

Acute Intestinal Obstruction

Chapter 341 | Part 10: Disorders of the Gastrointestinal System

KEY CLINICAL POINTS

- 1 Cardinal signs of acute obstruction: colicky abdominal pain, abdominal distention, emesis, and obstipation.
- 2 Closed-loop obstruction (e.g., volvulus, hernia) carries a significantly higher risk of strangulation and ischemia.
- 3 CT sensitivity for high-grade bowel obstruction is ~95% with 96% specificity; however, accuracy for closed-loop obstruction is lower (~60%).
- 4 Barium studies are strictly contraindicated in patients with suspected complete or high-grade obstruction due to risk of barium concretions.
- 5 Cecal diameter >10–12 cm in distal colonic obstruction indicates a high risk of ischemic necrosis and perforation.
- 6 Neostigmine is the primary treatment for Ogilvie's syndrome but must only be used after mechanical obstruction is excluded.
- 7 Postoperative adhesions are the leading cause of small-bowel obstruction (>50% of cases).
- 8 Ileus is distinguished from mechanical obstruction by the absence of colicky pain and the potential passage of flatus/stool.
- 9 Late CT findings such as mesenteric venous gas, pneumatosis intestinalis, and pneumoperitoneum indicate bowel necrosis.
- 10 Neostigmine is contraindicated in any patient with suspected mechanical obstruction.

DEFINITION & CLASSIFICATION

- **General Definition:** Acute intestinal obstruction occurs either mechanically from blockage or from intestinal dysmotility (functional).
- **Mechanical Obstruction:** Caused by blockage from extrinsic, intrinsic, or intraluminal disease.
- **Functional Obstruction:** Also known as ileus or pseudo-obstruction; present when dysmotility prevents movement without a mechanical blockage.
- **Severity Classifications:**
 - **Simple obstruction:** No vascular insufficiency or ischemia.
 - **Strangulated obstruction:** Vascular insufficiency and intestinal ischemia are evident.

Classification of Obstruction

- **Mechanical:**
 - **Extrinsic:** External to the bowel wall.
 - **Intrinsic:** Within the bowel wall.
 - **Intraluminal:** Inside the lumen.

EPIDEMIOLOGY

- **Hospitalization Rate:** Accounts for ~1–3% of all hospitalizations.
 - **Surgical Volume:** Represents 1/4 of all urgent or emergent general surgery admissions.
 - **Small Bowel Involvement:** Approximately 80% of cases involve the small bowel.
 - **Ischemia Prevalence:** About one-third of patients show evidence of significant ischemia.
 - **Mortality (Strangulation):**
 - Surgery within 24–30 h of symptoms → ~8% mortality.
 - Delay beyond 24–30 h → Mortality triples.
 - **Trends:** While incidence/prevalence have increased over the last two decades, morbidity and mortality appear to be decreasing.
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ETIOLOGY & PATHOPHYSIOLOGY

- **Etiologic Categories:**
 - **Extrinsic:** Most common cause of small intestine obstruction (e.g., adhesions, hernias).
 - **Intrinsic:** Usually congenital, inflammatory, neoplastic, or traumatic.
 - **Intraluminal:** Bezoars, feces, foreign bodies, gallstones, and enteroliths.
 - **Functional:** Dysmotility without blockage.

Pathophysiologic Cascade

- **Initial Response:** Increased intestinal contractility proximally and distally to obstruction.
 - **Progression:** Peristalsis slows → proximal dilation with gas/fluid accumulation → increased intraluminal pressure.
 - **Vascular Impact:** Pressure exceeds venous pressure → impaired venous/lymphatic drainage → edema → hypoxemia.
 - **Tissue Damage:** Epithelial necrosis can occur within 12 h of obstruction.
 - **Critical Failure:** Arterial supply compromised → full-thickness ischemia, necrosis, and perforation.
 - **Bacterial Growth:** Stasis increases counts of *E. coli*, *S. faecalis*, and *Klebsiella*.
 - **Systemic Impact:** Inflammation leads to reactive oxygen species and neutrophil/macrophage activation; loss of absorption causes dehydration; emesis leads to loss of K^+ , H^+ , and Cl^- .
 - **High Pressure Effects:** Intraperitoneal fluid → increased intraabdominal pressure → elevated diaphragm → inhibited respiration → impaired systemic venous return.
- **Closed-loop Obstruction:**
 - **Definition:** Both proximal and distal openings of a segment are occluded (e.g., volvulus, hernia).
 - **Risk:** Most common precursor for strangulation; higher risk of rapid ischemia and systemic inflammation.

Incidence by Cause

- **Table 341-1 & 341-2 Summary:**
 - **Postoperative adhesions:** >50% overall.
 - **Neoplasms:** ~20%.
 - **Hernias (ventral/internal):** ~10% (higher risk of strangulation).
 - **Inflammatory bowel disease/other inflammation:** ~5% (may resolve if inflammation subsides).

- Intussusception, volvulus, others: <15%.

CLINICAL FEATURES

- **Cardinal Signs:** Colicky abdominal pain, abdominal distention, emesis, and obstipation.
 - Distal Obstruction → More fluid accumulation → greater distention, more discomfort, delayed emesis (feculent if bacterial overgrowth present).
 - Proximal Obstruction → Less distention, more pronounced vomiting.
- **Systemic Signs:** Patients may be critically ill; often oliguric, hypotensive, and tachycardic due to volume depletion. Fever is a warning sign for strangulation or systemic inflammation.
- **Physical Examination:**
 - **Bowel Sounds:**
 - Early Small-bowel Obstruction → high-pitched, 'musical' tinkling sounds; peristaltic 'rushes' (borborygmi).
 - Late Stage/Ileus → absent or hypoactive.
 - **Masses:** Tender abdominal/groin mass → suggests incarcerated hernia.
 - **Peritoneal Signs:** Severe pain with localization or signs of irritation → suspicious for strangulation/necrosis.
 - **Distinction via Flatus:** Ongoing, regular discharge of stool/flatus may indicate partial obstruction or ileus rather than complete mechanical obstruction.

DIFFERENTIAL DIAGNOSIS

- **Ileus vs. Mechanical Obstruction:**
 - **Ileus (Functional):** No mechanical blockage; typically lacks colicky pain; may pass flatus/stool.
 - **Obstruction (Mechanical):** Physical blockage exists; complete obstruction leads to obstipation.
- **Causes of Ileus (Table 341-3):**
 - **Procedural:** Intraabdominal procedures, lumbar spinal injuries/surgery.
 - **Metabolic:** Hypokalemia, hypomagnesemia, hyponatremia, uremia, severe hyperglycemia.
 - **Drugs:** Opiates, antihistamines, psychotropics (haloperidol, tricyclic antidepressants), anticholinergics.
 - **Other:** Ischemia, inflammation/hemorrhage, lower lobe pneumonia, systemic sepsis, hyperparathyroidism, Ogilvie's syndrome, myopathies/neuropathies, collagen vascular diseases (lupus, scleroderma).

DIAGNOSTIC APPROACH

1. Laboratory Assessment:

- CBC and serum electrolytes/creatinine.
- Findings: Mild hemoconcentration, elevated WBC (simple obstruction); Hypokalemia, hypochloremia, metabolic alkalosis (emesis/dehydration).
- Malignancy Indicators: Guaiac-positive stools, iron-deficiency anemia.
- Ischemia/Sepsis Indicators: High WBC with immature forms, metabolic acidosis.
- Specific Markers: Serum D-lactate, creatine kinase BB isoenzymes, intestinal fatty acid binding protein (suggestive of strangulation).

2. Imaging Studies:

- **Abdominal Radiography:**

- Rapid assessment; identifies 'staircasing' (dilated loops >2.5 cm) and air-fluid levels.
- Distinguishes obstruction from ileus if air-fluid levels are present without significant colonic distension.
- Volvulus → 'coffee bean' shaped dilated shadow.

- **Computed Tomography (CT):**

- High sensitivity (~95%) and specificity (96%) for high-grade obstruction.
- Lower accuracy for closed-loop obstruction (60%).
- Findings: Altered bowel wall enhancement (early ischemia), mesenteric venous gas, pneumoperitoneum, pneumatosis intestinalis (late/necrosis).
- Contrast Study: Water-soluble contrast in cecum within 4–24 h → high sensitivity/specificity (~95%) for improvement.
- Volvulus signs: 'bird's beak', 'c-loop', or 'whorl' deformity.

- **Ultrasound:** Used primarily when x-ray is contraindicated (e.g., pregnancy).

- **Specialized Procedures:**

- CT scan after water-soluble contrast enema → distinguish ileus/pseudo-obstruction from distal large-bowel obstruction.
- Contrast enemas or colonoscopies → required to identify causes of acute colonic obstruction.

MANAGEMENT & TREATMENT

1. Initial Stabilization:

- Fluid resuscitation and electrolyte repletion (address hypokalemia, etc.).
- Nasogastric tube suction → decompresses stomach, reduces distention, improves comfort, reduces aspiration risk.
- Foley catheter → monitor urine output.
- Monitoring: Central venous pressures for patients with cardiac disease.

2. Antibiotics:

- Controversial; prophylactic use may be warranted if surgery is anticipated.

3. Surgical Intervention:

- Indicated for complete bowel obstruction or signs of strangulation/ischemia.

4. Specific Management:

- **Ogilvie's Syndrome (Colonic Pseudo-obstruction):**

- Treatment: Neostigmine.
- Requirement: Must have cardiac monitoring and atropine available; must exclude mechanical obstruction first.

- **Stenting:** Consider for high-grade obstruction with unresectable stage IV malignancy or for pre-operative bowel preparation.

Barium Contraindications

- **Rule:** Barium studies are contraindicated in patients with evidence of complete or high-guard bowel obstruction.

- Reason: Risk of barium concretions and potential for required surgery; also renders cross-sectional imaging/angiography uninterpretable.

COMPLICATIONS & PROGNOSIS

- **Ischemic Necrosis:** Identified within 12 hours of obstruction.
 - Risk Factors: Cecal diameter >10–12 cm in distal colonic obstruction → high risk of necrosis/perforation.
 - Late CT Findings: Mesenteric venous gas, pneumatosis intestinalis, and pneumoperitoneum → indicate bowel necrosis.
- **Sepsis:** Resulting from bacterial translocation (*E. coli*, *S. faecalis*, *Klebsiella*) into bloodstream or other sites.
- **Systemic Inflammatory Response:** Triggered by severe hemodynamic compromise or tissue ischemia.

SPECIAL POPULATIONS

- **Pregnancy:** Ultrasound is the preferred modality when x-ray is contraindicated.
 - Note: Risk of obstetric complications from large-bowel obstruction (e.g., if caused by malignancy or volvulus).

KEY PEARLS & HIGH-YIELD POINTS

- **Clinical Trap:** Do not use Neostigmine until mechanical obstruction is definitively excluded.
 - Rule: Neostigmine → only for pseudo-obstruction (Ogilvie's).
 - Contraindication: Mechanical obstruction.
- **Diagnostic Clue:** 'Staircasing' on X-ray and dilated loops >2.5 cm are hallmarks of small-bowel obstruction.
 - Distinction: If air-fluid levels exist without colonic distension, it is more likely to be mechanical obstruction than ileus.
 - Volvulus: Look for 'coffee bean' (X-ray) or 'bird's beak' (CT).
- **Critical Threshold:** Cecal diameter >10–12 cm → high risk of ischemia/perforation.
 - Action: Requires urgent surgical evaluation.

REFERENCE TABLES

TABLE 341-1

Most Common Causes of Acute Intestinal Obstruction Extrinsic Disease Adhesions (especially due to previous abdominal...

- Extrinsic Disease
- Adhesions (especially due to previous abdominal surgery), internal or external hernias, neoplasms (including carcinomatosis and extraintestinal malignancies, mostly commonly ovarian), endometriosis or intraperitoneal abscesses, and idiopathic sclerosis
- Intrinsic Disease
- Congenital (e.g., malrotation, atresia, stenosis, intestinal duplication, cyst formation, and congenital bands—the latter rarely in adults)

- Inflammation (e.g., inflammatory bowel disease, especially Crohn's disease, but also diverticulitis, radiation, tuberculosis, lymphogranuloma venereum, and schistosomiasis)
- Neoplasia (note: primary small-bowel cancer is rare; obstructive colon cancer may mimic small-bowel obstruction if the ileocecal valve is incompetent)
- Traumatic (e.g., hematoma formation, anastomotic strictures)
- Other, including intussusception (where the lead point is typically a polyp or tumor in adults), volvulus, obstruction of duodenum by superior mesenteric artery, radiation or ischemic injury, and aganglionosis, which is Hirschsprung's disease
- Intraluminal Abnormalities
- Bezoars, feces, foreign bodies including inspissated barium, gallstones (entering the lumen via a cholecystoenteric fistula), enteroliths

TABLE 341-3

Most Common Causes of Ileus (Functional or Pseudo-Obstruction of the Intestine)

- Intraabdominal procedures, lumbar spinal injuries, or surgical procedures on the lumbar spine and pelvis
- Metabolic or electrolyte abnormalities, especially hypokalemia and hypomagnesemia, but also hyponatremia, uremia, and severe hyperglycemia
- Drugs such as opiates, antihistamines, and some psychotropic (e.g., haloperidol, tricyclic antidepressants) and anticholinergic agents
- Intestinal ischemia
- Intraabdominal or retroperitoneal inflammation or hemorrhage
- Lower lobe pneumonias
- Intraoperative radiation (likely due to smooth muscle damage)
- Systemic sepsis
- Hyperparathyroidism
- Pseudo-obstruction (Ogilvie's syndrome)
- Ileus secondary to hereditary or acquired visceral myopathies and neuropathies that disrupt myocellular neural coordination
- Some collagen vascular diseases such as lupus erythematosus or scleroderma

TABLE 341-2

**Acute Small-Intestinal and Colonic Obstruction Incidences CAUSE Postoperative adhesions
Neoplasms Hernias (especially...**

CAUSE	INCIDENCE
Postoperative adhesions	>50% overall
Hernias (especially ventral or internal types, where the risk of strangulation is increased)	~10%
Intussusception, volvulus, other miscellaneous diseases	<15%