



CANADIAN ASSOCIATION
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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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DIAGNOSTIC IMAGING MODALITIES

Dynamic Practice Guidelines for Emergency General Surgery

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DIAGNOSTIC TESTING: IMAGING

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 - d) Intestinal Ischemia
 - e) Thumbprinting
 - f) Cecal vs. Sigmoid Volvulus

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3. Computer Tomography (CT) Scan

4. Magnetic Resonance Imaging (MRI) Scan

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Plain Films: Abdominal X-Ray (AXR)

3 View X-Ray Series includes

1. Upright chest
2. Upright abdominal
3. Supine abdominal (KUB)

PRO

- Limited radiation
- Easy to obtain
- Can be done at the bedside

CONS

- Broad screening with limited information
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Approach to Reading Plain Film Abdominal X-Rays

1. Patient Data: Name, date, patient health record number, history
 2. Air: Free air under the diaphragm, air-fluid levels, air in the biliary tract
 3. Gas Dilatation: 3-6-9 rule, pattern of the gas
 4. Borders: Psoas shadow, preperitoneal fat stripe
 5. Mass: Organomegaly, kidney shadow
 6. Stones/ Calcifications: Urinary, biliary, fecalith, appendicolith, vessels
 7. Stool: Pattern of the stool
 8. Tubes
 9. Bones
 10. Foreign Bodies
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Plain Films: Abdominal X-Ray (AXR)



Findings: Sub-diaphragmatic Air

a. Upright chest x-ray to assess for sub diaphragmatic air

- Suspicious for perforated viscus
- Can be present in post-op state

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Plain Films: Abdominal X-Ray (AXR)

Findings: Small (SBO) vs. Large Bowel Obstructions (LBO)

- Look at caliber, lines, and location to differentiate SBO vs LBO
- Air fluid levels on upright x ray are neither specific nor sensitive and cannot help distinguish ileus, enteritis, or partial from complete SBO



Small Bowel Obstruction

SMALL	LARGE
3cm max diameter	6cm max diameter
Lines all the way across the bowel (Plicae Circulares)	Lines not fully across (Haustra)
Central	Peripheral



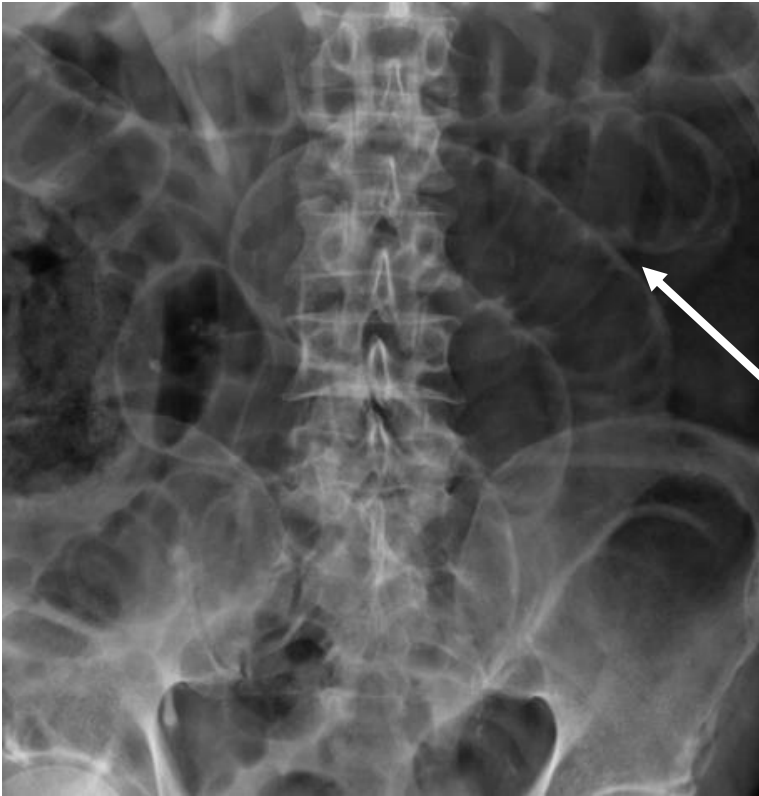
Large Bowel Obstruction

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Plain Films: Abdominal X-Ray (AXR)



Findings: Rigler's Sign

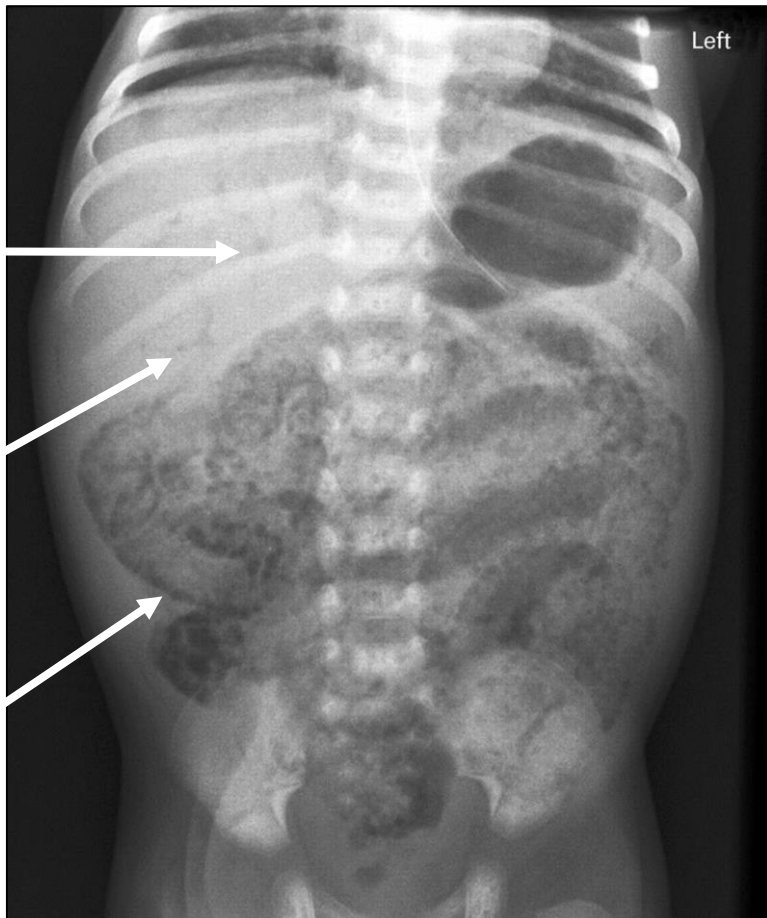
- When there is air outside of the bowel wall adjacent to air filled loops of bowel then both sides of the bowel wall become very well defined (such as in a bowel obstruction complicated by a perforation)

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Plain Films: Abdominal X-Ray (AXR)



Findings: Intestinal Ischemia

- Portal venous gas – seen as darker lines within the liver in the RUQ
- Pneumatosis intestinalis – air within the bowel wall
- Better appreciated on CT scan but in severe cases can be noted on XR

Note: X-Ray is an infant with necrotizing enterocolitis with extensive portal venous gas and pneumatosis

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Plain Films: Abdominal X-Ray (AXR)



Findings: Thumbprinting

- Mucosal thickening/edema of the large bowel results in the haustral folds becoming more pronounced
- Can be seen in IBD, ischemia, infectious colitis

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Plain Films: Abdominal X-Ray (AXR)

Findings: Cecal vs. Sigmoid Volvulus

- Cecal = Typically flips up to the LUQ and takes on the shape of an embryo therefore called the “embryo sign”
- Sigmoid = Due to a twist at the base of the sigmoid mesentery and it takes on the appearance of a giant “coffee bean”



Cecal Volvulus



Sigmoid Volvulus

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Abdominal Ultrasounds

To determine presence of free fluid, appendicitis, cholecystitis, fluid collection

PROS	CONS
Accurate >95% for detection of gallstones, pericholecystic fluid, thickened gallbladder wall or sludge	Operator dependent – varies from center to center based on skill of technician Patient body habitus can limit assessment Less sensitive for stones in the distal CBD
Can determine presence of free fluid or fluid collection	
Assessment of appendix and ovary	
Portable	
Non-Invasive	
Rapid and easily repeatable	
No ionizing radiation	

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CT Abdomen/ Pelvis in Abdominal Emergency

PRO

- Very accurate assessment of intraabdominal organs and abdominal wall

CONS

- Uses Ionizing Radiation
- Need transport of the patient = not adequate for unstable patients
- Use of IV contrast possibly nephrotoxic

Three types of contrast:

1. IV Contrast

- Evaluation of bowel wall for ischemia, vessels for infarct/occlusion, intraabdominal collections, appendicitis, neoplasia
- Nephrotoxic

2. Oral contrast

- Used to assess for perforations (i.e. secondary to PUD), obstructions, more proximal anastomosis for possible leak/stricture

3. Rectal contrast

- Used in assessment of rectal/distal anastomosis or large bowel obstructions

- With No IV contrast can still assess for bowel obstruction, masses, foreign bodies, hernias, free fluid
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Use of MRI in Abdominal Emergency

Focus Assessment of the Abdomen

Pros

- No radiation
- Good option for abdominal imaging for pregnant woman or pediatric patient
- Good characterization of biliary tree, liver and pancreas
- Rule out choledocholithiasis
- Assessment of a hepatopancreaticobiliary mass (although this is not often necessary in the acute setting)

Cons

- Not always available timely
 - Limited physical space and can cause claustrophobia
 - Gadolinium contrast possibly nephrotoxic
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