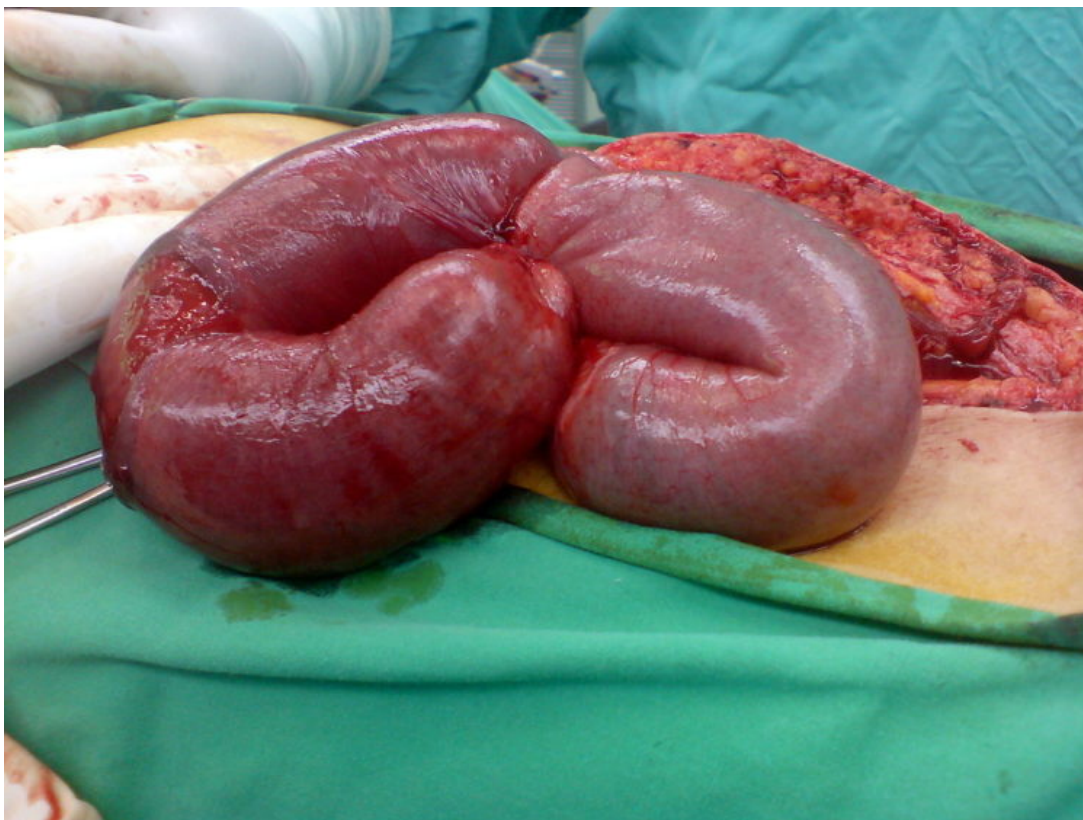


Intestine Obstruction — Diagnosis and Management

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The intestine is part of the GI tract responsible for food digestion and absorption. The large surface area of the intestinal wall formed by villi, plicae, and valvulae is responsible for the absorption of water, minerals, vitamins, and all nutritional components. The small intestine is more vulnerable to obstruction for many reasons including the length, diameter, and location. Intestinal obstruction can be actual mechanical obstruction or compression and can be functional paralysis of the hollow muscular organ. The most common cause of obstruction is external adhesions following abdominal surgical interventions and obstruction complicating hernias. Bowel obstruction is sometimes partial chronic obstruction due to adhesions, irradiation and Crohn's disease causing strictures or intestinal wall neoplasm or polyp.



Definition

Intestinal obstruction is the failure, reversal, or impairment of the normal transit of intestinal contents.

Etiology of Intestine Obstruction

Common causes of intestinal obstruction can be classified as either:

Luminal lesions

- Gallstones
- Impactions
- Intussusception in newborns

Intrinsic lesions

- Congenital lesions such as [atresia](#), [stenosis](#), [Meckel's diverticulum](#)
- Traumatic injury to the gut
- Inflammatory conditions such as [Crohn's disease](#), [ulcerative colitis](#) and [radiation](#)
- Neoplastic conditions that institute mass effect on the intestine

Extrinsic lesions

- Adhesions
- Hernias
- Masses such as [neoplasms](#), annular pancreas, abscesses, and hematomas
- Volvulus

Pathophysiology of Intestine Obstruction

Proximal to the obstruction, the bowel dilates with food, fluid, and gas from bacterial fermentation and swallowing. Distal to the obstruction, the lumen decompresses due to the passage of its contents. The intestinal wall loses its absorptive function, becomes edematous and ischemic.

Fluid and electrolyte loss into the intestinal lumen, peritoneal cavity and through emesis leads to **hypovolemia**. Ischemia of the intestinal wall will lead to **necrosis**, followed by **perforation** and **sepsis**. **Ischemia** can also be due to mechanical compression or twisting of the mesentery.

Clinical Picture of Intestine Obstruction

Intestinal obstruction is a **medical emergency** with a high risk of intestinal perforation, sepsis, shock, and death. Patients present early with nausea, vomiting, abdominal pain, distension, and the inability to pass stool or flatus. Nausea and vomiting are severe and present early in upper GI obstruction, while the distension and constipation is more with distal obstruction.

The pain is usually **intermittent periumbilical cramping** that can transform into **severe sharp pain** due to bowel perforation and peritoneal irritation. History of abdominal surgery, hernia, abdominal tumor, irradiation, foreign body ingestion or inflammatory bowel diseases may be evident as possible etiological factors.

Examination starts with the general condition of the patients and vital signs.

Hypovolemia presents with **tachycardia** and **hypotension**. Some patients may be in

shock due to hypovolemia or **sepsis**. **Fever** is a sign of infection in case of **bowel necrosis or perforation**.

Physical examination may reveal the cause of obstruction e.g. complicated hernia, surgical scar, hematochezia in case of tumors, volvulus or intussusception. Patients with a chronic obstruction present with nausea and distension, especially after meals.

A digital rectal examination is indicated in cases of intestinal obstruction as it could reveal fecal impaction or features of malignancy such as a palpable mass or blood on the examining finger.

Laboratory Work Up for Intestine Obstruction

Basal metabolic profile with renal function, sodium and potassium are mandatory in every patient to assess volume status and electrolytes imbalance since the patient has lost a lot of fluid and electrolytes via vomitus.

Imaging Studies in Intestine Obstruction

Plain X-ray

Plain X-ray is the initial imaging modality to confirm the diagnosis of bowel obstruction. Plain X-ray erect and supine can detect intestinal obstruction, specific etiology in some patients and perforation in case if complications develop.

Multiple air-fluid levels are seen in the case of small bowel obstruction. The loops proximal to the obstruction are dilated and filled with air, while the distal loops are collapsed with absent gas. Gas in fluid-filled loops appears as a string of beads on the X-ray due to dilated intestinal segments separated by valvulae conniventes.

Free air in the abdomen in the upright or supine positions is a sign of perforation of the gut. The air can be intra-peritoneal under the diaphragm or retroperitoneal due to perforation of the duodenum or retroperitoneal colon.

Abdominal ultrasonography

The use of abdominal ultrasonography is limited in intestinal obstruction to specific conditions due to less visualization of the intestine and gaseous abdominal organs. It can be used in specific patients with **allergy to contrast media, pregnant patients and the pediatric population** to avoid ionizing radiations.

CT scan

A CT scan is more valuable for confirming the diagnosis with more detailed visualization of the specific location, etiology, and complications of the obstruction. A CT scan can detect mucosal and submucosal edema or hemorrhage, wall thickness, contrast enhancement, the air in the wall, edema or hemorrhage in the mesentery and gas in the portal veins. These are all **signs of ischemia on radiologic imaging**.

A CT scan is also more accurate than plain X-ray in detecting **free air in the abdomen**. Closed-loop obstruction appears as a distended segment of the intestine as (C) or (U) shaped with two locations of obstructions which appears as **beak sign** or **whirl sign**.

MRI

The use of MRI in the setting of bowel obstruction is **less practical** due to the longer duration and availability of more accurate imaging modalities.

Differential Diagnosis

Adhesive intestinal obstruction is the most common cause for intestinal obstruction, usually following abdominal or pelvic surgeries and sometimes due to peritonitis. Most of the patients develop adhesive bands following surgeries, but only a few percentages develop intestinal obstruction that requires surgical adhesiolysis.

Complicated hernias: External and internal hernias can evolve to complications such as irreducibility, obstruction, and incarceration. Hernias can present with the chronic partial intestinal obstruction which might lead to wall necrosis and infarction without complete obstruction; therefore careful examination and even exploration of the abdomen and intestine loops during surgery for early signs of infarction is crucial before closing the wound.

Neoplastic obstruction: Tumors of the small or large intestine are common causes of mechanical intestinal obstruction. Metastatic neoplasms are more common than primary tumors to cause intestinal obstruction due to mechanical compression. Examples of metastatic tumors include; direct metastases from ovarian, colonic and pancreatic tumors, while hematogenous metastases from lung, breast, and other tumors can spread to the wall and lead to obstruction of the lumen. The most common primary tumors to cause bowel obstruction include; gastrointestinal stromal tumor (GIST), lymphoma and carcinoid tumor.

Luminal stricture: Strictures within the lumen of the intestine can complicate Crohn's disease, radiation, ischemia and drugs. Blunt trauma to the abdomen can lead to hematoma in the wall which leads to narrowing of the lumen and partial or complete bowel obstruction. CT is the gold standard for diagnosis.

Foreign body obstruction: The ileocecal valve is the most common site for foreign body impaction leading to intestinal obstruction. Common foreign bodies include; gall stones through a fistula connecting the intestine with the biliary tract. Besides bowel obstruction, patients may present with cholangitis and pneumobilia. Foreign bodies include heavy parasitic infestation e.g. *Ascaris lumbricoides* or bezoar materials e.g. ingested food, hair or medications especially in children which lead to acute mechanical obstruction and typical clinical picture.

Management of Intestine Obstruction

Intestinal obstruction is a **medical emergency** that can be complicated with **hypovolemic shock** or **metabolic acidosis** regardless of the cause.

Fluid resuscitation with **electrolyte replacement** is the first step of management to maintain adequate volume status. Patients should be placed on **NPO** and **gastric decompression** with a nasogastric tube and flatus tube to relieve the pain and associated vomiting and distension. Some analgesics may be administered if the pain is severe.

Conservative management is successful in most patients with partial intestinal

obstruction and with adhesions. Patients should be **monitored closely** for signs of complications or recurrent obstruction.

Surgical exploration is indicated in all patients with complete intestinal obstruction, patients with closed-loop obstruction, patients who developed complications of ischemia and perforation and patients with incarcerated hernias. Surgeons apply careful examination of the bowel loops to exclude early ischemia or gangrene.

Special Forms of Intestinal Obstruction

Intussusception

Intussusception refers to invagination or telescoping of part of the intestine into itself leading to obstruction, venous congestion, and ischemia. Intussusception is the most common cause of intestinal obstruction in children less than 3 years and it is idiopathic, while in adults and older children, pathological etiology e.g. polyp, lymphoid hyperplasia or hematoma usually precipitates the condition. Some children report **upper respiratory infection** due to adenovirus or rotavirus vaccination before they develop intussusception.

Some cases are also related to **intestinal bacterial infection** leading to **lymphoid hyperplasia**. Intussusception is most common at the **ileocecal valve** between the ileum and cecum, but ileoileal and jejunoileal can also happen.

Clinically, the child will have **severe intermittent cramping abdominal pain** with leg elevation and vomiting. The stool is described as currant jelly due to blood and mucus. A sausage-shaped mass may be palpated in the abdomen of some patients. The typical presentation is not evident in all patients with intussusception, especially young infants, so intussusception should be suspected in all infants with lethargy or sepsis with unknown etiology.

Diagnosis of intussusception is best made with **ultrasonography**. Target sign or bull's eye is the typical imaging sign due to invagination of the intestinal loop within itself. The duplex **scan** can detect blood flow and signs of ischemia. **Fluoroscopy** can also be used for confirming the diagnosis with high specificity.

Ultrasonography and fluoroscopy can be used to guide and follow the **hydrostatic reduction** of intestinal loops. CT scan and plain X-ray are other options that are less commonly used than ultrasound. Ileal invagination into the cecum gives rise to the crescent formation on plain radiography known as a **crescent sign**.

Treatment of intussusception: non-complicated cases with the confirmed radiologic diagnosis can be managed with hydrostatic or pneumatic reduction after stabilization of the general condition and volume status. Surgical management is indicated in late presentation with possible complications of bloody stool, perforation, and sepsis, or failure of non-operative reduction.

Volvulus

Volvulus is **torsion of part of the intestine**, commonly the sigmoid colon and cecum around its mesentery leading to intestinal obstruction and interruption of blood supply. Distal intestinal obstruction due to volvulus is responsible for delayed typical clinical picture and delayed presentation.

It is common in old patients with a long history of **constipation**. Clinically, volvulus presents with **constant progressive abdominal pain** and **intermittent cramping attacks**. Some patients may develop late with complications of perforation, peritonitis, and sepsis. Local examination of the abdomen reveals distention and tenderness to palpation with **empty left iliac fossa**.

Diagnosis of the volvulus is confirmed with a CT scan of the abdomen. **Whirl sign** is dilated sigmoid colon around its mesentery with bird beak pattern at both ends. Gas in the wall of the colon is characteristic of ischemia and necrosis. Plain X-ray will show distended sigmoid colon with absent gas distal to the obstruction.

Treatment starts with the reduction of the mal-rotated colon, either surgically or endoscopically, followed by surgical resection with end-to-end anastomosis.

Intestinal malrotation

This occurs in embryonic life due to **abnormal rotation of the gut around the superior mesenteric artery**. It is associated with other congenital anomalies, including diaphragmatic hernia, omphalocele or heart diseases.

The presentation is early in infancy with vomiting, distension, tenderness, and hypovolemia. Infants usually develop two distinctive anatomical anomalies; volvulus or duodenal obstruction.

Upper GI series will show tapering of the contrast in a corkscrew shape at the duodenojejunal junction in volvulus patients. **Complete duodenal atresia or annular pancreas** can be seen in plain radiographs as double bubbles of air in the stomach and duodenum.

Lower GI contrast enema may be used to locate the duodenojejunal junction. Abdominal ultrasound and CT scan are both useful for confirming the diagnosis. Treatment is mainly surgical after stabilization of the patient's general condition.

Paralytic ileus

Paralytic ileus refers to **diminished physiological propulsive intestinal motility without mechanical obstruction**. This leads to an accumulation of fluid and gas in the abdomen with a clinical picture similar to intestinal obstruction.

While post-operative ileus is the most common cause and can be normal for up to 3 days, prolonged intestinal paralysis with the absence of bowel function on postoperative day 6 is considered abnormal.

Patients present with nausea, vomiting, distension, absent flatus or bowel movement. It is more common in open surgeries than laparoscopic surgeries or the lower GI tract, routine nasogastric tube placement or delayed enteral nutrition, use of opioid analgesics and sepsis. X-ray shows dilated intestinal loops with air. Treatment is conservative with **bowel rest, fluid and electrolyte replacement** and **nutritional support**.

References

[Overview of the management of intestinal obstruction](#) via uptodate.com

[Gastric volvulus in adults](#) via uptodate.com

[Intussusception in children](#) via uptodate.com

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Notes