Bowel Obstructions

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Obstruction can be partial, with some intestinal contents allowed to progress through the area of narrowing, or complete. A patient with complete obstruction has a low likelihood of spontaneous resolution and a high likelihood of bowel strangulation, whereas a patient with partial obstruction can typically be managed nonoperatively because of the lower risk for bowel strangulation. The central dilemma in caring for patients with small bowel obstruction is to identify those at risk for strangulation to ensure timely surgical intervention.

**PATHOPHYSIOLOGY**

Bowel obstructions can be divided into simple obstructions (bowel occlusion at one location with an intact blood supply) and closed-loop obstruction (occluded loop of bowel at two adjacent points, which may or may not involve a vascular pedicle). Closed-loop obstructions are most commonly caused by entrapment of bowel in a hernia (incarceration) or, less commonly, by volvulus. Closed-loop bowel obstructions have a higher likelihood of concomitant vascular compromise and strangulation, thus warranting a more aggressive management approach.

Large bowel obstructions are at increased risk for perforation if a closed-loop obstruction is present or if the ileocecal valve is functional (preventing proximal decompression into the small bowel). The most likely sites of perforation are at the cecum (especially if the diameter is larger than 10 cm) or at the site of a primary tumor.

Volvulus, or axial twisting of the bowel, represents a special category of closed-loop obstruction. Volvulus occurs most commonly at either the cecum or the sigmoid colon and much less frequently at the transverse colon, small bowel, or stomach. Sigmoid volvulus, which is responsible for 50% to 75% of all cases of colonic volvulus, is more common in elderly and institutionalized patients. Cecal volvulus is found in younger patients, who may have an anatomic predisposition because of abnormal fixation of the right colon.

**CLINICAL PRESENTATION**

Bowel obstructions are manifested as colicky abdominal pain that precedes the onset of nausea and vomiting, abdominal distention, constipation, and obstipation. Proximal small bowel obstructions tend to have minimal distention and an
early onset of intractable vomiting because the bowel proximal to the obstruction has minimal capacity to distend. Conversely, distal small bowel obstructions are characterized by abdominal distention, colicky abdominal pain, and obstipation before the onset of vomiting. Large bowel obstruction may be preceded by changes in stool caliber and progressive abdominal distention when it is caused by a slow-growing tumor, or it may be sudden in onset in the setting of volvulus.

Physical examination may detect signs of volume depletion, tachycardia, and hypotension. Fever suggests strangulation and perforation. The abdomen is variably distended and tympanic, depending on the level of obstruction. Scars from previous surgery can provide valuable clues to the cause of the obstruction. Bowel sounds tend toward high-pitched rushes of “tinkling” borborygmi; a silent abdomen is an ominous sign of perforation and peritonitis. Tenderness may be present, but localized tenderness and peritoneal signs indicate perforation. The examination should include a search for hernias.

A digital rectal examination should be performed to exclude stool impaction in the elderly. Occult blood may be detected in cases of strangulated obstruction, intussusception, or an obstructing mass. A rectal mass may be identified as the cause of large bowel obstruction.

**DIAGNOSTIC TESTING**

**LABORATORY TESTING**

Laboratory abnormalities are not diagnostic of bowel obstruction but instead may indicate complications of obstruction. A complete blood count may demonstrate leukocytosis with a left shift in a patient with strangulation; serum chemistry evaluations may show dehydration, hypokalemia, and acid-base disturbances. The serum lactate concentration can be elevated in the setting of strangulation, but its measurement is neither sensitive nor specific.

**RADIOGRAPHS**

Plain supine and upright radiographs of the abdomen are the most commonly ordered initial diagnostic study for bowel obstruction because of their widespread availability and the low cost of radiographic evaluation (Fig. 40.1).

Small bowel obstruction appears on radiographs as air-fluid levels and dilated loops of bowel. Air in the distal part of the colon and rectum implies early or partial small bowel obstruction. As the obstruction progresses, small bowel dilation and air-fluid levels become more prominent, and the distal end of the bowel decompresses and collapses.

Ileus is distinguished from mechanical obstruction by the presence of air-fluid levels at uniform height across an upright image of the abdomen; with obstruction, air-fluid levels are classically found at variable heights.

**DIFFERENTIAL DIAGNOSIS**

Many abdominal disorders may cause a functional ileus that can be mistaken clinically for bowel obstruction.

Potential causes of mechanical small or large bowel obstruction are summarized in Box 40.1.

**BOX 40.1 Causes of Mechanical Bowel Obstruction**

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<thead>
<tr>
<th>Causes of Small Bowel Obstruction</th>
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<tr>
<td>Adhesions</td>
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<td>Inflammatory bowel disease</td>
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<td>Neoplasms</td>
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<td>Hernias</td>
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<td>Abscess</td>
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<td>Intussusception</td>
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<td>Foreign bodies</td>
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<tr>
<td>Volvulus</td>
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<td>Diverticulitis</td>
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<td>Metastatic cancer (extrinsic compression)</td>
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<tr>
<td>Stricture</td>
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<tr>
<td>Hernia</td>
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<tr>
<td>Fecal impaction</td>
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Plain radiography is less useful for closed-loop obstructions, which are detected only by the subtle finding of a paucity of intestinal gas in the region of an often fluid-filled closed loop.

Sigmoid volvulus is characterized by a massively distended loop of large bowel arising out of the pelvis, sometimes
surgical reports, enteroclysis, and clinical follow-up as criterion standards. A review of these studies shows that plain radiographs are of limited value because they are diagnostic in only 50% to 60% of cases and have a reported sensitivity of just 46% to 76%. A study of plain radiographs interpreted by gastrointestinal radiologists had a sensitivity of 66%; 21% of radiographic studies reported as showing normal bowel were actually images of obstructions. Despite the limitations related to false-negative interpretations, plain radiography is still recommended as the initial test of choice for the evaluation of possible bowel obstruction because the classic radiographic findings, when present, are useful for quickly confirming the diagnosis.

Computed tomography (CT) has supplanted the emergency department (ED) use of contrast-enhanced radiography to confirm suspected bowel obstruction when initial plain radiographs are nondiagnostic (typically in cases of low-grade or intermittent obstruction).

**COMPUTED TOMOGRAPHY**

CT of the abdomen is commonly used for the diagnosis of bowel obstruction (1) to confirm a clinically suspected obstruction not identified on a plain radiograph; (2) to determine the level, severity, and cause of the obstruction; (3) to characterize a closed-loop obstruction; (4) to demonstrate signs of strangulation; and (5) to identify alternative causes of acute abdominal pain when obstruction is not present.

CT has a sensitivity of 64% to 100% and a specificity of 71% to 100% for the diagnosis of bowel obstruction. Signs of small bowel obstruction on CT consist of small bowel dilation to a caliber of 2.5 cm or greater with a distinct transition zone and a collapsed distal bowel lumen. The “small bowel feces sign”—the presence of intraluminal particulate material in dilated small bowel—can be helpful in confirming the diagnosis of small bowel obstruction. CT correctly identifies the cause of obstruction in 73% to 95% of patients.

A completely fluid-filled closed-loop obstruction is more easily diagnosed with CT than with plain radiography. Characteristics of closed-loop obstruction include a C- or U-shaped configuration of the dilated loops, a radial distribution of the dilated loops toward the site of obstruction, a radial distribution and engorged mesenteric vessels toward the site of obstruction (the “beak and whirl” sign), and the presence of two collapsed bowel lumens adjacent to the site of obstruction.

Intravenous contrast-enhanced CT has a sensitivity for the diagnosis of strangulation of 56% to 85% and a specificity exceeding 90%. Strangulation is suggested by a characteristic configuration of the obstructed loop, bowel wall thickening and reduced contrast enhancement, mesenteric vascular changes, gas in the bowel wall, and the presence of free peritoneal fluid. Combinations of clinical, laboratory, and radiographic features have been used in an attempt to identify patients with strangulation who need urgent surgery. One study suggested that the presence of any three of six variables (duration of pain longer than 4 days, abdominal guarding, C-reactive protein level higher than 75 mg/L, white blood cell count greater than 10,000/mm³, presence of more than 500 mL of intraabdominal fluid on CT, or reduced wall contrast enhancement on CT) had a sensitivity of 68% for resection of small bowel. Another study found that the presence of two of four clinical criteria (tachycardia, leukocytosis, fever, and tenderness) increased the specificity of the CT criteria.

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**Fig. 40.2 Sigmoid volvulus.** Note U-shaped, massively dilated, and ahastral sigmoid. (From Kahi CJ, Rex DK. Bowel obstruction and pseudo-obstruction. Gastroenterol Clin North Am 2003;32:1229-47.)

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Cecal volvulus appears as a coffee bean–shaped loop of bowel projecting from the right lower quadrant into the upper part of the abdomen, often with a collapsed distal large bowel and accompanying small bowel dilation that can be mistaken for a primary small bowel obstruction.

Large bowel obstruction resulting from mechanical causes must be differentiated from pseudoobstruction, a colonic motility disorder that is treated nonoperatively. Enemas of a water-soluble contrast agent (WSCA) (used instead of barium to avoid chemical peritonitis in the setting of perforation) can differentiate obstruction from pseudoobstruction. A contrast agent enema improves the sensitivity and specificity for mechanical obstruction from 84% and 72% to 96% and 98%, respectively, by using a criterion standard of laparotomy findings and clinical follow-up. In addition, a contrast agent enema is helpful in confirming the diagnosis of sigmoid and cecal volvulus, with a tapering “bird’s beak” appearance at the end of the column of contrast agent as it reaches the base of the colonic twist.

Studies evaluating the effectiveness of plain radiography in diagnosing obstruction are limited by their methodology. Researchers have used combinations of discharge diagnosis,
CT enteroclysis (delivery of contrast agent to the small bowel via a tube so that it bypasses the pylorus) combines the anatomic information provided by CT with the intraluminal detail of enteroclysis. Although this technique is more labor-intensive because of the need to intubate the small bowel, it may play a role in the future evaluation of small bowel obstruction.\(^5\) CT enteroclysis is a useful test for confirming the diagnosis of superior mesenteric artery syndrome, a rare cause of proximal small bowel obstruction that occurs after rapid weight loss.

Orally administered WSCA can help distinguish partial small bowel obstruction from complete obstruction. Two separate metaanalyses have shown that identification of oral contrast agent in the colon 4 to 24 hours after administration predicts the success of conservative management with a pooled positive likelihood ratio of 25 to 40 and that the absence of contrast agent predicts failure of conservative therapy with a pooled negative likelihood ratio of 0.03 to 0.04.\(^6\)\(^,\)\(^7\)

**TREATMENT**

**CONSERVATIVE MANAGEMENT OF SMALL BOWEL OBSTRUCTION**

“Don’t let the sun set on a bowel obstruction.” This adage has guided surgeons since the advent of operative therapy for this condition inasmuch as clinical and radiographic predictors of strangulation were poor before the advent of CT. In the modern era, however, nearly half of all patients with acute small bowel obstruction improve with conservative therapy.\(^6\) The mainstay of nonoperative treatment is gastric decompression via nasogastric suctioning. The nasogastric tube is easy to insert, requires no fluoroscopic guidance to place, and reduces the risk for aspiration pneumonia by effectively relieving the gastric distention. Nasointestinal (long) tubes that cross the pylorus are not recommended for ED use.

Small bowel obstructions caused by postoperative adhesions in the first 30 days after laparotomy complicate up to 10% of procedures. These early adhesions represent inflammatory reactions, unlike the fibrous adhesions that develop later in the postoperative course. Obstructions occurring in the early postlaparotomy period can usually be managed nonoperatively because more than 85% resolve spontaneously.\(^19\) Conversely, early postlaparoscopic small bowel obstructions generally require surgery because they are typically caused by herniation of bowel through the peritoneal defect made by the trochar.\(^20\)

Oral contrast agents have been postulated to have a therapeutic role in resolving small bowel obstructions because WSCAs are hyperosmolar and draw water into the small bowel lumen while decreasing bowel wall edema, but studies have demonstrated conflicting results. A metaanalysis of four trials demonstrated no significant difference between WSCAs and placebo in successful nonoperative management of acute small bowel obstruction; however, hospital stay was shorter in patients given WSCAs than in patients receiving placebo.\(^16\)

**SURGICAL MANAGEMENT OF SMALL BOWEL OBSTRUCTION**

Surgical excision of an obstructive lesion and assessment of bowel viability are mandated for all cases of suspected bowel strangulation. Viability is assessed by visual inspection of the decompressed bowel during surgery; in questionable cases, fluorescein injection and subsequent fluorescence of the intestines confirm viability. Complete small bowel obstructions and closed-loop obstructions pose higher risks for strangulation and are therefore managed more aggressively with surgical intervention. A trial of nasogastric decompression is reasonable for partial small bowel obstructions.

Laparoscopic treatment of small bowel obstruction appears to be appropriate for carefully selected patients.\(^23\) The most significant complication of laparoscopy is iatrogenic perforation of bowel, which occurs in 1% to 16% of patients. Between 8% and 40% of cases initially planned as laparoscopic procedures are converted to laparotomy intraoperatively. Prospective studies are needed to further compare the risks and benefits of laparoscopic and open surgery for acute small bowel obstruction (Fig. 40.3).

**MANAGEMENT OF LARGE BOWEL OBSTRUCTION**

Large bowel obstruction can be divided into four types according to treatment options: mechanical obstruction as a result of cancer, sigmoid volvulus, cecal volvulus, and pseudo-obstruction. Mechanical large bowel obstruction is treated surgically, with resection and primary anastomosis in most cases of right and transverse colon carcinoma. For carcinoma of the left colon, either initial decompression followed by staged resection or immediate resection (with or without primary anastomosis) is performed. Palliative treatment of obstruction secondary to disseminated or recurrent carcinoma includes creation of a colostomy (or ileostomy for right-sided masses) proximal to the obstruction, corticosteroids, placement of a self-expanding stent, and chemotherapy.

Sigmoid volvulus is initially treated by nonoperative decompression, followed by elective surgery to prevent recurrence after colonoscopy excludes the possibility of carcinoma.
Decompression can be performed via rigid or flexible endoscopic detorsion of the twisted segment. Endoscopy is contraindicated in patients with suspected intestinal necrosis. A rectal tube may be left in place before surgery to facilitate further decompression and prevent recurrence during hospitalization.

Cecal volvulus is managed surgically, with most surgeons choosing a right colectomy as definitive therapy. Cecopexy, or manual detorsion and subsequent correction of the underlying hypermobile right colon, is associated with a high rate of recurrent volvulus.

Pseudoobstruction can initially be managed nonsurgically with a combination of decompression, colonoscopy, and promotility agents, including neostigmine. Medications that slow colonic motility should be discontinued, and suspected infectious causes should be treated appropriately. Surgical management is indicated when conservative therapy fails or in cases of suspected colonic ischemia, perforation, or sepsis. Because of the large number of potential causes of pseudoobstruction, inpatient management with surgical and gastroenterologic consultation is recommended.

**DISPOSITION**

Surgical consultation is indicated for all patients with partial or complete bowel obstruction. Such patients require hospital admission for resuscitation, decompression, serial abdominal examination, and possibly operative therapy.

**SUGGESTED READINGS**


**REFERENCES**

References can be found on Expert Consult @ www.expertconsult.com.
REFERENCES