

**DISSERTATION ON**

**ANALYTICAL STUDY OF ACUTE INTESTINAL  
OBSTRUCTION – LARGE INTESTINE VS SMALL  
INTESTINE**

**M.S.DEGREE EXAMINATION**

**BRANCH – I**

**GENERAL SURGERY**



**THANJAVUR MEDICAL COLLEGE AND HOSPITAL**  
**THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY**

**CHENNAI**

**APRIL 2017**

## **CERTIFICATE**

This is to certify that dissertation entitled '**ANALYTICAL STUDY OF ACUTE INTESTINAL OBSTRUCTION – LARGE INTESTINE VS SMALL INTESTINE**' is a bonafide record of work done by **Dr.N.S.GOKULAKRISHNAN**, in the Department of General Surgery, Thanjavur Medical College, Thanjavur, during his Post Graduate Course from 2013-2016.This is submitted in partial fulfillment for the award of **M.S. DEGREE EXAMINATION- BRANCH I (GENERAL SURGERY)** to be held in April 2017 under **The Tamilnadu Dr. M.G.R. Medical University, Chennai.**

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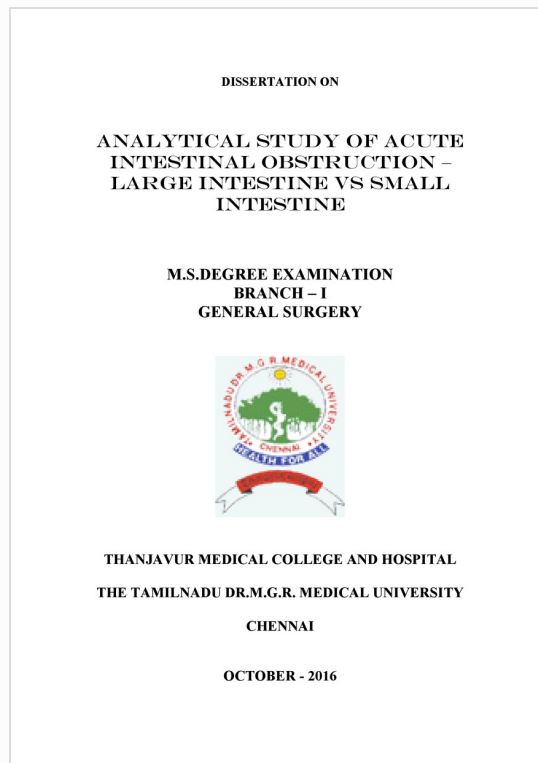


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## **DECLARATION**

I declare that this dissertation entitled '**ANALYTICAL STUDY OF ACUTE INTESTINAL OBSTRUCTION – LARGE INTESTINE VS SMALL INTESTINE**' is a record of work done by me in the Department of General Surgery, Thanjavur medical college, Thanjavur, during my Post Graduate Course from 2013-2016 under the guidance and supervision of my unit chief **PROF. DR.K.SATHYABAMA, M.S.**, and Professor and Head of the department **PROF.M.ELANGOVAN, M.S.**, It is submitted in partial fulfillment for the award of **M.S. DEGREE EXAMINATION- BRANCH I (GENERAL SURGERY)** to be held in April 2017 under the **Tamilnadu Dr. M.G.R. Medical University, Chennai**. This record of work has not been submitted previously by me for the award of any degree or diploma from any other university.

**THANJAVUR,**

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## CONTENTS

<b>S.NO</b>	<b>TOPIC</b>	<b>PAGE NO.</b>
<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>2</b>	<b>AIM OF STUDY</b>	<b>2</b>
<b>3</b>	<b>CLASSIFICATION AND ETIOLOGY</b>	<b>3</b>
<b>4</b>	<b>PATHOPHYSIOLOGY</b>	<b>6</b>
<b>5</b>	<b>CLINICAL FEATURES AND DIAGNOSIS</b>	<b>12</b>
<b>6</b>	<b>GENERAL OUTLINE OF TREATMENT</b>	<b>21</b>
<b>7</b>	<b>MATERIALS AND METHODS</b>	<b>23</b>
<b>8</b>	<b>STRANGULATION</b>	<b>25</b>
<b>9</b>	<b>SMALL BOWEL OBSTRUCTION</b>	<b>29</b>
<b>10</b>	<b>LARGE BOWEL OBSTRUCTION</b>	<b>58</b>
<b>11</b>	<b>TREATMENT</b>	<b>74</b>
<b>12</b>	<b>DISCUSSION</b>	<b>79</b>
<b>13</b>	<b>CONCLUSION</b>	<b>83</b>
<b>14</b>	<b>BIBLIOGRAPHY</b>	<b>85</b>
<b>15</b>	<b>MASTER CHART</b>	<b>89</b>
<b>16</b>	<b>PROFORMA</b>	<b>93</b>

# INTRODUCTION

Acute intestinal obstruction continued to be a emergency presentation till date. It is one of the gravest emergencies presenting to the surgeon in all aspects. It was said by Berkeley Moynihans in 1926 **“when called upon to deal with a case of acute intestinal obstruction the surgeon is confronted with of the gravest and most disastrous emergencies. The patient may be, and often is, a man or woman in the prime of life, in full enjoyment of vigorous health, who, without, warning, is suddenly seized with the most intolerable pain in the abdomen.....”**

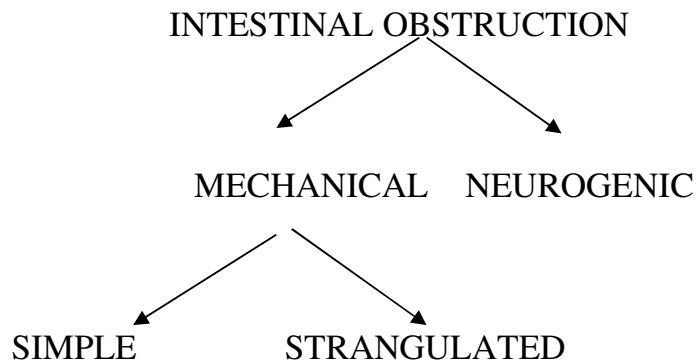
Physical signs and their interpretation reach very much of importance in the diagnosis. It is one of the emergencies where as quickly as possible we act, the result will be remarkable. This fact was indicated by Sir Heneage Ogilvie that **“in the acute abdominal emergencies the difference between the best and worst surgery is infinitely less than that between early and late surgery, and greatest sacrifice of all is the sacrifice of time”** more apt in the present context.

## **AIM OF THE STUDY**

1. To evaluate the common causes of acute intestinal obstruction in this region.
2. To identify the aetiopathogenesis.
3. To evaluate the various modes of presentation.
4. To study the various modalities of treatment in this centre.
5. To evaluate the morbidity and mortality of acute intestinal obstruction.
6. Causes may vary in acute intestinal obstruction in different cases.

# CLASSIFICATION AND ETIOLOGY

Intestinal obstruction is classified into **two** main types.



## **MECHANICAL OBSTRUCTION :**

In Mechanical obstruction, the intestinal contents are prevented from passing along the bowels by acute obstruction of the lumen of the gut.

## **NEUROGENIC OBSTRUCTION:**

In Neurogenic obstruction, the peristalsis ceases and no true propulsive waves occur and so the intestinal contents do not traverse the bowel.

Mechanical obstruction is further classified:-

**According to site of obstruction** it is classified into

1. small bowel obstruction      High
2. Large bowel obstruction      Low

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

1. **Causes in the Lumen** Gall stone, Food bolus, Faecal Impaction, Barium, bezoar, worms etc.
2. **Causes in the wall** Congenital atresia, Bowel neoplasms, inflammatory strictures etc.
3. **Causes outside the wall:** Strangulated Internal hernia, external hernia, obstruction due to adhesions, volvulus, Intussusception

### **Age Incidence**

Intestinal obstruction may occur at any age. Its incidence rises in middle age and reaches a plateau in old age. Comparatively rare in children and in young adults.

### **Common causes of intestinal obstruction at each age group**

**Neonate** - Congenital atresia, Hirschprung's disease, Meconium ileus, Ano-rectal anomalies.  
Volvulus neonatorum,

- Infant** - Strangulated Inguinal hernia, Intussusception, complication of Meckel's diverticulum, Hirschsprung's disease.
- Young Age** - Adhesions and bands, strangulated Inguinal hernia.
- Middle Age** - Adhesions and bands, strangulated Inguinal hernia, strangulated Femoral hernia, Carcinoma of colon.
- Elderly** - Adhesions and bands, strangulated Inguinal hernia, strangulated Femoral hernia, carcinoma of large bowel, diverticulitis, Impacted feces.

### **Sex Incidence**

Intestinal obstruction is roughly equal in male and female.

### **Site**

Obstruction occurs in both small bowel and large bowel in these cases about 70 percent of intestinal obstructions occur in the small bowel and about 30 percent in the large bowel.

# PATHOPHYSIOLOGY

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

## **A) SIMPLE MECHANICAL OBSTRUCTION OF THE SMALL INTESTINE:**

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

- i. Accumulation of Fluid and Gas above the point of obstruction
- ii. Altered Bowel motility.

### **i) FLUID AND ELECTROLYTE DISTURBANCES**

The bowel above the obstruction is the most affected commonly initially. The ileum above an obstruction ceases to absorb sodium and water. So these substances get accumulated in the intestinal lumen and, as time passes, the rates of their secretion increase. Potassium, normally secreted by ileum, was secreted at an even greater rate after gut had been obstructed. In early stages there is accumulation of water,  $K^+$  and  $Na^+$ , due to retarded absorption. Prostaglandin release in response to bowel distension is thought to be a mechanism by which secretion into obstructed loop is increased.



The ileum below the obstruction showed only moderate changes in its absorptive and secretory capacity.

Since the fluid lost into the intestinal lumen was isotonic with the body fluids, the concentration of electrolytes in the serum was not altered until later in obstruction.

The fluid in lumen made up by whatever fluids the patients ingest as well as the various digestive juices-about 8000 ml per 24 hours.

Above pylorus 4000 ml	Saliva	1500 ml
	Gastric	2500 ml
Below pylorus 4000 ml	Bile and pancreatic	1000 ml
	Succus entericus	3000 ml

In obstruction, absorption from the gut is retarded but the exact concentration of excretion of water and electrolytes, varies depending on the particular site of intestinal obstruction.

The severity of depletion and the speed with which it manifests depends upon the level of obstruction. It is most severe and occurs early in high intestinal obstruction, later in ileal obstruction and is slow to appear in colonic obstruction.

The second route of fluid and electrolyte loss is into the wall of the involved bowel, accounting for the boggy oedematous appearance of the bowel. Thirdly, some of this fluid exudes from the serosal surface of the bowel, resulting in free peritoneal fluid. Fourthly and most obvious route of fluid and

electrolyte loss is by vomiting or Nasogastric tube aspiration after treatment is initiated.

Above said causes rapidly depletes the extra cellular fluid space, leading progressively to haemo-concentration, Hypovolemia, Metabolic acidosis, renal insufficiency, shock and death unless treatment is prompt and resolute.

(ii) **INTESTINAL GAS**

This is also responsible for distension of bowel above the obstruction.

This consists of swallowed atmospheric air (68%) diffusion from blood into the bowel lumen (22%) and the products of digestion and bacterial activity (10%). The O<sub>2</sub> and Co<sub>2</sub> (8%) has been absorbed into blood stream; the resultant mixture is made up of Nitrogen (90%) and Hydrogen sulphide. The enormous increase in the intestinal gas is mainly due to the marked increase in the gut bacteria both anerobes and aerobic organisms.

(iii) **BOWEL MOTILITY**

Initially, the bowel proximal to the obstruction shows increase in the peristaltic activity to overcome the obstruction, initiated by stimulation of stretch reflexes. These contractions account for the severe colicky abdominal pain. Increased peristalsis continues for a period from 48 hours to several days. The more distal the point of obstruction, the longer does it remains vigorous. If

the obstruction is not relieved, the increasing distension causes peristalsis to become feebler; Finally the peristalsis ceases, and the obstructed intestine becomes flaccid and paralysed.

The intestine below the point of obstruction exhibits normal peristalsis and absorption from it continues for 2 to 3 hours following the obstruction, until the residue of its contents has been passed onwards. Then the distal empty intestine becomes immobile, contracted and pale.

## **B) STRANGULATED OBSTRUCTION**

Caesation of blood supply to a segment of bowel in addition to obstruction of the lumen is usually referred to as **strangulated obstruction**. The first effect of strangulation is to compress the veins, and its involved mesentery, to become blue and congested. When the venous return is completely occluded, the colour of the intestine turns from purple to black. There is marked increase in the capillary pressure that results in escape of intravascular fluid and red blood cells into the bowel wall, its lumen and the hernia sac or peritoneal cavity. About this time, owing to increased oedema at the point of obstruction, the arterial supply is jeopardized mucous membrane becomes ulcerated and gangrene is imminent. Large amount of blood get sequestered in the strangulated segment which is proportional to the length of the segment.

Unlike non-strangulating obstruction, early distension of the proximal intestine is absent. By the time gangrene of the strangulated segment is imminent, retrograde thrombosis proceeds along the related tributaries of the mesenteric vein. Distension occurs, when the venous return is completely obstructed while the arterial supply remains unimpaired.

When the wall of the intestine becomes partly devitalized, both bacterial toxins and products of tissue autolysis pass into the peritoneal cavity, there to be absorbed into the circulation. This is followed by the migration of bacteria and peritonitis follows. Delay in the recognition and treatment of intestinal strangulation significantly enhances the mortality.

## **BACTERIOLOGY**

The normal upper small intestinal contents are virtually sterile. The distal small gut fluid may yield a scanty growth of faecal flora. The situation is quite different in the presence of obstruction. The bowel above the level of obstruction contain profuse bacterial colonies, predominantly faecal in type (Both aerobic and anaerobic) an increase in the anaerobic organisms especially **Bacteroides**. Experimental studies demonstrate that **Clostridium perfringenes** exotoxin contribute to the lethal activity of filter-sterilized strangulation fluids but direct clinical evidence is lacking. The longer the period of obstruction, the higher up the bowel this contamination extended.

The major threat to life in intestinal obstruction is the possible absorption of toxins, mainly from Gram Negative organisms in the presence of damaged bowel, particularly when strangulation is present. In unrelieved strangulation, toxic substances appear in the peritoneal cavity and absorption in the systemic circulation takes place. However, when obstruction is relieved, these toxins may pass on to the normal bowel where rapid absorption can occur. These factors stress the need for intestinal decompression before and during operation, and for adequate prophylactic antibiotic cover against Gram Negative organisms.

In carcinomatous stricture of the colon. It is occluded by the neoplasm distally while in one-third of cases the ileo-caecal valve prevent regurgitation of the contents of the large intestine into the ileum. As a result of anti peristalsis the pressure within the caecum becomes as high as to compress the blood vessels within its wall. If the obstruction is unrelieved, stercoral ulceration, gangrene and **pistol – Shot** perforation of caecum will eventually occur.

## CLINICAL FEATURES AND DIAGNOSIS

There are **Four** common complaints of patients with Acute obstruction:-

1. pain
2. vomiting
3. constipation / obstipation
4. Abdominal distension

All these complaints present in single case or in the different cases.

### 1. PAIN

Pain is the first and most common symptom. The onset may be insidious or abrupt. The pain is colicky and each attack lasts from 3 to 5 minutes. If the obstruction lies in the jejunum or high in the ileum the characteristic attacks of intestinal colic come at an interval of 3 to 5 minutes. In obstruction to the terminal ileum or the large intestine, the interval of freedom tends to be longer- from 6 to 10 minutes.

### 2. VOMITING

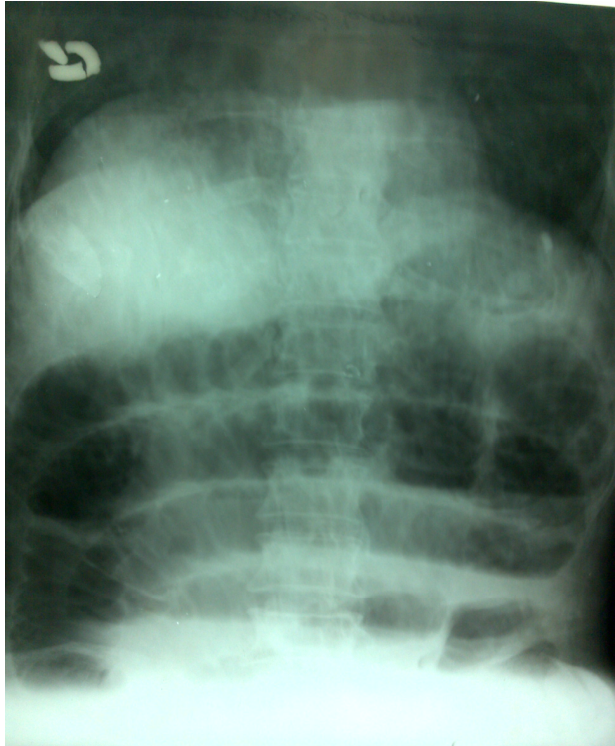
Usually occurs almost immediately after obstruction of bowel. This early vomiting is usually **reflex vomiting** and is due to obstruction of bowel followed by a variable quiescent period before vomiting resumes.

In high obstruction and vomiting is more frequent and copious leads to more rapid reduction in extra cellular fluid volume. With low small bowel obstruction, vomiting is less frequent and less productive so patient with low obstruction may look well even when he has quite marked physical signs in the abdomen. In low obstruction progresses, the vomit begins to assume faeculant character.

In closed loop obstruction, vomiting and small bowel distension may not occur. Reflex vomiting is unusual in colon obstruction. Vomiting results only after retrograde distension of small bowel occur due to incompetent ileo-caecal valve.

### **3. CONSTIPATION / OBSTIPATION:**

In complete intestinal obstruction, after the contents of the bowel below the obstruction have been evacuated, there is constipation, and usually neither faeces nor flatus is passed (absolute constipation). This rule does not apply in cases of Richter's hernia, Gall stone obstruction, Mesenteric vascular occlusion, and intestinal obstruction associated with a pelvic abscess, acute intussusception and there may be diarrhea of various types.



**X-RAY IN INTESTINAL OBSTRUCTION**



**DISTENDED ABDOMEN  
IN INTESTINAL OBSTRUCTION**



## **ABDOMINAL DISTENSION:**

In early cases of obstruction, abdominal distension is often slight or even absent. When the proximal jejunum is occluded, the stomach becomes distended and so epigastric region may be more prominent and tense. When the ileum is involved the central portion of the abdomen is moderately blown out and when the distal colon is blocked, there is considerable universal distension of the abdomen with well marked bulge in the flanks. Volvulus of the sigmoid may be accompanied by distension of stupendous proportions.

## **CLINICAL SIGNS**

The presence of an abdominal scar, whether recent or old, always suggests an underlying band or adhesions. In the early stage, the vital parameters are normal. At a late stage, the patient becomes anxious and pale, with a feeble rapid pulse, falling temperature and blood pressure, and typical features of dehydration – a dry skin, dry tongue, sunken eyes may be present. Shock may be more marked in the strangulated case.

### **Palpation:**

Usually reveals tenderness and rebound tenderness. This, together with muscle guarding, tends to be more marked in the strangulated case. A mass may be detected on palpation, such as carcinoma of the colon, diverticulitis of the sigmoid or an intussusception. The hernial orifice should be methodically palpated and a rectal examination should be performed. Typically, in an intestinal obstruction the rectum is ballooned. Occasionally impact mass of

faeces may be found or pelvic tumour may be palpable through the rectal mucosa or there may be telltale blood or slime on the examining finger.

## **BORBORYGMI**

Synchronous with the colic, it is often possible to hear borborygmi with the aid of a stethoscope, establishes the diagnosis in nine out of ten cases. The clinician should listen for at least a minute. Obstruction is indicated by high pitched splashing, rushing or tinkling sounds lasting at least a second and having a characteristic gurgling quality.

## **DIFFERENTIAL DIAGNOSIS**

Simple mechanical obstruction has to be distinguished from the following causes of acute abdomen which include:-

1. Acute Gastro enteritis
2. Pancreatitis
3. Appendicitis
4. perforated peptic ulcer
5. Renal or Biliary colic
6. Torsion of ovarian cyst
7. Medical causes e.g. Diabetic coma.

## DIAGNOSTIC STUDIES

### 1) LABORATORY TESTS

The loss of large amount of essentially isotonic extra cellular fluid into the intestine is principally responsible for the laboratory findings in simple mechanical obstruction.

- a) **Urine:**
  - Mild proteinuria or acetonuria
  - Specific gravity 1.025 to 1.030
  - Reduced urine output
- b) **HB %** -Elevated due to haemo concentration  
**PCV** -Elevated due to haemo concentration
- c) **WBC count** -Increased count of 15,000/mm<sup>3</sup> – in case of simple mechanical obstruction. 15,000 to 25,000/mm<sup>3</sup> increased neutrophils in strangulation.
- d) **Blood urea** - increased
- e) **Serum Na+, K+, Cl-, Hco3** - lowered
- f) **Serum Amylase** -increased

## 2) RADIOLOGICAL FINDINGS

As we take plain x-ray abdomen as only the radiological investigation to diagnose the intestinal obstruction, prime importance has been given to this and dealt with in detail. Erect films diagnose obstruction by showing multiple fluid levels, particularly if these are step-ladder. Supine films allow the nature of the distended bowel to be assessed.

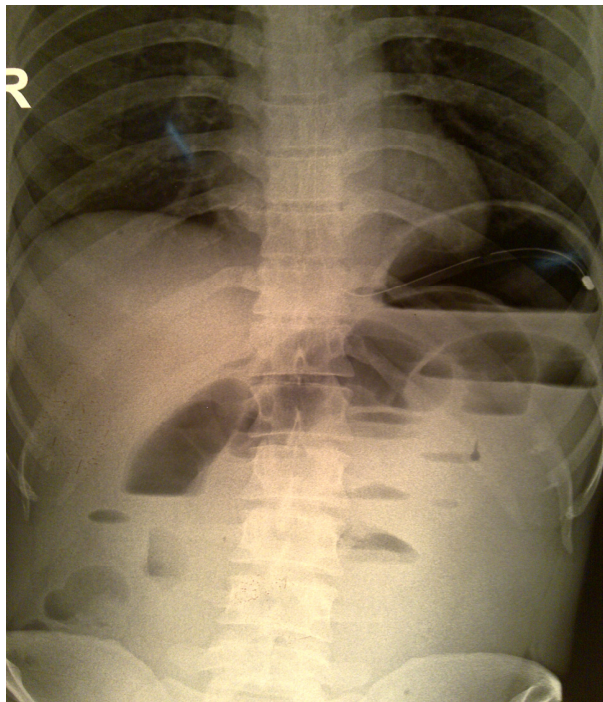
### **Gas shadows**

When the jejunum, the ileum or the colon is distended with gas, each has a characteristic appearance. Obstruction of the small intestine is revealed by relatively straight loops that generally lie more or less transversely in a **step – ladder** fashion. Obstructed large intestine is disclosed by its haustration markings; a distended caecum is shown by a rounded gas – shadow.

**Jejunum** is characterized by its **valvulae conniventes** that passes from the anti mesenteric to the mesenteric border, spaced regularly, giving rise to a **concertina** effect.

**Ileum** has been rightly described by Wangensteen as **characterless**

**X-RAYS IN ACUTE INTESTINAL OBSTRUCTION  
WITH MULTIPLE AIR-FLUID LEVELS**



**Large Intestine** shows haustral folds which are spaced irregularly, not traversing the complete width of the bowel, and indentations are not placed opposite to one another.

### **Fluid levels**

In intestinal obstruction it takes a little time for the gas to separate from the fluid; consequently, fluid levels appear later than gas shadows. When paralysis of the intestine has occurred, fluid level is proportionate to degree of obstruction and they become more conspicuous and more in number. The number of fluid levels is proportionate to degree of obstruction and to its site in the small intestine. The nearer the obstruction to the ileocaecal valve, the larger the number of fluid levels. Obstruction low in the colon does not commonly give rise to fluid level in the small intestine. Differential Air-fluid level in the same loop of 20mm or greater was moderately suggestive that a bowel obstruction was mechanical in nature.

## GENERAL OUTLINE OF TREATMENT

There are **four** measures for combating and over coming the effect of intestinal obstruction. They are

1. Naso gastric or when possible, Gastro intestinal suction drainage – used to decompress the distended bowel by aspirating the fluid as well as swallowed air.

2. Replacement of fluid and electrolytes

If acid gastric juice loss is prominent, then normal saline solution is used. Otherwise lactated Ringer's solution and 5% Dextrose in water in about equal proportions are preferred to replace the lost fluid. Potassium chloride also will be necessary but should not be given until good urine out put is established.

3. Antibiotics to prevent complications from associated sepsis, either local (peritonitis) or peripheral (chest complications) or general (septicemia).

4. Relief of obstruction by surgery

The surgical procedures for the relief of intestinal obstruction may be divided into seven categories (Goar et al, chaib eet al).

- a) Exploratory laparotomy for obstruction of uncertain origin.

- b) External drainage of the intestine proximal to the obstruction – enterostomy, caecostomy, colostomy.

- c) Short – circuiting anastomosis around an obstruction e.g. Entero enteral anastomosis or ileo colic anastomosis.
- d) Resection of bowel either to remove the obstructing lesion e.g. a carcinoma of the colon or because a strangulated segment of bowel has undergone irreversible ischaemic change.
- e) Lysis of bands or adhesion.
- f) Planned operations for specific obstructive lesions e.g. a strangulated external hernia or laparotomy for intussusception in a child.
- g) Enterotomy for removal of obstruction- Gall stones, Bezoars.



## MATERIALS AND METHODS

A total of 90 cases of acute intestinal obstruction admitted in all surgical wards, THANJAVUR MEDICAL COLLEGE HOSPITAL, THANJAVUR, over a span of 1 year from October 2014 – October 2015. Both men and women more than 15 years of age totaling 60 cases with features of acute intestinal obstruction were chosen. The paediatric patients were not included in this study.

The Age, Sex detailed History relevant to the etiology were noted. The characteristic clinical features of acute intestinal obstruction were abdominal pain, vomiting, constipation/obstipation, Abdominal distension and clinical signs including Fever ( $>37.2^{\circ}\text{C}$ ). Tachycardia ( $>100/\text{mt}$ ), Palpable abdominal mass if any were noted.

All the patients were subjected to investigation while resuscitative measures were on progress

1. Urine – albumin, sugar
2. Hb%
3. Blood Grouping with typing
4. WBC count
5. Blood – urea, sugar
6. Serum Creatinine, Electrolytes – in cases with severe dehydration.
7. X – ray chest PA view

8. ECG
9. Plain X-ray abdomen erect and supine position and results were recorded.

After adequate preoperative preparation, all patients were subjected to surgical procedures appropriate to the condition and preoperative pathology were noted.

The etiological incidence, Sex incidence, Age incidence, incidence of strangulation, value of plain X-ray Abdomen in diagnosis of acute intestinal obstruction, importance of early treatment were studied.

# STRANGULATION

## Definition

Occlusion of the blood supply to a segment of bowel in addition to obstruction of the lumen is usually referred to as **strangulated obstruction**. Interference with the mesenteric blood supply is the most serious complication of intestinal obstruction.

## Etiology

This frequently occurs secondary to

- a) External hernias like Inguinal, Femoral, Paraumbilical, Incisional hernias.
- b) Intra abdominal hernias.
- c) Adhesive band obstruction.
- d) Volvulus of – Sigmoid colon, Small bowel, Caecum etc.

## Differentiation between simple and strangulated obstruction:-

- a) **A sudden onset:** The symptoms nearly always begin suddenly and perhaps are of most reliable factor to differentiate strangulation from non-strangulating obstruction.
- b) **Shock:** Occurs early in severe strangulating obstruction.

- c) **Pain:** In both strangulating and non-strangulating obstruction this is typically colicky but it becomes continuous and sometimes unremitting.
- d) Elevation of **Temperature (37.2°C)** and **Tachycardia (100/mt)** are associated with strangulation.
- e) **Increase in WBC count** in the range of 15,000 – 25,000/mm<sup>3</sup> with polymorphonuclear predominance.
- f) **Metabolic acidosis** – is present after 12 hours in at least half of the patients with strangulation.
- g) Tenderness over an intra-abdominal strangulated coil and the **Rebound tenderness** is a distinctive sign of strangulation.
- h) Nearly 10 % of cases present with Presence of an **Abdominal or Pelvic swelling** which is tense and tender.

The clinical parameters, like **Continuous pain, Fever (>37.2°C), Tachycardia (>100/mt), Leukocytosis (15,000 – 25,000 cells/mm<sup>3</sup>), Palpable abdominal mass**, enable us to detect the presence of strangulation in about 38% of cases that too mainly in external hernias.

Despite advances made in the diagnosis and management of intestinal obstruction, its mortality rate is still high in case of strangulated obstruction. Bacteria and bacterial toxins play a role in causing mortality. For this reason high doses of antibiotics are indicated.

Mortality in case of strangulated obstruction can be reduced by

- a) Adopting immediate resuscitative measures to combat dehydration and Electrolyte loss.
- b) Preoperative and postoperative nasogastric/gastro intestinal suction and antibiotics.
- c) Early operations.
- d) Resection of dead segment of the bowel and adequate lavage of peritoneal cavity with normal saline with or without antibiotics so as to remove and dilute the toxic intra peritoneal fluid.

### **OPERATIVE FINDINGS IN STANGUALTED OBSTRUCTION**

On opening the abdomen, blood stained fluid present in the peritoneal cavity should be removed by suction or mopped up as completely as possible, for it is toxic and infected. After the relief of strangulation a decision must be reached as to whether the segment that was strangulated is viable. When it is black and the peritoneal coat has lost its sheen, when the mesentery shows a lack of arterial pulsation, or there is thrombosis of its veins, it is non-viable, if not already gangrenous, and, if practicable, resection followed by anastomosis is carried out. In doubtful cases when the intestine is blue, purple or dark red, the effect of wrapping it in a warm moist abdominal pack is noted. At the same time the anaesthetist administers 100% oxygen for 3 minutes. By these means viable is differentiated form non-viable intestine.

Special attention should be paid to the sites of pressure rings at each end of the segment. When strangulated intestine is deemed non-viable, it is resected and the continuity of the alimentary canal restored by end-to-end anastomosis. If the patients general condition is poor in case of large bowel strangulation are treated by Paul-Mickulicz type colostomy/Hartmann's procedure.

## **SMALL BOWEL OBSTRUCTION**

In our series it contributes (60 cases) in total, of which strangulated obstruction being (10 cases). In this series the following are major causes of small bowel obstruction.

- A. External hernia
- B. Adhesion and bands
- C. Tuberculous Adhesions
- D. Small bowel volvulus
- E. Meckel's Diverticulum
- F. Intussusception
- G. Ileo Sigmoid Knotting
- H. Miscellaneous

Jejuno-Gastric Intussusception

Small bowel Tumours

## **OBSTRUCTION CAUSED BY EXTERNAL HERNIA**

### **Definition:**

A hernia is the protrusion of whole or part of a viscus through an abnormal opening in the wall of its containing cavity. Most common External hernias are Inguinal, Femoral, and Umbilical.

In this study External hernia contributes to (40 cases) of total occurrence. Among External hernias (30 cases) is contributed by inguinal hernia and remaining by other hernias. Males are predominantly affected especially 3<sup>rd</sup> to 6<sup>th</sup> decade of life .

### **Etiology:-**

Three factors are involved in precipitation of hernia.

1. **Presence of pre formed sac:** A patent processus vaginalis is held to be the prime cause of indirect Inguinal hernia in infants, children and probably in adults.

2. **Repeated elevations in the intra abdominal pressure:**

- a) Chronic cough
- b) Straining on defaecation (constipation)
- c) Straining on micturition (BPH, stricture urethra)
- d) Pregnancy
- e) Ascites
- f) Intra Abdominal malignancy



### 3. **Weakening of the body muscles and tissues**

Occurs in old Age and obesity

#### **Pathology:**

The hernia either reduces itself when the patient lies down or can be reduced by the patient with expansible impulse on coughing is the common presentation.

It becomes irreducible when the contents cannot be returned to the abdomen and there is no evidence of other complications. It is due to adhesions between the sac and its contents or from over-crowding within the sac. Any degree of irreducibility predisposes to strangulation.

An irreducible hernia containing intestine which is obstructed from without or within, but there is no interference to the blood supply to the bowel, with absence of cough impulse, becomes an obstructed Hernia. When the blood supply of contents of obstructed hernia gets impaired, Strangulated Hernia results. Pathological features of strangulated hernia is as that of strangulating obstruction already discussed.

The constricting agent causing obstruction and strangulation of the contents are

#### **In Indirect Inguinal Hernia**

1. Neck of the sac
2. The external abdominal ring in children
3. Adhesions within the sac – rare



**STRANGULATED INCISIONAL HERNIA**



**RUPTURED INCISIONAL HERNIA**

### **In Femoral Hernia**

1. Narrow, unyielding femoral ring.
2. Narrow neck of the sac
3. Gimbernat's (lacunar) ligament.

### **In Paraumbilical Hernia**

1. Narrow neck
2. Fibrous edge of the linea alba.

Structures commonly involved in strangulations are

1. Small intestine – commonest
2. Omentum
3. Portion of a circumference of small intestine (Richter's hernia)
4. Large intestine – rarely involved.

### **Clinical features**

Sudden pain, at first situated over the hernia, is followed by generalized abdominal pain, paroxysmal in character and often located mainly at the umbilicus. Vomiting is forcible and usually often repeated. The patient may say that the hernia has recently become larger.

On examination, the hernia is tense, extremely tender, and irreducible and there is no expansile impulse on coughing.

## **Treatment**

Vigorous manipulation (taxis) has no place in modern surgery. Its dangers include;-

1. Contusion or rupture of the intestinal wall.
2. Reduction – en – masse
3. Reduction into a loculus of the sac.
4. Sac may rupture and its contents are reduced extra peritoneally.

In obstructed/Strangulated hernia **operative treatment is mandatory.**

Strangulated omentum must always be resected. Strangulated small bowel resected and end-to-end anastomosis carried out.

## **For Indirect Inguinal hernia**

With liberal Inguinal incision skin, subcutaneous tissue incised and the body and fundus of the sac together with its covering and the testis (in male) delivered onto the surface. The sac is incised, the fluid there in is mopped up or aspirated. Then the external oblique and superficial Inguinal ring divided.

A finger passed into the opening made in sac, and employing the finger as a guide, the sac is slit along its length (this will divide two constrictions lying at external ring or in the Inguinal canal).

When the constricting agent is at the deep ring it may be possible to continue slitting up the sac over the finger beyond the point of constriction or a grooved director is inserted and the neck of the sac is divided with a knife in an upward and inward direction under vision. Now draw down the content and examine and dealt accordingly.

After transfixing the sac, repair the hernia.

### **In case of Femoral hernia**

Modified **Lotheissen's** procedure is the operation of choice with inguinal incision, skin, subcutaneous tissue divided. As soon as external oblique has been exposed, the inferior margin of the wound is retracted strongly, there by displaying the swelling. The covering of sac is incised and peeled off. Sac is incised and fluid is drained out. The Inguinal canal is opened. The transversalis fascia is incised to the medial side of the epigastric vessels and the opening is enlarged. Once opening the peritoneum above the Inguinal ligament, the content of sac is inspected. Should the obstruction lie in a narrow neck of sac, the beak of a haemostat is insinuated and neck is stretched (may injure abnormal obturator artery). The contents of the sac are delivered and dealt accordingly and the hernial defect is repaired.

## **OBSTRUCTION CAUSED BY ADHESIONS AND BANDS**

Adhesions or solitary bands are the most common cause of intestinal obstruction in the western world.

**Mc Entee** al of United Kingdom showed that adhesions and bands are important prime cause for intestinal obstruction which accounts for 49%, 32% in their studies respectively.

### **Etiology**

The causes of intra peritoneal adhesions are shown below:-

1. Ischemic areas - Sites of anastomosis  
Reperitonealization of raw areas
2. Foreign bodies - Talc, starch granules, gauze lint,  
Cellulose, non-absorbable sutures.
3. Infective disease - Peritonitis  
Tuberculosis
4. Inflammatory disease - Crohn's disease
5. Radiation enteritis -
6. Sclerosing Peritonitis - usually drug induced (eg.Practolol)

The number 1 and 2 constitute post-surgical (operative) adhesion and it is the most common category. Appendicectomy, Gynecological surgery and surgery of large bowel were the most common preceding surgical procedure. Post operative adhesion giving rise to Intestinal obstruction usually involves the lower ileum.

## **Pathology**

Following Abdominal surgery, fibrinous adhesions always form between the intestinal loops. In the majority of cases, these fibrinous materials become organized with the ingrowth of both fibroblast and capillaries to form adhesions. Adhesions are best regarded as an attempt by the body to revascularize ischaemic area. Adhesions form at the line of a bowel anastomosis or to a laparotomy scar as a result of the strangulating effects of sutures.

The earlier belief in maintaining the intactness of peritoneal endothelium to prevent fibrinous adhesions is replaced by the fact that large peritoneal defects which are left open and bleeding heal within a few days into a smooth glistening new serosa. However if the injury is accompanied by vascular damage (if the tissues are crushed, sutured or ligated) then adhesions develop.

The peritoneum reacts in a similar manner to foreign material as it does to ischaemic tissue. Therefore, granulomas and adhesions may result from fragments of gauze, unabsorbed suture material, talc or starch glove powder introduced at the time of laparotomy.

### **Clinical features:**

Obstruction may present in early post-operative period or may occur at any time after abdominal surgery or an intra abdominal





**STRANGULATED INCISIONAL HERNIA**



**RUPTURED INCISIONAL HERNIA**



inflammatory episode. When symptoms arise shortly after an abdominal operation, it has to be differentiated from Post-operative ileus.

The patient with late adhesive obstruction may give a history of number of previous episodes of subacute obstruction. The clinical features are those of classic low small gut obstruction with severe central colicky abdominal pain, nausea, vomiting and abdominal distension. Examination reveals central distension of the abdomen, nearly always with an abdominal scar from previous surgery, with rebound tenderness, increased bowel sounds. Plain X-ray abdomen usually demonstrates multiple fluid levels.

#### **Treatment:**

- 1. Non operative Treatment** with Naso-Gastric tube drainage combined with intravenous fluid therapy is extremely beneficial for all types of adhesions and occasionally it is curative in those cases that develop obstruction within 3<sup>rd</sup> and 6<sup>th</sup> postoperative days. Patient who will respond to tube decompression of the GIT usually do so in the first 48 hours (**Bizer et al, Brolin et al. Peetz et al, Wolfson et al, Cox et al**). There is **no** convincing evidence that long intestinal tubes are more efficacious than Nasogastric tube in the decompression of small bowel obstruction.

## **2. Adhesiolysis (enterolysis)**

The abdomen opened through previous wound after excising the scar. Although many adhesions are often present, frequently only one of those found to be the cause of obstruction which was divided near the insertion where it is least vascular. At other times the intestine is angulated by adherence to the parietes, to the mesentery, to the nearby structures. In these circumstances it is sometimes possible to free the obstructed intestine by dissection. In order to prevent recurrence the bare areas should be covered with omental grafts.

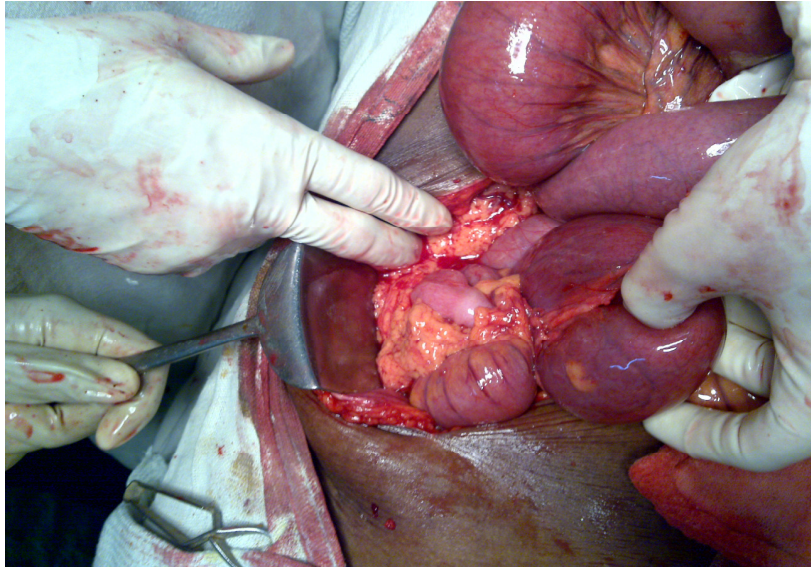
## **3. In cases of Recurrent adhesions:**

- a) Noble's plication operation
- b) Child's – Phillip's transmesenteric plication were recommended.

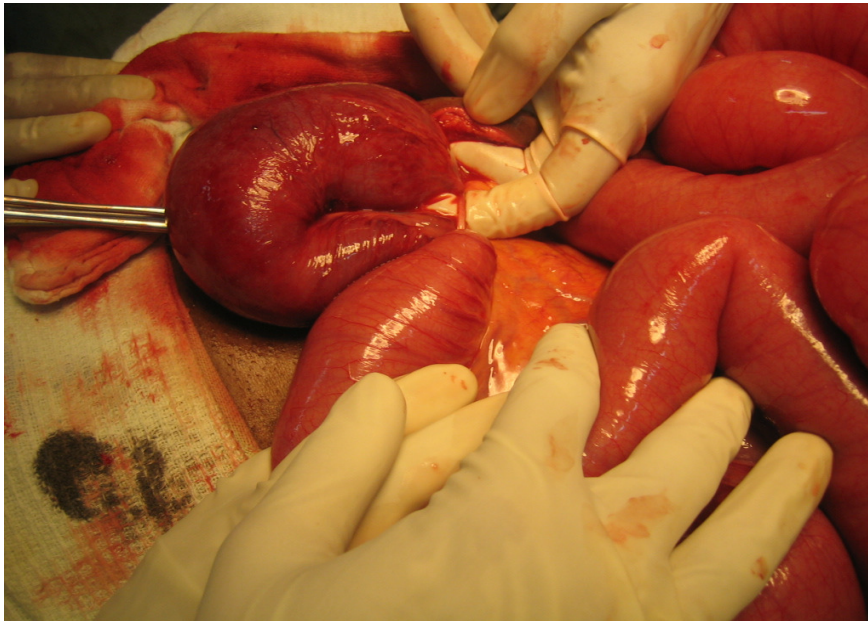
## **Prevention of Adhesion formation**

The following precautions are aimed at minimizing adhesion formation after Abdominal surgery:

1. Meticulous surgical Technique
2. Washing the peritoneal cavity with **saline** or **Dextran (Fabri et al)** solutions at the end of the procedure to remove clots and implanted foreign bodies (glove power, suture material).
3. Avoidance of excessive packing with gauze.



**ILEAL BAND WITH CONGESTED BOWEL**



**CONGENITAL ILEAL BAND**

4. Covering anastomosis and raw peritoneal surface with the greater omentum.
5. Leaving raw peritoneal areas unsutured. Numerous substances have been instilled into the peritoneal cavity in the hope of preventing adhesion formation. Hyaluronidase, Hydrocortisone, Silicone, Fibrinolysin, Dextran, Poly vinyl pyrrolidone (PVP), Chondroitin, Streptomycin solutions have been tried. No single substance has been demonstrated to be completely effective and safe in clinical use.

### **OBSTRUCTION BY A BAND**

A band (usually one band only is culpable) is occasionally the cause of acute obstruction. Such a band may be,

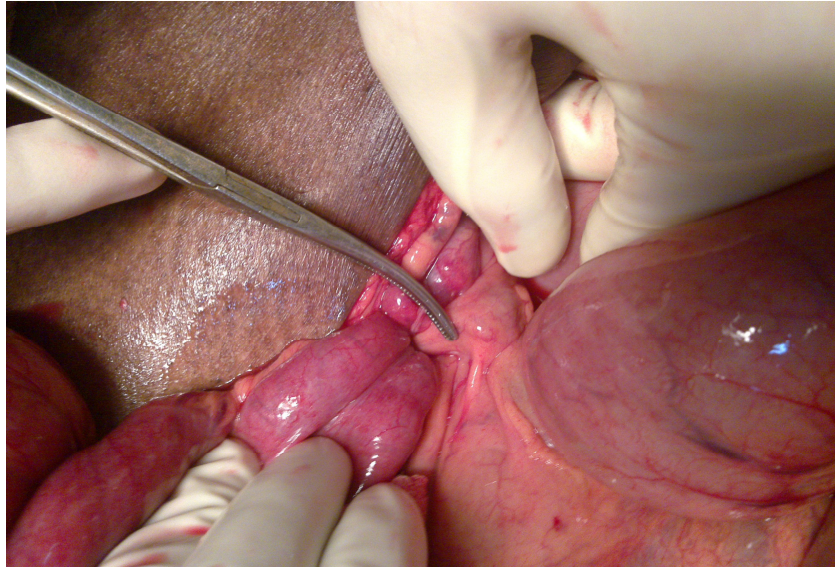
Congenital – often an obliterated vitello- intestinal duct.

A string – like band, frequently thin and fragile, following previous bacterial peritonitis.

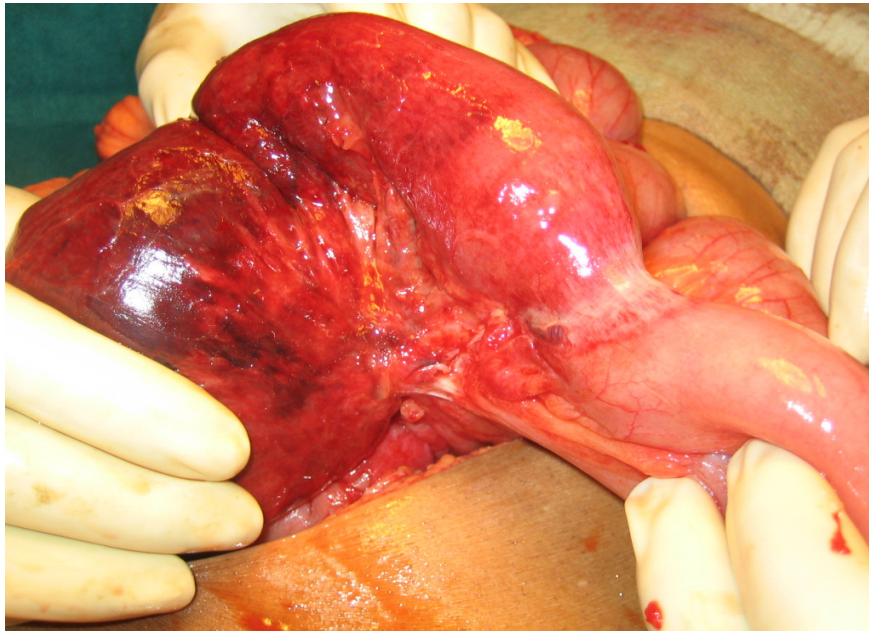
A portion of greater omentum, adherent usually to the parietes, constitutes an obstructing band.

#### **Treatment:**

1. If involved intestine is viable, division of the band and release of the obstructed loop is the simplest surgery.



**TUBERCULOUS NODULE**



**ILEO CAECAL TUBERCULOSIS**

2. After releasing the band the entrapped intestine regains its colour usually.

If the involved bowel is found to be gangrenous, resection and end-to-end anastomosis is the choice.

If the constriction sites that have suffered direct compression by the band show any residual colour changes, they should be invaginated.

### **OBSTRUCTION CAUSED BY ABDOMINAL TUBERCULOSIS**

Intestinal tuberculosis is a common disease prevailing in our country. This study includes only those cases of abdominal tuberculosis which presented as acute intestinal obstruction and account for 8.37% (**15 cases**) in total.

Main source of infection is swallowed sputum.

#### **Pathology**

Commonly the **Fibrous (Plastic)** form present as acute intestinal obstruction characterized by production of widespread fibrous adhesion. In the acute phase the bowel in the ileo-caecal region is red, oedematous and friable with visible tubercles on the serosa. In the more chronic phase the wall of the intestine is thickened due to granulomatous infiltrates and fibrosis and forms a mass in the right iliac fossa. On naked eye examination, the lesion may be indistinguishable from Crohn's disease of the terminal ileum and caecum.

Histologically there is little difference between the lesions in the small intestine and hyperplastic mass found in the ileo-caecal region. The

mucosal ulcers do not usually penetrate the muscularis mucosa, but deep to the layers there are masses of granulomatous follicles often with central caseation and lymphocytic infiltration. The Granulomata are scattered through all the layers of the intestine from the mucosa to the serosa. Unlike Crohn's disease, abscess and fistula formation are uncommon in tuberculosis. Sometimes there may be combination of tuberculous peritonitis with stenotic lesions in the small intestine. In tuberculous enteritis the typical granulomatous lesion leads to the formation of multiple strictures and intestinal obstruction.

### **Clinical features**

Most common presentation of abdominal tuberculosis in our country is acute or chronic obstruction.

Abdominal pain is the commonest symptom in both the obstructive and non-obstructive group (**Das et al**) Vomiting is also a frequent symptom in obstructive group. Although perforation of the small intestine is uncommon, it may occur in a dilated loop of ileum proximal to a stenotic tuberculous lesion causing obstruction. Anorexia, loss of weight with abdominal distension are also present. Distended coils act as a **blind loop** and give rise to steatorrhoea. In the chronic intestinal obstruction there are usually symptoms of increasing constipation and loss of weight. The obstruction may be due to stricture of small intestine either single or multiple.

## **Investigations:**

A Plain X-ray abdomen erect may show multiple fluid levels with or without Ascites. There may be diffuse calcification or evidence of localized abscess.

## **Treatment**

1. If a tuberculous abdomen is opened due to a mistaken diagnosis unless there is any mechanical obstruction present, only an omental or Lymph node biopsy must be taken and sent for histopathological examination. Exploration of abdomen should be followed by a course of antituberculous drugs viz. Rifampicin, INH, Ethambutol, pyrazinamide.
2. **Division of band or adhesiolysis** is sufficient if band or adhesions are causing obstruction and followed by a course of antituberculous drug.
3. For ileo-caecal lesion, a **limited resection** of terminal ileum and caecum is adequate. A formal Right Hemicolectomy is not required (**Pujari**). A bypass ileo-transverse anastomosis should be avoided for fear of creating **blind loop**.
4. If a single stricture is found as culprit, **Stricturoplasty** is sufficient (**Joshi**)



5. If adhesions are accompanied by multiple fibrous strictures of the ileum situated close to each other, it is best to excise the affected bowel only **(limited resection)**.

## **VOLVULUS OF SMALL INTESTINE**

Volvulus of small intestine accounts for about 20% of all cases of intestinal obstruction (excluding hernia) that have been reported in (**Agarwal and Misra**) in literature. In this study 2 cases were reported and all of them required resection.

### **Predisposing factors**

Small intestine volvulus often follows a previous pathological lesion such as

- a. Congenital anomalies like Meckel's diverticulum
- b. Local peritonitis
- c. Tuberculous mesenteric-lymphadenitis
- d. An abdominal operation.

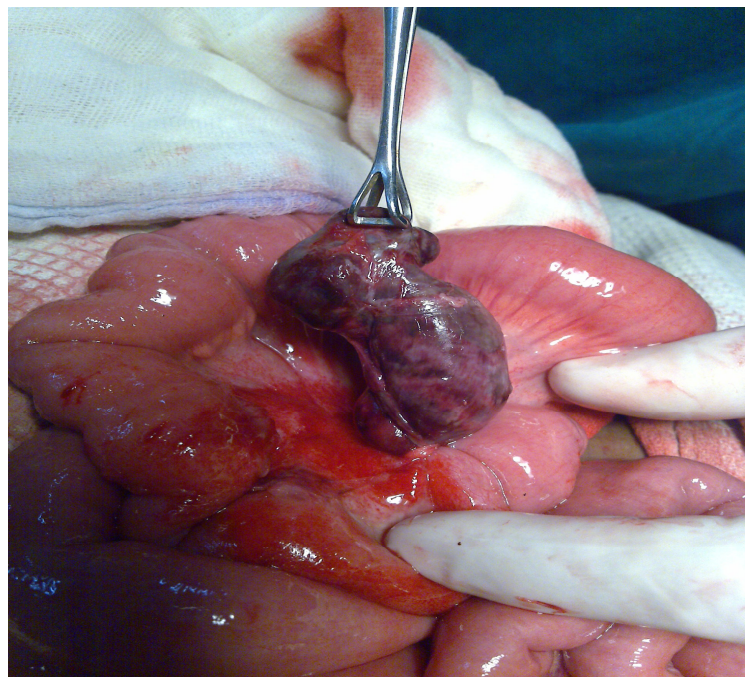
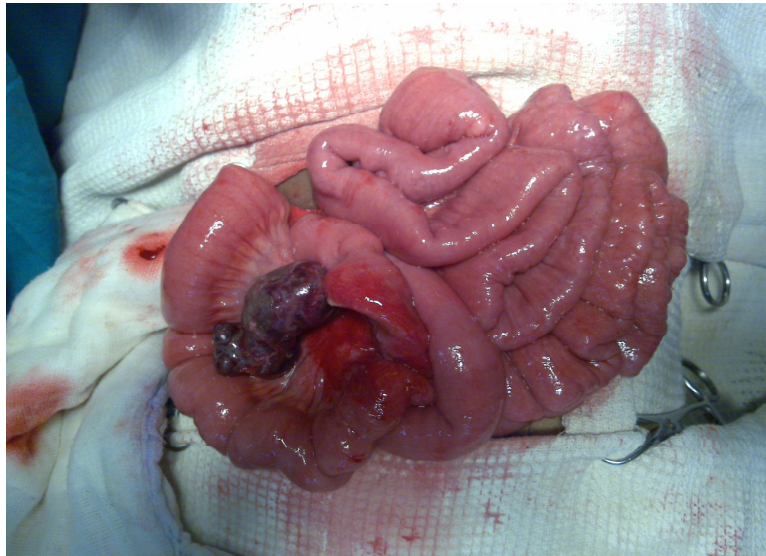
These favour formation of adhesion passing from the antimesenteric border of an intestinal loop to the parietes.

In Africa, consumption of a large meal of maize and vegetables seems to predispose this condition.

**Pathology:**

The loop of intestine generally twist in a **clockwise** direction. The lower quarter of ileum is most commonly involved, although at times a

**GANGRENOUS MECKEL'S DIVERTICULUM**



large part of small gut (or) whole of the jejunum and ileum and its mesentery may undergo rotation.

**Clinical features:**

The signs and symptoms are more of small gut obstruction with strangulation. The distended coils of small intestine may be felt through the abdominal wall.

**Investigations:**

Plain X-ray abdomen erect shows multiple fluid levels and gas shadow pertaining to the small bowel obstruction.

**Treatment**

Laparotomy and untwist the bowel if it is found to be viable. Divide the causative band

If bowel is gangrenous and the mesentery cannot be untwisted, resection and end-to-end anastomosis should be done to maintain the intestinal continuity.

**MECKEL'S DIVERTICULUM**

It is one of the rare causes for acute intestinal obstruction. In this series 1 case was reported contributing 0.55% . It is present in 2% of human race, situated upon the anti mesenteric border of small intestine, commonly 2 feet from the ileo cecal valve and it is usually 2 inches long. Being congenital diverticulum, it possesses all three coats of the intestinal wall.

The presence of a band between the apex of the diverticulum and the umbilicus may cause obstruction either by band itself or by a volvulus around it or obstruction within a hernia.

### **Clinical features**

In most cases, Meckel's diverticulum is an incidental finding and usually asymptomatic. All features of intestinal obstruction occur. X-ray show features of small bowel obstruction but fails to identify the cause.

### **Treatment:**

1. In Non gangrenous obstruction –Meckel's diverticulectomy is the choice (Volkov et al).
2. In Gangrenous obstruction resection of a segment of the ileum containing the diverticulum followed by end – to – end anastomosis.

## **OBSTRUCTION CAUSED BY INTUSSUSCEPTION**

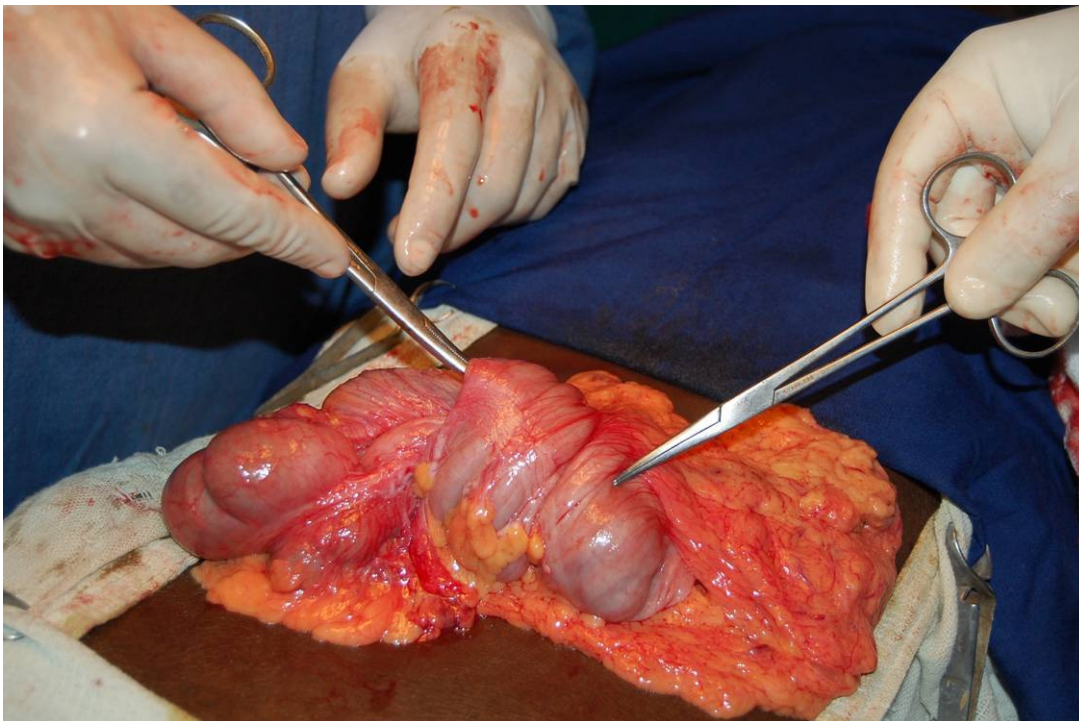
Intussusception can occur at any age. In the adult, intussusception is comparatively rare, accounting for about 5 percent of all obstructions. Common in some African communities.

### **Etiology**

This is usually a tumour forming the apex of the intussuception which tend to be a benign lesion in small bowel intussusception and a malignant tumour in intussusception of the colon.



**SMALL BOWEL INTUSSUSCEPTION**



**LARGE BOWEL INTUSSUSCEPTION**

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

### **Clinical manifestations**

Usually dominated by the general signs and symptoms of intestinal obstruction. Presence of lump and passage of blood per rectum often suggest the diagnosis. During the height of an attack, an obvious mass may be present but may disappear completely when the patient is reexamined just a few hours later.

### **Radiological examination**

1. Plain X-ray abdomen Shows dilated loops of small bowel with multiple fluid levels.
2. Barium enema: -used to diagnose an intussuscepting large bowel tumour. Indeed, this may produce at least temporary reduction of intussusception.
3. CT Scan : - extremely useful to detect the involved segment and a mass lesion from intussusception. Three concentric circles that form as one segment of bowel invaginates into another and central circle by entering layer of intussusception, and 2<sup>nd</sup> circle by entrapped mesentery and 3<sup>rd</sup> circle represents the intussusciens (IKO et al).

**Treatment:**

Treatment of adult intussusception is invariably surgical.

In large bowel intussusception risk of malignancy as the cause is high and so resection is done without any attempt at reduction.

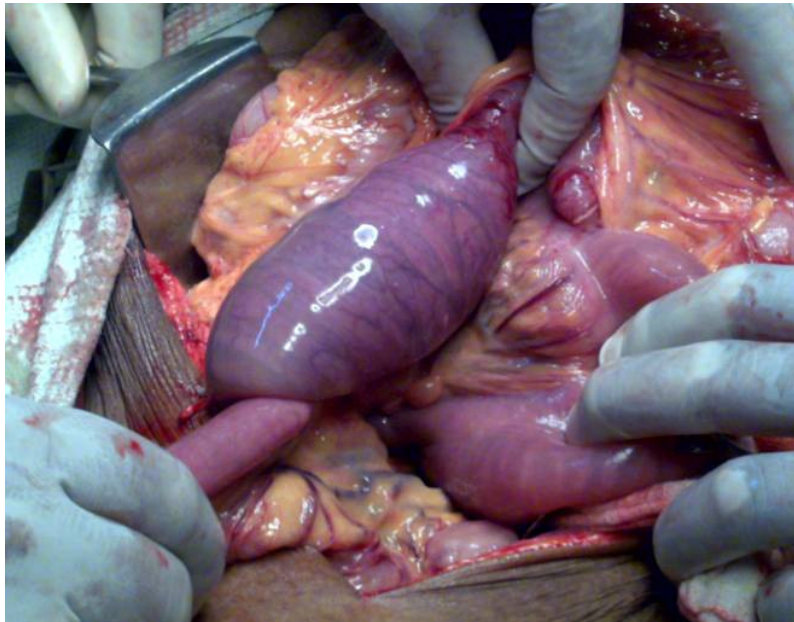
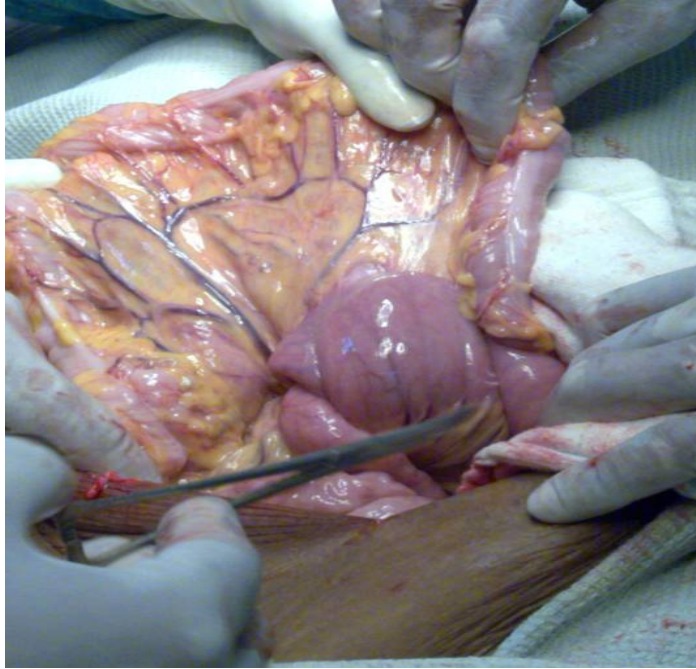
- ❖ Reduction should be attempted.
- ❖ If bowel is Gangrenous- resection and end – to end anastomosis must be carried out.
- ❖ In idiopathic cause, nothing further than reduction need to be performed.
- ❖ Benign lesion causing intussusception – enterotomy and removal of lesion (polypus).

**ILEO SIGMOID KNOTTING**

A loop of ileum wraps around the base of an elongated sigmoid colon or vice versa. It is a variant of midgut volvulus. Also called as compound volvulus, double volvulus, intestinal knot syndrome of ileo sigmoid intertwining results in two closed loop obstruction



## **JEJUNO GASTRIC INTUSSUSCEPTION**



**Efferent loop of gastro jejunostomy entering the stomach**



An abnormally long sigmoid colon with a lean and lengthy ileal mesentery.

**CLINICAL FEATURES:**

Dramatic onset of obstructive symptoms with rapid deterioration of general condition.

**INVESTIGATIONS:**

Plain X-ray abdomen

- i) shows distension of both ileal loops and sigmoid colon.
- ii) Disproportionately dilated loops of the bowel with their limbs directed downwards into their lower quadrants.
- iii) Small bowel air fluids levels.
- iv) Undistended but faecal loaded bowel proximal to the pelvic colon.
- v) Medial deviation of the descending colon.

Immediate surgery is the choice to prevent mortality from gangrene ileum 80% and sigmoid 50%.

**MISCELLANEOUS**

**JEJUNO GASTRIC INTUSSUSCEPTION**

Rare acute abdominal condition

200 cases reported worldwide- most cases reported are not diagnosed pre-operatively

Anatomical classification:

- ◆ Type I - AFFERENT [ANTEGRADE]
- ◆ Type II - EFFERENT [RETROGRADE]
- ◆ Type III - Combined

Mechanism-poorly understood

Surgical option

-Manual reduction

-Resection of gangrenous bowel and revision of anastomosis

-Fixation of jejunum to mesocolon,colon or stomach- to prevent recurrence

### **SMALL BOWEL TUMOURS :**

Rare, both benign and malignant types collectively account for less than 10% of all Gastro Intestinal Tract neoplasms. Risk factors are Crohn's disease, celiac disease, dermatitis herpetiformis, Peutz Jeghers syndrome, radiation enteritis and adenomas.

**BENIGN:**

60% of small bowel neoplasms.

Mostly asymptomatic and are incidental findings.

**Types:** Epithelial tumours,villous adenomas, lipomas, haemangiomas and neurogenic tumours.

- May occur in association with any of the various types of familial polyposis.

- Gardner's Syndrome : Familial polyposis and epidermoid cysts.
- Turcot's syndrome : Familial polyposis and brain tumours.
- Villous tumour is prone for malignant change.
- Commonest presentation is intestinal obstruction due to intussusception, iron deficiency anaemia and gastro intestinal bleeding.

**MALIGNANT:**

Rare, less than 5% of all Gastro intestinal neoplasms.

<b>Types:</b>	Adenocarcinoma	-40%
	Carcinoid tumour	-30%
	Lymphoma	-25%
	Smooth muscle tumour	-5%

It occurs in patients with hereditary polyposis syndromes, familial polyposis, Peutz-Jegher's syndrome, Crohn's disease. The sequence is hamartoma – adenoma - dysplasia – carcinoma. Adeno carcinomas are well differentiated mucus secreting tumours.

**Incidence:** Duodenum-40% Jejunum-40% Ileum-20%

**Clinical features:** Age - over 40 to 50 years, Sex - equal distribution.

Epigastric or periumbilical discomfort or pain. Post prandial colicky pain, nausea, vomiting, weight loss and Gastro Intestinal bleeding, anaemia, guaiac positive stools and jaundice in periampullary lesion. Intestinal obstruction is an advanced stage. This tumour does not respond to chemotherapy or radiotherapy. Surgical resection is the choice.

## **LARGE BOWEL OBSTRUCTION**

It contributes to (30 cases) in total in which strangulated obstruction being (3 cases). In our series the following are major causes of large bowel obstruction.

- a. Sigmoid volvulus
- b. Malignant growth of large bowel.

### **OBSTRUCTION CAUSED BY SIGMOID VOLVULUS**

#### **Definition**

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

#### **Incidence**

In our study majority of large bowel obstruction is caused by sigmoid volvulus which contributes to (11 cases) in contrast to Western literature, where it account for 2% and ranks third among the causes of acute intestinal obstruction. The incidence is high in Russia, Eastern Europe, central and Eastern Africa and south East Asia. In India, there is a wide variation in its incidence in different parts of the country being more common in Bihar, Madhya Pradesh, Uttar Pradesh and

Maharashtra. Avotins and Waugh described a volvulus belt. It is rare in western Europe and North America.

## **Predisposing causes**

1. Band of adhesions (peridiverticulitis) either tethering the base of the two limbs closed together or fixing the apex.
2. Overloaded pelvic colon
3. Long freely movable sigmoid loop on a long and freely movable mesosigmoid.
4. Acquired mesocolon.
5. Narrow attachment of pelvic mesocolon.
6. the absence of the last band of Lane and creation of a wide left paracolic gutter.(Pujari)
7. Fibrosis in the middle of mesosigmoid (Intermediate group of lymph node) narrowing the base and creating a sort of a pedicle.
8. The lateral limb of the mesosigmoid is always in approximation with ovaries in females but it has a very variable disposition in male extending from internal inguinal ring to the left iliac crest. Hence this horizontal upper limb, which is seen in males, predisposes to volvulus.

## **Pathology**

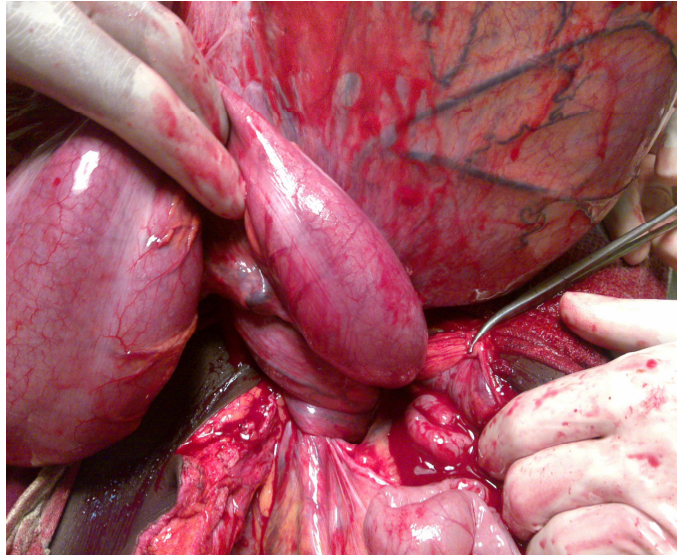
In most cases of sigmoid volvulus the upper limb of the loop descends in front of the lower, twisting on its mesenteric axis from one and a half to two turns in anticlockwise direction. The loop may rotate half a turn in which event spontaneous rectification can occur. After one and a half turn rotation the veins involved in the torsion are compressed. If it rotates more

than one and a half turns, the blood supply is cutoff entirely and the loop becomes gangrenous. The loop is instantly distended to its utmost capacity by gas (partly due to CO<sub>2</sub>) which cannot be absorbed, and in a very short time becomes cyanotic, water logged and gangrenous. A large quantity of blood gets sequestered and may cause fatal collapse. Death is usually due to peritonitis from perforation of the closed loop or from rupture of a gangrenous patch of intestine proximal to the twist itself.

### **Clinical features**

There is often a history of acute attacks of left sided abdominal pain, probably due to partial volvulus, that untwists itself and is followed by the passage of large quantities of flatus and faeces.

Onset of volvulus is sudden and is characterized by severe abdominal pain, often coming on while the patient is straining at stool. Abdominal distension soon follows mainly left sided and in a matter of 6 hours the whole abdomen becomes distended. Hiccough and retching occur early; vomiting is late. Constipation is absolute. Peristalsis is rarely visible in the distended loop. Marked pallor is often observed and is due to shock and to loss of blood.



**SIGMOID VOLVULUS SHOWING  
TWISTED MESOCOLON**



**X-RAY OF SIGMOID VOLVULUS-  
BENT INNER TUBE APPEARANCE**

## **Investigations**

1. Plain X-ray abdomen erect reveals a distended sigmoid loop giving a coffee bean or bent inner tube appearance. The Frimann-Dahl Sign is pathognomonic and is often present. Haustral markings are absent. Three dense lines converging towards the obstruction are characteristic. Two air fluid levels are almost always seen within the sigmoid loop.
2. Gastrograffin enema shows a narrowing at the site of torsion with “spiralling” of the mucosal folds and the pathognomonic ‘birds beak’ or ‘ace of spades’ deformity and normal mucosal pattern in the rectum distal to the dilated loop. Barium enema is contraindicated when gangrene is suspected because of danger of perforation.
3. CT scan is useful in sigmoid volvulus producing non specific pattern in plain X-ray. The “WHIRL SIGN” is the descriptive term for the CT appearance of volvulus. The whirl is constituted by afferent and efferent loop and central portion by twisted mesentery and bowel (Shaft et al).

## **Management**

The aim of treatment is two fold.

- 1) To relieve the torsion
- 2) To prevent recurrence.

Initial treatment can be either Conservative (or) operative.



1. **Conservative Treatment** is indicated only when the sigmoid twist is less advanced. This is a temporary measure; the recurrence rate is high and complication rate is substantial.

a) Passing a well lubricated soft rubber flatus tube through a sigmoidoscope into the twisted area relieves obstruction in 84-91% cases, but recurrence rate is 40-90% (William).

b) Simple Enema or Barium enema may relieve.

c) Derotation of volvulus using the colonoscope

**CONTRAINDICATION FOR CONSERVATIVE TREATMENT:**

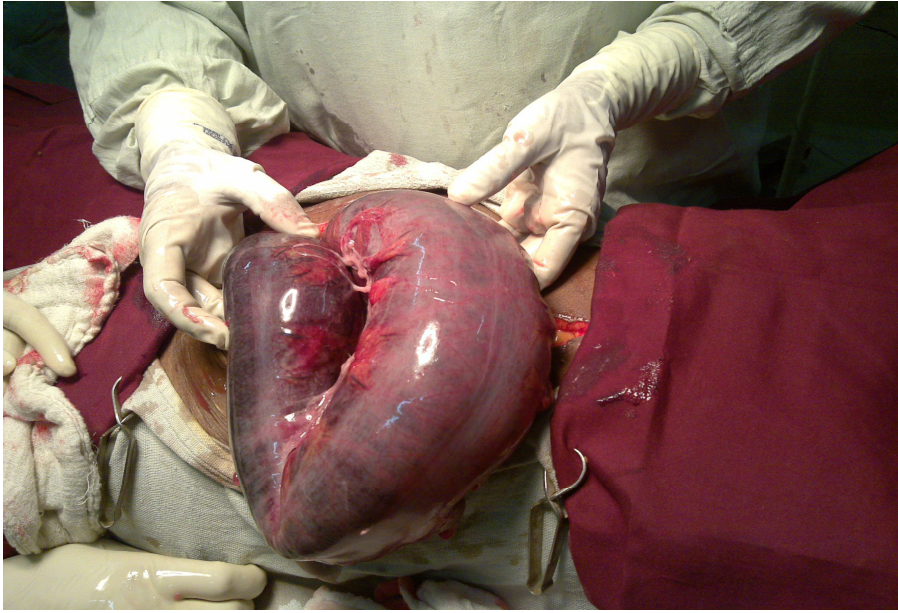
- i. Compromised bowel viability
- ii. Perforated bowel with free air in the abdomen.
- iii. Peritonitis
- iv. Internal hernia with strangulation.

2. **Operative Treatment** operative intervention is necessary

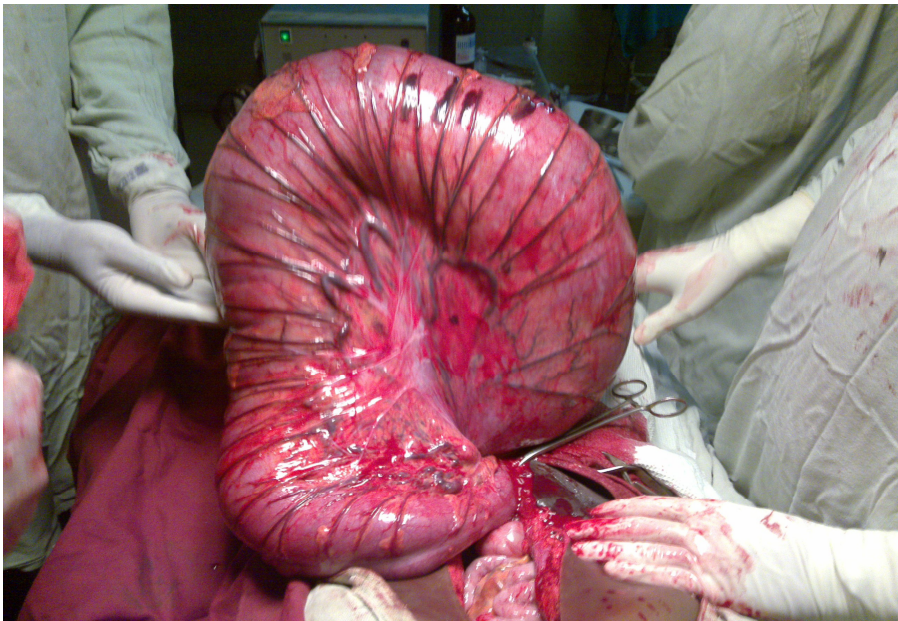
- i. early cases if conservative measures fail
- ii. Gangrenous loop
- iii. Electively to prevent recurrence.

The methods available are:

- a.) Operative detorsion without sigmoidopexy.
- b.) Resection with primary end- to-end anastomosis



**SIGMOID VOLVULUS WITH GANGRENOUS COLON**



**SIGMOID VOLVULUS WITH DISTENDED SIGMOID COLON**

c.) Paul-Mickulicz type double barrel colostomy.

d.) Hartmann operation

### **Operative Detorsion**

Through a left low paramedian incision abdomen opened and the volvulus is untwisted in the clockwise direction. Reduction is facilitated by passing a rectal tube into it past the twist. The viable deflated bowel replaced into the abdomen and rectal tube left in situ for about 14 days. If it is difficult to reduce the volvulus, deflate it by an aspirating needle. The site of needle puncture is inverted by a purse-string. Following detorsion, recurrence is common.(Cuschieri).

If the loop is non-viable, it must be resected. Following resection, the surgeon has his choices, determined by local and general condition of the patient:

- a) Perform an end – to –end anastomosis to reconstitute colonic continuity. This is the preferred choice. The anastomosis should be in one layer, using interrupted inverting sutures of 2/0 or 3/0 non absorbable material.
- b) To bring both cut ends of bowel to the surface- the proximal ends as an end colostomy and the distal end separately as a mucous fistula – Paul-Mickulicz operation (Ottinger LW). Intestinal continuity is restored at a later date.

- c) The length of distal bowel available may not permit its cut end being brought to the surface. The distal cut end is oversewn in two layers and returned to the pelvis, while the proximal cut end is brought out as an end colostomy –(HARTMANN’S Procedure).  
Intestinal continuity is restored at a later date.

Elective resection is indicated in

1. Patients treated conservatively.
2. Patients previously treated by simple operative detorsion.

### **OBSTRUCTION CAUSED BY CAECAL VOLVULUS**

Although volvulus of the Caecum is the term commonly employed, it is anatomically a misnomer, because the terminal ileum and ascending colon are usually involved. Other terms employed include volvulus of the Ileocolic segment, Ileocaecal volvulus and volvulus of the right colon. In our series two cases were reported.

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

#### **Predisposing factors**

1. abnormal mobility of both the caecum and the ascending colon occurs due to
  - a) complete malrotation.

- b) A common ileocaecal mesentery
  - c) Imperfect fixation of caecum
2. Extremes of dietary intake.
  3. Previous abdominal operations.
  4. Post inflammatory peritoneal adhesions
  5. Upward displacement of caecum due to pregnancy, pelvic tumours, cysts.

### **Clinical features**

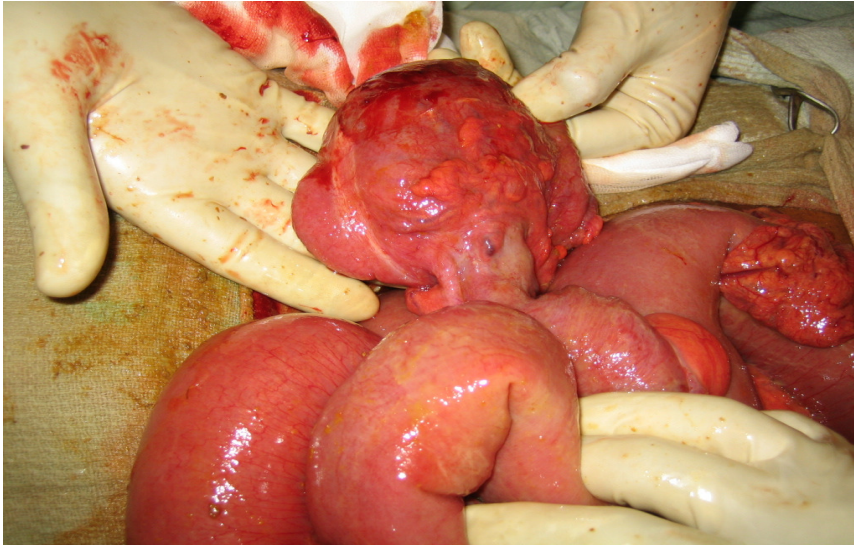
Occur in any age but majority in the 5<sup>th</sup> and 6<sup>th</sup> decades, it is about twice as common in females, caecal volvulus may manifest itself either as an acute or chronic obstruction.

The patient presents with colicky abdominal pain in the right lower quadrant with marked distension. The grossly dilated right colon producing a 'Tympanitic' mass situated in the right iliac fossa but flop over onto the left side of the abdomen. Nausea, vomiting and absolute constipation are accompanying features.

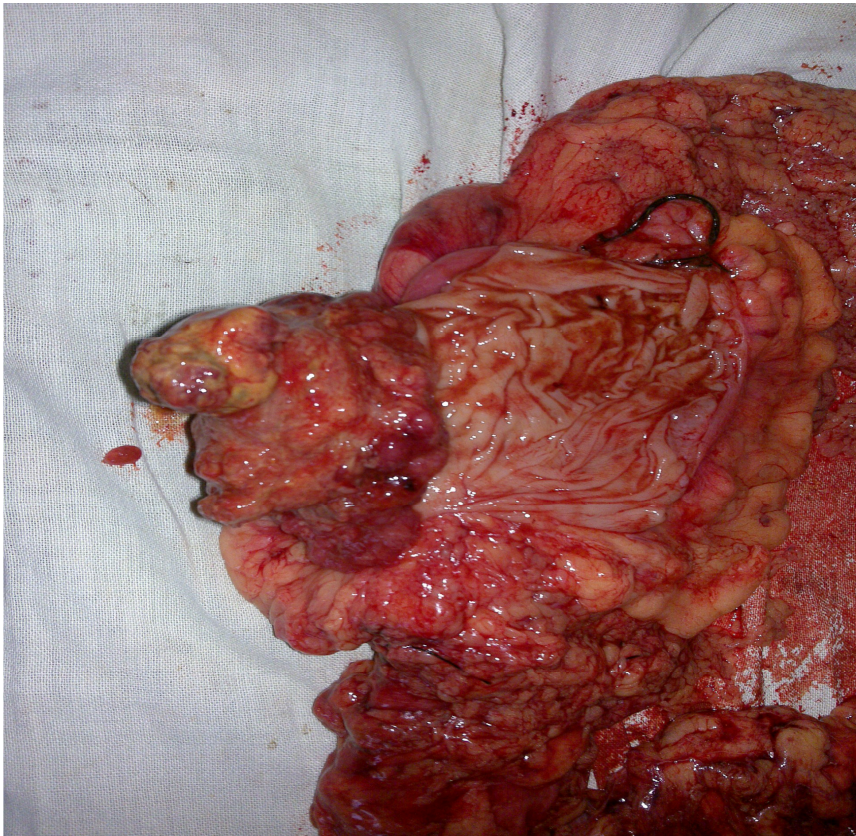
### **RADIOLOGICAL EXAMINATION**

1. Great distension of the caecum, often placed ectopically in the left upper quadrant (zuber et al).
2. Distended loops of small intestine located to the right of the caecal gas shadow.





**CAECAL VOLVULUS**



**LARGE BOWEL GROWTH CAUSING OBSTRUCTION**

## **SPECIMEN OF RIGHT HEMICOLECTOMY WITH GROWTH**

3. visualization of the ileocaecal valve when the caecum is outlined by gas.
4. presence of a single fluid level in the caecum compared with two large fluid levels in case of sigmoid volvulus.

Barium enema is most effective in diagnosis of chronic cases where opaque medium cut off at the transverse colon or at the hepatic flexure.

### **Treatment:**

For practical purposes, operative treatment is mandatory.

1. **Detorsion with caecopexy** – if the bowel is viable.
2. **Caecostomy** – in cases with a small patch of gangrene on the caecal wall which was used as the site of caecostomy.
3. **Primary right hemicolectomy** – when involved segment of intestine is frankly gangrenous.

## **OBSTRUCTION CAUSED BY LARGE BOWEL NEOPLASMS:**

Obstruction of the large bowel is a common surgical problem and primary tumors of colon is the principal cause in western world (Lund **et al**). Most of the obstruction is caused by carcinoma. About 25% of cases of carcinoma arising from the left side of colon present with features of chronic or acute-on-chronic obstruction because

1. Neoplasms in this situation are of stenosing variety.
2. Faecal content is relatively solid.
3. Lumen of the bowel is comparatively narrow.

**Pathophysiology** of large bowel obstruction depends on the competence of the ileo-caecal valve. In 10-20% of patients, the ileo-caecal valve is incompetent and colonic pressure is relieved by reflux into the ileum. If the ileo-caecal valve is competent, a **closed loop** is formed between the valve and obstructing point and so luminal pressure becomes very high, circulation is impaired and gangrene and perforation can result. The wall of right colon is thinner than the left colon and its luminal caliber is larger, so the caecum is at greatest risk of perforation( Law of Laplace). If caecum acutely reaches a diameter of 10-12cms, the risk of perforation is great with intra-luminal pressure between 20-55 mm of Hg.

**Clinical features:**

Most patients give a history of flatulence, alteration of bowel habits, and the passage of blood and mucus for weeks or months before the onset of acute colonic obstruction. Obstruction develops insidiously. Deep cramping pain is usually referred to hypogastrium. Borborygmus may be loud and coincident with the cramps. Constipation or Obstipation is a feature of complete obstruction. Vomiting is a late finding and may not occur at all if the ileo-caecal valve is competent. Faeculent vomiting is a late manifestation.

Symptoms of small bowel



obstruction are associated if the colonic content refluxes into the ileum through incompetent ileo-caecal valve.

Physical examination shows peripheral abdominal distension and tympany with visible peristalsis over the distended loop. There may be associated anaemia, cachexia and other signs of underlying malignancy.

**X-Ray examination:**

The distended colon gives a “**Picture Frame**” outline of the abdominal cavity. Barium meal study is contraindicated in suspected growth of colon. Barium enema will confirm the diagnosis and localises the site of lesion.

**Treatment:**

Enter the abdomen through mid line or one of paramedian incisions. The Caecum is first inspected, if it is distended, the diagnosis of large gut obstruction is immediately confirmed. When an obstructing carcinoma of colon has been identified, the resectability of the tumour should be assessed first.

If the large bowel is grossly distended, it can be decompressed by means of trocar and cannula inserted through the caecal wall and attached to the suction apparatus. The small aperture in the caecum is then closed by means of a purse string suture.

## **In case of Left sided obstruction**

1. 3 stage procedure First stage- do transverse colostomy to relieve the obstruction. Second stage- resection of left colon with end to end anastomosis.(after 2-3 weeks). Third stage- closure of colostomy.(4-6 weeks)

2. One stage resection and anastomosis

a) By Hughes: resection of terminal ileum, caecum and whole of distended colon beyond the obstruction in the Transverse colon or Left colon. Anastomosis is then performed between normal distal ileum and the non distended bowel distal to the obstruction(**Such et al**).

b) By Dudley and Phillips: After resection of the tumour in the left side of colon, the distended colon is converted into the non-distended state by “**on-table ante grade lavage**”. After that, end to end anastomosis is carried out. Advanced malignancy and signs of peritonitis are relative contraindications to primary anastomosis.

3. Hartmann's operation

If the obstructing tumour in the sigmoid or recto sigmoid junction has been excised but the conditions for immediate anastomosis do not apply, the proximal bowel may be brought out as a colostomy and distal rectum oversewn after irrigating the distal rectum. Reconstruction is carried out at later date.

4. Caecostomy alone(Kristiansen et al) if the general condition of the patient is extremely poor.

5. More recently

a) the obstructive tumour is identified endoscopically(Lelcuk et al) and a guide wire is passed through the narrowed lumen to permit successively large tubes to be inserted to decompress the colon.

b) endoscopic laser recanalization of the obstructing lumen(Kiefhaber et al,Denekar et al)

#### **For right sided obstruction**

1.Immediate right hemicolectomy after decompression of the bowel

2.Ileo transverse colostomy bypass with side to side anastomosis may occasionally be warranted if the tumour is large and fixed to the posterior abdominal wall structures such as duodenum or ureter.

3.Caecostomy alone may be indicated as a first stage procedure if the general condition of the patient is extremely poor.

#### **Acute Colonic Pseudo Obstruction (Ogilvie's syndrome)**

Colonic pseudo obstruction is a functional disorder in which the colon becomes massively dilated in the absence of mechanical obstruction. It is associated with the use of narcotics, bed rest and comorbid disease. Diagnosis is made based upon massive dilatation of colon in the absence of mechanical obstruction. Treatment consists of colonoscopic decompression, intravenous neostigmine and placement of rectal tube.

## **TREATMENT**

### **Inguinal hernia**

Among the cases of inguinal hernia those present with simple obstruction All underwent simple reduction of contents and herniorraphy.1 case expired in the post operative period.

For strangulated cases, resection of the non viable intestine and end to end anastomosis, followed by Herniorrhaphy was done.

### **Femoral hernia**

For femoral hernias with non viable bowel, resection and anastomosis followed by repair was done. For those cases developed post operative adhesive intestinal obstruction for which Laparotomy was done.

### **Para umbilical hernia**

For the Para umbilical hernia with simple obstruction, Mayo's repair was done.Vaccum drainage was kept for 2 days. Their post operative period was uneventful.

### **Incisional hernia**

Cases present with simple obstruction or with strangulation underwent repair and treated with intravenous fluids and antibiotics.

### **Post surgical adhesion**

In the two cases, were treated conservatively, became normal and discharged. For the other cases that underwent laparotomy, in which simple adhesive obstruction, simple adhesiolysis was done. For the remaining 1 case that was with non viable bowel for which resection followed by end to end anastomosis was done. In the post operative period, patients had wound infection. All were treated intensively with appropriate antibiotics and intravenous fluids.

### **Post inflammatory**

In those with post inflammatory adhesive cases, 4 were with simple obstruction and 2 were strangulated. For simple obstruction, adhesiolysis was done. 2 strangulated cases underwent resection and anastomosis. In the post operative period, 3 had wound infection.

### **Congenital bands**

Laparotomy was done in all the cases, those present with simple adhesion and adhesiolysis was done and for 1 case, resection and anastomosis was done. 3 cases developed post operative wound infection.

### **Tuberculous abdomen**

Laparotomy was done in all and was found to be simple obstruction. So biopsy was taken from the omentum, lymph nodes and sent for histopathological examination. Subsequently they

were put on anti tuberculous drugs.viz Rifampicin, I.N.H., Ethambutol and Pyrazinamide. One developed septicaemia and died.In the remaining cases those developed wound infection which subsequently healed.

### **Small bowel volvulus**

In these 2 cases, laparotomy was done, in which non viable bowel was resected and adhesions were released followed by end to end anastomosis.

Both had wound infection and they were under intensive management.Among them, 1 recovered and 1 succumbed to septicaemia.

### **Meckel's diverticulum**

In the 1 case with simple obstruction, Meckel's diverticulectomy was done..

### **Intussusception**

In the 2 cases, both were with gangrenous jejunum for which resection and anastomosis was done.Their post operative period was uneventful.

### **Ileosigmoid knotting**

In the 1 case, resection of knot along with ileum and sigmoid colon with end to end anastomosis was done. Patient had wound

infection,peritonitis which subsequently led to pelvic abscess and was drained.

## **Miscellaneous**

### **Small bowel tumours**

Only one case was found during Laparotomy and the tumour was found to occupy jejunum which was resected and end to end anastomosis was done. Specimen was sent for histopathological examination.

### **Jejuno-gastric intussusception**

1 case underwent partial gastrectomy and resection of the efferent loop with reconstruction of gastro jejunostomy. Patient developed duodenal stump blow out, for which relaparotomy was done.

### **Large bowel obstruction**

#### **Sigmoid volvulus**

In the 22 cases, 19 were simple and 3 were with strangulated bowel,all patients underwent laparotomy and resection of sigmoid colon, of which 8 developed post operative wound infection and 3 died in the post operative period.

#### **Caecal volvulus**

1 case underwent Laparotomy and right hemicolectomy was done.Patient expired in the post operative period due to septicemia.

### **Malignant growth of the large bowel**

Out of the 24 cases with large bowel malignancy causing obstruction, definitive 1 stage resection was done in 5 cases. 3 patients ended in Hartmann's procedure. 12 cases underwent temporary diversion colostomy and 4 cases underwent ileo transverse anastomosis.

### **Acute colonic pseudo obstruction**

1 patient was taken up for emergency exploratory laparotomy and found to have dilated caecum, ascending colon and transverse colon and with normal descending colon, sigmoid and rectum. Tube caecostomy done and patient became alright after 10 days.



## DISCUSSION

In our study of study of Acute Intestinal obstruction of small bowel and large bowel **obstruction** were recorded contributing 78.16% and 21.84% respectively, in contrast to Western literature, where 70% of obstruction occur in small bowel and 30% in large bowel. The difference of contribution of large bowel obstruction is due to low prevalence of large bowel neoplasms, diverticulitis and inflammatory bowel disease in our part as compared to Western countries.

In this study, **External hernia** contributes to Acute Intestinal obstruction. **Inguinal hernia** contributes to 81.82% of external hernia and **50.2%** of total small bowel obstruction. It ranks FIRST among the causes of Acute intestinal obstruction. This is contrast with the world literature, where adhesive obstruction is the prime cause (40%), and hernia becomes the second cause of obstruction (25%).

We have encountered only 3 cases of femoral hernia and 7 cases of paraumbilical hernia and 10 cases of incisional hernia.

The high prevalence of inguinal hernia causing obstruction is attributed to

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

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

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

In our study, **Adhesive obstruction** accounts for **18.78%** of acute intestinal obstruction ranks second. Among this **44%** were due to **Post-surgical adhesion**, **13.95%** due to post inflammatory adhesion and 41.86% due to congenital band. Among this strangulation occurred in **9.30%** involving the small bowel only. Increased incidence of Caesarean section , Hysterectomies and P.I.D. accounts for more incidence of adhesive obstruction in females.

Still the Abdominal tuberculosis account for 8.38% in total as a cause of small bowel obstruction. Even with advent of potent anti tuberculous drugs, the reason for failure of improvement of situation is not known to certain. In our study, adhesiolysis could be contemplated in 3 cases because of extensive adhesions. The occurrence of small bowel volvulus was 1.12% in contrast to Agarwal and Misra's observation who reported 20%. Surprisingly we have come across 2 cases of Intussusception and 1 case of Meckel's diverticulum causing obstruction. One case of small bowel tumour was encountered.

**Large bowel Obstruction**, accounted for 21.84 % of acute intestinal obstruction.

In this series, **Sigmoid volvulus** contributes for large bowel obstruction accounting for 44% and **Neoplasm of large bowel** contributes to **48%** . The high incidence of Sigmoid volvulus in our place are due to

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

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

1. Diet containing less amount of vegetables, fibre.
2. High fat diet and decreased calcium intake.

The clinical parameters like continuous pain, fever ( $>37.2^{\circ}\text{C}$ ) tachycardia ( $>100/\text{mt}$ ), palpable abdominal mass enable us to detect the presence of strangulation in about **38%** of cases, that too mainly in external hernias. Shatila and Chamberlain, Sarr et al in a large series highlighted the failure of these clinical parameters to differentiate between simple and strangulated obstruction.

Plain X-ray Abdomen is still valuable in diagnosing the bowel obstruction. In our study, we were able to get multiple fluid levels in radiological picture in about **73%** of cases. We haven't got positive air-fluid

level in early stage of obstruction in cases of inguinal hernia. But clinical correlation along with radiological positivity increases the accuracy of diagnosis. But exact localization of obstruction necessitates other complementary investigations.

Early recognition by the patient and prompt treatment by surgeon gives good reward and decreases the mortality.

## CONCLUSION

1. Among the causes of Acute Intestinal obstruction, 78.16% is contributed by Small bowel obstruction and **21.84%** by Large bowel obstruction
2. The major cause of acute intestinal obstruction is still External hernia (48.03%) here. Among this, inguinal hernia alone accounts for 81.82% in total.
3. Even though the inguinal hernia causing obstruction is highly prevalent, the **Strangulation** rate comes down dramatically to **13.33% (12)** cases.
4. Adhesive obstruction accounts for **18.78%** in total, of which the Post-surgical adhesion is the major cause
5. Sigmoid volvulus ranks **fourth** in etiology of acute intestinal obstruction contributing **9.61%**, next only to large bowel neoplasms contributing **10.48%**.
6. Sigmoid volvulus contributes to large bowel obstruction accounting for 44 % and Neoplasm contributes to **48 %** only.
7. Clinical parameters fail to differentiate between simple and strangulated obstruction exactly.

8. Plain X-ray abdomen is a valuable in the diagnosis of the acute obstruction (73%) and hence it is considered as minimal investigation before surgery.
9. Early surgical intervention and antibiotics has reduced the mortality of the simple bowel obstruction.
10. In Strangulated obstruction, the mortality rate is still significantly more, due to age, associated diseases and late arrival to hospital .
11. Mortality associated with large bowel obstruction is 14% compared to 7.26% with small bowel obstruction
12. Early diagnosis and early surgical intervention is the key to reduce the mortality.

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# MASTER CHART

Sl No.	Name	IP.No.	Age/sex	Diagnosis	Procedure Done	Viability	Interval between admission & Surgery (Hours)	Prese ntation	Complication
1	Mathiazhagan	966825	40/ M	Ileocaecal Tuberculosis	Right Hemicolectomy	Viable	12	Acute	-----
2	Ayyappan	967194	50/ M	Right Side obstructed Hernia	Release and Herniorrhaphy	Viable	4	Acute	-----
3	Arun	968216	23/ M	Right side Strangulated Hernia	Ileal Resection and Anastomosis	Non viable	8	Acute	Wound infection
4	Vaithialingam	969166	57/ M	Sigmoid Volvulus	Resection and Anastomosis	Viable	18	Acute	Wound infection
5	Elavathy	969743	45/F	Sigmoid Volvulus	Resection Anastomosis	Viable	24	Acute	-----
6	Chellaiyan	969170	60/ M	Postinflammatory Adhesion	Adhesiolysis	Viable	20	Acute	-----
7	Siddique	970424	65/ M	Left Side Stragulated Hernia	Resection Anastomosis and Herniorrhaphy	Non Viable	10	Acute	Expired
8	Murugan	970633	35/ M	Left side Obstructed Hernia	Release and Herniorrhaphy	Viable	6	Acute	-----
9	Vasantha	971979	40/F	Sigmoid Volvulus	Resection and anastomosis	Viable	15	Acute	Wound infection
10	Mariyayee	972475	80/F	Small Bowel Volvulus	Resection and Ileotransverse Anastomosis	Viable	48	Acute	Expired
11	Nadimuthu	974691	15/ M	Congenital Ileal Band	Band Release	Viable	72	Acute	-----
12	Thangappan	975072	45/ M	Left Side obstructed Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
13	Simonraj	975222	40/ M	Sigmoid Volvulus	Resection and Anastomosis	Viable	48	Acute	-----
14	Veerabadharan	977500	55/ M	Growth Caecum	Ileotransverse Anastomosis	Viable	72	Acute	-----
15	Mohandoss	977493	42/ M	Congenital Ileal Band	Ileal resection and Anastomosis	Non Viable	24	Acute	Wound infection
16	Vembu	975797	55/F	caecal growth	Right Hemicolectomy	Viable	72	Acute	Wound infection
17	Kaliyaperumal	975762	75/ M	Post Surgical Adhesions	Adhesiolysis	Viable	24	Acute	-----
18	Vanathaiyan	978680	67/ M	Left Side Obstructed Hernia	Release and Herniorrhaphy	Viable	12	Acute	Wound infection
19	Alima beevi	979278	50/F	Obstructed Incisional Hernia	Release and Anatomical Repair	Viable	72	Acute	Wound infection
20	Uthirapathy	980523	60/ M	Right Side Obstructed Femoral Hernia	Release and Repair	Viable	8	Acute	Wound infection
21	Kunjammal	980534	50/F	Post Inflammatory Adhesions	Resection Anastomosis	Viable	72	Acute	Wound infection
22	Vignesh	980574	15/ M	Congenital Ileal Band	Band Release	Viable	24	Acute	-----
23	Sarankabani	980836	70/ M	Right side Obstructed Hernia	Release and Herniorrhaphy	Viable	10	Acute	-----
24	Prabhakaran	981473	17/ M	Left side Obstructed Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
25	Durai	983355	40/ M	Ileocaecal Tuberculosis	Right Hemicolectomy	Viable	48	Acute	-----
26	Pitchai	984352	79/ M	Right side Obstructed Hernia	Release and Herniorrhaphy	Viable	15	Acute	Wound infection

27	Chellamal	984450	45/F	Congenital Ileal Band with Adhesions	Band release with Adhesiolysis	Vibale	72	Acute	-----
28	Swamiappan	984840	45/M	Left side Obstructed Hernia	Release with Herniorrhaphy	Viable	12	Acute	-----
29	Parisutham	984997	58/M	Right Side Obstructed Hernia	Release and Herniorrhaphy	Viable	6	Acute	Wound infection
30	Sekar	985857	35/M	Congenital Ileal Band	Band Release	Viable	48	Acute	-----
31	Duraisamy	985280	65/M	Left side obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	24	Acute	-----
32	Govindraj	986065	60/M	Right side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	8	Acute	Wound infection
33	Kumar	986010	41/M	Right side Strangulated Inguinal Hernia	Ileal resection and Anastomosis	Nonviable	18	Acute	Wound infection
34	Thavasimuthu	986252	60/M	Sigmoid Volvulus	Resection and Anastomosis	nonviable	24	Acute	expired
35	Karuppaiyan	986297	30/M	Left side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
36	Vasanthakannan	987072	26/M	Right side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	12	Acute	-----
37	Selvam	987772	22/M	Left side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	15	Acute	-----
38	Adaikalasamy	988111	71/M	Left side Obstructed Hernia	Release and Herniorrhaphy	Viable	24	Acute	Wound infection
39	Perumal	988683	42/M	Sigmoid Volvulus	Resection Anastomosis	Non viable	48	Acute	Wound infection
40	Kunju	988768	60/M	Right side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	12	Acute	Wound infection
41	Rathinam	988129	51/F	Congenital Ileal Band	Band Release	Viable	24	Acute	-----
42	Kannan	989570	37/M	Left side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
43	Durairajan	989855	60/M	Right sided Strangulated Inguinal Hernia	Ileal Resection and Anastomosis	Nonviable	24	Acute	Expired
44	Anbarasi	990758	40/F	Post inflammatory adhesion	Resection and Anastomosis	Non Viable	48	Acute	Adhesive intestinal obstruction
45	GANESAN	992058	78/M	Right side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	15	Acute	Wound infection
46	Subbaiyan	993658	55/M	Left side Strangulated Inguinal Hernia	Resection and Anastomosis	Nonviable	15	Acute	Expired
47	Veerasamy	994020	25/M	Left side Strangulated Inguinal Hernia	Resection and Anastomosis	Nonviable	24	Acute	Wound infection
48	Sivaraman	994177	44/m	Left side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
49	Mahendran	993884	21/M	Congenital Ileal Band	Band release	Viable	48	Acute	-----
50	Jayaraj	995944	45/M	Sigmoid Volvulus	Sigmoid resection and Anastomosis	Viable	72	Acute	-----
51	Ambujam	994951	35/F	Ileal Stricture tuberculous	Ileal resection and Anastomosis	Viable	24	Acute	Wound infection
52	Gandaroo	995796	32/M	Left side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
53	Ilyaraja	997037	22/M	Sigmoid Volvulus	Sigmoid resection and Anastomosis	Viable	24	Acute	-----

54	Vellaipillai	995606	70/ M	Right side obstructed hernia	Release and Herniorrhaphy	Viable	12	Acute	Wound infection
55	Marimuthu	995686	45/ M	Right side Obstructed Inguinal Hernia	Release an Herniorrhaphy	Viable	10	Acute	-----
56	Loordhumary	997218	40/F	Right side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	8	Acute	Wound infection
57	Kaliamoorthy	997643	55.M	Right side Obstructed Hernia	Release and Herniorrhaphy and Orchidectomy	Viable	12	Acute	-----
58	Devendran	997749	40/ M	Ca rectum	Colostomy done	Viable	48	Acute	-----
59	Jayapaul	997933	53/ M	Left side Obstructed Hernia	Release And Herniorrhaphy	Viable	8	Acute	-----
60	Shahulhameed	996032	55/ M	Left side Obstructed inguinal Hernia	Release and Herniorrhaphy and Orchidectomy	Viable	10	Acute	-----
61	Chitravel	998119	40/ M	Congenital Ileal Band	Band release	Viable	72	Acute	-----
62	Chinnaiyan	998206	55/ M	Left side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
63	Veeramuthu	998217	53/ M	Right side Obstructed Inguinal Hernia	Release and Herniorrhaphy	Viable	24	Acute	-----
64	Ayieponnu	998781	60/F	Right side Strangulated Femoral Hernia	Resection, Anastomosis and repair	Nonvia ble	10	Acute	Wound infection
65	Prakash	999090	19/ M	Sigmoid Volvulus	Resection , Anastomosis	Viable	48	Acute	-----
66	Sivasamy	999086	56/ M	Right side Obstructed hernia	Release and Herniorrhaphy	Viable	12	Acute	-----
67	Thirugnanasamb andam	999802	19/ M	Right side Obstructed Hernia	Release and Herniorrhaphy	Viable	15	Acute	-----
68	Michael	999885	45/ M	Growth Rectum	Colostomy	Viable	72	Acute	-----
69	Saraswathy	100043 9	40/F	Congenital Ileal Band	Band release	Viable	48	Acute	-----
71	Anbzhagan	100146 4	40/ M	Sigmoid Volvulus	Resection and Anastomosis	Viable	48	Acute	
72	Nagammal	100201 8	55/F	Sigmoid Volvulus	Resection and Anastomosis	Viable	56	Acute	Wound infection
73	Kumarasamy	100163 6	40/ M	Ileal Band	Band release	Viable	24	Acute	
74	Kaliyan	100282 7	45/ M	Ileocaecal Tuberculosis	Right Hemicolectomy	Viable	36	Acute	Wound infection
75	Varadharajan	100998 5	60/ M	Obstructed Incisional Hernia	Release and Anatomical Repair	Viable	72	Acute	Wound infection
76	Durairaj	100466 9	53/ M	Right side obstructed hernia	Release and Herniorrhaphy	Viable	6	Acute	-----
77	Saradhambal	100535 2	65/F	Strangulated Umbilical hernia	Resection and Anastomosis	Viable	8	Acute	Wound infection
78	Deenadayalan	100565 9	!7/M	Left side Obstructed hernia	Release and Herniorrhaphy	Viable	11	Acute	-----
79	Muthulakshmi	100595 4	41/F	Obstructed Incisional Hernia	Release and Anatomical Repair	Viable	38	Acute	-----
80	Aiyiyavu	100626 5	80/ M	Right side strangulated Hernia( Meckel's Diverticulum)	Resection Anastomosis and Herniorrhaphy	Non Viable	20	Acute	Expired
81	Azhagesan	100639 5	33/ M	Left side Obstructed Hernia	Release and Herniorrhaphy	Viable	8	Acute	-----
82	Mohandoss	100661 6	33/ M	Adhesive Intestinal Obstruction	Adhesiolysis	Viable	46	Acute	Wound infection
83	Dharmalingam	100777 9	60/ M	Right side Obstructed Hernia	Release and Herniorrhaphy	Viable	8	Acute	Wound infection

84	Shanthamary	100805 2	55/F	Obstructed Para Umbilical Hernia	Release and Anatomical Repair	Viable	15	Acute	-----
85	Sundaramoorthy	100832 0	70/ M	Adhesive Intestinal Obstruction	Adhesiolysis	Viable	48	Acute	Wound infection
86	Murugaiyan	100818 4	32/ M	Sigmoid Volvulus	Resection and Anastomosis	Viable	72	Acute	-----
87	Rajamanickam	100938 3	70/ M	Rectal stricture	Transverse Loop Colostomy	Viable	80	Acute	Wound infection
88	Raj	100938 0	51/ M	Left side Obstructed Hernia	Release and Herniorrhaphy	Viable	10	Acute	-----
89	Nayagan	100974 5	75/ M	Congenital Ileal Band	Band Release	Viable	72	Acute	Wound infection
90	Sathya	101117 4	14/F	Tuberculous Abdomen	Adhesiolysis	Viable	72	Acute	-----



**Investigations:-**

Blood Hb

Blood Sugar

Urea

Serum Creatinine

Urine Albumin

Sugar

Deposit

Electrolytes:

Na

K

X-ray Abdomen

X-ray Chest

**Operative findings**

**Procedure done**

**Post Operative Complications**

**Follow Up**

**Biopsy report**

**Others:**