
BRIGHAM HEALTH
BWH
BRIGHAM AND
WOMEN'S HOSPITAL
Small Bowel Obstruction Pathway
Jennifer W. Uyeda, MD
Liwei Jiang, MD
Fiona Malone, MD
HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL
A FOUNDING MEMBER OF
PARTNERS
HEALTHCARE

Lecture Outline

- After this 45 minute lecture, the Radiology resident will be able to:
  - Describe the clinical challenge in management of small bowel obstructions
  - Identify the appropriate imaging study for suspected SBO and protocol
  - Recognize imaging findings of SBO, etiologies, and associated complications
  - Understand the indications & contraindications for SBO oral contrast pathway
  - Implement SBO oral contrast pathway appropriately

SBO: Clinical Dilemma

- Small bowel obstruction (SBO) are common
  - Account for 4% of all ED admissions
  - 20% of all emergency surgery
- Non-operative management is successful in selected patients
  - NG tube, fluid resuscitation
  - Close and frequent clinical assessment
- Endpoint unclear (uncertain when patients need surgery)

SBO: Clinical Dilemma

- SBO management algorithm was developed to give more certainty to management
- Late recognition of bowel strangulation → markedly increased morbidity and mortality
- Mortality of ischemic SBO
  - 8% if surgery is within 36 hours
  - 25% if surgery is >36 hours

Zielinski MD, et al. World J Surg 2010.
Santillan CS. Radiol Clin N Am 2013.

Key Diagnostic Study

- CT ABDOMEN/PELVIS with IV CONTRAST
- NO oral contrast

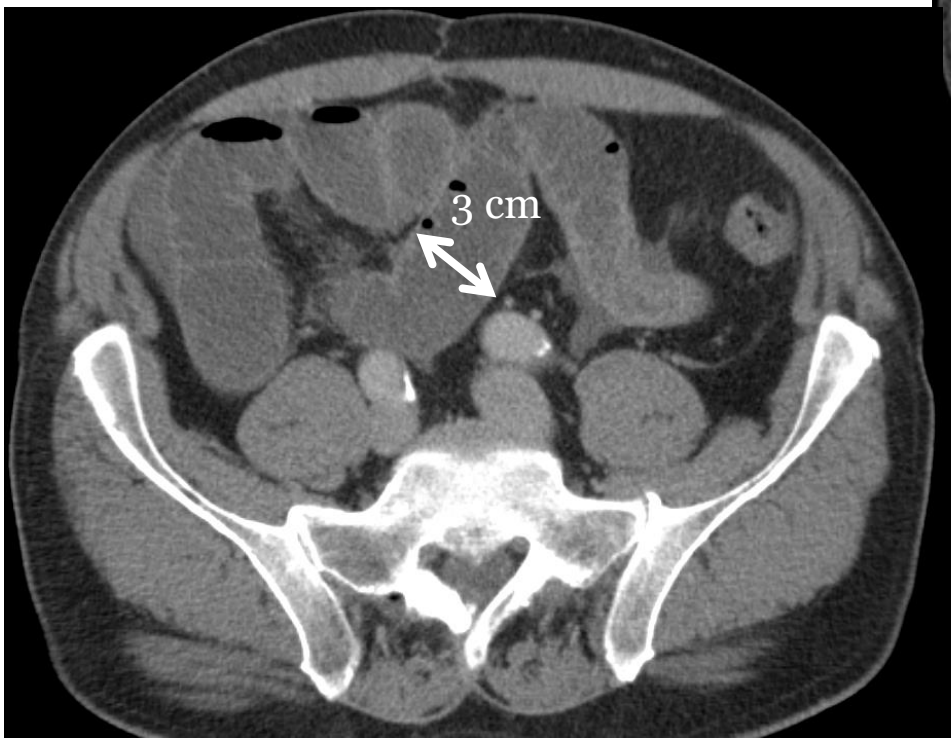
CT Findings of Small Bowel Obstruction

- Dilated bowel loops with collapsed distal bowel and/or colon, + signs
- Presence of identifiable transition point
- Etiology of SBO: what are some causes?

- Most important: evaluate for exclusion criteria and bowel ischemia

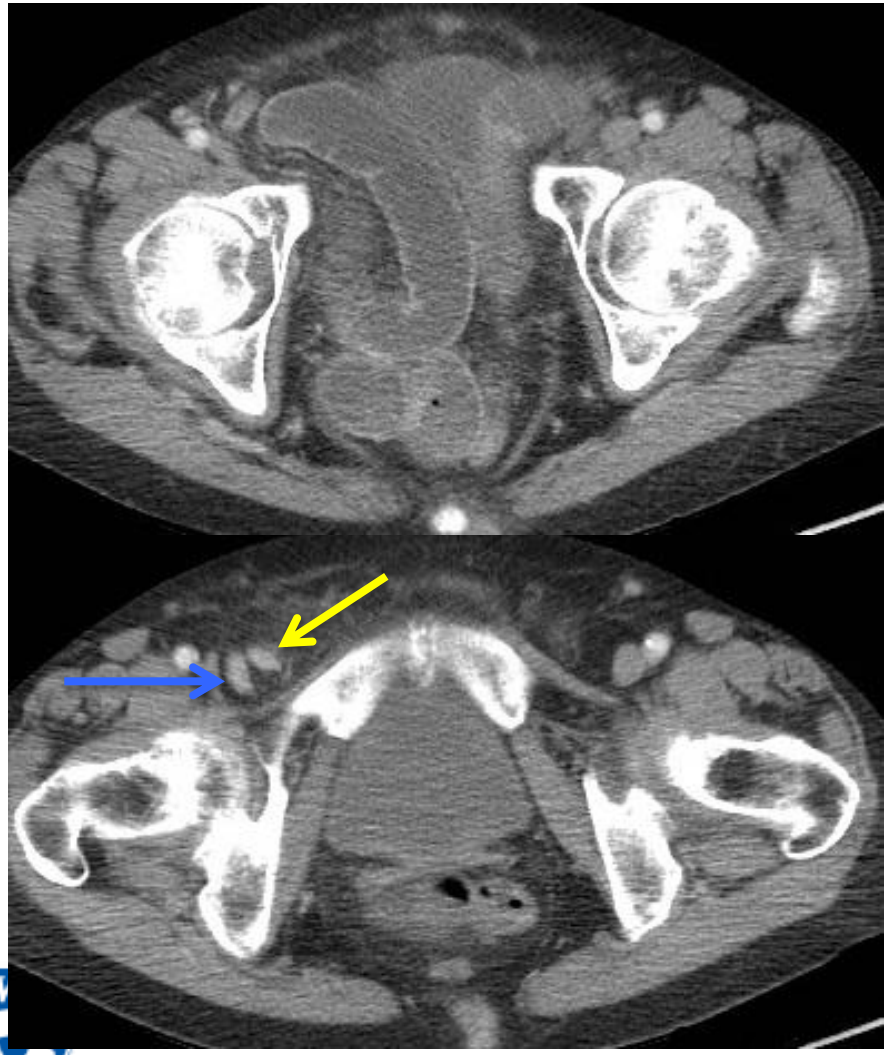
Azagury D, et al. J Trauma Acute Care Surg 2015.

CT Findings of SBO

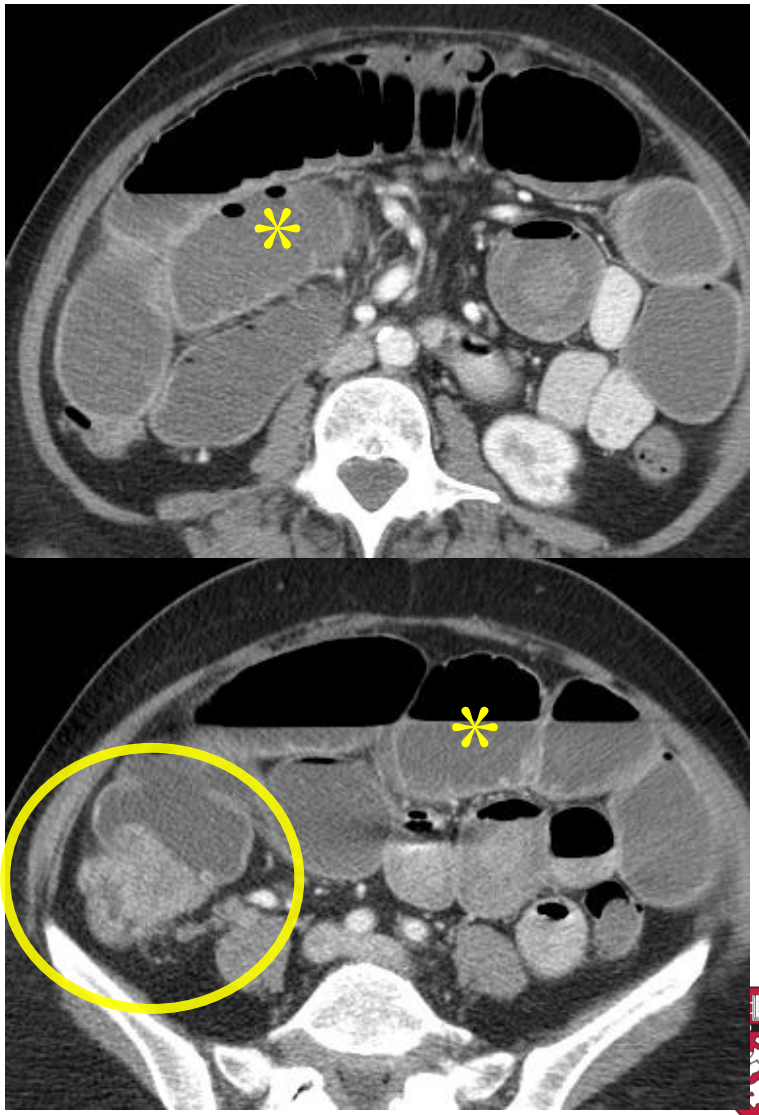


- ✔ Small bowel ≥ 2.5-3 cm
- ✔ "Small bowel feces" sign
- ✔ Transition point

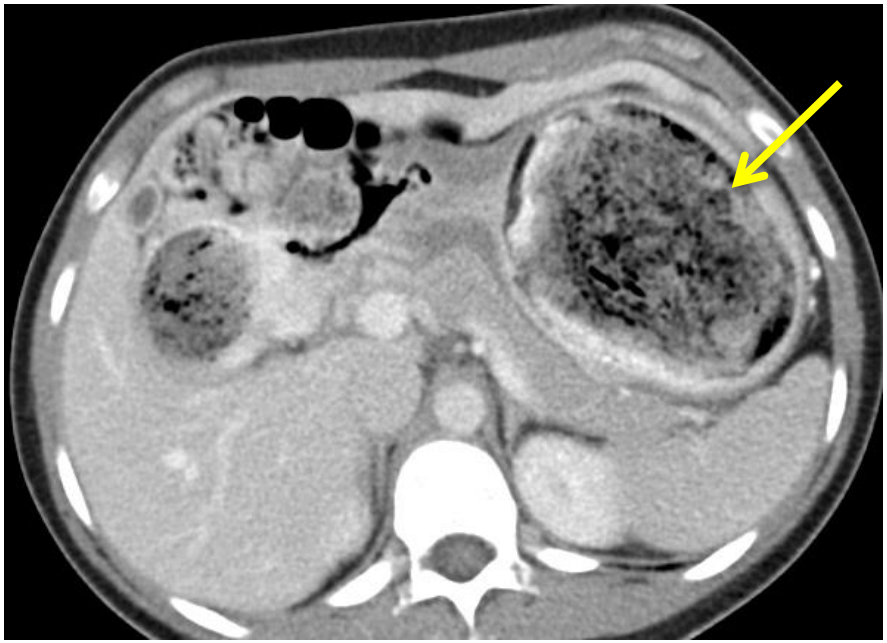
SBO from Inguinal Hernia

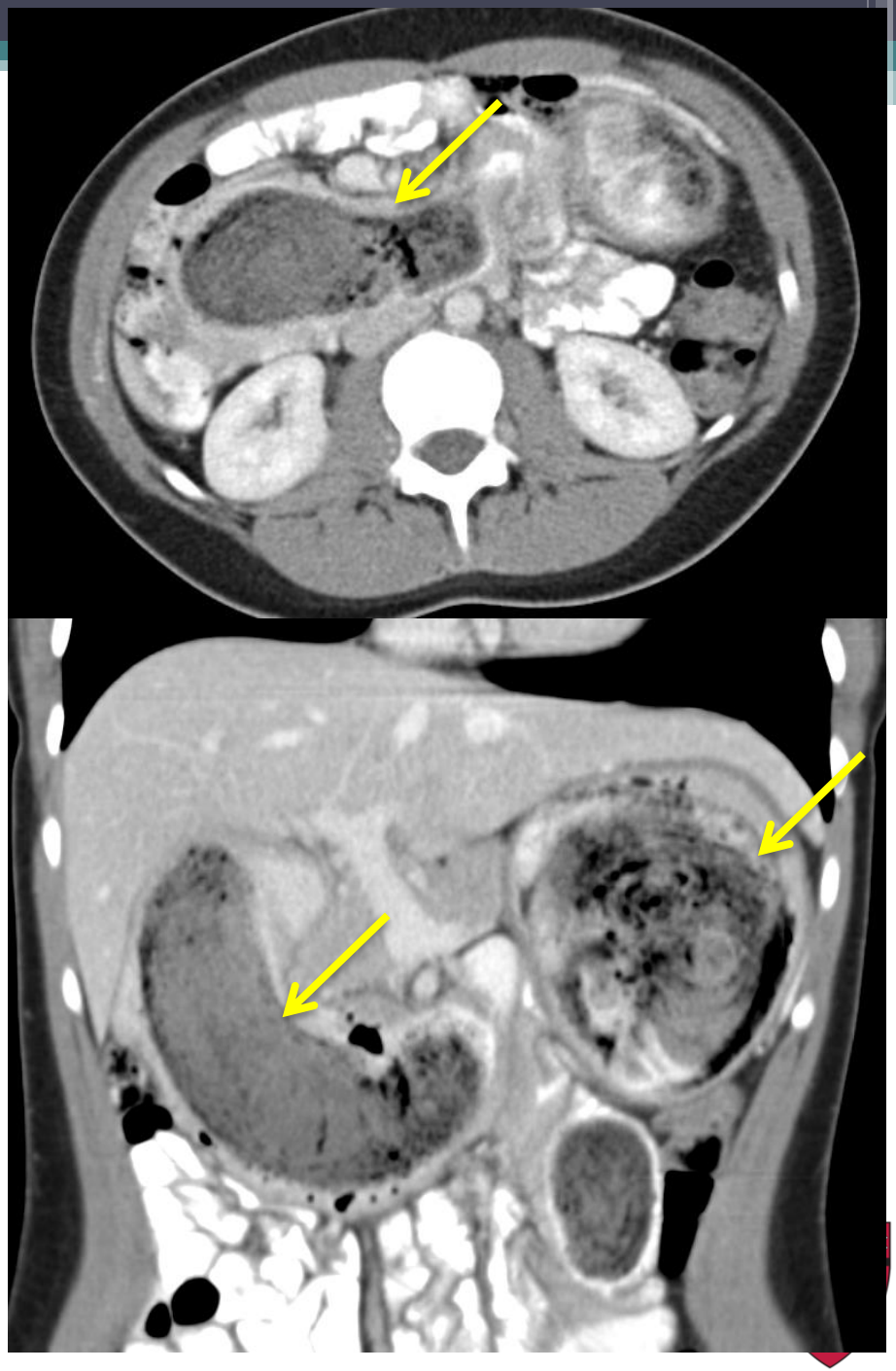


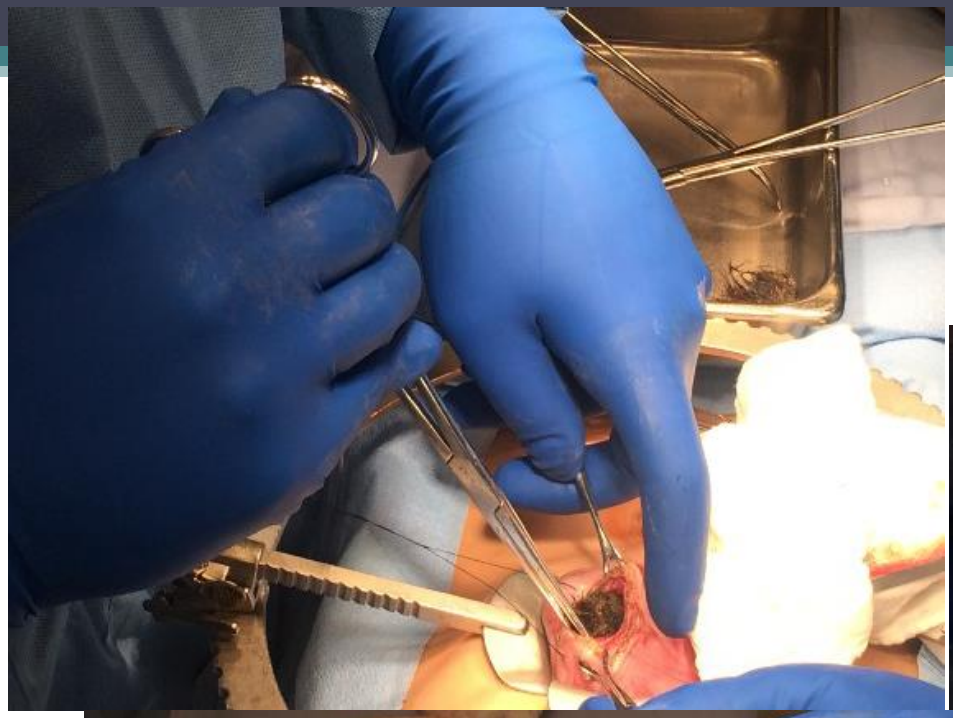
SBO from Cecal Mass

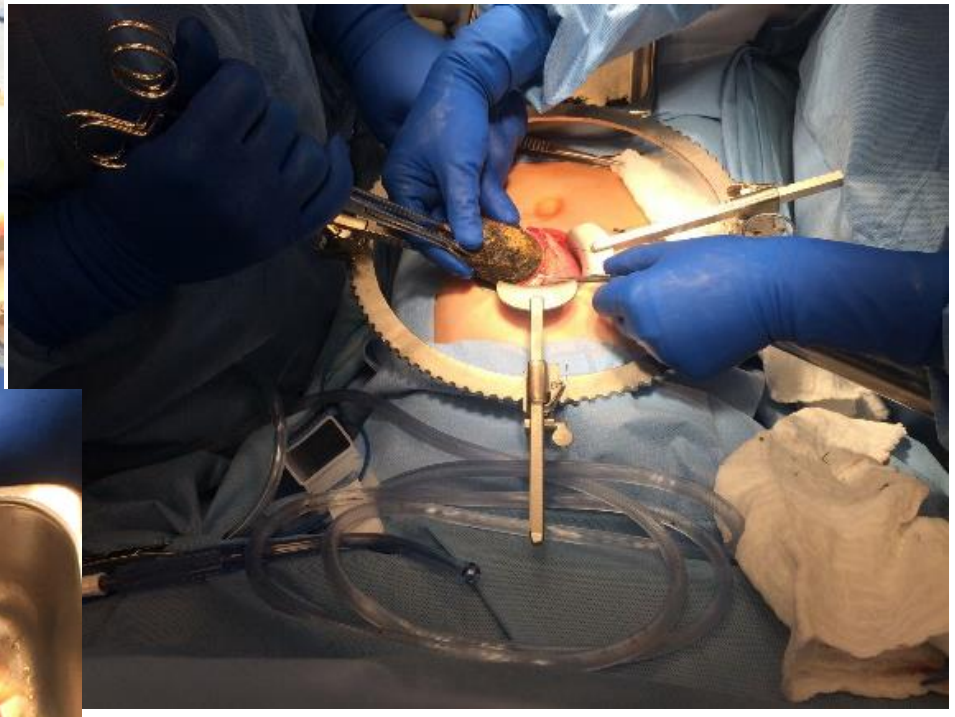


Bowel Obstruction: Bezoar



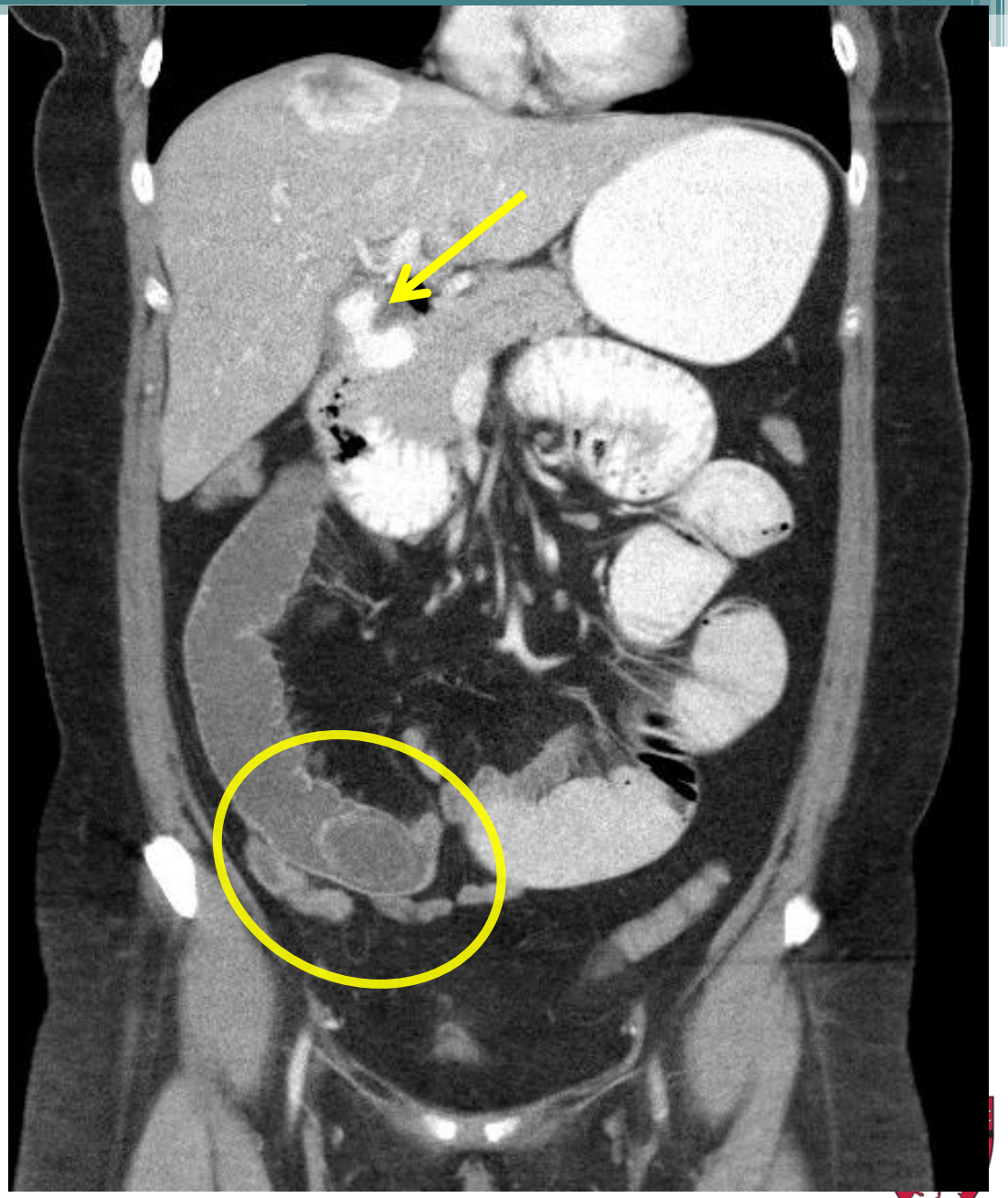






SBO from Gallstone

"Gallstone ileus"

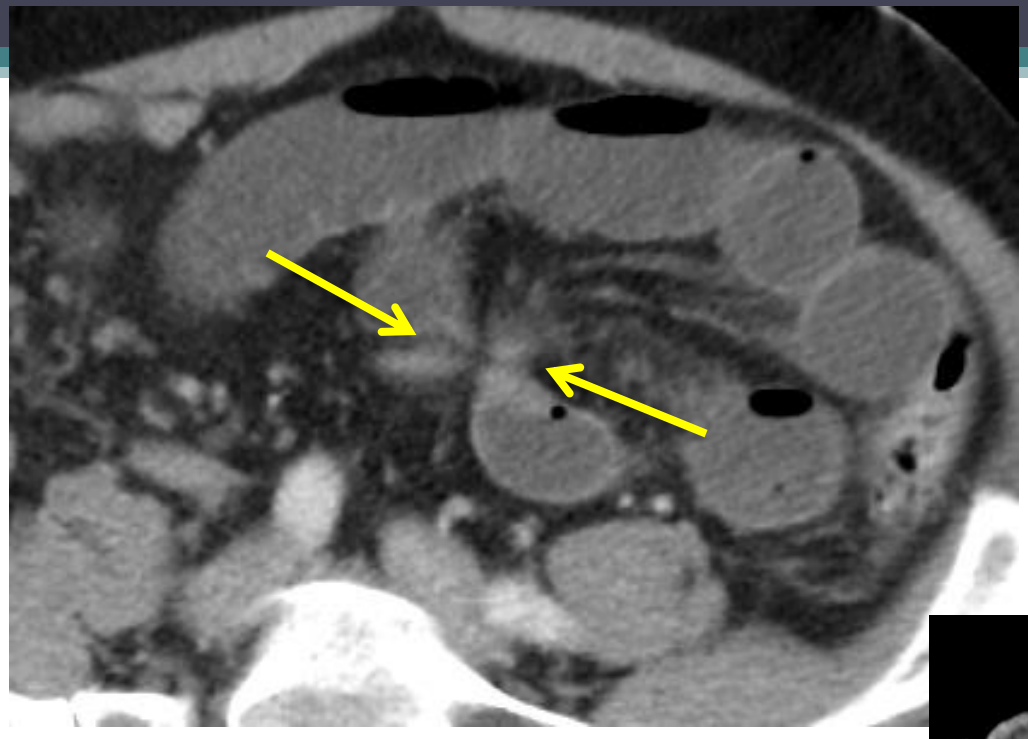


Exclusion Criteria (Off the Pathway)

- Infectious abdominal process
- Cancer
- Incarcerated hernia (ventral or internal)
- Pregnancy
- Abdominal surgery in the last 6 weeks
- Pelvic radiation
- Evidence of closed-loop obstruction

Urgent Surgical Exploration

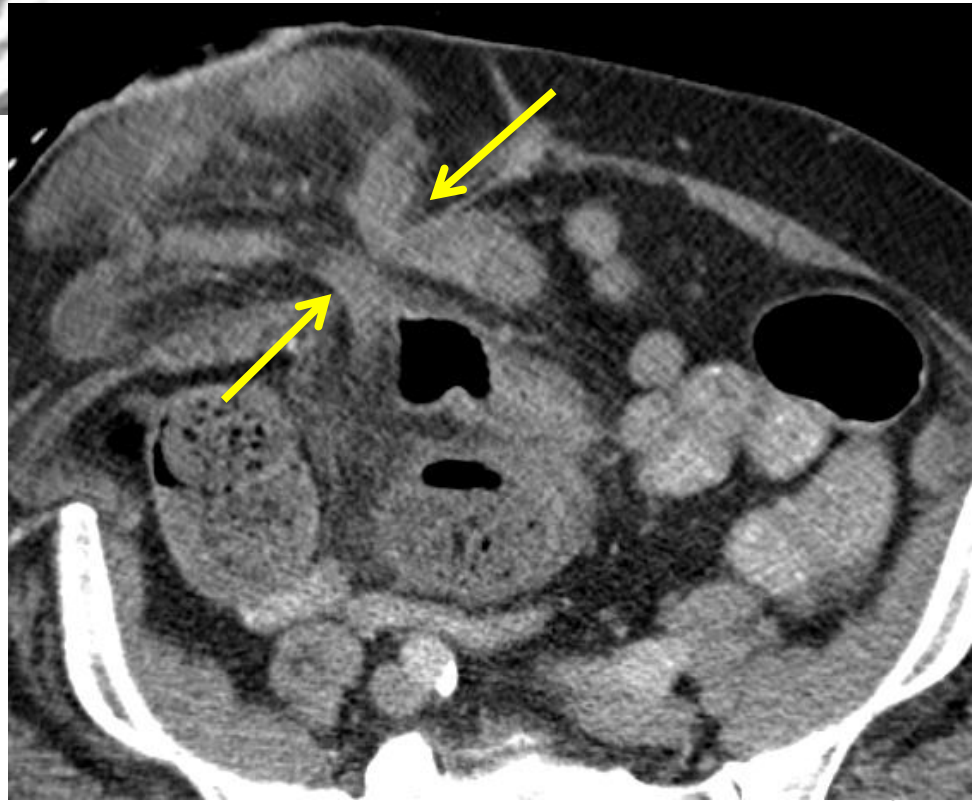
- Signs of:
  - Peritonitis
  - Strangulation
  - Perforation
  - Bowel ischemia
- Closed loop obstruction

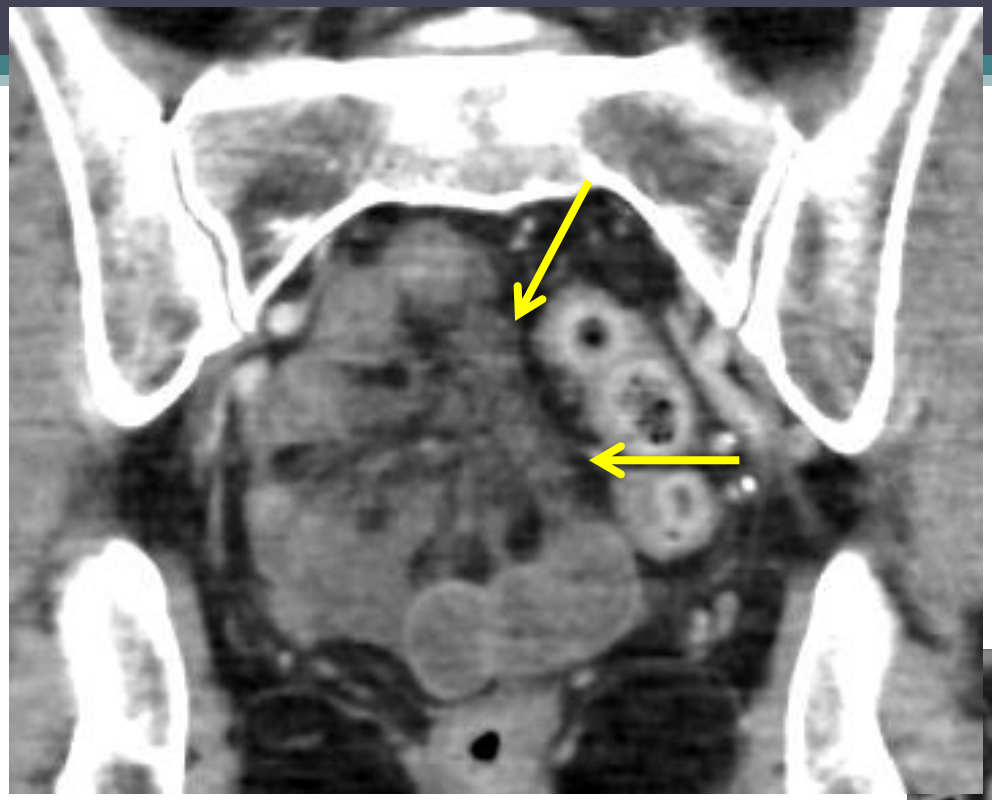


Closed Loop Obstruction

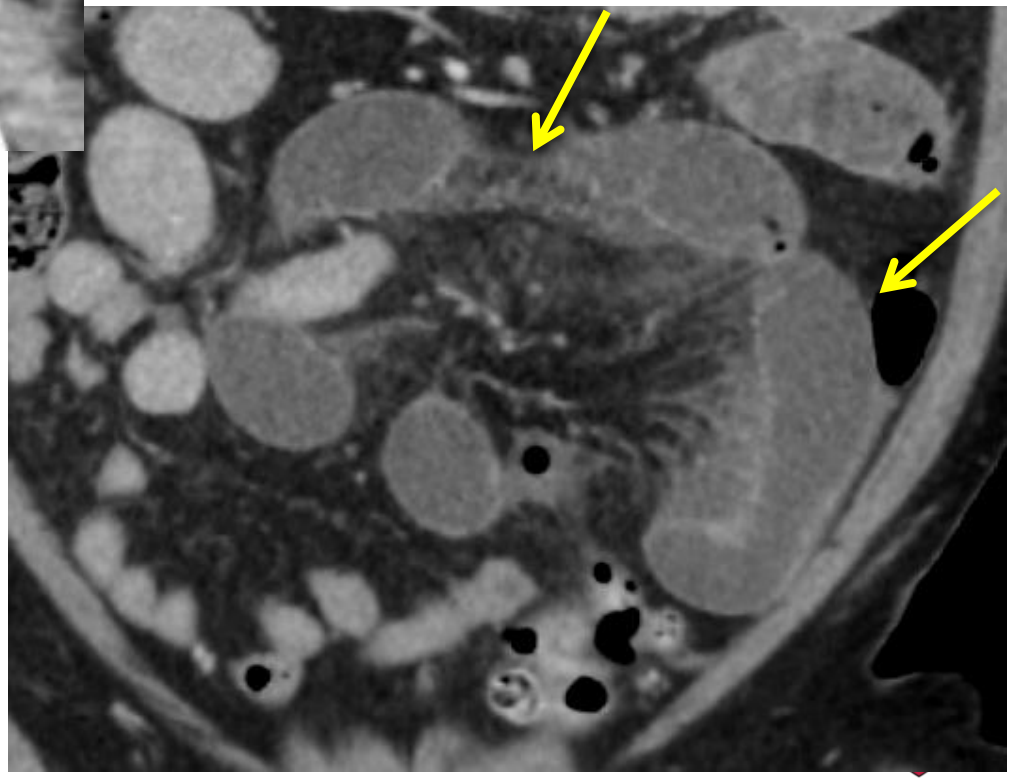
"Double Beak Sign"

https://www.dailymail.co.uk/sciencetech/article-3238301/I-m-bringing-sexy-beak-Penguins-attracted-colours-partner-s-bills-invisible-eyes.html





Closed Loop Obstruction



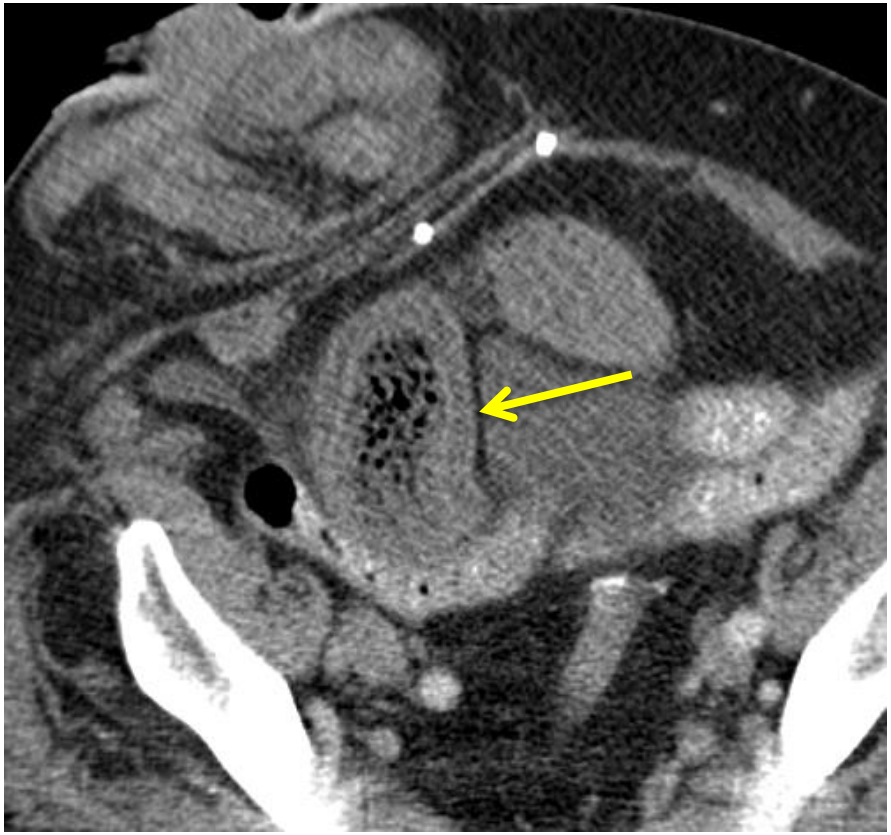
"Mesenteric Swirl Sign"

CT Findings of Ischemia

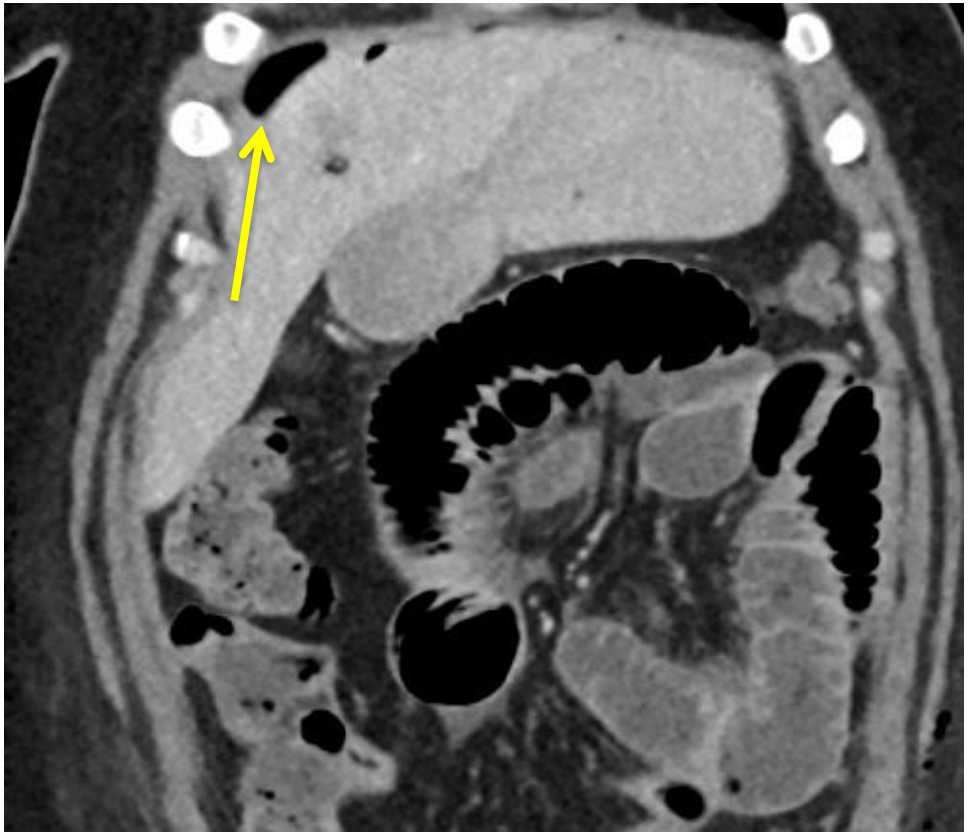
- Decreased bowel wall enhancement
  - Sensitivity > 95%
  - Negative predictive value 99%
- Two of the following (similar diagnostic performance)
  - Mural thickening
  - Mesenteric fluid
  - Mesenteric venous congestion
  - Ascites

Azagury D, et al. J Trauma Acute Care Surg 2015.

Operative Management

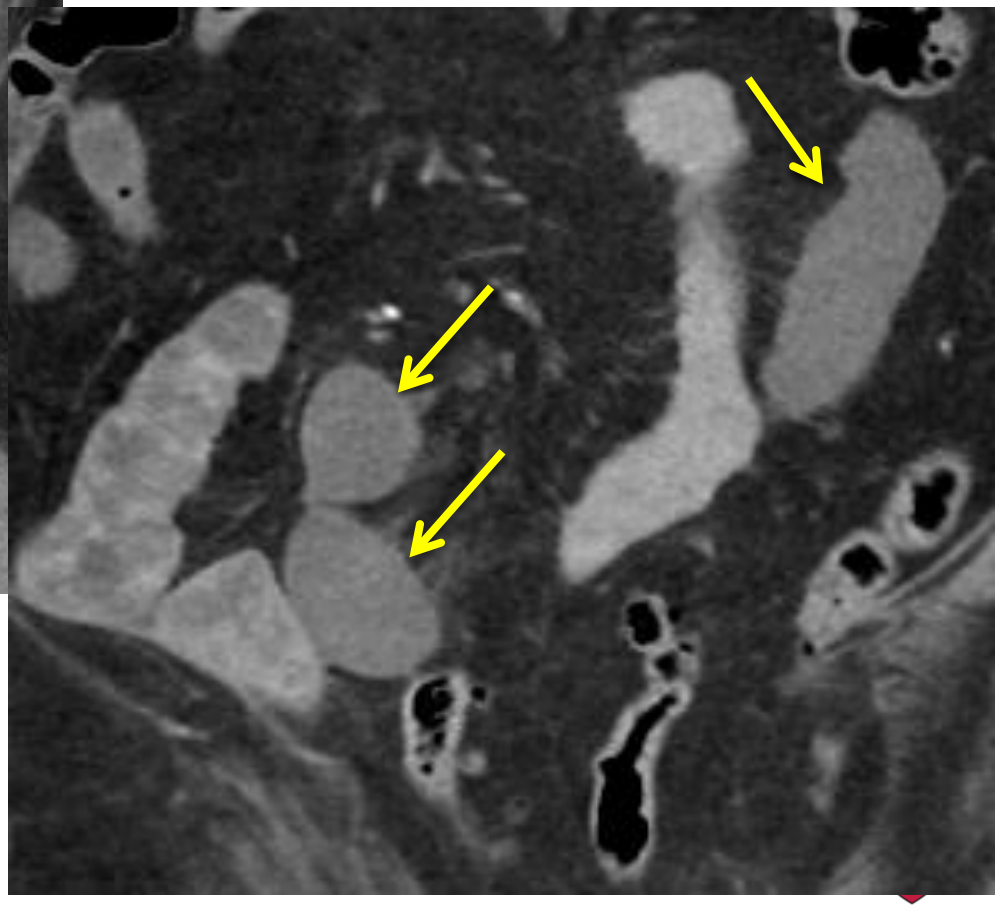


Mural Thickening



Pneumoperitoneum

Ischemic Small Bowel



Evaluation of Acute Abdominal Pain in the Emergency Setting Using Computed Tomography Without Oral Contrast in Patients With Body Mass Index Greater Than 25.

Uyeda JW[1], Yu H, Ramalingam V, Devalapalli AP, Soto JA, Anderson SW.

⊕ Author information

Abstract

PURPOSE: To evaluate the rate of delayed or missed diagnoses and need for additional computed tomography (CT) imaging in emergency department patients with abdominal pain who are imaged without oral contrast.

MATERIALS AND METHODS: The institutional review board approved this Health Insurance Portability and Accountability Act-compliant retrospective study; informed consent was waived. All consecutive adult patients with body mass index greater than 25 undergoing a CT abdomen/pelvis with intravenous contrast and without oral contrast with nontraumatic acute abdominal pain during a 16-month period at our academic tertiary care center were included. Medical records were reviewed, imaging findings on admission CT, use of repeat CT examinations within 4 weeks of the original examination, and clinical outcomes were recorded. In patients undergoing repeat imaging, an investigator determined whether repeat imaging was influenced by the lack of oral contrast on the original examination. As the most common cause of bowel-related positive CT scans, an analysis of acute appendicitis was performed.

RESULTS: Of the 1992 patients included in this study, 4 patients (0.2%) underwent repeat CT studies directly related to the absence of oral contrast on the original examination. Of the 1992 CT scans, 1193(59.8%) were interpreted as negative, none of which required surgery or direct intervention. In patients with acute appendicitis, there was a sensitivity of CT in this patient population of 100% with a specificity of 99.5%.

CONCLUSIONS: In patients with body mass index greater than 25 presenting to the ED with acute abdominal pain, CT examinations can be acquired without oral contrast without compromising the clinical efficacy of CT.

J Comput Assist Tomogr. 2015

Unknown Cases

- Break into SIX groups

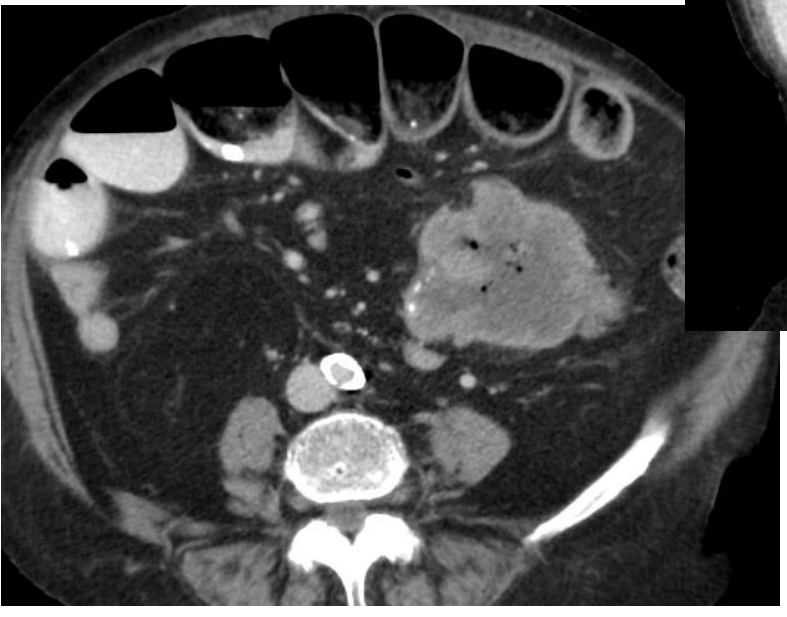
- Review unknown cases on EPIC & assess the following:
  - Etiology of small bowel obstruction
  - Complications of SBO
  - Treatment of choice- medical vs surgery

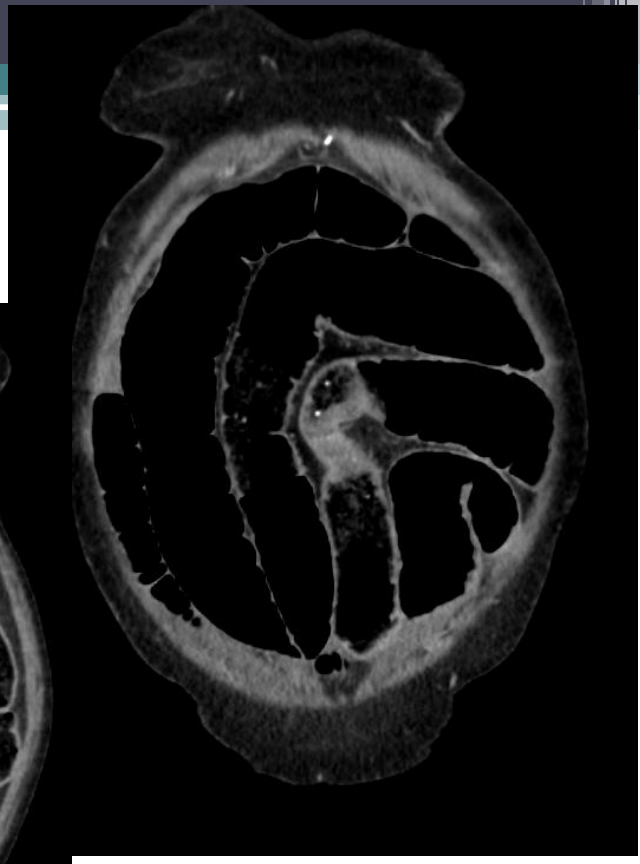
Unknown cases- give in person

1. X
2. X
3. X
4. X
5. X
6. X

Group 1

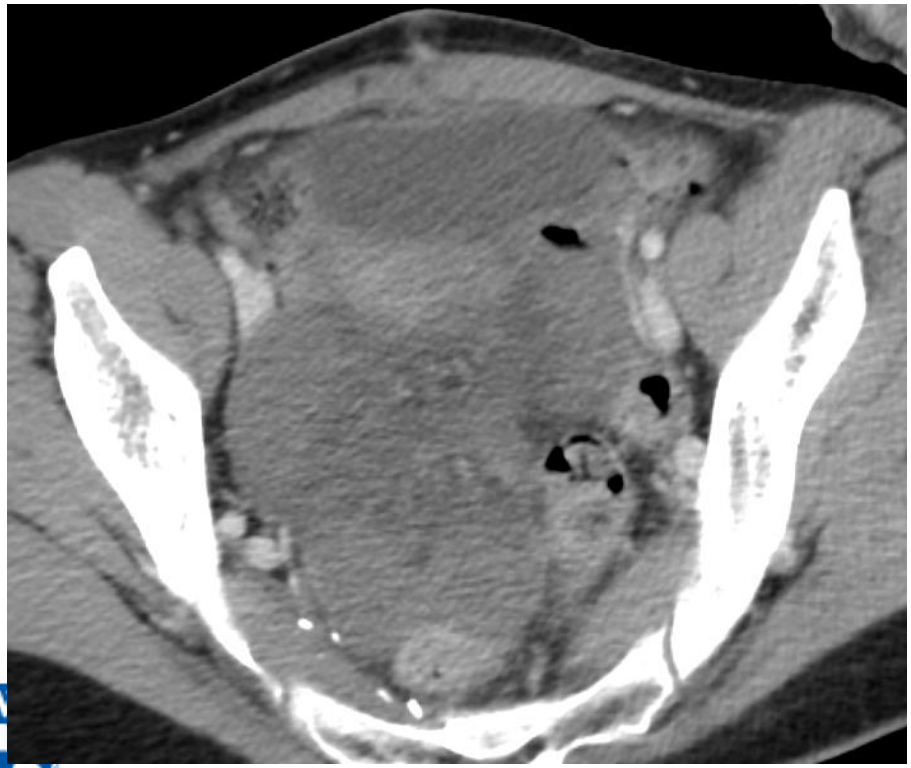
Necrotic colonic mass causing SBO





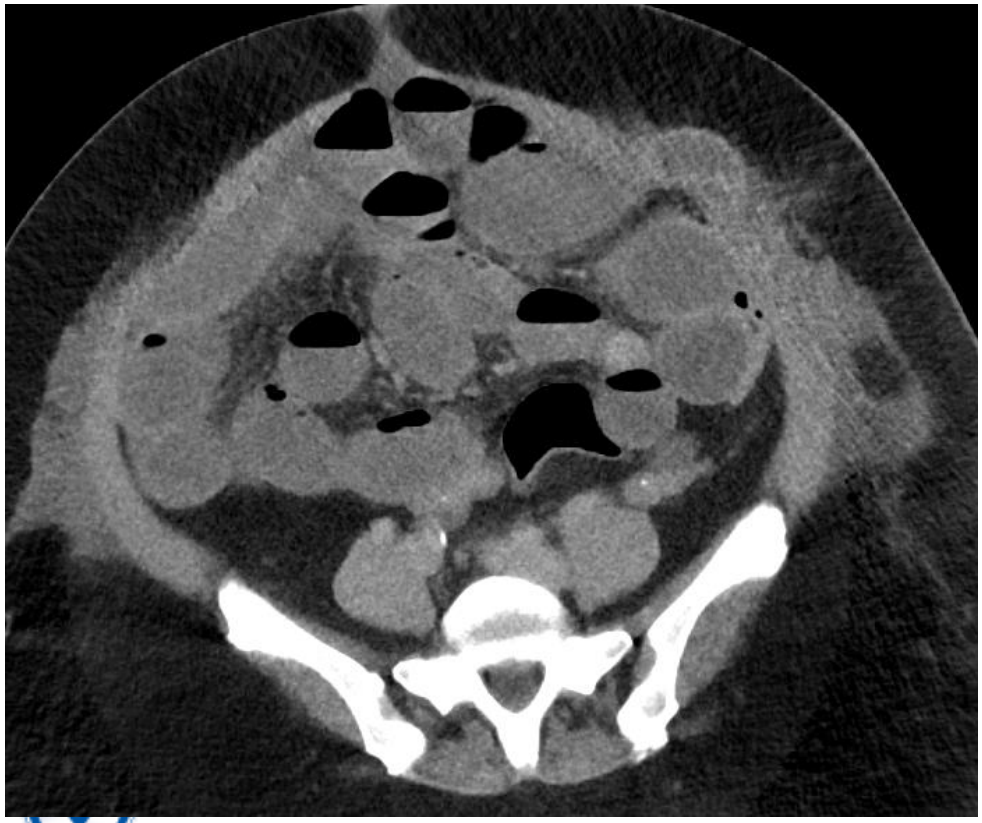
Group 2

Closed loop bowel obstruction



Group 3

SBO from hernia hiatus semilunaris



Group 4

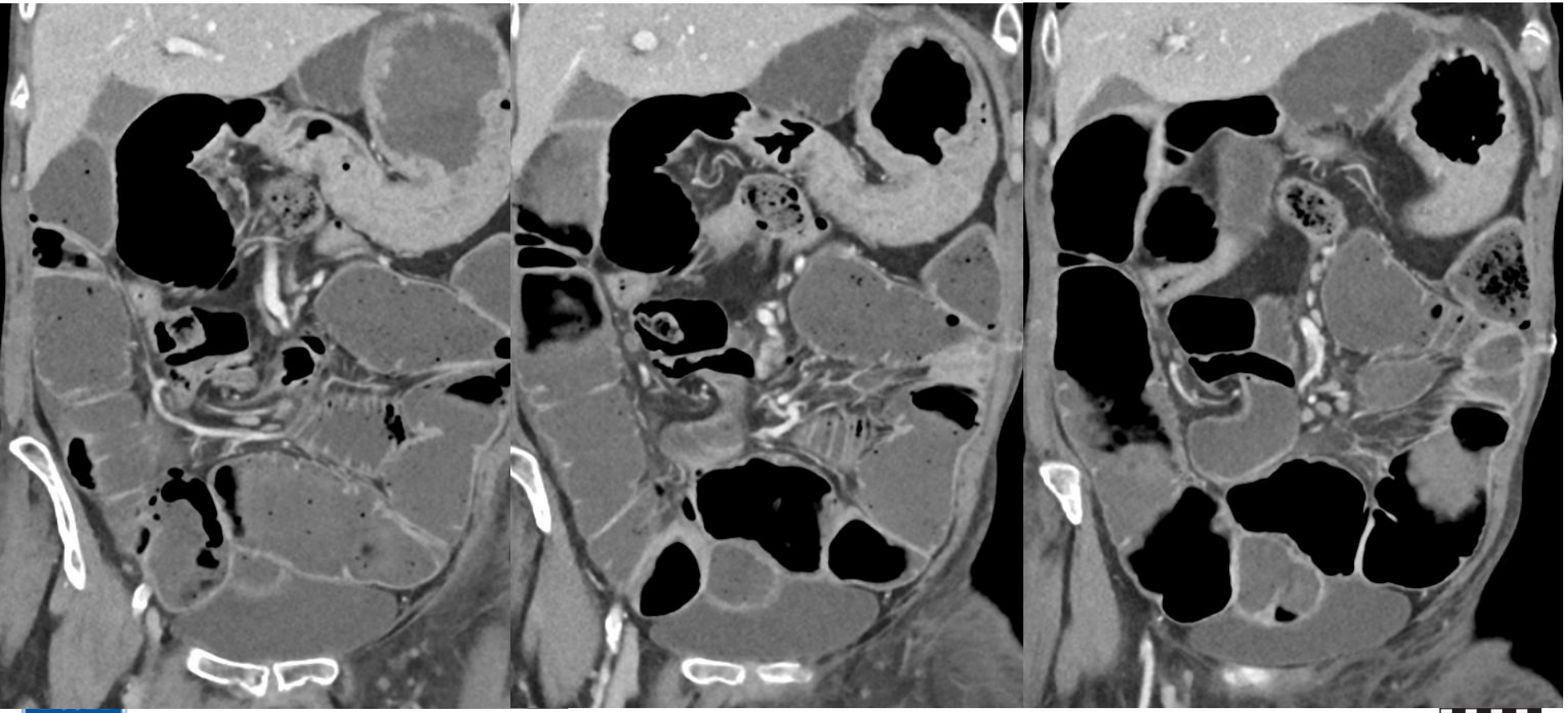
Crohn's stricture and active flare

Group 5

SBO from carcinoid metastases

Group 6

SBO from cecal volvulus



Non-Operative Management

- Based on current best practice guidelines, patients who lack the previously mentioned concerning imaging findings are appropriate candidates for a trial of nonoperative management.

- Studies have shown that 80% of patients with SBO will resolve without surgery

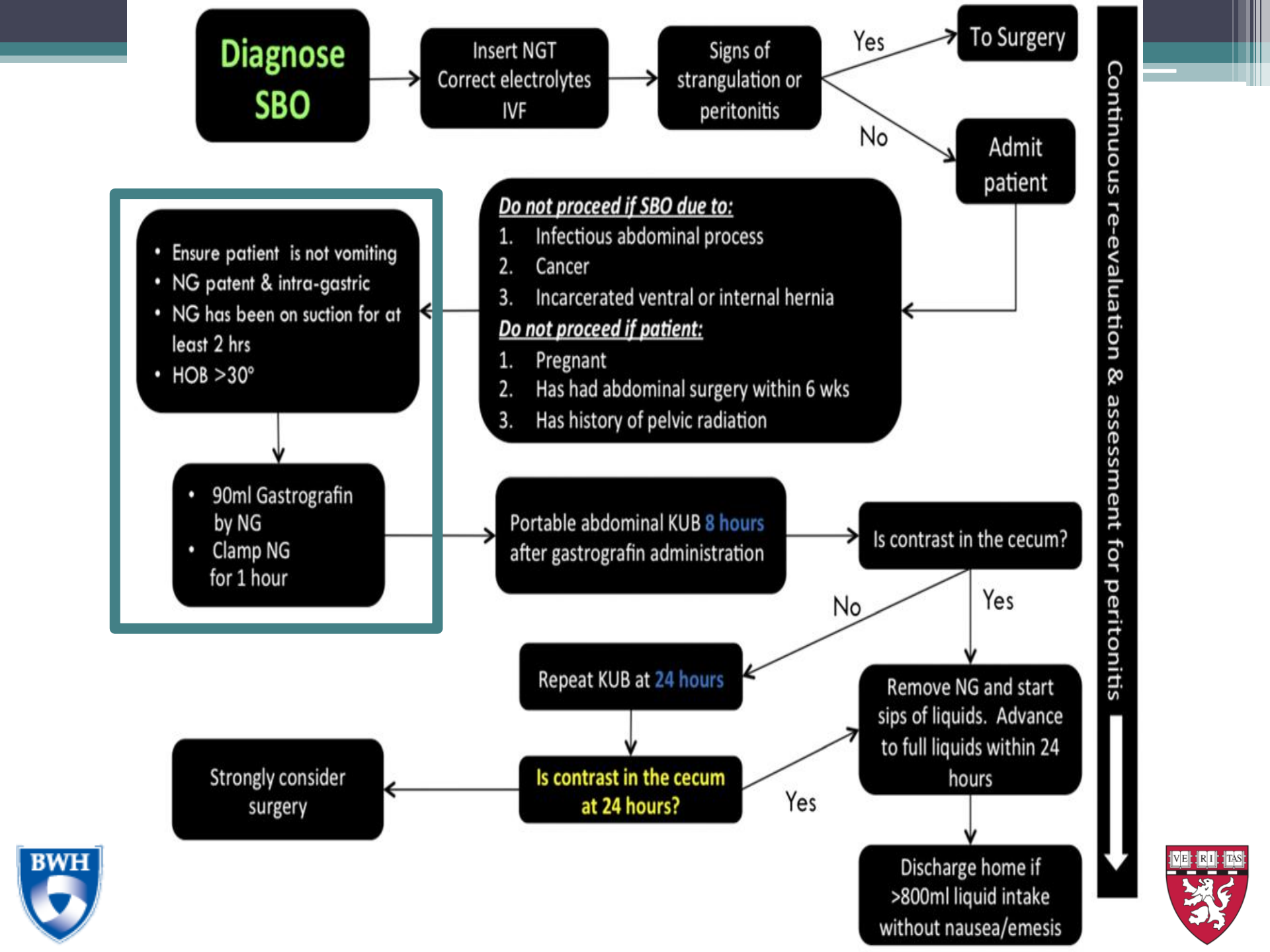
Why SBO PO Contrast Pathway?

- Predict which patients are more likely to fail medical management and require surgery
  - Contrast that reaches colon **within 24 hours** indicates SBO will resolve WITHOUT surgical intervention with **97% sensitivity and 96% sensitivity**
- Therapeutic benefit
- Current guidelines recommend that patients w/o resolution of SBO undergo surgery by **days 3-5**

Abbas S, et al. Cochrane Database Syst Rev 2007
Foster NM, et al. J Am Coll Surg 2006
Maung AA, et al. J Trauma 2010

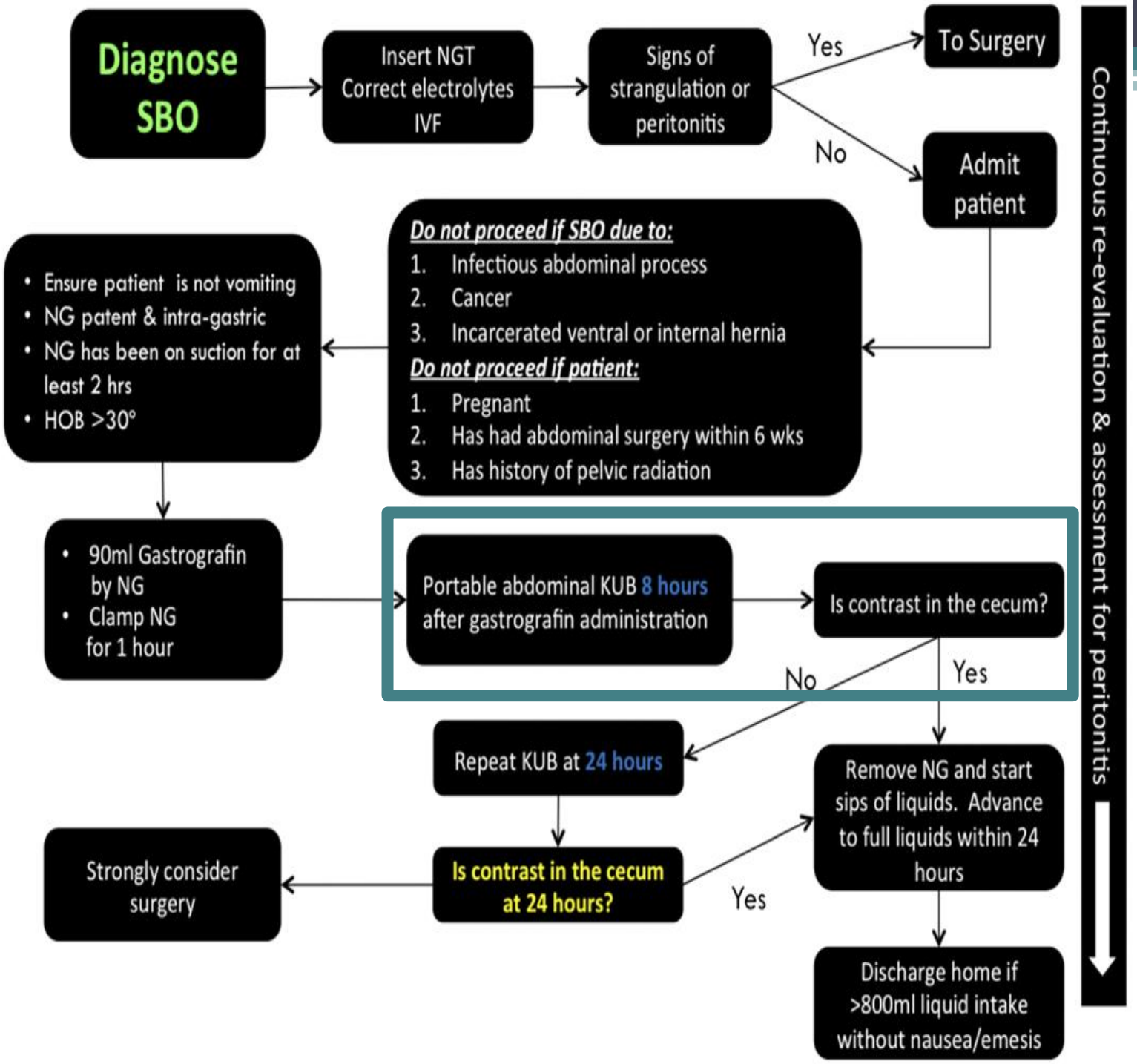
SBO Pathway In Action

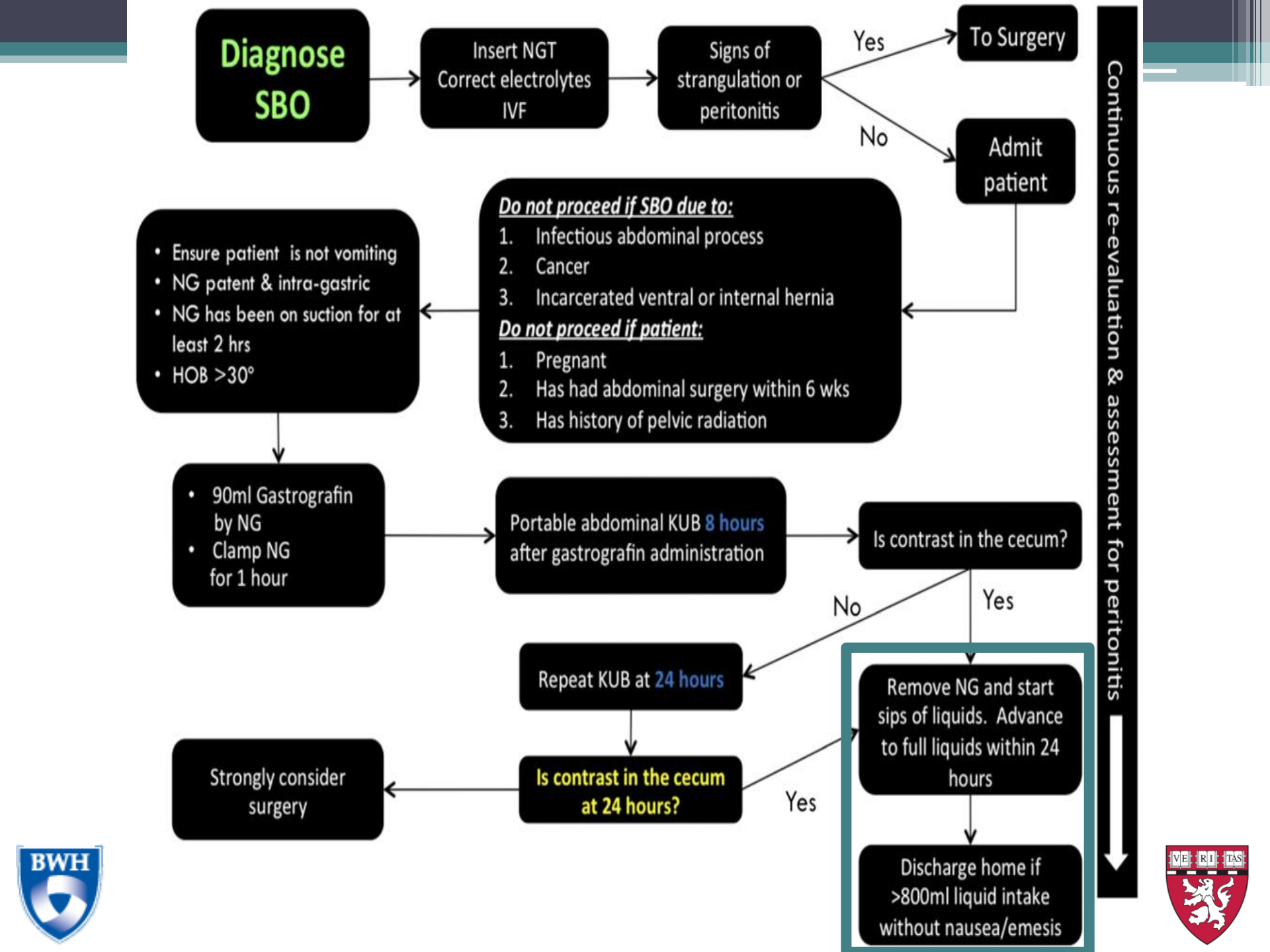
- Patient has met the SBO pathway criteria…**now what?**
- Patient will undergo NGT decompression, usually in the ED (aspiration precautions)
- After **2 HOURS** (as long as pt is not actively vomiting), **100 ml of omnipaque** (2 bottles) is administered via NGT by surgery resident/intern/PA, either in the ED or on the floor. **Omnipaque can be found on all the surgical floors in the tower (8, 12, 15).
- The NGT will then be clamped for **1 HOUR**

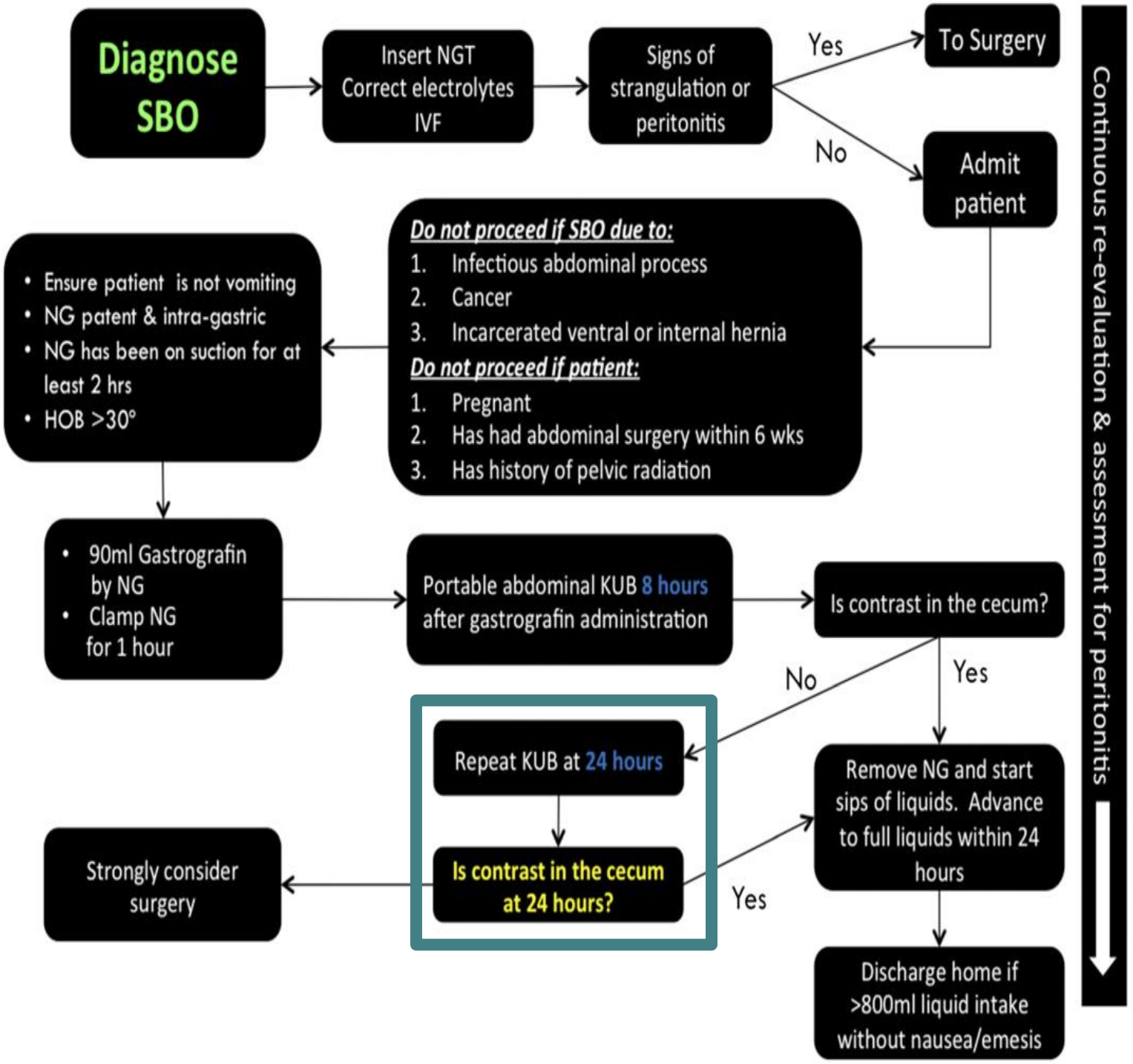

Diagnose SBO
Insert NGT
Correct electrolytes
IVF
Signs of strangulation or peritonitis
Yes
To Surgery
No
Admit patient
Do not proceed if SBO due to:
1. Infectious abdominal process
2. Cancer
3. Incarcerated ventral or internal hernia
Do not proceed if patient:
1. Pregnant
2. Has had abdominal surgery within 6 wks
3. Has history of pelvic radiation
Ensure patient is not vomiting
NG patent & intra-gastric
NG has been on suction for at least 2 hrs
HOB >30°
90ml Gastrografin by NG
Clamp NG for 1 hour
Portable abdominal KUB 8 hours after gastrografin administration
Is contrast in the cecum?
No
Yes
Repeat KUB at 24 hours
Is contrast in the cecum at 24 hours?
Strongly consider surgery
Yes
Remove NG and start sips of liquids. Advance to full liquids within 24 hours
Discharge home if >800ml liquid intake without nausea/emesis
Continuous re-evaluation & assessment for peritonitis

SBO Pathway in Action

- First KUB: **8 hours** after administration of contrast (there is an order for KUB for SBO pathway in epic)
- At **8 hours**, is there contrast in the cecum?
  - If YES, NGT can be pulled
  - If NO, 24-hour KUB needs to be obtained
- At **24 hours**, is there contrast in the cecum?
  - If YES, NGT can be pulled
  - If NO, surgery strongly considered within 72 hours


Diagnose SBO
Insert NGT
Correct electrolytes
IVF
Signs of strangulation or peritonitis
Yes
To Surgery
No
Admit patient
Continuous re-evaluation & assessment for peritonitis
Do not proceed if SBO due to:
1. Infectious abdominal process
2. Cancer
3. Incarcerated ventral or internal hernia
Do not proceed if patient:
1. Pregnant
2. Has had abdominal surgery within 6 wks
3. Has history of pelvic radiation
• Ensure patient is not vomiting
• NG patent & intra-gastric
• NG has been on suction for at least 2 hrs
• HOB >30°
• 90ml Gastrografin by NG
• Clamp NG for 1 hour
Portable abdominal KUB 8 hours after gastrografin administration
Is contrast in the cecum?
No
Yes
Repeat KUB at 24 hours
Remove NG and start sips of liquids. Advance to full liquids within 24 hours
Strongly consider surgery
Is contrast in the cecum at 24 hours?
Yes
Discharge home if >800ml liquid intake without nausea/emesis


Diagnose SBO
Insert NGT
Correct electrolytes
IVF
Signs of strangulation or peritonitis
Yes
To Surgery
No
Admit patient
Continuous re-evaluation & assessment for peritonitis
Do not proceed if SBO due to:
1. Infectious abdominal process
2. Cancer
3. Incarcerated ventral or internal hernia
Do not proceed if patient:
1. Pregnant
2. Has had abdominal surgery within 6 wks
3. Has history of pelvic radiation
• Ensure patient is not vomiting
• NG patent & intra-gastric
• NG has been on suction for at least 2 hrs
• HOB >30°
• 90ml Gastrografin by NG
• Clamp NG for 1 hour
Portable abdominal KUB 8 hours after gastrografin administration
Is contrast in the cecum?
No
Yes
Repeat KUB at 24 hours
Is contrast in the cecum at 24 hours?
Yes
Strongly consider surgery
Remove NG and start sips of liquids. Advance to full liquids within 24 hours
Discharge home if >800ml liquid intake without nausea/emesis


Diagnose SBO
Insert NGT
Correct electrolytes
IVF
Signs of strangulation or peritonitis
Yes
To Surgery
No
Admit patient
Do not proceed if SBO due to:
1. Infectious abdominal process
2. Cancer
3. Incarcerated ventral or internal hernia
Do not proceed if patient:
1. Pregnant
2. Has had abdominal surgery within 6 wks
3. Has history of pelvic radiation
Ensure patient is not vomiting
NG patent & intra-gastric
NG has been on suction for at least 2 hrs
HOB >30°
90ml Gastrografin by NG
Clamp NG for 1 hour
Portable abdominal KUB 8 hours after gastrografin administration
Is contrast in the cecum?
No
Yes
Repeat KUB at 24 hours
Is contrast in the cecum at 24 hours?
Strongly consider surgery
Yes
Remove NG and start sips of liquids. Advance to full liquids within 24 hours
Discharge home if >800ml liquid intake without nausea/emesis
Continuous re-evaluation & assessment for peritonitis

Abdominal radiographs

You must report the most distal location of contrast!

Passed

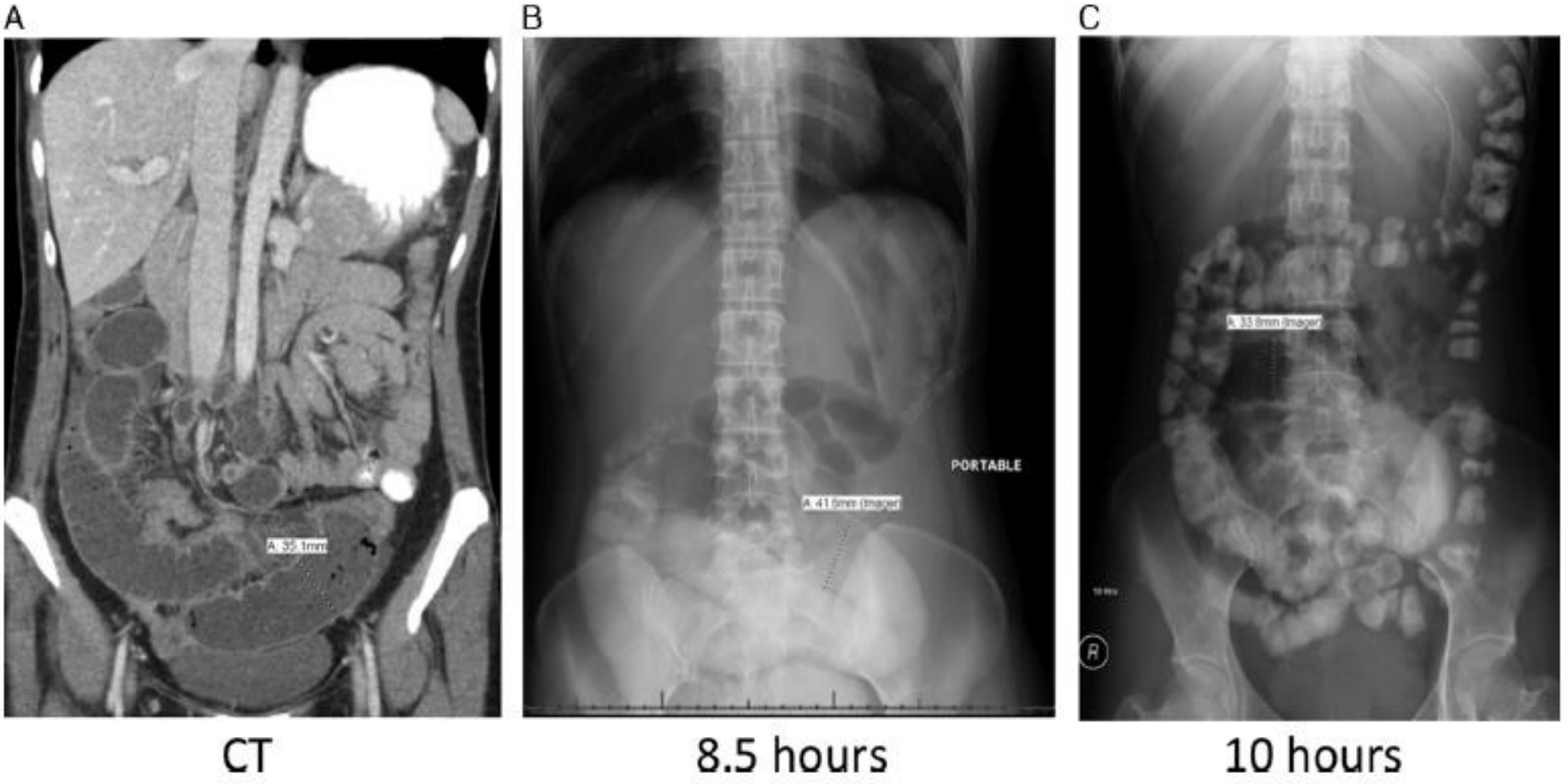


Figure 2. *A*, Patient was admitted with SBO confirmed by CT. *B*, Abdominal plain film 8.5 hours after administration of Gastrografin. *C*, Patient had bowel movement 1 hour after film in *B*. Repeat abdominal plain film shows contrast in sigmoid colon. Patient was discharged 26 hours after Gastrografin administration.

Azagury D, et al. J Trauma Acute Care Surg 2015.

7 hours

25 hours

Figure 3. Abdominal plain films of a patient who failed the Gastrografin protocol because of absence of Gastrografin in the colon after 24 hours. Patient went to surgery 50 hours after Gastrografin administration and was found to have a thick band causing an internal hernia.

Azagury D, et al. J Trauma Acute Care Surg 2015.

Summary

- Name various etiologies of SBO
- Understand what info should be obtained from CT
- Identify complications of SBO
- Describe role of conservative tx for SBO
- Indications & contraindications for SBO oral contrast pathway
- Know steps involved in SBO oral contrast pathway

Thank you for your attention!