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# Dynamic Practice Guidelines for Emergency General Surgery

Committee on Acute Care Surgery, Canadian Association of General Surgeons

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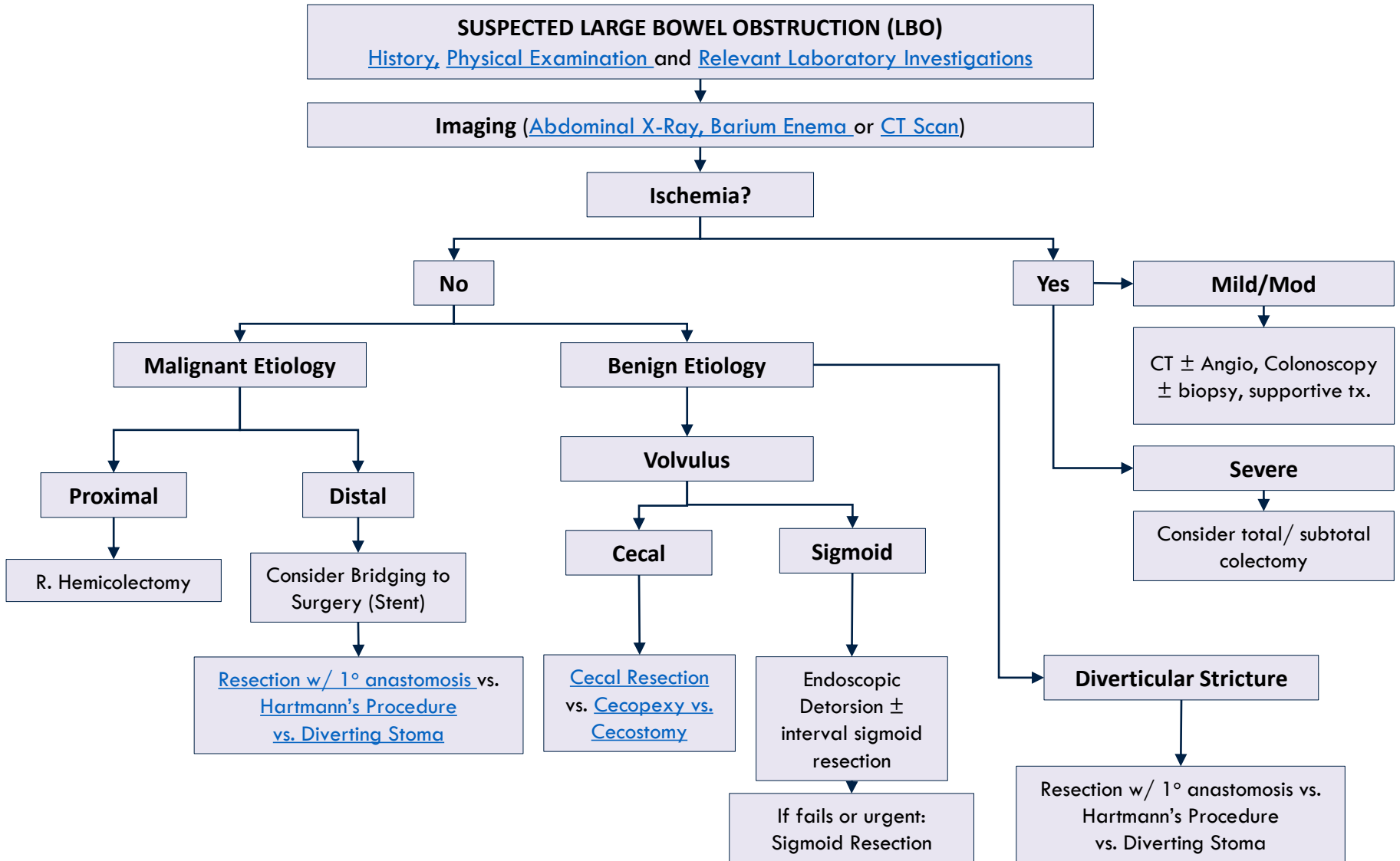
## LARGE BOWEL OBSTRUCTIONS

Dynamic Practice Guidelines for Emergency General Surgery

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Committee on Acute Care Surgery, Canadian Association of General Surgeons

# LARGE BOWEL OBSTRUCTIONS



# LARGE BOWEL OBSTRUCTIONS

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## Definition:

- Interruption or failure of aboral intraluminal flow in the colon or rectum
- Most often caused by a partial or complete mechanical obstruction but can also be functional (e.g. acute pseudo-obstructions)

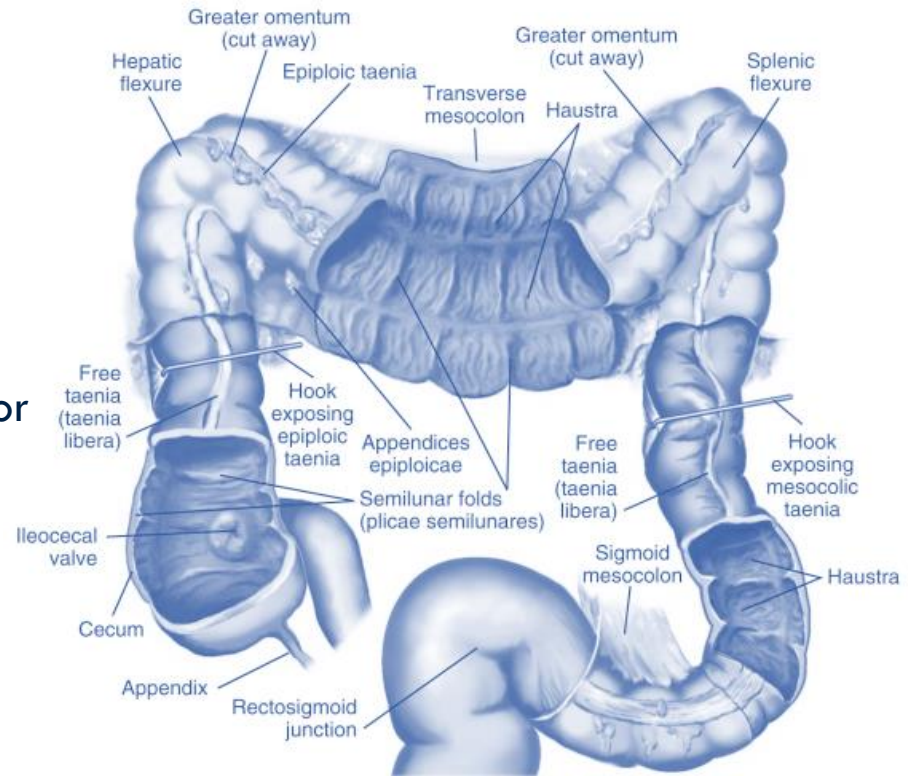


Image adapted from Sleisenger and Fordtran's Gastrointestinal and Liver Disease  
Cameron JL, Cameron AM. The Management of Large Bowel Obstruction. 2017. Current Surgical Therapy

# LARGE BOWEL OBSTRUCTIONS

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## ETIOLOGY

- Large bowel obstruction accounts for only ~25% of bowel obstructions but is much more ominous than small bowel obstructions as the majority are a result of colorectal cancer
- > 75% of large bowel obstruction occurs distal to the splenic flexure

### Mechanical Causes of Large Bowel Obstructions:

Common (>95%)	Uncommon (<5%)
Neoplasm (primary colon carcinoma; 60-80%) Volvulus (11 – 15%) <ul style="list-style-type: none"><li>• Sigmoid</li><li>• Cecum</li><li>• Transverse</li></ul> Diverticulitis (4 – 10%)	Intussusception Hernia Inflammatory bowel disease Extrinsic compression from mass Fecal impaction Intraluminal foreign body

# LARGE BOWEL OBSTRUCTIONS

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## PATHOPHYSIOLOGY: MECHANICAL OBSTRUCTION

Intraluminal, intramural, or extramural obstruction causes increasing dilation of the bowel as air and fluid cannot pass distally

When intraluminal pressure equals systolic blood pressure, blood flow is compromised and edema begins with subsequent transudation of fluid into bowel wall and lumen

As distension increases, intraluminal pressure increases

### As a consequence...

- Decreased blood flow results in ischemia, necrosis and gangrene.
- Bowel wall thickening can lead to perforation if the process is not interrupted due to loss of integrity of the wall strength.
- Transudation of fluid and emesis lead to dehydration.
- Translocation of bacteria can lead to sepsis.



## HISTORY OF PRESENTING ILLNESS

- Cardinal symptoms of large bowel obstruction:
  - Abdominal Pain (colicky pain due to hyperperistalsis against a fixed obstruction)
  - Abdominal distention/bloating
  - Decrease/ Cessation of flatus and bowel movement (obstipation)
- Emesis is typically a late presentation unless concomitant small bowel obstruction
- Acute onset of symptoms (3 – 5 days) → suggestive of acute obstruction
- Chronic onset of symptoms → highly suspicious for colorectal malignancy
  - Patient may describe history of bloating, constipation, narrowing of stool caliber, and gradually increasing abdominal pain

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## PHYSICAL EXAMINATION



1. Vital signs (heart rate, blood pressure, temperature)
2. Hydration status and systemic symptoms
3. Abdominal exam (peritoneal signs, masses, pain)
  - Findings consistent with bowel obstruction include abdominal distension and tympany
4. Examination of Groin (e.g. incarcerated hernia)
5. Digital Rectal Exam (fecal impaction, gross blood, or rectal mass)
6. Nodal examination – evaluate for possible metastatic disease

## Indications for urgent laparotomy

Signs and symptoms of perforation, strangulation or ischemia:

- Fever ( $>38^{\circ}\text{C}$ )
- Tachycardia
- Peritonitis
- Point tenderness
- Pain out of proportion to exam
- Shock

**EMERGENCY**



## LABORATORY INVESTIGATIONS



**Basic labs should be ordered for all patients presenting with signs and symptoms of a large bowel obstruction, including:**

1. Complete blood count (CBC): evaluation of anemia or elevated WBC
2. Complete blood chemistry: electrolyte/ acid-base imbalance, elevated creatinine
3. Lactate: degree of ischemia

## HIGH GRADE OBSTRUCTIONS

### Plain Radiography Findings

- Presence of more than 2 air-fluid levels
- Air-fluid levels  $> 2.5$  cm
- Air-fluid levels differing more than 2 cm in height from one another within the same small bowel loop.

### CT Findings

- 50% difference in caliber between the proximal dilated bowel and the distal collapsed bowel.

## OTHER HIGH RISK FACTORS

- Peritoneal signs on physical examination
- Strangulation: closed-loop obstruction associated with intestinal ischemia
- Ischemia (Target sign, mesenteric congestion, pneumatosis, ascites, delayed or asymmetric enhancement)
- Perforation/ High Risk of Perforation (cecum  $> 12$ cm diameter, free fluid, free gas)

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## IMAGING



dilated colon

Findings of large bowel obstruction include air/fluid levels and a preceding a luminal caliber change (transition point)

### **Flat and upright abdominal plain film x-ray (84% sens. & 72% spec.)**

- Typically the first diagnostic imaging performed because quick and cheap
- A good abdominal x-ray can identify cecal or sigmoid causes of obstruction and rule out free air
- Hemodynamically stable patients should undergo further imaging

### **Contrast Enema (96% sens. & 98% spec.)**

- Traditionally the gold standard for diagnosis of large bowel obstruction
- Can help delineate the degree of obstruction and may be therapeutic
- Colonoscopy or water-soluble contrast enema is usually needed to diagnosis a pseudo—obstruction
- CT is the modality of choice as it is more readily available and better able to identify underlying etiologies

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## IMAGING



CT scan (83% sens. and 93% spec.) is the imaging modality of choice in large bowel obstruction

- CT is indicated in all hemodynamically stable patients without signs of perforation, ischemia, or strangulation necessitating urgent laparotomy.
- Dilated colon is the hallmark finding of large bowel obstruction:
  - Cecum > 9cm
  - Rest of the colon >6cm
- Cecal diameter  $\geq$  12cm is associated with increased risk for ischemia and perforation.

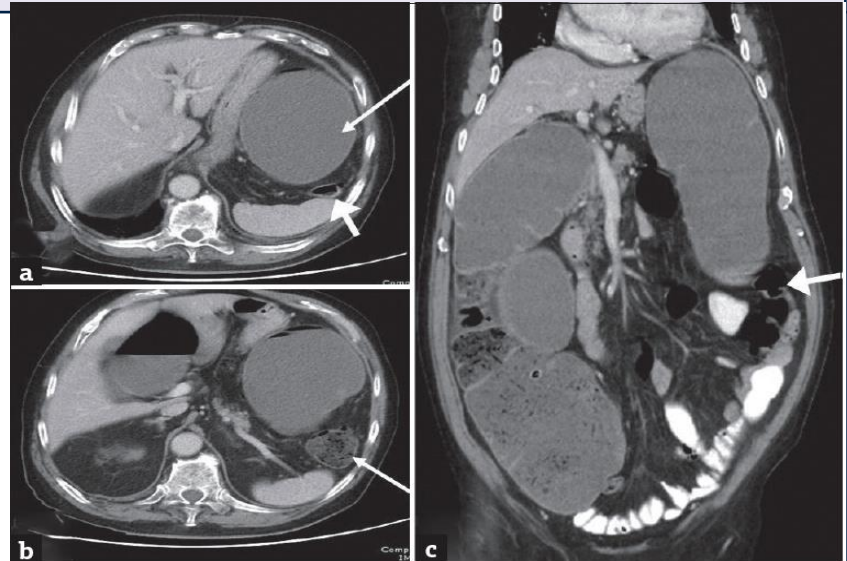
Select from the following for classic findings for:

- [Colon Carcinoma](#)
- [Sigmoid Volvulus](#)
- [Cecal Volvulus](#)
- [Diverticulitis](#)

## IMAGING: FINDINGS

### Colon carcinoma

- Proximal colon dilation and collapse of distal colon (transition point)
- Asymmetric and short segment (< 10 cm) thickening or colon wall
- Enhancing soft tissue mass located within colon
- Mass may have central necrosis if large enough
- Obstructing mass may have a shouldering appearance



*Figure a.* Distention of transverse colon and splenic flexure (small arrow) and short segment colon wall thickening with abrupt transition point (short arrow)

*Figure b.* Normal descending colon

*Figure c.* Dilated large bowel and abrupt transition

# LARGE BOWEL OBSTRUCTIONS

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## IMAGING: FINDINGS

### Sigmoid volvulus

- Enlarged proximal sigmoid and collapse of distal sigmoid (transition point)
- Absence of rectal gas

Sign	Description
<a href="#">Coffee Bean</a> Sign	Shape of volvulus on plain film with apposition of the medial colonic walls forming coffee bean cleft and lateral walls of the dilated bowel forming the outer walls of the bean.
<a href="#">Bird Beak</a> Sign	Smooth, tapering of colonic lumen just distal to transition point
<a href="#">Northern Exposure</a> Sign	Repositioning of the dilated sigmoid colon above transverse colon
<a href="#">Whirl</a> Sign	Spiraled loops of collapsed colon with enhancing vessels

# LARGE BOWEL OBSTRUCTIONS

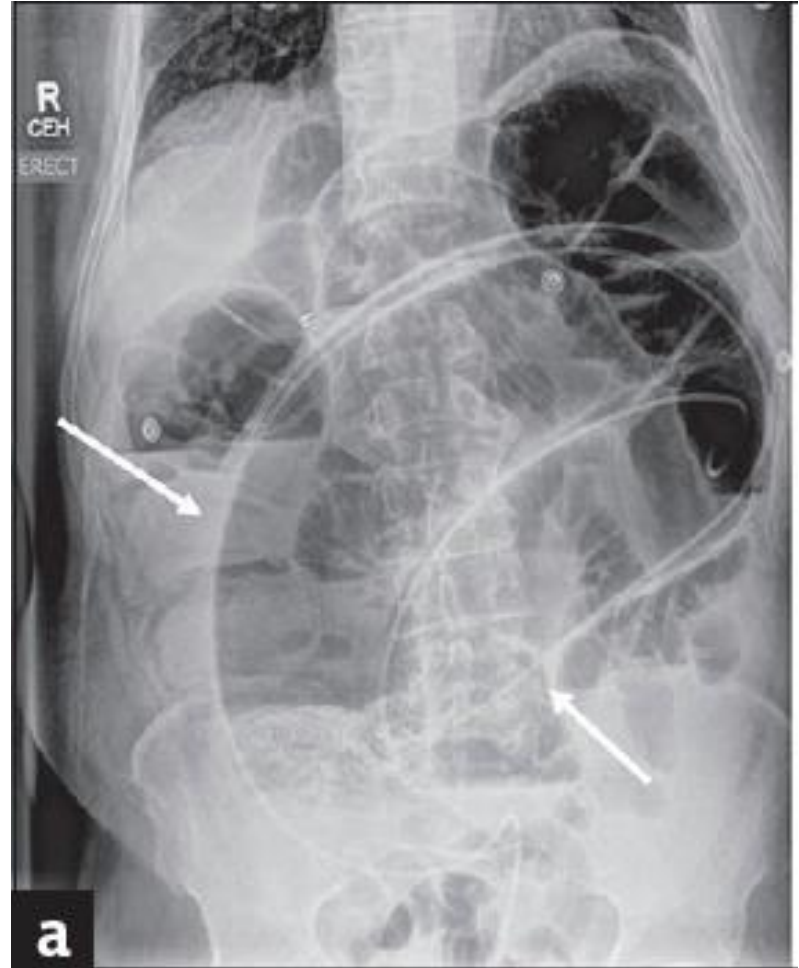
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## IMAGING:

### Coffee Bean Sign

### Plain film abdominal x-ray of sigmoid volvulus:

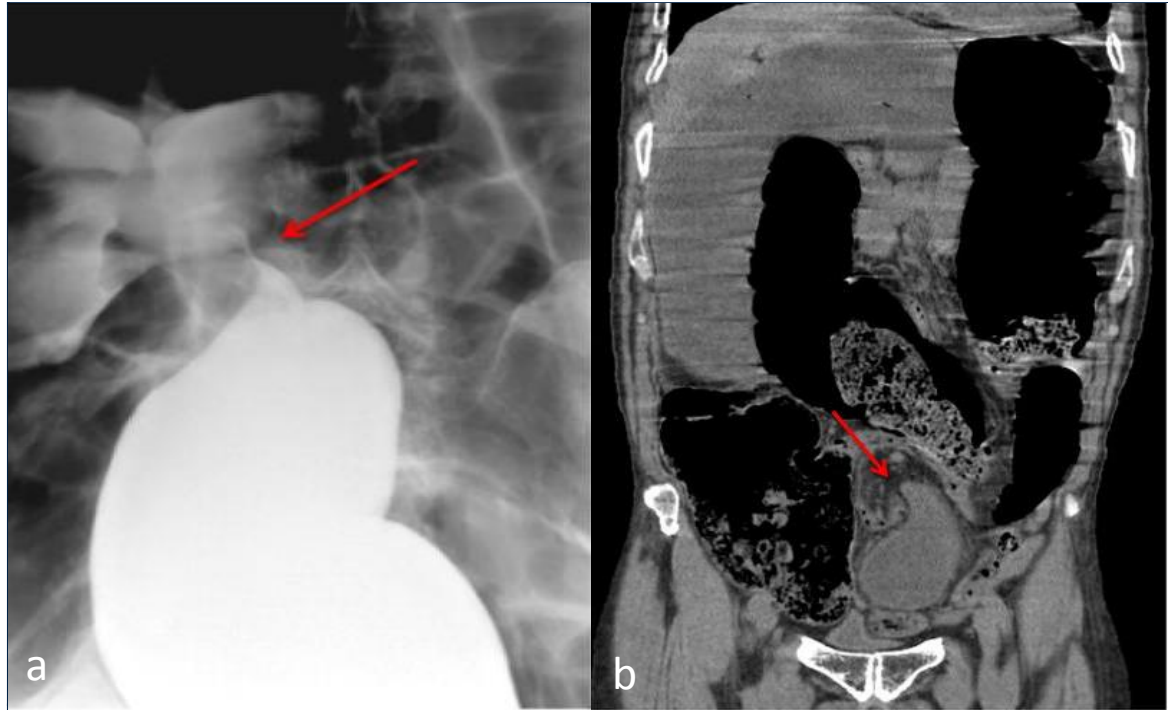
- Coffee bean sign (arrows)
- Distension of sigmoid colon



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## IMAGING: Bird Beak Sign



**Figure A.**  
Contrast enema of sigmoid volvulus with tapering distal to point of obstruction

**Figure B.**  
Non-contrast CT of sigmoid volvulus with tapering distal to point of obstruction



# LARGE BOWEL OBSTRUCTIONS

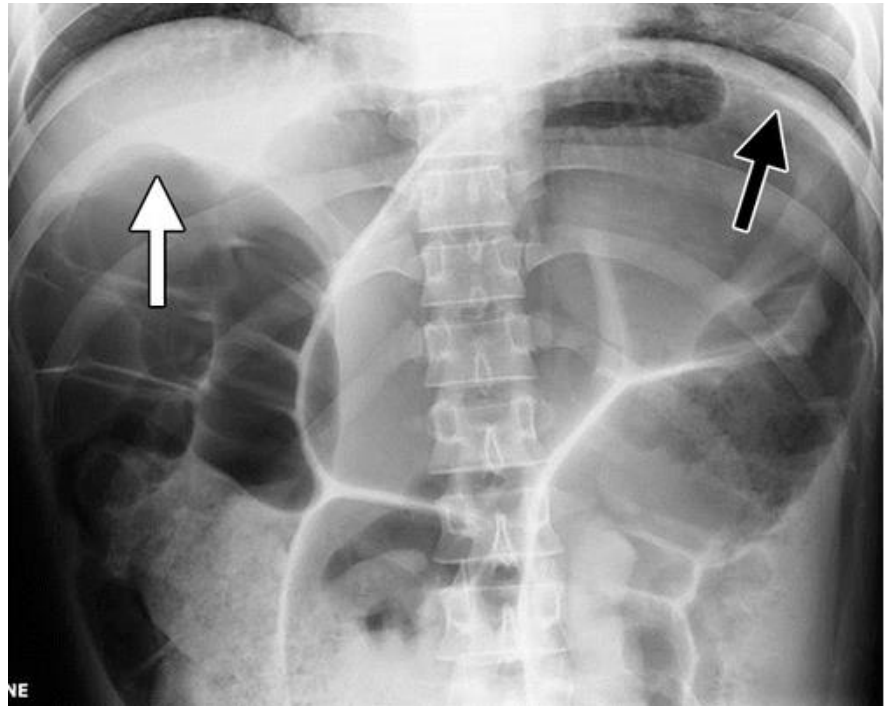
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## IMAGING:

Northern Exposure Sign

**Plain film AP abdominal x-ray of sigmoid volvulus:**

- Northern exposure sign
- Marked dilation of sigmoid colon (black arrow)
- Sigmoid extends above transverse colon (white arrow)



Images adapted from Jaffe T, Thompson WM. 2015. [Radiology](#)

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## IMAGING:

Whirl Sign

### Coronal CT of sigmoid volvulus:

- Whirl sign (white arrow)
- Proximal dilated stool-filled colon (black arrow)



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## IMAGING: FINDINGS

### Cecal volvulus

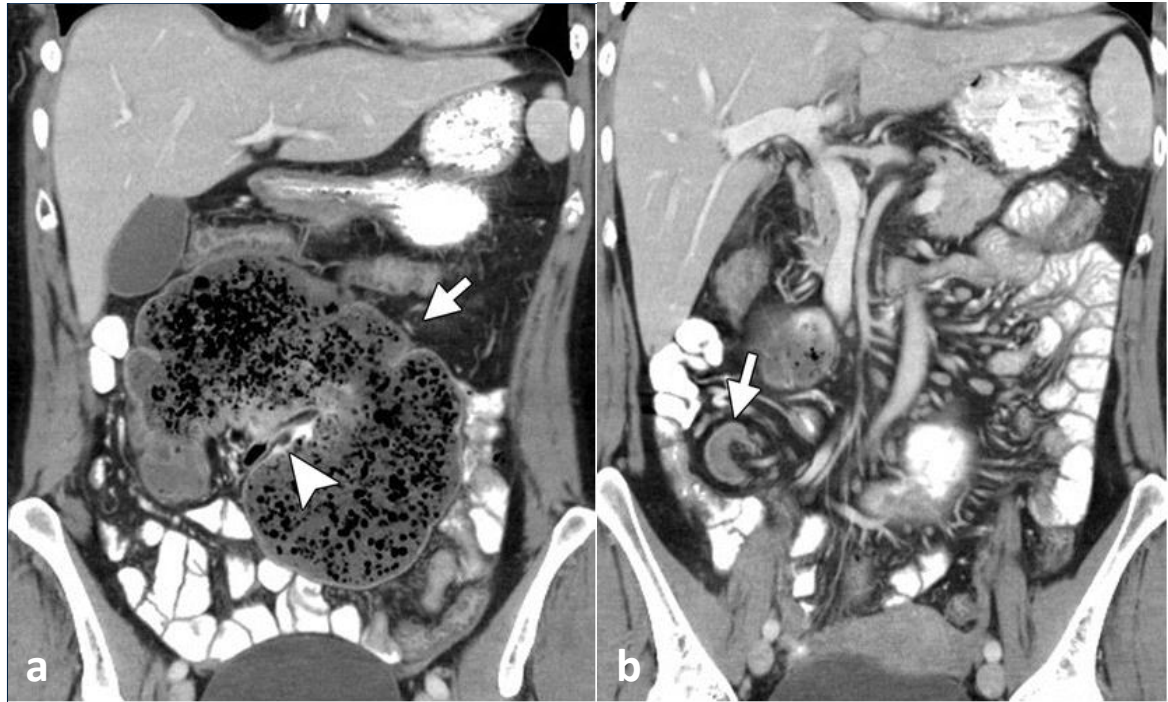
- Displacement of the cecum out of the right lower quadrant to left upper quadrant
- Transition point in cecum
- Small bowel dilation may be present depending on location of obstruction

Sign	Description
Coffee Bean Sign	Shape of volvulus on plain film with apposition of the medial colonic walls forming coffee bean cleft and lateral walls of the dilated bowel forming the outer walls of the bean.
Bird Beak Sign	Smooth, tapering of colonic lumen just distal to transition point
<a href="#">Whirl</a> Sign (Cecal)	Spiraled loops of collapsed colon with enhancing vessels

# LARGE BOWEL OBSTRUCTIONS

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## IMAGING: Whirl Sign (Cecal)



**Figure A.**  
Cecal volvulus with Cecum apex in left upper quadrant (arrow) and Ileocecal value located in left upper quadrant (arrowhead)

**Figure B.**  
IV contrast of cecal volvulus demonstrates whirl sign (arrow) in right lower quadrant confirms cecal origin

# LARGE BOWEL OBSTRUCTIONS

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## IMAGING: FINDINGS

### Diverticulitis

- Segmental, symmetric bowel wall thickening
- Typically longer segments than colorectal carcinoma (> 10 cm)
- Pericolic inflammation and fat stranding

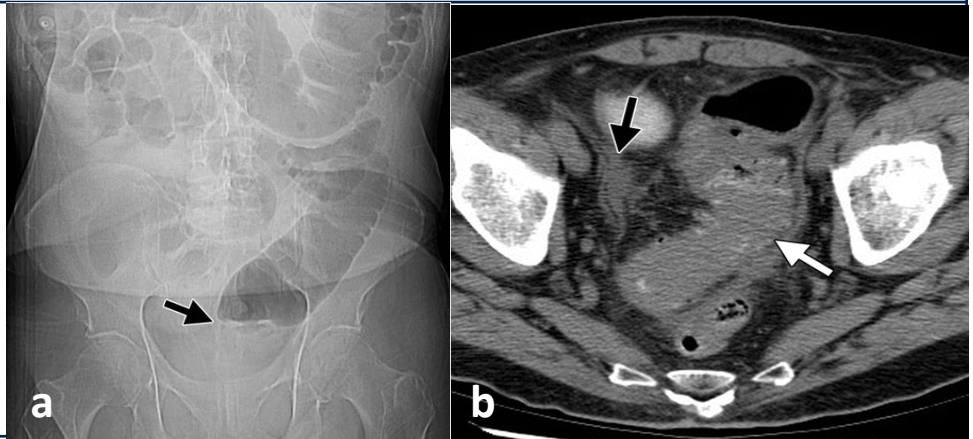


Figure a. Dilated colon terminating in pelvis

Figure b. Pelvic CT with IV contrast demonstrating thick walled, inflamed sigmoid colon (white arrow) and fluid in the root of the mesentery (black arrow)

## BRIDGING TO SURGERY FOR MALIGNANCIES



### EAST Practice Management Guidelines <sup>1</sup>

Self-expanding endoluminal colonic stents be used as an initial therapy for malignant colonic obstructions as they decrease mortality and need for unplanned procedures.

- Debated within the literature regarding its appropriateness as a bridge to surgery.
- 5 RCTs have been completed on this topic with slight variations on the primary outcome and hypothesis: <sup>1</sup>
  - 3 of the RCTs found initial stenting led to decreased rates of stoma formation. <sup>1</sup>
  - 2 of the RCTs demonstrated lower anastomotic leak rates, while 1 reported higher rates. <sup>1</sup>
  - 3 of the RCTs reported decreased morbidity, and 1 showed no difference. <sup>1</sup>
- Commonly considered an integral part of palliation for unresectable metastatic disease (LOE 1C). <sup>2</sup>

<sup>1</sup>Ferrada P, Patel MB, Poylin V, et al. 2016. [J Trauma Acute Care Surg](#)

<sup>2</sup>Fargo R, Ramirez E, Millan M, et al. 2014. [American Journal of Surgery](#)

## MANAGEMENT OF PROXIMAL MALIGNANCIES



Colonic obstructions can be categorized based on the location of the tumor in relation to the splenic flexure; **therefore, proximal LBO's are proximal to the splenic flexure.**

- Right hemicolectomies with primary anastomoses to the ileum of the small bowel are considered to be the treatment of choice. <sup>1</sup>
- Considered to be safe given low anastomotic leak rates (2.8-4.6%). <sup>1</sup>
- If the patients have risk factors that increase leak rates, a diverting loop ileostomy can be added to the right colectomy [LOE 2C]. <sup>1</sup>
  - Risk Factors include:
    - Chronic renal failure
    - Malnutrition
    - Immunosuppression
    - ASA Class 3 or 4

<sup>1</sup>Fargo R, Ramirez E, Millan M, et al. 2014. [American Journal of Surgery](#)

## MANAGEMENT OF DISTAL MALIGNANCIES



Colonic obstructions can be categorized based on the location of the tumor in relation to the splenic flexure; **therefore, distal LBO's are distal to the splenic flexure.**

### ***Resection and primary anastomosis with colonic irrigation***

- This operative treatment is a 1-stage procedure and is the surgical management of choice.<sup>1</sup>
- Has largely replaced the 3-stage management that involved proximal stoma creation, followed by tumor resection, and finally stoma reversal.<sup>1</sup>
  - A Cochrane review and several other high-quality evidence show that the 3-staged procedure increase length of stay and complications.<sup>1</sup>
  - However, staged management is still used for mid or low rectal cancers as it provides time for neoadjuvant therapies to be instituted in the care plan.<sup>1</sup>

<sup>1</sup>Fargo R, Ramirez E, Millan M, et al. 2014. [American Journal of Surgery](#)



## ALTERNATE APPROACHES TO DISTAL MALIGNANCIES



### ***Hartmann's Procedure***

Resection of affected colon (usually recto sigmoid) with closure of the anorectal stump and formation of an end colostomy.

- Alternative to a primary anastomosis and primarily used in emergency cases with perforation secondary to left colonic lesions.<sup>1</sup>
- Also should be considered for all high-risk patients (chronic renal failure, malnutrition, immunosuppression and ASA III or IV).
- End colostomy reversal median time: 12-14 months; although 40% elect to not have the reversal due to advanced age, comorbidities and/ or improved quality of life.<sup>1</sup>

### ***Resection and primary anastomosis with proximal diverting stoma***

- The main role of the loop ileostomy/ colostomy is to protect the distal anastomosis (LOE 1C).<sup>1</sup>
- No clear evidence showing decreased leak rates.<sup>1</sup>

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<sup>1</sup>Fargo R, Ramirez E, Millan M, et al. 2014. [American Journal of Surgery](#)

## MANAGEMENT OF CECAL VOLVULUS



### ASCRS Practice Management Guidelines <sup>1</sup>

Cecal resection is required in cases with non-viable bowel, and is an appropriate first-line intervention for patients with viable bowel who are good operative candidates (LOE 1C).

### *Cecal Resection*

- Cecal resection consistently prevents recurrence.
- The viability of the bowel is an important predictor of mortality in patients.
- Primary anastomosis vs. resection with ileostomy
  - No evidence shows superiority of one approach
  - Data supports resection with ileostomy in patients with perforation, extensive gangrene or peritonitis.

<sup>1</sup>Vogel JD, Feingold DL, Stewart DB, et al. 2016. [Dis Colon Rectum](#)

## ALTERNATE MANAGEMENT OF CECAL VOLVULUS



### *Cecostomy or Cecopexy*

Cecopexy: detorsion with suture fixation to the abdominal wall

- Variable results have been seen in the literature; recurrence rates are higher than resection but patients may benefit from lower post-operative morbidity. <sup>1</sup>

Cecostomy: tube placed in the large bowel for decompression

- Patients may benefit from low rates of recurrence but there are high incidences of post-op morbidity and complications related to the ostomy. <sup>1</sup>

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<sup>1</sup>Vogel JD, Feingold DL, Stewart DB, et al. 2016. [Dis Colon Rectum](#)

## MANAGEMENT OF SIGMOID VOLVULUS



### ***Rigid or Flexible Endoscopy***

- Initial treatment of sigmoid volvulus with no features of perforation or ischemia is endoscopic detorsion (LOE 1C).<sup>1</sup>
- Rigid or flexible sigmoidoscopy is usually sufficient; in rare cases a colonoscopy may be needed if the transition point is beyond the view of the shorter scope.
- Endoscopic management is effective in 65-90% of patients.<sup>1</sup>
- A decompression tube is usually left in for 1-3 days to maintain the successful reduction.<sup>1</sup>

### ***Interval Sigmoid Resection***

- Recurrence rates of sigmoid volvulus ranges from 43-75%.<sup>1</sup>
- Sigmoid colectomy should be strongly considered during the same admission after the acute phase or soon thereafter (LOE 1C).<sup>1</sup>
- Resection of sigmoid with colorectal anastomosis is the commonest approach.

<sup>1</sup>Vogel JD, Feingold DL, Stewart DB, et al. 2016. [Dis Colon Rectum](#)

## URGENT MANAGEMENT OF SIGMOID VOLVULUS



### *Urgent Sigmoid Resection*

- Indicated if endoscopic detorsion fails, or if there are signs of colonic ischemia, perforation, peritonitis, and/ or septic shock. (LOE 1C).<sup>1</sup>
- Intraoperatively, involved bowel should be manipulated minimally to prevent release of endotoxin and bacteria into general circulation, and avoid perforation.
- Hartmann's vs. primary colorectal anastomosis.
  - No evidence shows superiority of one approach.<sup>1</sup>
  - In large retrospective reviews, Hartmann's was the more commonly performed operation, especially with patients with non-viable colon or hemodynamically unstable patients.<sup>1</sup>

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<sup>1</sup>Vogel JD, Feingold DL, Stewart DB, et al. 2016. [Dis Colon Rectum](#)

## MANAGEMENT OF DIVERTICULAR STRICTURE



- Similar to the management of distal malignant colonic obstructions the surgical management options include: <sup>1,2</sup>
  - Resection and primary anastomosis with colonic irrigation/ lavage
  - Hartmann's Procedure
  - Resection and primary anastomosis with proximal diverting stoma
- Hartmann's Procedure is the most common procedure however the decision is clinical and depends on the viability of the proximal bowel, as well as the risk factors of the patient (primary anastomosis not recommended for those with chronic renal failure, malnutrition, immunosuppression and ASA III or IV) <sup>1-3</sup>
- Stenting has been described in the literature as a bridge to subsequent one-stage sigmoid resection and primary colorectal anastomosis. <sup>1,2</sup>

<sup>1</sup>Stocchi L. 2010. [World Journal of Gastroenterology](#)

<sup>2</sup>O'Neill S, Ross P, McGarry P, Yalamarthy S. 2011. [British Journal of Medical Practitioners](#)

<sup>3</sup>Feingold D, Steele SR, Lee S et al. 2014. [Dis Colon Rectum](#)

## DEFINITION OF COLONIC ISCHEMIA



### Mild to Moderate

Any patient with ischemia and more than three of the criteria for moderate disease:

- Male Gender
- Hypotension (SBP < 90 mmHg)
- Tachycardia (HR > 100 bpm)
- Abdominal pain w/o rectal bleed
- BUN > 7.2 mmol/L
- Hemoglobin < 120 g/L
- LDH > 350 U/L
- Serum Na < 136 mEq/L
- WBC > 15x10<sup>9</sup>/L
- Mucosal ulceration on colonoscopy

### Severe

Any patient with ischemia and more than three of the criteria for moderate disease **or** any of the following:

- Peritoneal signs on physical examination
- Pneumatosis or portal venous gas on radiographic imaging
- Gangrene on colonoscopy
- Pancolonic distribution or isolated right-colon ischemia in imaging/ colonoscopy

## MANAGEMENT OF COLONIC ISCHEMIA



### ACG Practice Management Guidelines: MILD TO MODERATE<sup>1</sup>

- CT Abdomen should be the first imaging modality for suspected ischemia looking for bowel wall thickening, edema, thumb printing (LOE 1B).
- CT Angiography should be considered for any patients where isolated right-sided colonic ischemia is suspected as it is a heralding sign of acute mesenteric ischemia.
- Early colonoscopy ± biopsies should be completed to confirm ischemic changes (LOE 1C).
- Most cases, especially mild to moderate resolve with supportive therapy, correction of cardiovascular abnormalities, and volume resuscitation.
- Broad spectrum antibiotics should be used in moderate to severe patients as they are believed to reduce inflammatory responses stimulated by the microbiome (LOE 1C).

### ACG Practice Management Guidelines: SEVERE<sup>1</sup>

- In severe cases surgical intervention should be considered, and transfer to intensive care unit is recommended. (LOE 1A)
  - Surgical procedure depends on the affected segment of colon but commonly a subtotal or total colectomy is performed.
- Correction of cardiovascular abnormalities, volume resuscitation and broad antibiotic therapy should not be delayed in this population, similar to the mild to moderate cases.

<sup>1</sup>Brandt LJ, Feuerstadt P, Longstreth GF et al. 2015. [Am J Gastroenterol](#)