



## **Review Article**

# **INTESTINAL OBSTRUCTION: AN OVERVIEW OF AETIOLOGY, EVALUATION AND MANAGEMENT**

**ABM Khurshid Alam<sup>1</sup>, Kazi Israt Jahan<sup>2</sup>, Mohammad Ali<sup>2</sup>**

### **Abstract :**

Intestinal obstruction occurs when there is an interruption in the forward flow of intestinal contents. This interruption can occur at any point along the length of the gastrointestinal tract, and clinical symptoms often depend on the level of obstruction. Intestinal obstruction is most commonly caused by intra-abdominal adhesions, malignancy, or intestinal hernia-tion. The clinical presentation generally includes colicky abdominal pain, vomiting, abdominal distension and constipation. Radiologic imaging can confirm the diagnosis. Although radiography is often the initial study, non-contrast computed tomography is recommended if the index of suspicion is high or if suspicion persists despite negative radiography. Management of uncomplicated obstructions includes fluid resuscitation with correction of metabolic derangements, intestinal decompression, and bowel rest. Evidence of vascular compromise or perforation, or failure to resolve with adequate bowel decompression is an indication for surgical intervention.

**Key Words:** Intestinal Obstruction, Bands and adhesions, abdominal malignancy

### **Intorduction**

Intestinal obstruction refers to any form of impedance to the normal passage of bowel content through the small or large intestine. Obstruction can be functional (due to abnormal intestinal physiology) or due to a mechanical obstruction, which can be acute or chronic.<sup>1</sup> Mechanical obstruction of the intestine can be partial or complete. According to the presence or absence of adequate blood supply mechanical obstruction of the intestine can be simple of

strangulated obstruction. Intestinal obstruction accounts for approximately 15 percent of all emergency department visits for acute abdominal pain.<sup>2</sup> Intestinal obstruction is a common surgical emergency that carries a favourable prognosis if recognized and treated promptly. Complications of intestinal obstruction include bowel ischemia and perforation. When cases of intestinal obstruction present late, go undiagnosed or are resuscitated inadequately before surgery, high morbidity and mortality rates may result. Mechanical obstruction often require corrective surgery, whereas functional obstruction, with certain exceptions, relies of conservative management. Aetiology manifestations, diagnosis, and management of intestinal obstruction will be reviewed here.

1. Professor & Head, Department of Surgery, Comilla Medical College & Hospital,

2. Department of Surgery, General Hospital, Comilla.

**Correspondence to:** Prof. A. B. M. Khurshid Alam, Professor & Head, Department of Surgery, Comilla Medical College & Hospital, Comilla, E-mail: alamdr2003@yahoo.com

**Received** 17 August 2013      **Accepted** 20 September 2013

**Pathophysiology**

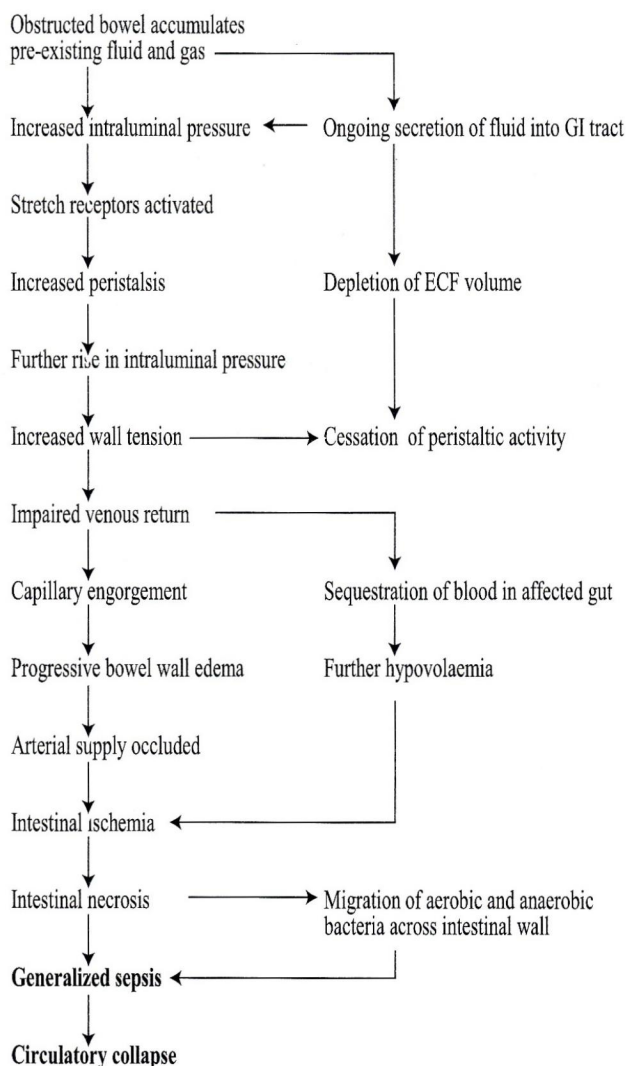
**a) Simple mechanical obstruction:** Intestinal obstruction causes proximal bowel to dilate as fluid and gas accumulate. Distal to the site of obstruction, bowel continues to function until it collapses. Stretch receptors in the proximal bowel are stimulated and the obstructed bowel responds to this distention initially by increased peristaltic activity, which results in colicky abdominal pain. Increased peristaltic activity continues until the obstruction is overcome; otherwise, the activity of the proximal bowel is ultimately overridden by an inhibition of motor activity. It is a protective mechanism.

Fluid loss from vomiting, bowel edema, and loss of absorptive capacity leads to dehydration. Vomiting leads to loss of gastric potassium, hydrogen, and chloride ions, and significant dehydration stimulates renal proximal tubule reabsorption of bicarbonate and loss of chloride, perpetuating the metabolic alkalosis.<sup>3</sup> In addition to derangements in fluid and electrolyte balance, intestinal stasis leads to overgrowth of intestinal flora and leads to bacterial translocation across the bowel wall.<sup>4</sup>

**b) Intestinal obstruction with strangulation:** Ongoing dilation of the intestine increases luminal pressures. When luminal pressures exceed venous pressures, loss of venous drainage causes increasing edema and hyperemia of the bowel. This may eventually lead to compromised arterial flow to the bowel, causing ischemia, necrosis, and perforation. Alternatively, mesenteric blood flow may be interrupted by direct vascular occlusion (intestinal entrapment in a hernial sac, volvulus and intussusception). The profound sepsis that accompanies the development of intestinal necrosis is a consequence of the release of predominantly anaerobic bacteria from the compromised intestine. A closed-loop obstruction, occurs when the intestine is obstructed at two locations, creating a segment with no proximal or distal outlet. Closed-loop obstruction can rapidly progress to bowel strangulation.

**c) Functional intestinal obstruction:** May affect both the small and large intestine and occurs when normal intestinal motility ceases in the absence of a mechanical cause.

**Pathophysiology of intestinal obstruction:**



**Aetiology**

Classification of type of obstruction:

Extrinsic	Intrinsic	Luminal
Adhesions	Tuberculosis	Parasites
Hernia	Carcinoma	Polypoid tumors
Volvulus	Crohn's disease	Foreign bodies
Intussusception	Congenital atresia	Gall stones
Inflammatory masses		Bezoars

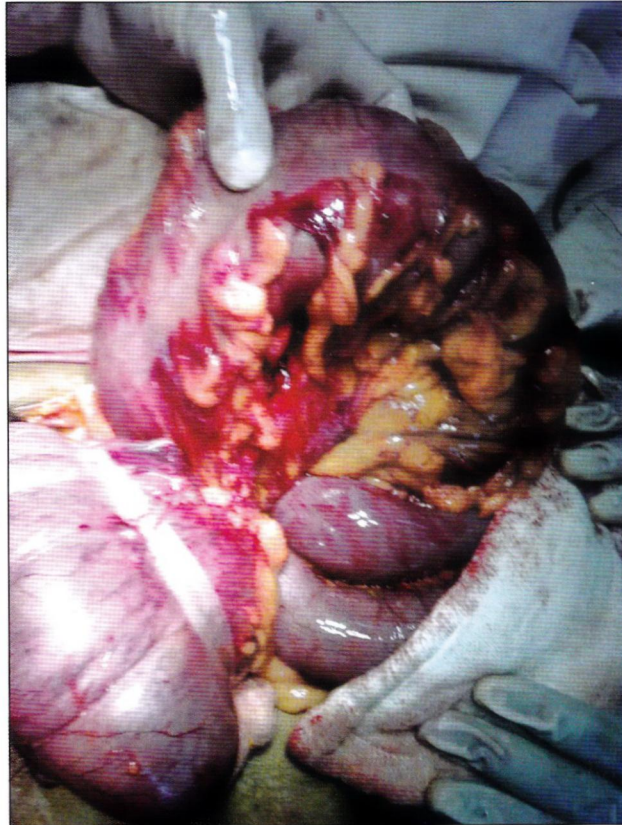
Small bowel mechanical obstruction accounts for about 80% of all cases of mechanical obstruction. Adhesions resulting from prior abdominal surgery are the pre-dominant cause of small bowel obstruction, accounting for approximately 60 percent of cases.<sup>5</sup>



**Fig 1:** Sigmoid colon volvulus



**Fig 2:** Sigmoid colon volvulus with gangrene



**Fig 3:** compound volvulus



**Fig.-4:** Mesenteric vascular occlusion with gangrene of small gut



**Fig.-5:** *Ascaris lumbricoides* is cause of intestinal obstruction



**Fig 6:** Foreign body is cause of intestinal obstruction



**Fig.-7:** Small intestinal GIST was the cause of intestinal obstruction

### Causes of functional intestinal obstruction

Reflex inhibition of motor activity  
 Postoperative paralytic ileus  
 Spinal injury  
 Retroperitoneal haemorrhage  
 Head injury  
 Chest infection

### Drug induced

Tricyclic antidepressants  
 General anaesthetics

### Mesenteric vascular diseases

Mesenteric arterial embolus  
 Mesenteric venous thrombosis

### Metabolic

Hypokalaemia  
 Hyponatraemia  
 Hypothermia  
 Diabetic ketoacidosis  
 Uraemia

### Peritoneal sepsis

Peritonitis  
 Pelvic and interloop abscesses

### Diagnosis

#### Symptoms

The hallmarks of intestinal obstruction include abdominal pain, vomiting, abdominal distension, and constipation. Symptoms vary according to the level of obstruction.

- **Pain-** mechanical obstruction causes colicky pain, whereas functional bowel obstruction usually causes vague abdominal discomfort. Mechanical obstruction of small intestine and proximal colon results in central abdominal colic and obstruction of the distal colon (embryological hind-gut) results in poorly localized hypogastric discomfort. A change from colicky to constant abdominal pain is associated with the development of ischemia.
- **Distention-** Distal obstructions allow for a greater intestinal reservoir and distension more marked.
- **Vomiting** occurs early with proximal intestinal obstruction.
- **Constipation-** failure to pass faeces or flatus is the hallmark of complete intestinal obstruction. Passage of flatus alone is indicative of subacute obstruction.

## Signs

- **Tachycardia** may be due to hypotension or may reflect bowel ischemia.
- **Hypotension** may represent hypovolaemia or development of septic shock in patients with strangulated intestinal obstruction.
- **Temperature**- a rise in temperature, coupled with a tachycardia and peritoneal irritation suggests intestinal ischemia.
- **Abdominal tenderness**- simple intestinal obstruction results in poorly localized abdominal tenderness. Bowel ischemia causes focal peritoneal signs.
- **Abdominal percussion** may reveal a tympanitic abdomen.
- **Auscultation** in patients with early obstruction reveals high-pitched bowel sounds, whereas those with late obstruction may present with minimal bowel sounds as the intestinal tract becomes hypotonic.
- **Hernial orifices**- examination of the hernial orifices is mandatory in all patients.
- **Rectal examination**- the rectum is often empty but may reveal rectal tumor, deposits in the Pouch of Douglas.

## Investigations

### a) Serology

Laboratory evaluation of patients with suspected obstruction should include a complete blood count, blood urea, serum creatinine and metabolic panel. Hypokalemic, hypochloremic metabolic alkalosis may be noted in patients with severe vomiting. Elevated blood urea nitrogen levels are consistent with dehydration, and hemoglobin and hematocrit levels may be increased. The white blood cell count may be elevated if intestinal bacteria translocate into the bloodstream. The development of metabolic acidosis, especially in a patient with an increasing serum lactate level, may signal bowel ischemia.

### b) Abdominal radiography

Supine abdominal radiograph is the initial method of confirming the presence of intestinal obstruction and it is confirmatory in 60% of patient with intestinal obstruction.<sup>6</sup>

## Characteristic findings of intestinal obstruction

Small intestinal obstruction	Large intestinal obstruction
Bowel loops with valvulae conniventes which traverse the diameter of the gut.	Haustral fold which incompletely traverse the gut.
Central bowel loops	Dilated bowel in the periphery of the film.
Pathological dilatation is present if bowel diameter exceeds 5cm.	Pathological dilatation is present if bowel diameter exceeds 8 cm.

### c) Ultrasonography

Ultrasound has a limited role in the diagnosis of intestinal obstruction because the presence of dilated bowel hinders image acquisition. Ultrasonography remains a valuable investigation for unstable patients with an ambiguous diagnosis and in patients for whom radiation exposure is contra-indicated, such as pregnant women.

### d) Contrast fluoroscopy

Incomplete intestinal obstruction is readily diagnosed using barium studies, though barium is contra-indicated if complete obstruction is suspected. A single contrast study using water soluble contrast material is recommended method of differentiation mechanical and functional bowel obstruction. There are several variations of contrast fluoroscopy. In the small-bowel follow-through study, the patient drinks contrast material, then serial abdominal radiographs are taken to visualize the passage of contrast through the intestinal tract. Enteroclysis involves naso- or oroduodenal intubation, followed by the instillation of contrast material directly into the small bowel. Rectal fluoroscopy can be helpful in determining the site of a suspected large bowel obstruction.

### e) CT Scan:

CT is appropriate for further evaluation of patients with suspected intestinal obstruction in whom clinical examination and radiography do not yield a definitive diagnosis. CT scan identifies obstruction in up to 95% of cases.<sup>6</sup> CT Scan may show- level of obstruction, cause of obstruction, viability of involved bowel.

CT findings in patients with intestinal obstruction include dilated loops of bowel proximal to the site of obstruction, with distally decompressed bowel. Thickened intestinal walls and poor flow of contrast material into a section of bowel suggests ischemia,

whereas pneumatosis intestinalis, free intra-peritoneal air, and mesenteric fat stranding suggest necrosis and perforation. Therefore, in most patients, CT should be ordered when the diagnosis is in doubt.

#### f) Magnetic resonance imaging

Magnetic resonance imaging (MRI) may be more sensitive than CT in the evaluation of intestinal obstruction.<sup>7</sup> MRI enteroclysis, which involves intubation of the duodenum and infusion of contrast material directly into the small bowel, can more reliably determine the location and cause of obstruction.<sup>8</sup>

#### Treatment of intestinal obstruction

Management of intestinal obstruction is directed at correcting physiologic derangements caused by the obstruction, bowel rest, and removing the source of obstruction.

##### a) Non-operative treatment and resuscitation

Initial non-operative treatment comprises-

Intravenous fluid resuscitation

Nil by mouth (intestinal rest)

Nasogastric decompression

Absence of tachycardia, fever, tenderness and leucocytosis indicates that non-operative treatment is safe. Operative intervention is indicated if one or more of these parameters changes. Resuscitation of the patient with intestinal obstruction is of crucial importance, whether or not early surgical intervention is anticipated. Premature surgery in patient who have not undergone correction of hypovolaemia or electrolyte disturbances may cause cardiac or renal complications. Before initiating resuscitation it is important to establish: the likely cause of intestinal obstruction, estimated fluid deficit, likely electrolyte imbalance.

#### Parameters used to guide resuscitation

##### Physiological

Mandatory

Pulse

Blood pressure

Hourly urine output.

##### Biochemical

Mandatory

Haematocrit

Serum electrolytes

##### Second line

Central venous pressure

Second line

Arterial blood gases

The use of a bladder catheter to closely monitor urine output is the minimum requirement for gauging the adequacy of resuscitation. Antibiotics are used to treat

intestinal overgrowth of bacteria and translocation across the bowel wall.<sup>9</sup> The presence of fever and leukocytosis should prompt inclusion of antibiotics in the initial treatment regimen. Antibiotics should have coverage against gram-negative organisms and anaerobes.

Conservative management is successful in 40 to 70 percent of clinically stable patients, with a higher success rate in those with partial obstruction.<sup>10</sup> Although conservative management is associated with shorter initial hospitalization (4.9 versus 12 days), there is also a higher rate of eventual recurrence (40.5 versus 26.8 percent).<sup>11</sup> With conservative management, resolution generally occurs within 24 to 48 hours. Beyond this time frame, the risk of complications, including vascular compromise, increases. If intestinal obstruction is not resolved with conservative management, surgical evaluation is required.<sup>12</sup>

#### b) Operative treatment

The decision to perform surgery for intestinal obstruction can be difficult. Peritonitis, clinical instability, or unexplained leukocytosis or acidosis are concerning for abdominal sepsis, intestinal ischemia, or perforation; these findings mandate immediate surgical exploration.

General aims of operating on patient with intestinal obstruction are:

- i. decompress the obstructed bowel
- ii. correct the cause
- iii. maintain intestinal continuity

In reality, these aims often require modification according to the pathology encountered. Patients with an obstruction that resolves after reduction of a hernia should be scheduled for elective hernia repair, whereas immediate surgery is required in patients with an irreducible or strangulated hernia. Stable patients with a history of abdominal malignancy or high suspicion for malignancy should be thoroughly evaluated for optimal surgical planning. Abdominal malignancy can be treated with primary resection and reconstruction or palliative diversion.

Treatment of stable patients with intestinal obstruction and a history of abdominal surgery presents a challenge. Conservative management should be attempted initially, using nasogastric decompression, aggressive intravenous rehydration, and antibiotics.

A common problem is the determination of viability, the most useful criteria for which are intestinal color, motility and presence of mesenteric arterial pulsation. Bowel of dubious viability should be warmed and oxygen delivery increased to restore effective tissue oxygenation. Bowel resection is carried out in intestine fails to return to normal. Anastomosis should be performed only if both ends are viable.

### Conclusion

Morbidity and mortality associated with intestinal obstruction have declined since the advent of more sophisticated diagnostic tests, but the condition remains a challenging surgical diagnosis. Physicians who are treating patients with intestinal obstruction must weigh the risks of surgery with the consequences of inappropriate conservative management.

### References

1. Miller G, Boman J, Shrier I, Gordon PH. Natural history of patients with adhesive small bowel obstruction. *Br J Surg* 2000; 87:1240.
2. Irvin TT. Abdominal pain: a surgical audit of 1190 emergency admissions. *Br J Surg*. 1989; 76(11): 1121-1125.
3. Wangenstein OH. Understanding the bowel obstruction problem. *Am J Surg*. 1978; 135(2): 131-149.
4. Rana SV, Bhardwaj SB. Small intestinal bacterial over-growth. *Scand J Gastroenterol*. 2008; 43(9): 1030-1037.
5. Shelton BK. Intestinal obstruction. *AACN Clin Issues*. 1999;10(4):478-491.
6. Botterill I D, Sagar PM. Intestinal obstruction. *Surgery*. 1998;16:221-227
7. Matsuoka H, Takahara T, Masaki T, Sugiyama M, Hachiya J, Atomi Y. Preoperative evaluation by magnetic resonance imaging in patients with bowel obstruction. *Am J Surg*. 2002;183(6):614-617.
8. Wiarda BM, Horsthuis K, Dobben AC, et al. Magnetic resonance imaging of the small bowel with the true FISP sequence: intra- and interobserver agreement of enteroclysis and imaging without contrast material. *Clin Imaging*. 2009;33(4):267-273.
9. Sagar PM, MacFie J, Sedman P, May J, Mancey-Jones B, Johnstone D. Intestinal obstruction promotes gut trans-location of bacteria. *Dis Colon Rectum*. 1995;38(6):640-644.
10. Mosley JG, Shoaib A. Operative versus conservative management of adhesional intestinal obstruction. *Br J Surg*. 2000;87(3):362-373.
11. Cox MR, Gunn IF, Eastman MC, Hunt RF, Heinz AW. The safety and duration of non-operative treatment for adhesive small bowel obstruction. *Aust N Z J Surg*. 1993;63(5):367-371.
12. Fevang BT, Jensen D, Svanes K, Viste A. Early operation or conservative management of patients with small bowel obstruction? *Eur J Surg*. 2002;168(8-9):475-481.