

MDCT of Bowel Obstruction

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Objectives

- Role of MDCT in evaluation of bowel obstruction
- CT technique
- Complications:
 - ✓ Closed loop obstruction
 - ✓ Strangulation / ischemia
- Specific causes of SBO

Introduction

- 20 % of patients admitted with signs and symptoms of acute abdomen
- Causes:
 - Adhesions 60 %
 - Hernias
 - Crohn's disease
 - Neoplasms 15 %
 - Others:
 - Intussusception
 - Gallston ileus

Classification

- Simple: "partial" vs. "high grade" or "complete"
- Closed loop obstruction: two sites of obstruction affecting same loop
- Strangulation: ischemia leading to wall necrosis, difficult to ≠ reliably from simple obstruction (clinically and with labs)

Triaging in the ER: when is CT indicated?

- Clinical evaluation usually followed by KUB
- Clinical findings may warrant need for CT:
 - conservative therapy planned
 - confirm findings that may mandate operation, even if not best candidate
 - equivocal cases
 - determine specific cause in some cases

Triaging in the ER: factors that favor early operative management

- Unequivocal clinical signs of vascular compromise, strangulation
- No prior history of abdominal surgery
- Incarcerated hernia
- Complete obstruction (“obstipation”)

When to obtain CT?

- Detection of high grade obstruction:
Sensitivity 90-96 % / Specificity 91-96%
- Performance decreases substantially in low grade obstruction
- Suspected low grade obstruction, consider:
 - CT enterography
 - Enteroclysis (fluoroscopy or CT)

Clinical utility of CT

- Confirm or exclude diagnosis
- Determine: site, cause and severity of obstruction (high grade vs. low grade)
- Signs of complications: bowel ischemia, necrosis, strangulation
- Closed loop obstruction: CT diagnosis

CT Protocol

- IV contrast: 100 mL @ 3-4 mL/sec, 30-40 mL saline chaser
- Delay: ~ 45 / 70 sec
- **No** oral contrast
- MDCT (16, 64+): 1.25 mm, reconstruct at 3.75 mm
- Routine orthogonal (coronal, sagittal) reconstructions, all sent to PACS and archived

CT Protocol

- **Oral contrast not necessary:**
 - ✓ Oral contrast frequently has not reached site of obstruction at time of image acquisition
 - ✓ Limits evaluation of bowel wall thickening and enhancement
 - ✓ May delay examination unnecessarily

CT Signs of Bowel Obstruction

- Transition “zone” or “point”
- “Small bowel feces” sign
- “Collar of pearls” sign

Coronal reformations in the evaluation of SBO

- Coronal reformations: enhance level of certainty to confirm or exclude diagnosis
- Study interpretation using exclusively coronal images: high diagnostic precision

Jaffe TA, et al. Radiology 2006
Yaghamai V, et al. Emer Radiol 2006

“Small bowel feces” sign

- ↓ sensitivity/specificity than transition point
- may help localize site
- > frequency in moderate to severe obstruction
- may coexist with ischemia? *

1. Mayo-Smith WW, et al. Clin Radiol 1995
2. Lazarus DE, et al. AJR 2004
3. Jacobs SL, et al. Clin Radiol 2007
4. Sheedy, SP. Radiology 2006 *



“Collar of pearls” sign

- line of air-fluid levels (bubbles) with a horizontal orientation
- gas trapped between valvulae conniventes
- highly specific in right clinical setting

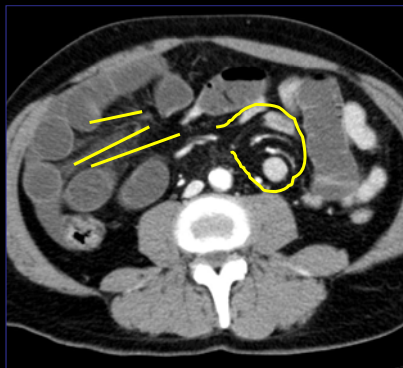


CT signs of closed loop obstruction

- 1) Dilated loops with a “C” or “U” configuration
- 2) Radial obstruction of dilated loops converging at point of obstruction
- 3) “Beak” sign
- 4) “Swirl” sign

“Swirl” Sign

- Low attenuation bands surrounded by edematous mesentery
- Highly suggestive of intestinal volvulus
- Should increase suspicion for closed loop obstruction



CT Signs Suggestive of Ischemia

1. Bowel wall thickening with submucosal edema: "target sign"
2. Mesenteric congestion/edema (venous outflow obstruction)
3. Ascitis
4. Abnormal enhancement of bowel wall (decreased or increased)

CT detection rate of strangulation:

Sens: 15- 83% / Spec 92-94% / NPV 93-95%

Identifying Cause of Obstruction with CT

Neoplasiam causing SBO:
Carcinoid tumor



Summary

1. CT is important tool in diagnosis and management of patients with acute bowel obstruction
2. Specific **cause** often identified (**but not always**)
3. CT helps detect **complications** of acute bowel obstruction such as closed loop obstruction, volvulus and ischemia

UNKNOWN CASE