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# Sigmoid volvulus

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Literature review current through: **Sep 2023**.

This topic last updated: **Jun 16, 2022**.

## INTRODUCTION

Volvulus refers to torsion of a segment of the alimentary tract, which often leads to bowel obstruction. The most common sites of volvulus are the sigmoid colon and cecum [1-4]. Volvulus of other portions of the alimentary tract, such as the stomach, gallbladder, small bowel, splenic flexure, and transverse colon, are rare.

This topic will review the epidemiology, pathogenesis, clinical manifestations, diagnosis, and management of sigmoid volvulus. Cecal volvulus is discussed separately. (See "[Cecal volvulus](#)".)

## EPIDEMIOLOGY

In the United States, sigmoid volvulus is a relatively uncommon cause of intestinal obstruction, representing fewer than 10 percent of cases in most series [1,5]. Limited data suggest that sigmoid volvulus is the underlying etiology in 50 to 80 percent of patients with intestinal obstruction in other parts of the world [6-10]. (See "[Chagas gastrointestinal disease](#)".)

Sigmoid volvulus usually occurs in older adults with a mean age of 70 years at presentation and has a higher incidence in men [5]. Patients are often institutionalized and debilitated due to underlying neurologic or psychiatric disease and have a history of constipation [11-14]. Sigmoid volvulus has been reported in younger patients and in children in association with abnormal

colonic motility [15-20] (see 'Colonic dysmotility' below). Sigmoid volvulus has been reported in patients with Crohn disease and Chagas disease [8,21-23].

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## ETIOPATHOGENESIS

**Pathophysiology** — Sigmoid volvulus occurs when an air-filled loop of the sigmoid colon twists about its mesentery. Obstruction of the intestinal lumen and impairment of vascular perfusion occur when the degree of torsion exceeds 180 and 360 degrees, respectively [24]. A variant of sigmoid volvulus (ileosigmoid knotting) occurs when the ileum wraps itself around the sigmoid, usually in a clockwise manner [25-27].

**Risk factors** — Although some risk factors have been associated with sigmoid volvulus, the precise pathophysiology underlying sigmoid torsion has not been well established.

**Anatomic factors** — Anatomic features that may predispose to sigmoid volvulus include a long redundant sigmoid colon with a narrow mesenteric attachment. It is hypothesized that chronic fecal overloading from constipation may cause elongation and dilatation of the sigmoid colon, predisposing patients to sigmoid volvulus, thereby explaining its higher incidence in older institutionalized adults with constipation [28,29].

A longer sigmoid colon and mesentery in men could be the reason for an increased likelihood of volvulus [28,29]. In addition, in women, a capacious pelvis with lax abdominal musculature may be protective as it can accommodate and allow the untwisting of a floppy sigmoid [30]. (See 'Epidemiology' above.)

**Colonic dysmotility** — Colonic dysmotility may predispose to torsion of the sigmoid colon. Support for an underlying colonic dysmotility as a risk factor for sigmoid volvulus is suggested by the following [8]:

- Prolonged colonic transit through the sigmoid colon and rectum has been observed in older patients with a history of constipation [31].
- Sigmoid volvulus may be the initial presentation in children with Hirschsprung disease, suggesting that the aganglionic segment below the sigmoid colon and a freely mobile mesosigmoid may predispose to the development of a volvulus [32].

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## CLINICAL FEATURES

The majority of patients with sigmoid volvulus present with the insidious onset of slowly progressive abdominal pain, nausea, abdominal distension, and constipation. Vomiting usually occurs several days after the onset of pain [33]. The pain associated with sigmoid volvulus is usually continuous and severe, with a superimposed colicky component during peristalsis. The disease may not be as apparent in the older, institutionalized adults who may have mild symptoms [34]. Due to the insidious presentation, the majority of patients usually present three to four days after the onset of symptoms. On physical examination, the abdomen is distended and tympanitic with tenderness to palpation. In some cases, there may be emptiness in the left iliac fossa [35]. Fever, tachycardia, hypotension, abdominal guarding, rigidity, and rebound tenderness are absent in the early stages of the disease, but if present, are indicative of perforation and/or peritonitis.

Approximately 17 percent of patients present within 48 hours of onset of symptoms with fulminant clinical symptoms consisting of sudden onset of acute severe pain, obstipation, and vomiting that either precedes or coincides with the onset of abdominal pain. Rarely, compromise of the blood supply to the sigmoid colon may result in gangrene, peritonitis, and sepsis [36].

Younger patients may have an atypical presentation with recurrent attacks of abdominal pain with resolution due to spontaneous detorsion [15].

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## DIAGNOSIS

The diagnosis is often suspected in patients with abdominal pain, nausea, abdominal distension, and constipation/obstipation and a physical examination that reveals a distended and tympanitic abdomen. The diagnosis of a sigmoid volvulus is established by imaging (abdominal computed tomography scan). (See ['Imaging'](#) below.)

**Laboratory testing** — We perform a complete blood count, electrolytes, serum lactate levels, and urine analysis. A pregnancy test should be performed in all women of childbearing age. In patients with a suspected perforation and diffuse peritonitis, serum aminotransferases, alkaline phosphatase, bilirubin, amylase, and lipase levels should be obtained to rule out other causes of acute abdominal pain. A complete blood count and electrolytes are usually normal in patients with sigmoid volvulus in the absence of gangrene, peritonitis, or sepsis. (See ["Evaluation of the adult with abdominal pain"](#), section on ["Urgent evaluation and/or surgical abdomen"](#).)

**Imaging** — Abdominal computed tomography (CT) scan establishes the diagnosis of sigmoid volvulus and can rule out other causes of abdominal pain and intestinal obstruction. In the

absence of immediate access to a CT scan, abdominal radiographs should be performed. Contrast enemas are rarely performed for the diagnosis of sigmoid volvulus. (See ["Evaluation of the adult with abdominal pain", section on 'Physical examination'](#).)

- **Abdominal CT scan** – Diagnostic findings of sigmoid volvulus include a whirl pattern, caused by the dilated sigmoid colon around its mesocolon and vessels, and a bird-beak appearance of the afferent and efferent colonic segments [37]. However, these features may be absent in one-fourth of CT scans [38].

Other supportive features of sigmoid volvulus include the absence of rectal gas, apparent separation of the sigmoid walls by adjacent mesenteric fat due to incomplete twisting or folding (split wall sign) and two crossing sigmoid transition points projecting from a single location ( [image 1](#) and [image 2](#)). The presence of pneumatosis intestinalis, portal venous gas, or loss of bowel wall enhancement on CT scan is suggestive of bowel necrosis. CT has been shown to confirm diagnosis of sigmoid volvulus with near 100 percent sensitivity and >90 percent specificity. (See ["Pneumatosis intestinalis", section on 'Clinical features'](#).)

- **Abdominal radiographs** – Diagnostic findings on abdominal radiography include the presence of a U-shaped, distended sigmoid colon seen as an ahaustral collection of gas (sometimes referred to as a "bent inner tube") extending from the pelvis to the right upper quadrant as high as the diaphragm ( [image 3](#)).

However, abdominal radiographs can establish the diagnosis of sigmoid volvulus in only 60 percent of patients [12,33]. Distended large bowel proximal to the sigmoid and air-fluid levels in the small bowel are often present in patients with sigmoid volvulus but can also be seen in patients with other causes of distal colonic obstruction, colonic pseudo-obstruction, and toxic megacolon. The presence of linear pneumatosis suggests impending bowel perforation due to bowel necrosis ( [image 4](#)). Free intraperitoneal air is suggestive of bowel perforation. (See ["Pneumatosis intestinalis", section on 'Clinical features'](#).)

- **Contrast enema** – The characteristic appearance of a sigmoid volvulus on contrast enema is a twisted taper or a bird's beak configuration where contrast tapers to the point of obstruction.

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## DIFFERENTIAL DIAGNOSIS

The differential diagnosis of sigmoid volvulus includes other causes of colonic obstruction. Sigmoid volvulus can be distinguished from these causes based on the clinical features and abdominal imaging. (See ['Imaging'](#) above.)

- **Toxic megacolon** – Toxic megacolon is characterized by total or segmental colonic dilatation plus systemic toxicity. Patients with toxic megacolon typically appear very ill with fever, tachycardia, and have diffuse abdominal tenderness on physical examination. They frequently have a history of bloody diarrhea or other signs or symptoms of chronic inflammatory bowel disease. Abdominal imaging may show "thumbprinting" due to bowel ischemia but U-shaped distension of the sigmoid colon on abdominal radiographs and computed tomography (CT) scan findings of a whirl pattern and a bird-beak appearance are absent in patients with toxic megacolon. (See ['Imaging'](#) above and ["Toxic megacolon"](#), [section on 'Clinical manifestations'](#).)
- **Intestinal pseudo-obstruction** – Acute colonic pseudo-obstruction (Ogilvie's syndrome) is a disorder characterized by gross dilatation of the entire colon, usually extending to the rectum, in the absence of an anatomic lesion that obstructs the flow of intestinal contents. It often occurs in association with other conditions ( [table 1](#)). Abdominal CT scan in patients with acute colonic pseudo-obstruction often reveals diffuse colonic dilatation, but in some cases a more proximal colonic dilatation occurs with an intermediate transitional zone at or adjacent to the splenic flexure. (See ["Acute colonic pseudo-obstruction \(Ogilvie's syndrome\)"](#), [section on 'Clinical manifestations'](#).)

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## MANAGEMENT

Management of patients with sigmoid volvulus depends on the presence of alarm signs (perforation or peritonitis) ( [algorithm 1](#)). Our recommendations are largely consistent with the guidelines by the American Society for Gastrointestinal Endoscopy on the role of endoscopy in the management of colonic volvulus [39] and those by the American Society of Colon and Rectal Surgeons [40].

**Patients with alarm signs** — Immediate surgical management is required in patients with perforation or peritonitis ( [algorithm 1](#)). Patients with perforation or peritonitis generally should **not** have their volvulus detorsed to avoid reperfusion injury. Instead, they should undergo resection of the compromised bowel in its volvulized position. The extent of resection depends on the status of the colon proximal to the volvulus (eg, if there is vascular compromise of the proximal colon, a subtotal colectomy rather than a segmental resection should be performed).

Reconstruction options include no reconstruction (Hartmann's procedure), colorectal anastomosis with proximal diversion, and colorectal anastomosis without proximal diversion. The choice must be individualized based on the patient's clinical parameters. Hartmann's procedure is preferred in the presence of hemodynamic instability, coagulopathy, acidosis, or hypothermia [40].

**Patients without alarm signs** — In patients who do not have perforation or peritonitis, we suggest flexible sigmoidoscopy in an attempt to detorse the twisted segment, and if successful, surgical resection during the index admission or shortly thereafter ( [algorithm 1](#)). (See '[Definitive management after endoscopic detorsion](#)' below.)

**Endoscopic detorsion** — A sigmoidoscopy can detorse the sigmoid volvulus when advanced through the twisted segment of the colon, thereby restoring luminal flow of enteric contents and ensuring that the blood supply to the affected sigmoid colon is maintained or restored [41]. An additional advantage of sigmoidoscopy is that it allows for an assessment of the viability of the colon. Endoscopic reduction of the volvulus converts an emergency surgery into a semiurgent surgery, performed 24 to 72 hours after endoscopic reduction of the volvulus, such that bowel preparation (cleanout) can be accomplished and underlying fluid and electrolyte imbalances can be corrected ( [algorithm 1](#)) [40,42].

**Technique** — On sigmoidoscopy, the area of torsion appears as a spiral, sphincter-like area of mucosa and is usually visualized within 25 cm of the anal verge. Gentle pressure with minimal insufflation permits advancement of the sigmoidoscope and straightens the sigmoid colon. Visualization of a dilated proximal segment filled with gas and stool or a sudden expulsion of gas and stool indicates successful reduction of the volvulus. Gas and fluid should be suctioned prior to withdrawal of the instrument. The mucosa just proximal to the site of obstruction should be carefully inspected for evidence of bowel ischemia. The procedure should be immediately stopped to prevent bowel perforation if the mucosa appears gangrenous. Counterclockwise twisting of the sigmoidoscope during withdrawal is not necessary since straightening of the sigmoid colon occurs during advancement.

We leave a colonic decompression (rectal) tube in place with its proximal end beyond the area of torsion, given the theoretical possibility that it may lessen colonic distension and reduce the chance of recurrent volvulus in the acute setting. Any relatively soft tube can be used as long as it can be placed past the point of torsion and into the segment that volvulized. The rectal tube should be left in-situ for one to three days and placed to gravity drainage into a bag to allow the passive passage of gas and stool [40].

**Outcomes** — Endoscopic decompression has an associated mortality of 6.4 percent [5]. Endoscopic reduction of a sigmoid volvulus has been reported to be successful in 75 to 95 percent of cases [12,41,43]. A wide range of recurrence rates have been reported ranging from 20 to 84 percent after initial successful endoscopic decompression [42,44,45]. In a study of 73 patients, detorsion was unsuccessful in 21 and was associated with previous abdominal surgery and a cecum diameter over 10 cm [46].

**Failure of endoscopic detorsion** — Patients with unsuccessful endoscopic detorsion should be referred for urgent surgical management ( [algorithm 1](#)). (See 'Surgery' below.)

**Definitive management after endoscopic detorsion** — Surgical resection should be performed during the index admission or shortly thereafter due to the high risk of recurrence and high mortality rates in patients with recurrent sigmoid volvulus ( [algorithm 1](#)) [39,40,47]. (See 'Prognosis' below.)

## Surgery

- **Surgical resection** – Surgical management of a sigmoid volvulus after endoscopic detorsion usually entails sigmoid colectomy with primary colorectal anastomosis; stoma creation in this nonemergency setting is not usually required but may be considered on a case-by-case basis depending on the operative findings and unique circumstances of the patients ( [picture 1](#)) [1,14,36,42,48,49]. As an example, a Hartmann's procedure should be performed in the setting of bowel gangrene, as a primary anastomosis may be associated with a high rate of leaks in such cases. Risk factors for post-operative complications following left-sided colectomy included age, male sex, systemic inflammatory response syndrome, sepsis, and septic shock [47]. Mortality after planned surgery following successful decompression is lower as compared with emergency surgery (3.3 percent versus 13 percent) [5,40].
- **Non-resectional surgery** – Nonresectional surgical techniques, including operative detorsion alone, detorsion with intraperitoneal or extraperitoneal fixation (sigmoidopexy), and tailoring of the sigmoid mesentery to broaden its base and prevent torsion (mesosigmoidopexy) are generally inferior to sigmoid resection in preventing recurrent volvulus. Thus, these procedures cannot be recommended [40].

**Limited role for other non-operative methods** — The use of advanced endoscopic techniques such as percutaneous endoscopic colostomy and percutaneous endoscopic sigmoidopexy are reserved for selected patients who are non-surgical candidates that have had repeated (two or more) bouts of volvulus [50]. These procedures tether the sigmoid colon to the

anterior abdominal wall, restricting its mobility and thus preventing recurrent volvulus. However, both techniques are associated with a high incidence of complications [51,52].

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## PROGNOSIS

The mortality related to sigmoid volvulus is highest in patients who have developed gangrene and ranges from 11 to 60 percent in case series [1,12,48,49,53]. In contrast, the mortality is less than 10 percent in patients who have not developed gangrene [12]. Recurrent sigmoid volvulus, after an initial episode that is not treated with surgery, occurs in up to 84 percent of patients. The median time to recurrence in one retrospective study of 168 patients was 58 days [13,44,53]. However, the time to recurrence can vary from hours to weeks or months. Recurrence rates increase with subsequent episodes [44]. Mortality rates appear to be higher in patients presenting with recurrent sigmoid volvulus with rates up to 21 percent reported in one study [54].

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## SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "[Society guideline links: Bowel obstruction](#)" and "[Society guideline links: Volvulus](#)".)

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## SUMMARY AND RECOMMENDATIONS

- Sigmoid volvulus occurs when an air-filled loop of the sigmoid colon twists about its mesentery ( [picture 1](#)). Obstruction of the intestinal lumen and impairment of vascular perfusion occur when the degree of torsion exceeds 180 and 360 degrees, respectively. (See '[Introduction](#)' above.)
- In the United States, sigmoid volvulus is a relatively uncommon cause of intestinal obstruction, representing fewer than 10 percent of cases in most series. In contrast, sigmoid volvulus is the underlying etiology in 50 to 80 percent of cases of intestinal obstruction in other parts of the world. Sigmoid volvulus usually occurs in older adults. Patients are often institutionalized and debilitated due to underlying neurologic or psychiatric disease and have a history of constipation. (See '[Epidemiology](#)' above.)
- Anatomic features predisposing to sigmoid volvulus include a redundant sigmoid colon that has a narrow mesenteric attachment and the presence of colonic dysmotility, but the



precise pathogenesis underlying sigmoid torsion has not been well established. (See '[Risk factors](#)' above.)

- The majority of patients with sigmoid volvulus present with slowly progressive abdominal pain, nausea, abdominal distension, and constipation. Vomiting usually occurs several days after the onset of pain. Approximately 17 percent of patients present within 48 hours of onset of symptoms with fulminant clinical symptoms consisting of sudden onset of acute severe pain, obstipation, and vomiting that either precedes or coincides with the onset of abdominal pain. Younger patients may have an atypical presentation with recurrent attacks of abdominal pain with resolution due to spontaneous detorsion. (See '[Clinical features](#)' above.)
- The diagnosis of a sigmoid volvulus is suspected in patients with abdominal pain, nausea, abdominal distension, and constipation/obstipation and physical examination that reveals a distended and tympanitic abdomen. We perform an abdominal computed tomography scan to establish the diagnosis of sigmoid volvulus and to rule out other causes of abdominal pain and intestinal obstruction. (See '[Diagnosis](#)' above.)
- Immediate surgical management is required in patients with perforation or peritonitis ( [algorithm 1](#)). (See '[Patients with alarm signs](#)' above.)
- In patients who do not have perforation or peritonitis, we suggest flexible sigmoidoscopy in an attempt to detorse the twisted segment (**Grade 2C**). Following successful detorsion, we leave a rectal tube in place. If detorsion is unsuccessful urgent surgery is required ( [algorithm 1](#)).
- In patients who have had endoscopic decompression, we suggest surgery to prevent recurrence after endoscopic detorsion (**Grade 2C**). We generally perform a sigmoid resection and primary anastomosis. The use of advanced endoscopic techniques such as percutaneous endoscopic colostomy and percutaneous endoscopic sigmoidopexy are reserved for selected patients who are not surgical candidates and have had repeated ( $\geq 2$ ) episodes of sigmoid volvulus ( [algorithm 1](#)). (See '[Definitive management after endoscopic detorsion](#)' above.)

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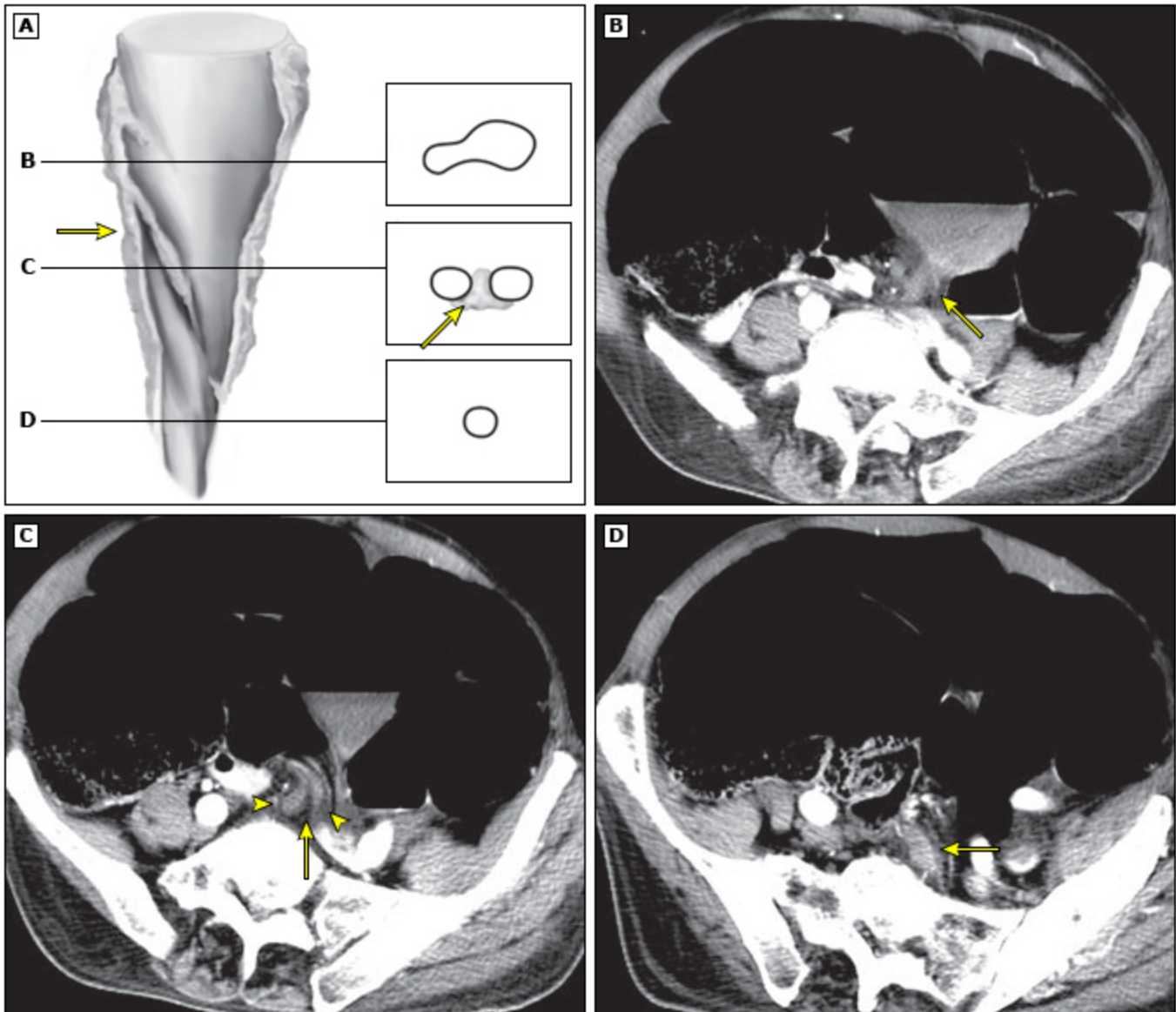
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## GRAPHICS

### Sigmoid volvulus



A 75-year-old man with sigmoid volvulus.

(A) Drawing shows split-wall sign caused by apparent separation of sigmoid walls by adjacent mesenteric fat (arrow) secondary to incomplete twisting. Horizontal lines and schematic axial insets indicate levels of B-D.

(B) Contrast-enhanced axial computed tomography (CT) image through the single beak-shaped transition point (arrow).

(C) Axial CT image 25 mm caudal to B shows mesenteric fat (arrow) separating the two sigmoid walls (arrowheads).

(D) Axial CT image 25 mm caudal to C shows the decompressed rectosigmoid (arrow).

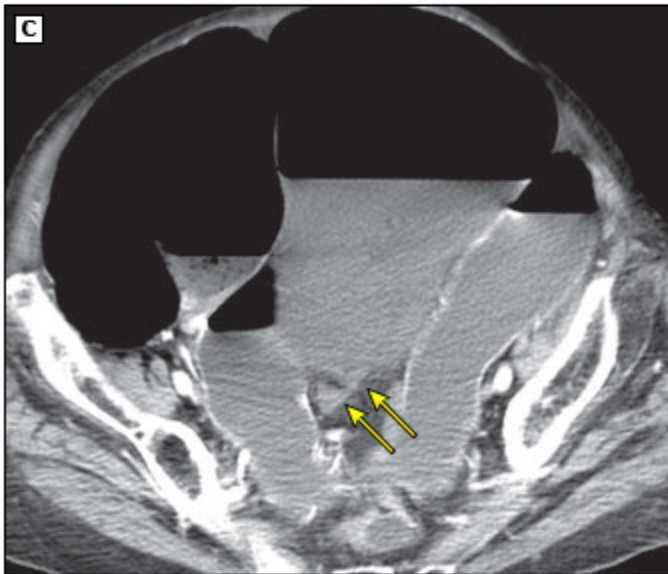
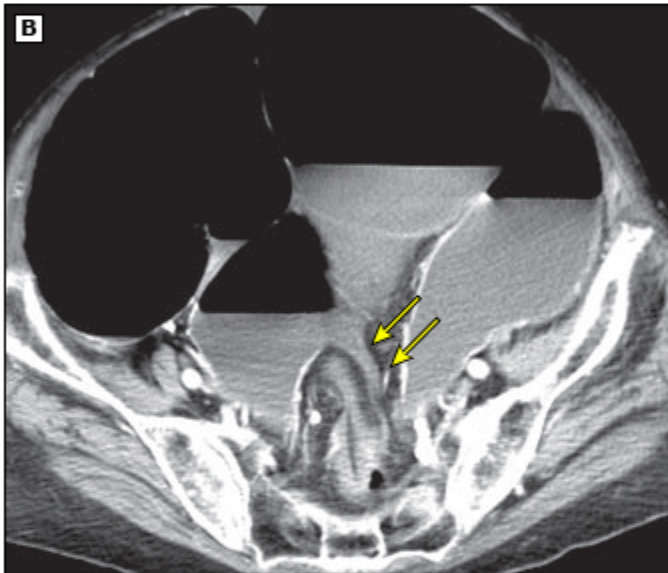
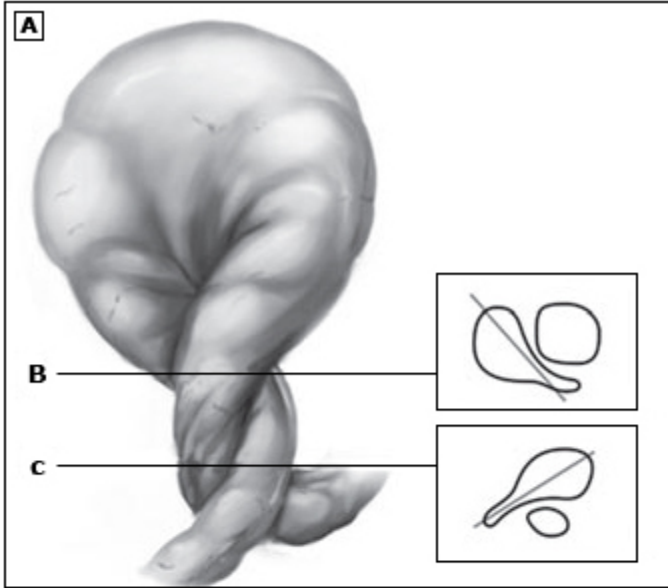
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Graphic 93453 Version 1.0

# Sigmoid volvulus



A 90-year-old woman with sigmoid volvulus.



(A) Drawing shows X-marks-the-spot sign caused by crossing transition points. Horizontal lines and schematic axial insets indicate levels of B and C. Oblique lines in insets indicate two transition zones oriented in opposite directions, producing an X shape.

(B) Contrast-enhanced axial computed tomography (CT) image through proximal-superior transition (arrows).

(C) Axial CT image 15 mm caudal to B through distal-inferior sigmoid transition (arrows), which is oriented in the direction opposite to the proximal transition.

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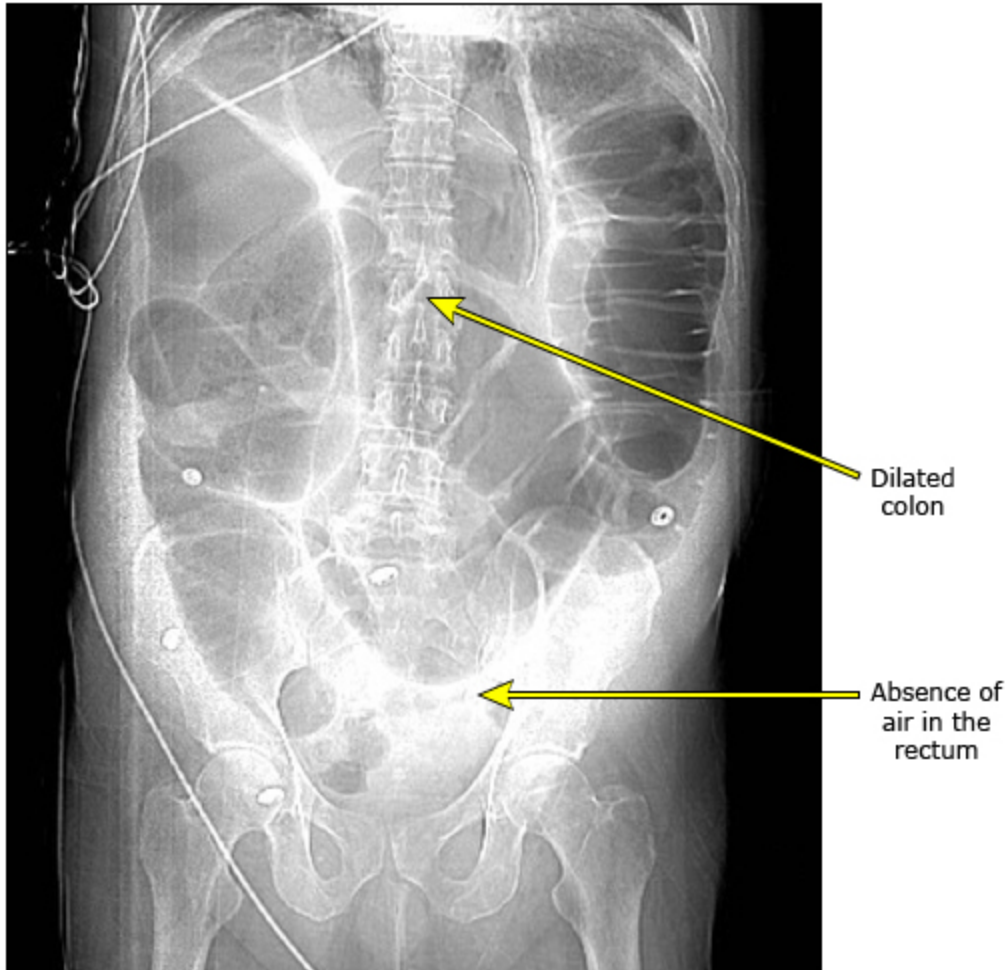
*Panel A reproduced with permission from Jordan Winick. Copyright © 2015.*

*Panels B and C reprinted with permission from the American Journal of Roentgenology. Levsky JM, Den EI, DuBrow RA, et al. CT findings of sigmoid volvulus. AJR Am J Roentgenol 2010 194:136. Copyright © 2010 American Roentgen Ray Society.*

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Graphic 93452 Version 1.0

## Sigmoid volvulus



Plain abdominal radiograph of a patient with a sigmoid volvulus demonstrates a large air-filled sigmoid colon (arrow) extending from the pelvis to the right upper quadrant and the absence of air in the rectum (arrow).

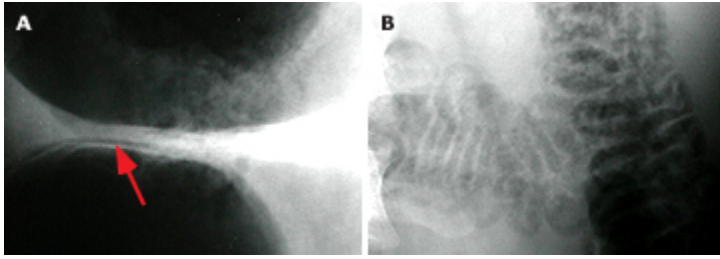
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*Courtesy of Mukesh Harisinghani, MD, Department of Radiology, Massachusetts General Hospital, Boston, MA.*

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Graphic 67675 Version 3.0

## Pneumatosis intestinalis



Panel A is a magnified image of a single fold in the colon demonstrating air within the wall of the colon, which appears as a thin linear lucency on this plain film (arrow). Panel B is a plain film from a 68-year-old male with ischemic bowel, demonstrating numerous linear collections of air within the bowel wall.

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*Courtesy of Jonathan B Kruskal, MD, PhD.*

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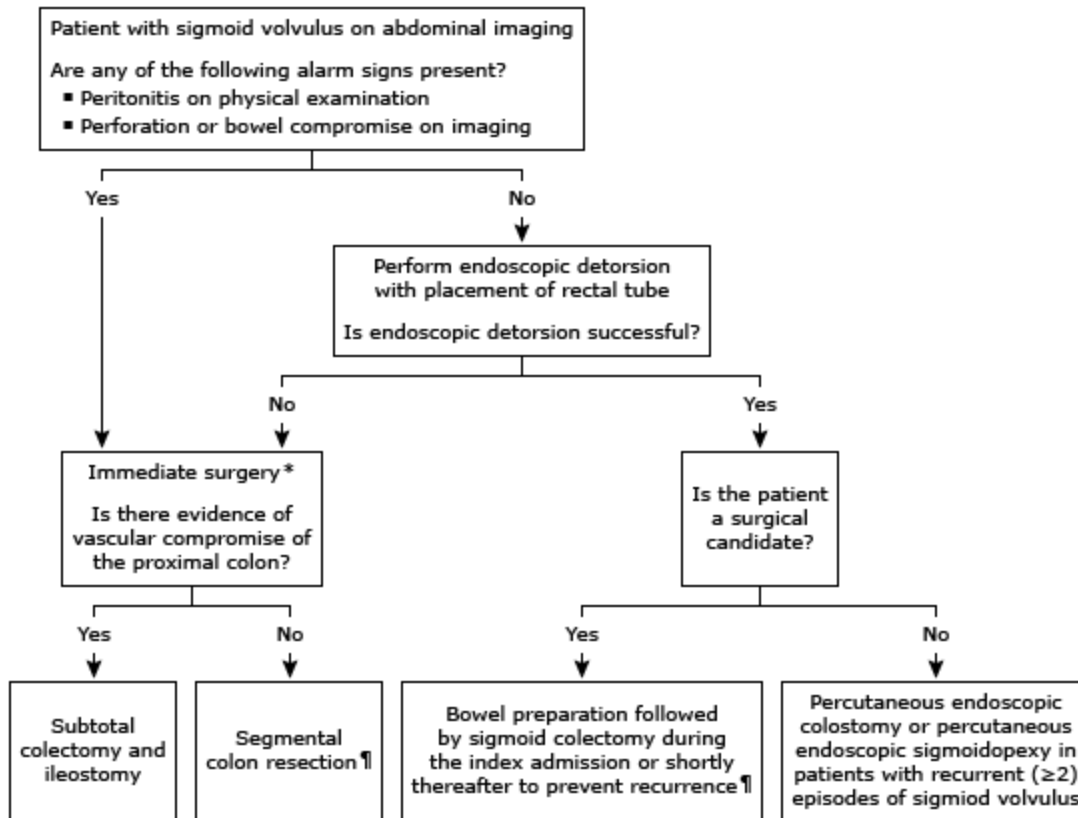
Graphic 72081 Version 2.0

## Common clinical conditions associated with Ogilvie's syndrome

Category	Examples
Medications	Opioids, anti-cholinergics, alpha-2-adrenergic agonists, anti-psychotics, Ca <sup>++</sup> channel blockers, cytotoxics, dopaminergics, epidural anesthesia
Trauma and orthopedic surgery	Fractures, hip and spine surgery
Obstetric and gynecological	Pelvic surgery especially involving spinal anesthesia; cesarian section; vaginal (normal or instrumental) delivery
Cardiothoracic surgery or disease	Cardiac surgery including transplantation; myocardial infarction, heart failure, pneumonia
Neurological diseases	Parkinsonism, stroke, dementia
Retroperitoneal diseases	Malignancy, hemorrhage
Metabolic imbalance	K <sup>+</sup> , Ca <sup>++</sup> , Mg <sup>++</sup> imbalance; hypothyroidism
Infection	Herpes zoster

Graphic 66068 Version 3.0

## Approach to the management of sigmoid volvulus in adults

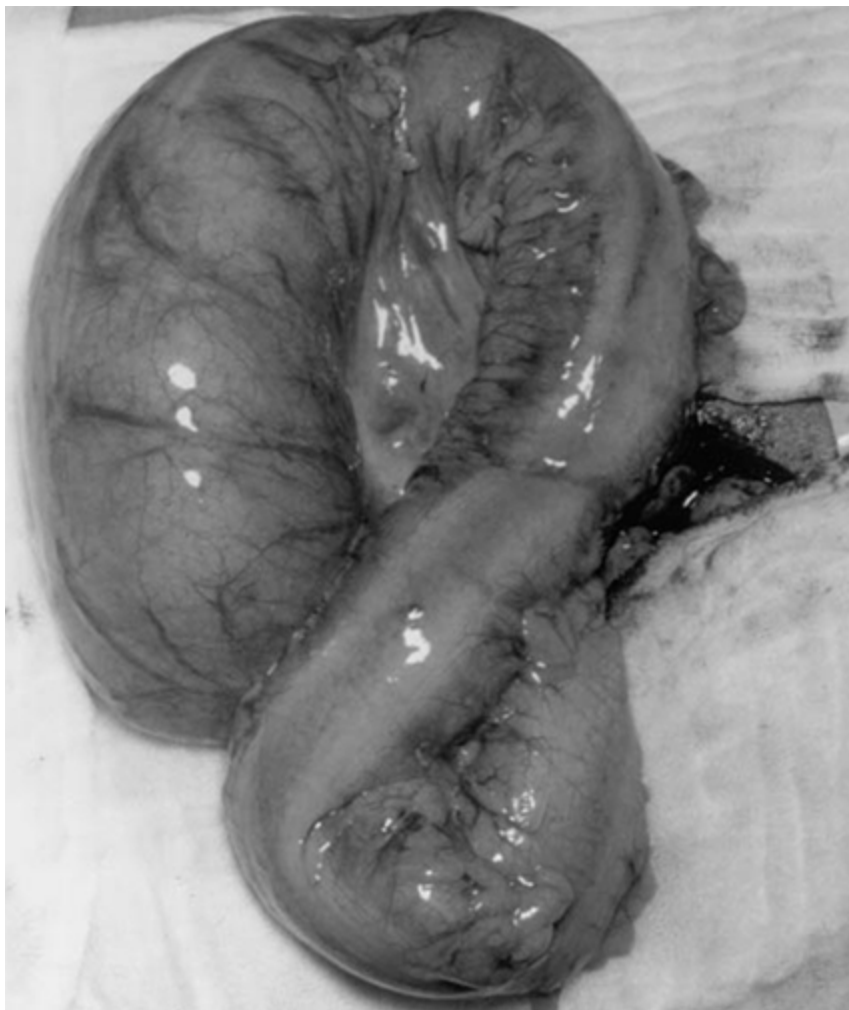


\* Patients with perforation or peritonitis generally should not have their volvulus detorsed to avoid reperfusion injury. Instead, they should undergo resection of the compromised bowel in its volvulized position.

¶ The choice of reconstruction must be individualized based on the patient's clinical parameters. Hartmann's procedure is preferred in the presence of hemodynamic instability, coagulopathy, acidosis, or hypothermia.

Graphic 127147 Version 1.0

## Sigmoid volvulus



Intraoperative finding: volvulus of the sigmoid colon.

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*Reproduced from: Salas S, Angel CA, Salas N, et al. Sigmoid volvulus in children and adolescents. J Am Coll Surg 2000; 190:717. Illustration used with the permission of Elsevier Inc. All rights reserved.*

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Graphic 89610 Version 1.0

## Contributor Disclosures

**Richard A Hodin, MD** No relevant financial relationship(s) with ineligible companies to disclose. **J Thomas Lamont, MD** Equity Ownership/Stock Options: Allurion [Weight loss]. Consultant/Advisory Boards: Teledoc [Gastrointestinal diseases]. All of the relevant financial relationships listed have been mitigated. **Shilpa Grover, MD, MPH, AGAF** No relevant financial relationship(s) with ineligible companies to disclose.

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