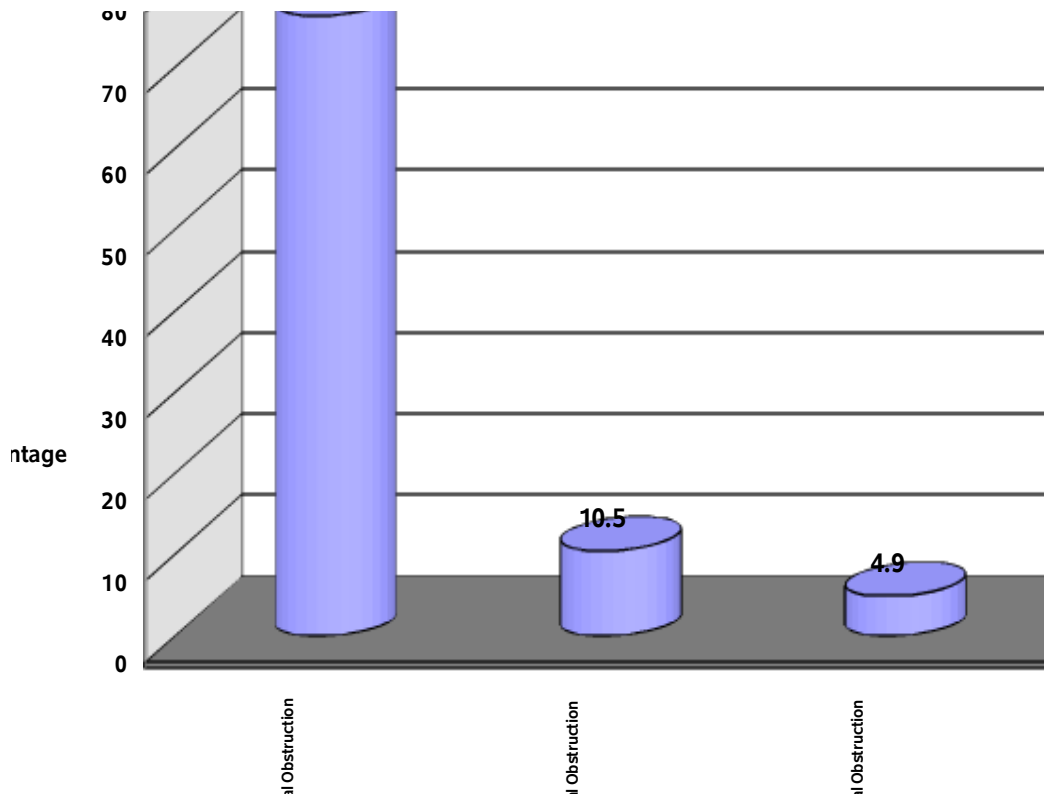


TABLE 8: INGUINAL HERNIAS – VARIOUS PROCEDURES DONE

Sl. No.	Procedures	No. of cases
1.	Exploration & Repair	23
2.	Orchidectomy + Procedure 1	4
3.	Omental Excision+ Procedure 1	3
4.	Resection Anastomosis	5
Total		35

TABLE 9: INGUINAL HERNIAS

No. of Cases operated	Sex		Side		Contents		Resection & Anastomosis
	M	F	R	L	SB	LB	
23	22	1	15	8	19	4	5

SB – Small Bowel

LB – Large Bowel

TABLE 10: OTHER HERNIAS

Sl. No.	Type	Sex		Contents	Resection & Anastomosis
		M	F		
1.	Incisional	0	4	Small Bowel	1
2.	Umbilical	1	2	Omentum & Small Bowel	3
3.	Femoral	1	2	Small Bowel	2
4.	Epigastric	1	0	Small Bowel	1
5.	Internal	1	0	Small Bowel	1

TABLE 11: ADHESIVE OBSTRUCTION

Sl. No.	Previous Surgery	No. of cases
1.	Appendicectomy	3
2.	Duodenal Perforation Closure	6
3.	Stab Injury Abdomen	2
4.	Gynaecological Surgery	2
5.	No Previous Surgery	18
6.	Feeding Gastrostomy	1
7.	Gastro Jejunostomy	2
8.	Unknown	2
Total		36

CHART 11: ADHESIVE OBSTRUCTION

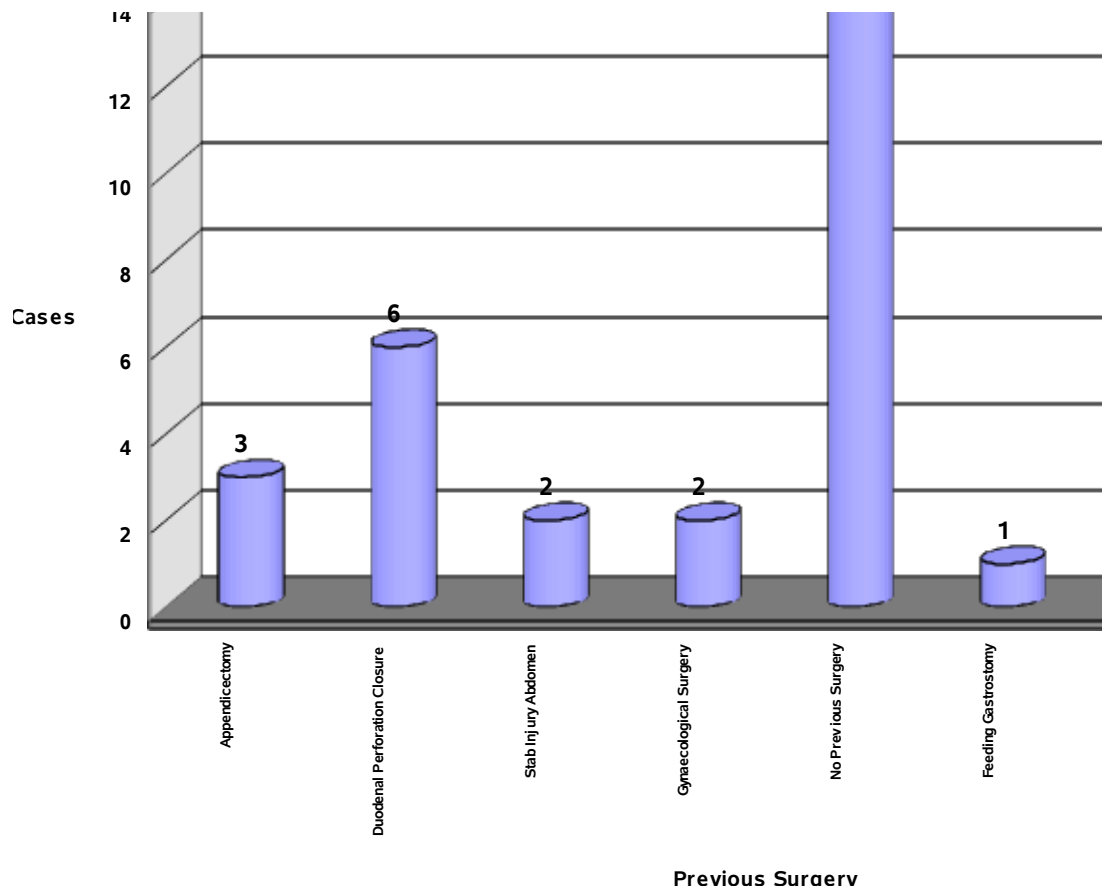


TABLE 12: AGE & SEX DISTRIBUTION OF VARIOUS TYPES OF
INTESTINAL OBSTRUCTION

Sl. No.	Causes of Intestinal Obstruction	Age	13-20		21-30		31-40		41-50		51-60		>61	
		Sex	M	F	M	F	M	F	M	F	M	F	M	F
1.	Adhesive Obstruction		2	1	2	0	9	2	5	4	2	2	7	0
2.	Hernias		0	0	2	0	5	1	4	1	3	4	12	3
3.	Sigmoid Volvulus		0	0	2	0	4	2	0	0	2	1	5	1
4.	Tumours		0	0	0	1	0	1	0	2	3	3	6	1
5.	Ileocecal Tuberculosis		1	0	0	1	1	0	2	1	1	0	0	0
6.	Mesentric Vascular Ischemia		0	0	0	0	1	0	3	0	1	1	0	0
7.	Intussusceptions		1	0	0	0	0	1	0	1	0	0	1	0
8.	Miscellaneous		0	0	0	0	0	0	0	0	1	0	0	0
Total			4	1	6	2	20	7	14	9	13	11	31	5
Percentage			3.3	0.8	4.9	1.6	16.6	5.6	11.4	7.3	10.6	8.9	25.2	4.1

TABLE 13: OBSTRUCTION AND STRANGULATION IN HERNIAS

Sl. No.	Type of Hernia	Obstruction	Strangulation	Total
1.	Inguinal	18	5	23
2.	Incisional	3	1	4
3.	Umbilical	0	3	3
4.	Femoral	1	2	3
5.	Epigastric	0	1	1
6.	Internal	0	1	1
Total		22	13	35

CHART 13: OBSTRUCTION AND STRANGULATION IN HERNIAS

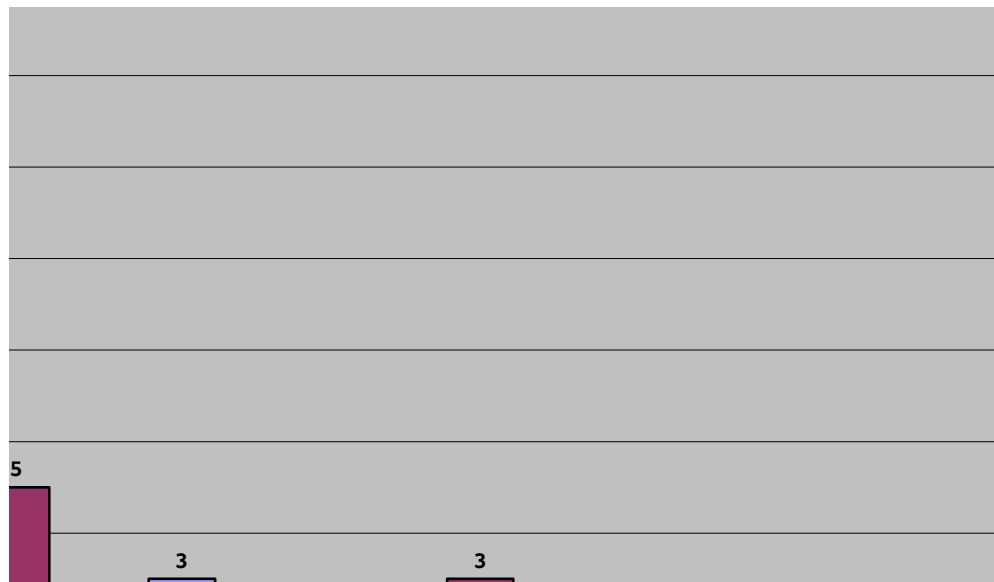


TABLE 14: SURGICAL PROCEDURES AND MORTALITY

Sl. No.	Type of Obstruction	Procedure	No.	Mortality
1.	Adhesive Obstruction	Adhesiolysis	17	0
		Adhesiolysis & Appendicectomy	4	0
		Adhesiolysis & Resection – Anastomosis	6	3
		Band Release	10	0
		End ileostomy	1	0
2.	Obstructed Hernias	Release & Repair	22	1
		Resection & Anastomosis	13	0
3.	Sigmoid Volvulus	Resection & Anastomosis	15	1
		Resection & Hartmaan's	2	0
4.	Tumors	Resection & Anastomosis	1	0
		R Hemicolectomy	5	1
		L Hemicolectomy	2	1
		APR/AR	3	1
		Bypass	1	1
		Proximal Colostomy	6	2
5.	Mesentric Vascular Ischemia	Resection & Anastomosis	6	2

TABLE 15: CAUSE OF DEATH IN 15/123 CASES OF INTESTINAL OBSTRUCTION

No.	Age	Sex	Diagnosis	Procedure	Cause of Death
1.	68	M	Meckel's Diverticular band with Intestinal Obstruction	Band Release Small Bowel Resection & Anastomosis	ARDS
2.	60	M	Descending Colon growth	Lt Hemicolectomy	Septicemia
3.	70	F	Hepatic Flexure Growth	Ileo Transverse Anastomosis	ARDS
4.	70	M	Sigmoid Volvulus	Resection & Anastomosis	MODs
5.	63	M	Ca Cecum	Rt. Hemicolectomy	Myocardia Infarction
6.	49	M	Mesentric Vascular Ischemia - Ileal Gangrene	Resection & Anastomosis	Septicemia
7.	55	F	Ileal Band Obstruction Ileal Gangrene	Band Release Resection & Anastomosis	Septicemia
8.	80	M	Ca. Rectum with Intestinal Obstruction	APR	MODS
9.	16	F	Ileal Band Obstruction with Gangrene Ileum	Resection & Anastomosis	Fecal Fistula with Septicemia
10.	62	M	Intestinal Band Obstruction with Ileal Gangrene	Resection and Anastomosis	Septicemia
11.	47	M	Mesentric Vascular Ischemia	Resection and Anastomosis	Septicemia
12.	56	F	Ca Rectosigmoid with Obstruction	Anterior Resection	MODS
13.	75	M	Carcinoma Sigmoid Colon	Pelvic Colostomy	CAHD with Septicemia
14.	65	M	Obstructed R. Inguinal Hernia	Release & Repair	CAHD
15.	75	M	Ca. Rectum with	APR	MODS

			Intestinal Obstruction		
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TABLE 16: POST OPERATIVE COMPLICATIONS IN 123 CASES OF INTESTINAL OBSTRUCTION

Sl. No.	Complications	No. of Cases	Percentage
1.	Hypotension and Shock	13	10.5
2.	Wound Infection	19	15.4
3.	Chest Infection	27	21.9
4.	Fecal Fistula	2	1.6
5.	Burst Abdomen	1	0.8
6.	Septicaemia	8	6.5
7.	ARDS	2	1.6
8.	Diarrhoea	1	0.8
9.	MODS	3	2.4
Total		76	61.5

CHART 16: POST OPERATIVE COMPLICATIONS IN 123 CASES OF INTESTINAL OBSTRUCTION

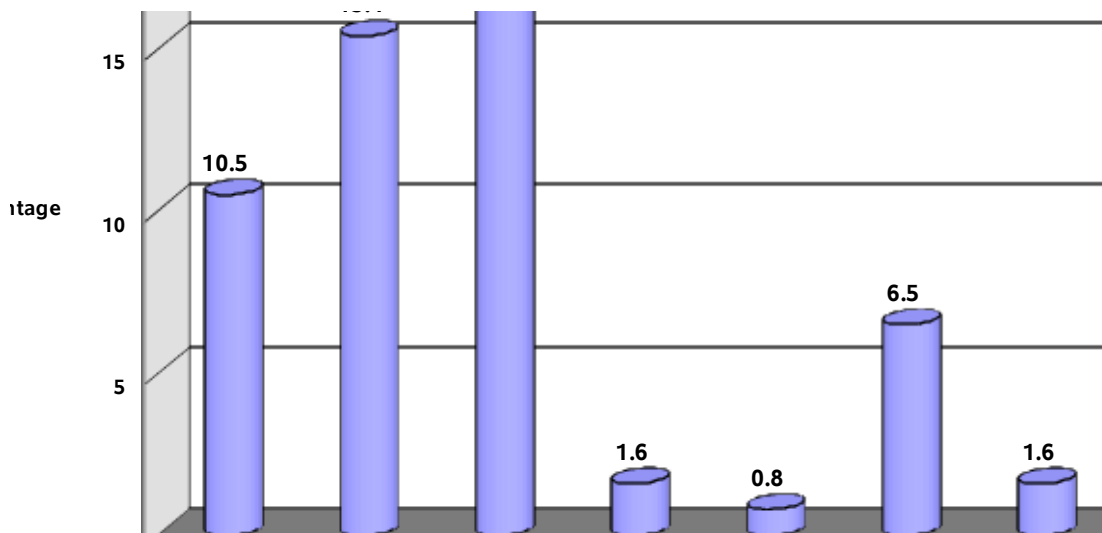


TABLE 17: MORTALITY INCIDENCE IN LARGE AND SMALL BOWEL RESECTION

Sl. No.	Type	No. of Cases	Deaths	Percentage
1.	Small Bowel Resection	27	7	26%
2.	Large Bowel Resection	32	8	25%

TABLE 18: INCIDENCE OF MORTALITY IN DIFFERENT TYPES OF OBSTRUCTION

Sl. No.	Type	No. of Cases	Deaths	%
1.	Adhesive Bands	18	4	22.2
2.	Post Operative Adhesions	18	0	0
3.	Obstructed/Strangulated Hernias	35	1	2.9
4.	Sigmoid Volvulus	17	1	5.9
5.	Tumours	17	7	41.2
6.	Mesentric Vascular Ischemia	6	2	33.3
7.	Adhesive Obstruction (Combined 1& 2)	36	4	11.11
8.	Ileocecal Tuberculosis	7	0	0
9.	Intussusception	4	0	0
10.	Miscellaneous	1	0	0

CHART 18: INCIDENCE OF MORTALITY IN DIFFERENT TYPES OF OBSTRUCTION

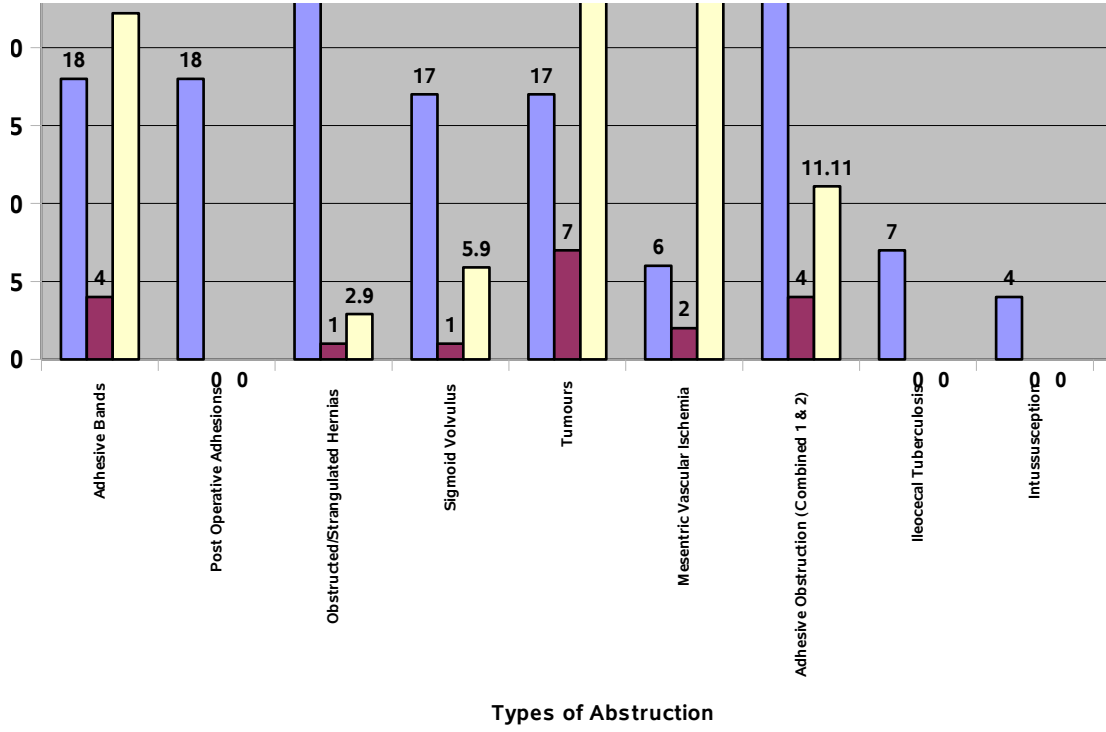


TABLE 20: ACUTE INTESTINAL OBSTRUCTION – MORTALITY RATES IN VARIOUS SERIES ²

Sr. No.	Series	Year	Number of cases	Mortality %
1.	Smith <i>et al</i>	1955	1252	14.5
2.	Barling	1956	355	20.0
3.	Savage PT	1959	179	15.0
4.	Waldon and Hampton	1961	493	14.0
5.	Gill and Eggleston	1965	147	16.0
6.	Kaltiala <i>et al</i>	1972	558	8.0
7.	Stron <i>et al</i>	1973	264	33.0
8.	Sufian and Matsumoto	1975	171	19.0
9.	Belokar <i>et al</i>	1978	267	17.2
10.	Stewardson <i>et al</i>	1978	238	5.5
11.	Ramchandran CS	1982	417	12.7
12.	Nelson and Ellis	1984	279	8.0
13.	Rao K P <i>et al</i>	1984	48	8.5
14.	Mc Entee <i>et al</i>	1987	220	11.4
15.	Muncha P Jr.	1987	314	9.6
16.	Arun Kumar Gupt <i>et al</i>	1997	128	8.6
17.	Present Series	2003 – 2006	123	12

**TABLE 19 : COMPARISON OF CAUSE OF INTESTINAL
OBSTRUCTION IN PRESENT SERIES WITH OTHER SERIES ²**

Series	Gill and Eggleston (1965)	Cole (1965)	Brooks and Burtner (1966)	Nelson and Ellis (1962- 83)	Ram Chandran C.S. (1982)	Mc Entee (1985)	Arun kumar gupta et al (1997)	Present Series (2003 - 2006)
Cause	n=147	n=436	n=250	n=279	n=417	n=228	n=128	n= 123
Hernia	27.0%	35.0%	25.0%	23.0%	13.6%	25.0%	11.7%	28.5%
Adhesions	15.0%	10.0%	23.0%	31.0%	23.1%	32.0%	54.7%	29.3%
Volvulus	25.0%	3.7%	6.4%	5.0%	27.4%	4.0%	18.8%	13.8%
Intussusceptions	12.0%	27.0%	19.0%	1.0%	7.4%	0	2.3%	3.3%
Malignancy	0	1.0%	5.0%	30.0%	9.3%	26.0%	8.6%	13.8%

OBSERVATIONS AND ANALYSIS

In the present study 123 patients with preoperative and peroperative diagnosis of intestinal obstruction in Tirunelveli Medical College Hospital, during a period of 2 ½ years were included. All the patients were studied in detail with regard to symptomatology and clinical features.

Age and sex distribution of the patients is shown in Table (1). The youngest patient was 14 years old and the oldest patient was 82 years old. The mean age was 50.1 years. The maximum number of patients 28 (22.8%), belong to 61-70 years age group.

In this study totally 88 males (71.5%) and 35 females (28.5%) were studied. The male to female ratio was 2.5:1.

The clinical features are shown in Table (2). Pain in the abdomen was the commonest clinical feature noticed and was present in 116 (94.3%) patients. This is followed by abdominal distension which was present in 101 (82.1%) patients. Constipation was found in 85 (69.1%) patients. Vomiting was present in 96 (78%) patients.

According to severity of obstruction 94 cases (76.4%) presented with features of acute intestinal obstruction, 13 cases (10.5%) presented with subacute obstruction and 6 cases (4.9%) with chronic intestinal obstruction as shown in Table (7). One case of Tuberculosis abdomen admitted in the ward with features of subacute obstruction suddenly developed features of acute intestinal obstruction.

The causes of intestinal obstruction observed in this series are shown in detail in Table (3).

The most common cause was adhesive intestinal obstruction in 36 (29.3%) patients, next comes the obstructed hernias in 35 (28.5%) patients. Over previous

two decades intestinal obstruction due to adhesive obstruction is on increasing number. This is because of increasing number of laparotomies being performed³⁶. Similarly obstructed hernias in decreasing incidence because of more number of elective early surgeries being performed for hernias.

In this study more number of obstructed hernia patients belong to old age above 61 years. Most of these patients neglected their hernias initially and later presented with obstruction.

Adhesions have become more and more common cause of intestinal obstruction over the years as shown in Table (19).

Over the years numerous techniques have been devised to prevent adhesion formation. However, these techniques were not evaluated in the present study. Volvulus occupies the third important place as a cause of intestinal obstruction in the present series and is seen in 17 (13.8%) patients. All of them are sigmoid volvulus. It is reported to be the commonest cause of acute intestinal obstruction in the elderly. Average age of the patients who suffered from sigmoid colon volvulus in this study is 50 years.

Malignancy is the next common cause of intestinal obstruction in this study and is seen in 17 cases (13.8%) large bowel was involved in 16 out of 17 cases and small bowel in one case.

Tuberculosis is the cause of intestinal obstruction in 7 patients (4.9%). Ramchandran reported tuberculosis in 13.8% cases. "Gastrointestinal tuberculosis" remains a common disease in Indian subcontinent; lack of medical facilities in the peripheral areas, non-availability of anti tubercular drugs and poor drug compliance by the patients may be some of the reasons for this entity in India. Tuberculosis was confirmed in our patients by a past history of taking antitubercular treatment, associated with lungs lesion, attacks of subacute intestinal obstruction and lymph node biopsy. Lymph node biopsy confirmed diagnosis of tuberculosis in 2 cases.

Mesenteric vascular ischemia forms next common cause of intestinal obstruction in this study.

It belongs to adynamic obstruction. Some patients presented with pain abdomen, vomiting and abdominal distension, who underwent surgery with a peroperative diagnosis of intestinal obstruction and later found to have mesenteric vascular occlusion present 4.8% of all causes of intestinal obstruction.

Intussusception is seen in 3.3% of cases in this study. Its incidence has been reported to be 1% by Nelson and Ellis and 7.4% by Ramchandran Table (19).

One case of pseudo obstruction was operated because of failure of conservative management.

Small bowel was involved in 87 (70%) and large bowel was involved in 37 (30%) cases Table (6).

Following operative procedures were performed depending upon the case:

- Lysis of adhesions or bands
- Resection of bowel
- Intestinal by-pass procedure
- Proximal diversion colostomy
- Planned operation for specific obstructed lesions

As shown in Table (16) Postoperative chest infections particularly lower respiratory tract infections forms commonest post operative complication and is seen in 27 (21.9%). Wound infection was next common postoperative complication. Shock and hypotension due to septicaemia is one of the commonest causes of death in postoperative period. 2 cases developed fecal fistula and one case developed burst abdomen.

The overall mortality in this series is 15(12%) compared with study as shown in Table (20). Mortality is more in intestinal obstruction associated with nonviable gut as compared to the patients having viable gut. Mortality is also more

in patients presented with intestinal obstruction due to malignant tumors and mesenteric vascular occlusion.

Visible intestinal peristalsis - A case of obstructed right inguinal hernia

Visible intestinal peristalsis – A case of small bowel obstruction

Terminal ileum

Visible intestinal peristalsis - A case of obstructed right inguinal hernia

Visible intestinal peristalsis – A case of small bowel obstruction

Terminal ileum

**X-ray Abdomen Erect Posture - Multiple Air fluid levels
Small bowel obstruction**





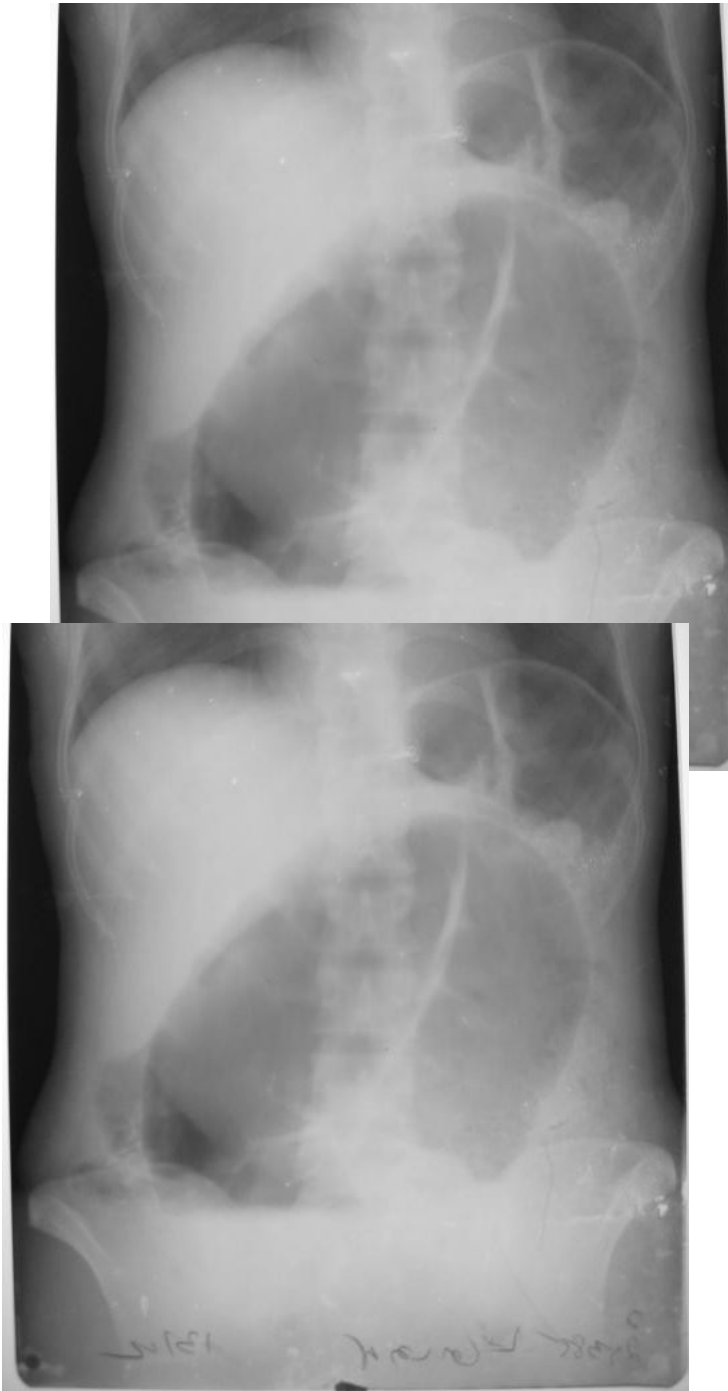
X-ray
Supine
Dilated small
loops
Complete small
obstruction

abdomen
posture –
bowel



bowel

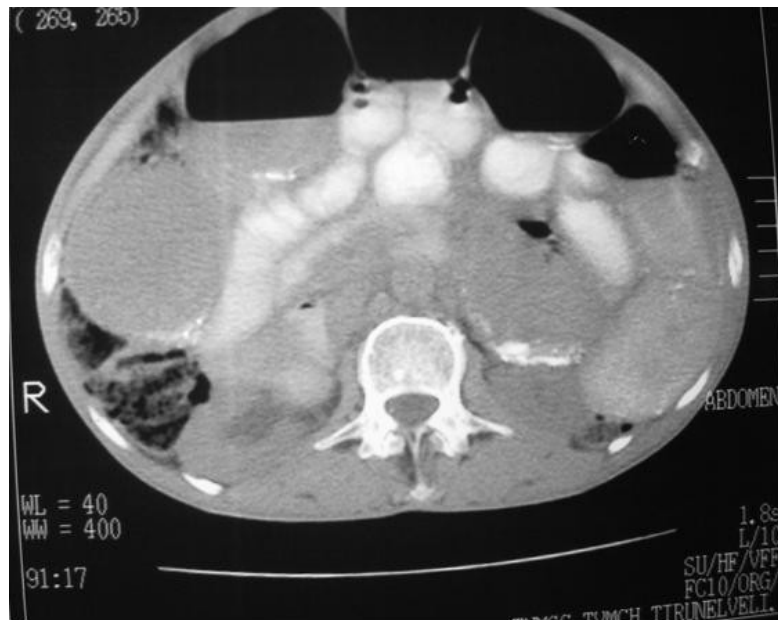
X-ray barium enema – Apple core lesion – Case of sigmoid carcinoma



X-ray abdomen erect posture - dilated large bowel - “Bent inner tube sign”
Sigmoid Volvulus



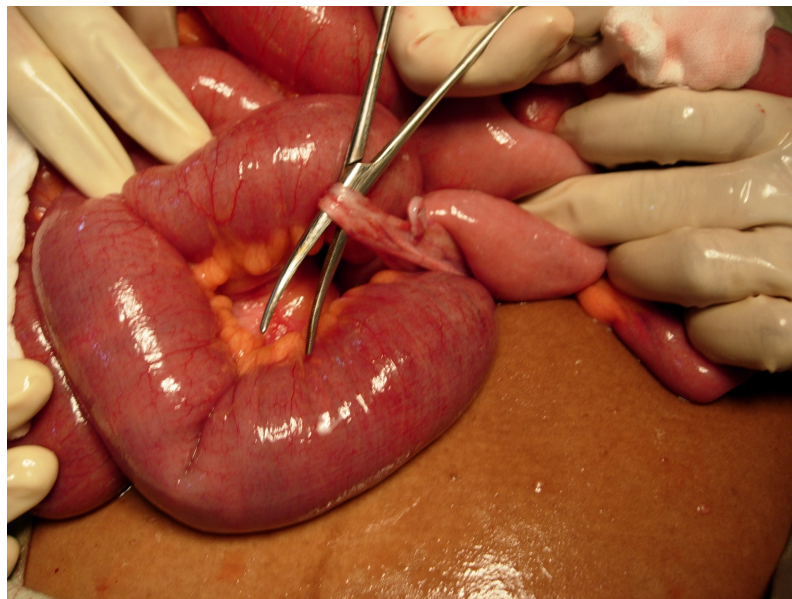
Ultrasonogram picture of dilated fluid filled bowel loops
Small bowel obstruction



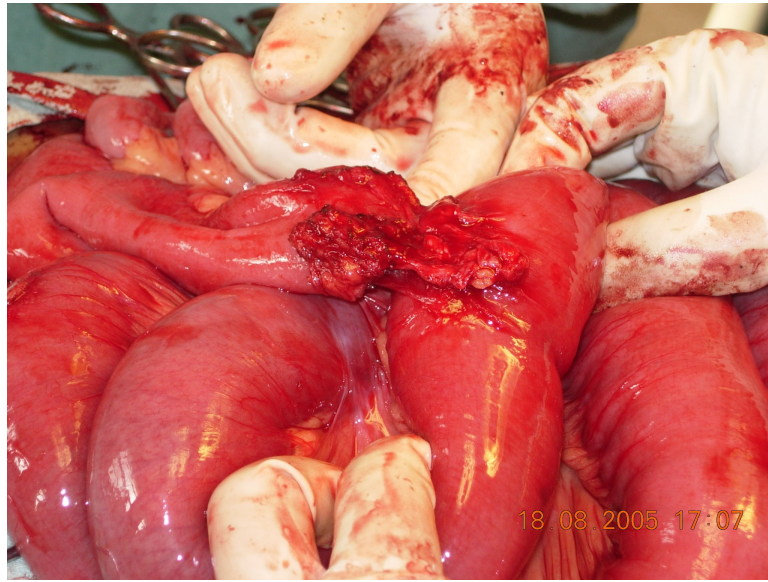
CT Scan abdomen with oral contrast – Dilated small bowel loops
with normal colon – Terminal ileal obstruction



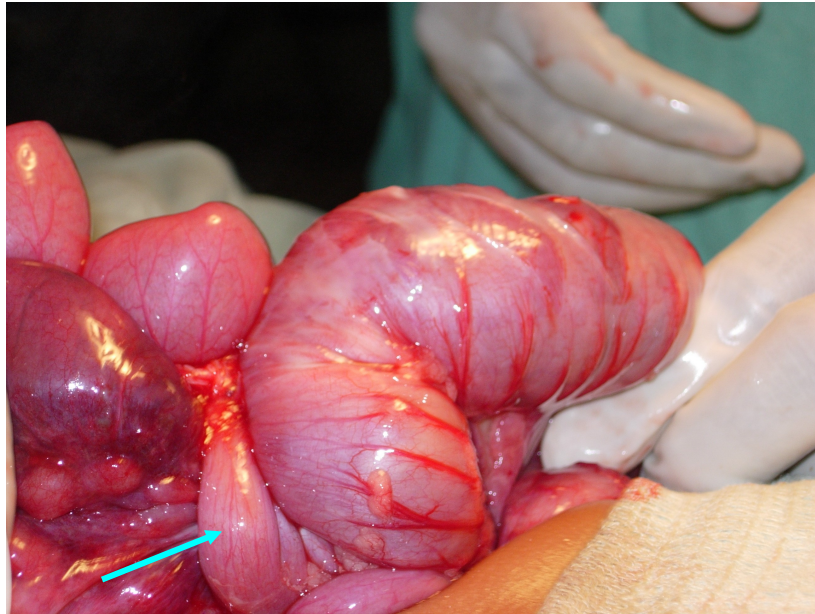
CT Scan abdomen with oral contrast – Dilated small bowel loops in incarcerated para umbilical hernia



Congenital band producing intestinal obstruction



Post operative adhesive obstruction



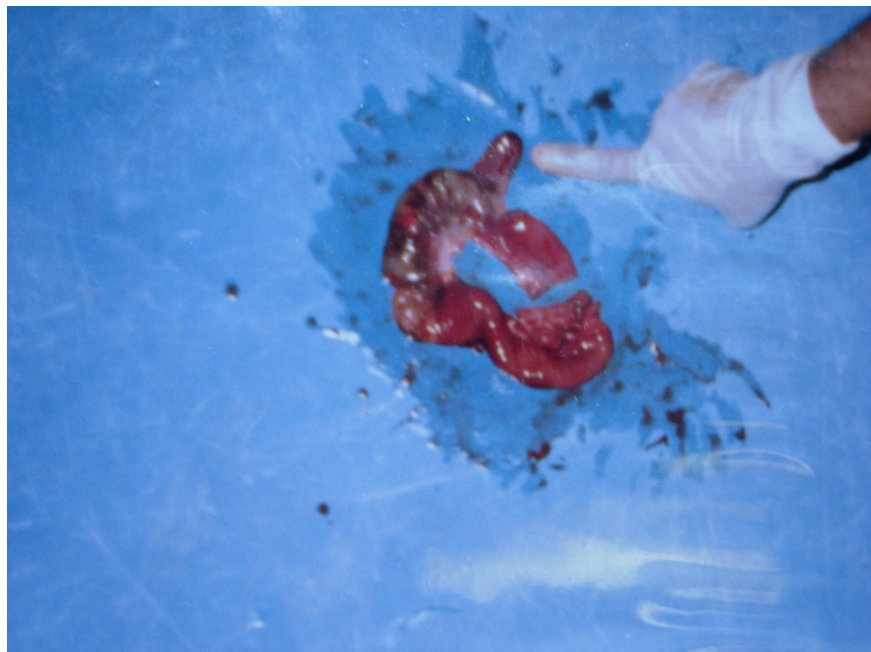
Mesodiverticular band causing intestinal obstruction



Gangrenous bowel segment at site of constriction ring



Strangulated umbilical hernia



Resected segment of small bowel with Meckel's diverticulum in case of Ileo-ileal intussusception



Mesenteric vascular ischemia – with dilated bowel loops - multiple patches of intestinal gangrene



Fecal fistula following small bowel resection in case of Adhesive obstruction



Sigmoid volvulus - Derotation in progress



**Carcinoma caecum with intestinal obstruction
Right hemicolectomy specimen**

DISCUSSION

In this study an attempt has been made to study 123 cases of adult suffering from intestinal obstruction, which required surgery, admitted to our wards during the period 2003 July to 2006 January the course of this study. This study mainly emphasised on the usual causes of intestinal obstruction that were met with and I have also analysed the clinical presentation, aetiological factors, and management of these cases. This study does not include paralytic ileus, other forms of functional intestinal obstruction, and sub acute intestinal obstruction which were treated with conservative treatment, and the paediatric intestinal obstruction.

Total cases	:	123	
Male	:	88	(71.5%)
Female	:	35	(28.5%)

1. Adhesions and Bands

There were 36 cases 29.3% of intestinal obstruction due to adhesions and bands, which underwent surgery.

This is the first important cause of acute intestinal obstruction in western series. Incidence is more in males than in females with a ratio of 3:1. Obstruction due to postoperative adhesions equals that due to congenital or inflammatory bands.

Of the 36 cases 18 cases were due to post – operative adhesive obstruction. 2 cases occurred following previous abdominal hysterectomy, 6 cases following perforative peritonitis, 1 case following feeding gastrostomy and 3 cases following appendicectomy.

Small bowel was involved in the obstruction in all the cases. 7 cases had gangrenous bowel and resection and anastomosis was done in 6 cases. One case underwent end ileostomy. The length of the gangrenous loop varied between 2 inches and 15 inches. All the other 29 cases had viable bowel and only adhesiolysis was carried out. In 4 cases appendicectomy was done in addition. All cases did well in the post operative period except 3 cases that underwent resection and anastomosis, but expired due to septicemia Table (15). One case developed adhesive obstruction again after 6 months and managed conservatively. One patient developed fecal fistula and septicemia expired in postoperative period Table (15).

2. Groin hernias

Total cases operated	:	26	21.1%
Inguinal	:	23	18.7%
Femoral	:	3	2.4%

The incidence of obstructed hernia is decreasing. This is because of the increased number of elective surgery and advanced health education.

2.1. Inguinal Hernias

Total cases - 23. This is the commonest of all hernias contributing to 65.7%. All were male patients except one. Maximum number of cases was encountered in the age group of above 55 years.

Side affected : The right side is more affected than the left. (15 : 8) Table (9). This proves the statement that the later descent of the testis on the right side and the later, obliteration of the processes vaginalis contribute to the high incidence on the right side.

Associated diseases : 6 patients were known tuberculous patients on treatment, and 3 patients were diabetic. 4 had prostatic enlargement. Cases with prostatic enlargement were operated with an indwelling Foley's catheter.

Management : All the 23 cases were operated after correcting fluid imbalance. The various surgical procedures adopted were shown in table below. Out of the 23 cases operated 3 were slider, containing caecum and appendix.

No.	Procedures	No. of cases	Indication
1.	Exploration + Repair	23	For uncomplicated cases
2.	Procedure 1+ Orchidectomy	4	For recurrent hernias and elderly people
3.	Procedure 1 + Omental excision	3	For gangrenous omentum
4.	Procedure 1+ Resection anastomosis	5	For gangrenous bowel
5.	Procedure 1 + Appendicectomy	1	For a case of appendix and caecum in the sac

Most of the cases were dehydrated and the electrolyte study revealed hyponatremia and the potassium was low normal. In strangulated hernia patients the sodium as well as potassium was low.

Level of obstruction : The constriction was found at the level of external ring in 15 cases (62%) and internal ring in 8 cases (38%).

Condition of the bowel : In 5 cases the small bowel was found to be gangrenous and was resected Table(9). In the sliders the bowel was viable.

Complications : 4 cases developed wound sepsis one case of strangulation expired in the post operative period due to shock Table(15).

2.2. Femoral Hernia

Total case 3 – 11 % of groin hernias. The Male : Female ratio is 1:2. One case was a 82 year old female admitted with history of pain abdomen, irreducible left inguinal swelling constipation and vomiting for 3 days – The content was part of the circumference of the bowel wall with gangrenous changes. Hence resection and anastomosis was done followed by herniorrhaphy.

Another case was a 55 year old female admitted with features of acute intestinal obstruction and the content was found to be viable small bowel. So reduction and repair was done.

2.3 Other Hernias :

As per Table (5),

Incisional hernia	:	4	11.3%
Umbilical hernia	:	3	2.9%
Epigastric hernia	:	1	2.9%

Next to groin hernias, incisional hernias, which produced intestinal obstruction constitute 11.3% of of obstructed hernias.

All the 3 Umbilical hernia patients had strangulated bowel and under gone small bowel resection and anastomosis Table (10).

One male patient about 57 years presented with obstructed epigastric hernia with impending gangrene of small bowel and under gone ileal resection and anastomosis. Patient recovered well in postoperative period.

3. Volvulus

Total no. of cases : 17 (13.8%)

Sigmoid Volvulus : 17

The third common cause of intestinal obstruction is volvulus of the gut. It forms 13.8% in the present series.

In western the incidence of volvulus is low. In parts of India, Africa, and America, this is more common than in Europe and North America.

Sigmoid Volvulus

In the present series I encountered 17 cases of sigmoid volvulus.

Age Incidence :

4th – 6th decade

Sex incidence : In the present series male : female ratio is 3.2:1.

11 cases gave history of intermittent chronic constipation. All of them were poor in economic status and used to take bulky diet consisting of a food rich in carbohydrate and roughage like cereals and rice and a bowel habit of passing bulky stools except in constipated cases.

17 cases presented with sigmoid volvulus for the first time and they are admitted mainly for complaints of progressive abdominal distension, constipation and abdominal pain. Vomiting was a very late feature and present in only 3 cases.

Electrolyte study revealed not much of change except a mild reduction in Sodium concentration. All sigmoid volvulus patients had redundant mesocolon and a narrow pedicle. All had anticlockwise rotation from ½ twist to 3 full twists of varying degrees. All 15 cases in which the sigmoid colon was viable a primary sigmoidectomy with end-to-end anastomosis was carried out. In 2 cases the sigmoid was gangrenous. The general condition of the 2 patients was very poor and the patients were in shock. So Hartman's procedure was carried out, and one

patient expired on the second postoperative day due to septicemic shock Table(15).

4. Tumours

Total No.. of Cases :	17 (13.8%)
Age incidence :	> 50 years
M : F	1.1 : 1
Carcinoma of Left side colon	: 7
Carcinoma of Right side colon	: 6
Carcinoma Rectum	: 3
Small bowel tumour (GIST)	: 1

All the tumours of colon and rectum those presented with intestinal obstruction belong to adenocarcinomas. Small bowel tumour that caused intestinal obstruction belong to gastrointestinal stromal tumour.

Carcinoma of left side colon is more common cause of intestinal obstruction than that of right colon.

All the 10 patients with colonic growth gave history suggestive of subacute intestinal obstruction which has gone in for acute intestinal obstruction. Clinically all patients had distended abdomen and constipation.

Per-operatively 2 cases had sigmoid colon growth and 4 cases had Rectosigmoid growth. In three cases primary resection of the tumour with end-to-end anastomosis was carried out. In one case the growth was in mid rectum and only a proximal transverse colostomy was done as an emergency procedure.

Small bowel tumour: One case of small bowel tumour presented with features of chronic intestinal obstruction.

Age : 53 yrs.

Sex : Male

Pre-operatively that case had ileal intraluminal mass causing near total obstruction of the lumen and there was proximal dilation of the small bowel. No mesenteric or para aortic node enlargement. So a primary resection and end-to-end anastomosis was carried out. Biopsy report of the specimen came as gastrointestinal stromal tumour.

Sl. No.	Findings	No. of cases	Procedure
1	Growth sigmoid colon	2	Sigmoidectomy and end-to-end anastomosis
2.	Rectosigmoid growth	1	Anterior Resection and end-to-end anastomosis
3.	Mid Rectal growth	1	Transverse loop colostomy
4.	Small bowel GIST	1	Segmental resection and end-to-end anastomosis

Tumours of the colon those presented with intestinal obstruction forms major portion of mortality in this study. Elderly age co-morbid illness late presentation forms important causes of mortality in this study.

In the patient with mid rectal growth bowel preparation was done through the colostomy and was posted for Abdomino perineal resection after 1 month. On exploration the growth was found to be fixed to the internal Iliac vessels and was inoperable. So the patient was put on chemotherapy.

5. Intussusception

Number of cases : 4 (3.3%)

Age incidence : 30- 55 yrs – Common in children but paediatric age group was not included in this study.

Sex incidence : Male:Female 3 : 1

2 cases were diagnosed pre-operatively as intussusception by the typical history of colicky abdominal pain, sausage shaped mass and the red current jelly stools. Other two cases were operated for acute intestinal obstruction with visible peristalsis and pre-operatively intussusception was confirmed.

3 cases were severely dehydrated and the electrolyte study showed low Sodium, Potassium and Chlorides. Patients were resuscitated with normal saline.

Sl. No.	Findings	No. of cases	Procedure
1.	Ileocolic intussusception without lead point-bowel gangrenous	2	Right hemicolectomy
2.	Ileocaecal intussusception with a submucous lipoma distal ileum	1	Segmental resection and anastomosis
3.	Ileo Ileal intussusception with a meckel's diverticulum	1	Segmental resection and anastomosis

6. Ileocaecal Tuberculosis

Number of cases : 7 (5.6%)

Age incidence : 30-50 yrs

Sex incidence : Male:Female 2:1

Associated pulmonary tuberculosis is seen in 3 cases. The incidence is becoming less due to early detection and mass screening programmes and adequate chemotherapy for pulmonary tuberculosis.

One case developed intestinal obstruction after thorough investigation. In that case the barium enema picture showed

- narrowed terminal ileum
- obtuse angle of ileocaecal junction
- sub hepatic caecum and
- fore-shortening caecum and

Other 2 cases were operated without thorough investigations as an emergency.

Sl. No.	Peroperative findings	No. of Cases	Procedure
1.	Ileal stricture	1	Segmental resection with end-to-end anastomosis
2.	Ileocaecal mass with transverse colon stricture	1	Right hemicolectomy
3.	Ileocaecal mass with ileal structure 4" proximal to ileocaecal junction	1	Ileo transverse anastomosis
4.	Tuberculoosis abdomen with adhesion bands.	3	Adhesiolysis

One patient did not have any intestinal obstruction during laparotomy and it became a negative laparotomy.

All above cases were put on Antituberculosis treatment post operatively.

7. Internal Herniation

One male patient of about 70years had herniation of ileal loops through a rent in the transverse mesocolon. 3 feet of ileal loop was gangrenous which was resected. Patient's general condition was poor and so exteriorization of ileal loop was made. After 1 week when the patient general condition improved reanastomosis done and patient recovered well.

8. Miscellaneous causes

8.1. Mesenteric vascular ischaemia

No of cases : 6 (4.8%)

Age incidence : 40-50 years

M : F 6 : 1

All the 6 patients presented with abdominal pain; two cases had constipation, abdominal distension and abdominal tenderness, dilated bowel loops with multiple fluid levels on x-ray abdomen. 2 cases presented with features of abdominal distension, constipation and perforative peritonitis. Ground glass appearance found on x-ray of abdomen.

Mesenteric vascular ischaemic patients who presented with features of intestinal obstruction diagnosed preoperatively as a case of intestinal obstruction with peritonitis were included in this study. MVI produces adynamic obstruction.

Among the 6 patients one developed burst abdomen in post operative period and one had wound infection. Two patients expired due to shock and septicaemia.

8.2. Pseudo obstruction

One patient presented with features of intestinal obstruction who had elevated renal parameters initially patient was treated conservatively but patient general condition was worsening due to abdominal distension and respiratory distress. Patient underwent laparotomy, bowel decompression done. There was no pathology found in exploratory laparotomy. Patient recovered well in postoperative period.

SUMMARY AND CONCLUSION

This study mainly dealt with those forms of intestinal obstruction, which were managed surgically excluding paediatric cases. 123 cases were operated during this study.

Adhesions and bands accounted for 29.3% of cases in this series. Most of them were postoperative. Rough handling of bowel, failure to reperitonealise raw areas and use of too tight sutures were found to be some of the aetiological factors.

Groin hernias accounted for 28.5% of this series. The constricting agent in the inguinal hernia is external inguinal ring in most of our cases.

Volvulus was responsible for 13.8% of cases. Surgical treatment preferably one stage resection is recommended. Chance of recurrence is high in case of conservative treatment and sigmoidopexy. Volvulus was more common in Muslims and that too at the end of fasting season. Most of the patients were elderly males, and were habitually constipated.

Intussusception formed 3.3% of our cases. This is more common in paediatric age group. In adults the main aetiological factors are submucous polyps, Meckel's diverticulum, and inflammation. Early intervention and appropriate surgical correction is the treatment of choice. Plication of the terminal ileum to the ascending colon combined with caecopexy is a useful method to prevent recurrence. However in adults all cases go for resection and anastomosis of involved segments as appropriate treatment.

Tumours of the large and small bowel accounted for 13.8% of our cases. In most of these cases there were some symptoms predating the onset of the present complaints. Surgical treatment with primary resection and end-to-end anastomosis is ideal. But some cases will be too much advanced for curative procedure.

We had 7 cases of ileocaecal tuberculosis and one case was treated by segmental resection and end-to-end anastomosis. Ileocaecal tuberculosis without

intestinal obstruction doesn't require surgical treatment. Only medical management with anti-tuberculosis drugs gives satisfactory results.

Dehydration was there in almost all cases of intestinal obstruction and was severe with small bowel obstruction.

Serum electrolyte study revealed low sodium, and potassium levels in proximal small bowel obstruction and low sodium with low normal potassium levels in the distal small gut obstruction. There was not much of electrolyte imbalance in cases with large bowel obstruction.

The mortality and morbidity rate is influenced by the time factor, viability of the bowel, comorbid illness and age of the patient. In old patients with gangrenous bowel the mortality rate is high.

Primary Resection and anastomosis of the bowel is the mainstay of treatment in all cases of gangrenous bowel and resectable growth.

The recent advances in surgery, the modern surgical techniques aseptic and antiseptic measures, the recent advance in anaesthesiology, the improvement made and enthusiasm shown by the allied departments like Radiology, Blood Bank and Bio-chemistry have definitely made the patients with intestinal obstruction safer for emergency surgery.

The mortality and morbidity are very much reduced by the adequate correction of electrolyte imbalance and the replacement of lost blood and by the proper surgical techniques employed.

Past History

H/o similar complaints in the past

H/o previous surgery

H/o Hernias

H/o Tuberculosis/Drug intake

Family History

Positive Family History if any

Personal History

Diet, Appetite, Bowel Habits, Addictions

General Examinations

Built and nourishment

Dehydration Present/Absent

Pallor

Jaundice

Cyanosis

Oedema

Pulse rate BP

Generalised lymph node enlargement

Examination of gastrointestinal tract:

Upper GIT

Oral hygiene

Tongue

Teeth

Oro pharynx

Abdomen

Shape

Visible peristalsis

Dilated vessels

Pulsations

Position of umbilicus

Hernia

Scars

Palpation

Tenderness Present/Absent

Mass Palpable/Not palpable

Liver, Spleen Palpable/Not palpable

Percussion : Liver dullness, shifting dullness

Auscultation : Bowel sounds present/absent/barborigmi

External Genitalia Examination

Per Rectal Examination

Per Vaginal Examination

Examination of other systems

Investigations

Blood TC

DC

Hb

ESR

Urine Alb

Sug

Dep

Blood Sugar

Urea

Se. Creatinine

Se. Electrolytes

Se. Amylase

ECG in all leads

X-ray chest PA view

X-ray abdomen erect and supine

X-ray Barium studies

Emergency Ultrasound Scan of abdomen & pelvis

Treatment :

Preoperative preparation

Operation – Findings

Procedure

Post Operative Period

Complications during postoperative period

Condition at discharge

Follow up

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