Pitfalls of Bowel Interpretation on “Routine” Abdominal and Pelvic CT

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Introduction

- Abdominal and pelvic pain - accounts for 8% of emergency department visits in the United States in 2014 [1], and has many potential etiologies.
- CT of the abdomen and pelvis is often the first-line diagnostic examination performed in non-emergent adults [2].
- In the emergency setting, a protocol without or with IV contrast, depending on the suspected diagnosis, typically WITHOUT oral contrast, is currently used.
- CT with IV contrast, with or without oral contrast, is also frequently used for the evaluation of patients in a variety of non-emergent indications.
- Other than possible NPO status, generally no bowel preparation is performed, or specific attempts to optimize bowel assessment.

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GE junction: true mass vs. a pseudomass

- Upright or CT of “routine” abdominal and/or thoracic CT – there is apparent local thickening/“pseudomass” at the gastroesophageal junction [3].
- Due to incomplete distention of esophagus and stomach, x oblique course of the GE junction on axial images
- On same level as fissure of the ligamentum venosum
- Repeat images with patient in a prone or left posterior oblique position should resolve the pseudomass, if needed.
- Can combine with “negative” oral contrast (water), to further distend the esophagus and gastric cardia, and confirming no actual mass [3].
- Evaluation for a mass in a hiatal hernia (relatively rare) versus just a hiatal hernia (very common) also be very problematic on CT; similar solution, but may need endoscopy/lower GI series to resolve.

68-year-old woman, CT for surveillance for bladder cancer

- Initial CT without contrast – hiatal hernia, 7 mm or thickening (left)
- Endoscopy/follow-up was recommended
- Follow-up CT with oral and IV contrast just shows the hernia, no mass; mildly prominent proximal gastric folds (right)
60-year-old woman with abdominal pain; collapsed stomach versus thickening/mass on CT (even with oral contrast)

- Normal stomach on endoscopy

59-year-old man with GE junction mass versus just a hiatal hernia

Diagnosis: Adenocarcinoma with metastases

67-year-old GI/oncologic surgeon with abdominal pain

- GIST missed prospectively, but subsequently identified on endoscopy

Esophageal leiomyoma vs. GIST

- True mass at distal esophagus/proximal stomach – differential includes leiomyomas – benign - and gastrointestinal stromal tumors (GISTs) - can be aggressive/malignant in some patients
- Leiomyomas on CT: round or ovoid intramural mass, with no disruption of adjacent fat; tend to have homogenously low or iso-attenuation - limited vascular supply
- Esophageal GISTs - generally larger than esophageal leiomyomas; an average 5.6 cm, vs. 2.6 cm for leiomyomas
- GISTs tend to occur along right side of the esophagus; leiomyomas – predominantly midline
- GISTs tend to have associated mucosal ulceration; this is not present with leiomyomas
- Again, can be difficult to differentiate from just a hiatal hernia

Esophageal leiomyoma

33-year-old woman with abdominal fullness

- CT: heterogeneous, relatively low density, oval mass in the proximal stomach
- Pathology: GIST
Gastric food vs. bezoar vs. true mass
- The stomach is now usually collapsed on CT, as oral contrast is increasingly being used, especially in the emergency setting.
- Makes evaluation for gastritis true wall thickening, ulcers, masses, and other findings much more difficult.
- Even when oral contrast is administered, the stomach may still be collapsed unless purposely distended (i.e., with oral contrast and/or effervescent crystals administered just prior to scanning).
- Gastric contents may be present, and need to be distinguished on CT from other structures, particularly a bezoar, which is much less common.

Gastritis vs. linitis plastica vs. underdistension
- Accurate assessment of the gastric wall can be very difficult.
- May lead to lack of recognition of actual thickening, most commonly gastritis (of multiple potential etiologies), but uncommonly but most importantly of linitis plastica - a form of primary muscious adenocarcinoma.
- May also lead to the reverse scenario of gastritis being overcalled (common), or an actual cancer being mistaken as normal on CT (much less common, but potentially a major pitfall).
- Gastritis on CT – look for true edema of the wall – regional or diffuse (versus submucosal fat); substantial thickening out of proportion to expected; watch for potential associated ulcer; will not necessarily have perigastric edema.

64-year-old woman with abdominal pain
- Distal gastric thickening and edema, but no definite associated mass, consistent with gastritis, and confirmed on endoscopy; note uniform submucosal edema.

10-year-old boy with abdominal pain and vomiting
- Non-specific gastritis, with associated adenopathy.

64-year-old woman with biliary obstruction, following endoscopy with papillotomy
- Thickening of posterior wall of stomach prominent papillary folds.
- However, the stomach looked normal on initial endoscopy.
- Mild hepatosplenomegaly; mild biliary dilatation with post-procedural gas.
Certain CT features of gastritis may overlap with malignancy, and may require further imaging and/or endoscopy to exclude neoplasm of mucosal hyperemia and submucosal edema results in mural stratification [14].

Helicobacter pylori (H. pylori) CT: Partially distended but diffusely thick-walled stomach with increased enhancement and abnormal architecture, and the possibility of cancer was strongly suggested by the radiologist – then confirmed at endoscopic biopsy.

37-year-old woman with weight loss
- CT: Partially distended but diffusely thick-walled stomach with increased enhancement and abnormal architecture, and the possibility of cancer was strongly suggested by the radiologist – then confirmed at endoscopic biopsy.

Gastritis vs. linitis plastica vs. underdistension
- Linitis plastica tends to exhibit a diffusely thickened gastric wall with low attenuation and associated abnormal architecture, and may have adjacent adenopathy [8].
- Pay careful attention to gastric wall architecture and enhancement, if IV contrast is given.
- Consider repeat CT with negative oral contrast, especially water, in combination with oral effervescence crystals – distend the stomach to assess for true wall thickness.
- This may alternatively require investigation with an upper GI series, and/or with endoscopy and biopsy if the diagnosis remains uncertain – and biopsy has its own pitfalls as well (need deep biopsy to diagnose linitis).

25-year-old African-American with post-partum abdominal pain
- Proved to be diffuse adenocarcinoma.

Gastritis vs. linitis plastica vs. underdistension
- Gastritis due to H. pylori, peptic ulceration, NSAIDs, alcohol, and other processes [13].
- CT is not indicated for assessing non-complicated patients with gastritis.
- However, CT is often the first examination requested due to a patient’s non-specific signs and symptoms, and gastritis may then be identified.
- CT findings: diffuse submucosal low attenuation and/or mucosal hyperemia [10]; combination of mucosal hyperemia and submucosal edema results in mural stratification [14].
- Certain CT features of gastritis may overlap with malignancy, and may require further imaging and/or endoscopy to exclude neoplasm.
- Mural stratification strongly points to inflammation, whereas focal or nodular areas of mural stratification require endoscopy with biopsy to exclude malignancy [13-14], but can also be inflammation associated with tumor.
Patients with PUD often present to the ED with unexplained abdominal complaints. Perforated gastroduodenal ulcers are still a common cause for pneumoperitoneum. Missed ulcers due to underdistended bowel or lack of recognition. Patients with PUD often present to the ED with unexplained abdominal complaints, and undergo abdominal and pelvic CT. Perforated gastroduodenal ulcers are still a common cause for pneumoperitoneum and are still relatively common when not perforated, so radiologists should be aware of the CT findings [10]. CT findings can be subtle in some patients, and especially if the stomach is collapsed. Careful CT interpretation and attention to both luminal and extraluminal signs is important in diagnosing or at least suggesting non-perforated PUD (and then endoscopy is usually performed). 78-year-old man in septic shock; history of metastatic prostate cancer, recent chemotherapy. Thickened proximal duodenum and edema of adjacent fat, with adjacent small outpouching consistent with ulcer, prospectively identified, confirmed by endoscopy. Differential diagnosis: duodenal diverticulitis. 54-year-old man with abdominal pain immediately after right inguinal hernia repair. Duodenitis, with substantial edema of the proximal duodenal wall, confirmed by endoscopy; no focal ulcer. Missed ulcers due to underdistended bowel or lack of recognition. Accurate CT diagnosis relies on both direct and indirect signs [10]. Direct signs: focal discontinuity of mucosa and submucosa, and identification of a luminal outpouching (ulcer crater). Indirect signs: mural thickening of affected portion of the stomach and/or proximal duodenum; stratified appearance from edematous submucosa. Active inflammation, with edematous fat stranding [10]. If there is perforation, extraluminal fluid and/or gas tends to be most prominent adjacent to the ulcer. Fluid and/or gas can be retroperitoneal if duodenal ulcer is more distal [10]. Active leak if oral contrast is given.
Missed ulcers due to underdistended bowel or lack of recognition

- Inadequately distended stomach may show prominent gastric folds and apparent mural thickening, which is usually normal, and can be difficult to assess [9,10].
- Dedicated CT with gastric distention can be performed, if the initial CT findings are equivocal.
- Also review axial, coronal, and sagittal planes.
- Can obtain obliquely-oriented CT images, focusing on the proximal duodenum and gastric antrum.
- Even large ulcers may be difficult to detect on CT due to underdistention, but deep or penetrating ulcers may be identified by paying attention to indirect findings, and by careful assessment [9,10].

51-year-old man with abdominal pain, and acute pancreatitis based on initial labs

- Proximal duodenal ulcer with duodenitis, small amount of free air, and secondary pancreatitis.

Incidental prominent jejunal folds

- 26-year-old with epiplectic appendicitis (not shown) and presumably normal but prominent proximal jejunal folds.

Pancreatitis versus primary duodenal PUD

- Duodenal inflammation can be non-specific, and can be primary or secondary.
- Same direct and indirect CT signs may be applied to duodenal ulcers as with gastric ulcers - but ulcerating duodenal tumors are relatively rare.
- Similar appearances may also result from other causes: pancreatitis and infection.
- Inflammation in pancreatitis usually occurs most substantially along the medial aspect of the descending duodenum rather than at the duodenal bulb, as is seen with PUD.
- Pancreatitis-induced duodenal inflammatory changes range from mild hazy stranding, to wall thickening, to a mass-forming infiltration of the pancreatic-duodenal groove [12].
- There may be more diffuse swelling in and around the pancreas with pancreatitis, but depends on the severity.

Normal jejunum vs. true thickening

- Differentiating between collapsed jejunum and a focal tumor for non-malignant true wall thickening can be difficult: underdistention or redundant mucosal folds, potentially mimicking a mass, or more typically mimicking regional wall thickening.
- Jejunum has the least amount of distention on “routine” CT, and normally has the most prominent small bowel folds, making identification of pathology difficult.
- CT is not indicated for the diagnosis of non-complicated infectious or inflammatory proximal enteritis.
- However, since so many patients undergo “routine” CT in the emergency setting and a subset will have enteritis, it is difficult to distinguish a true jejunitis from just normal, prominent folds.

Campylobacter jejunitis: 49-year-old woman with abdominal pain and diarrhea

- Extensive, diffuse jejunal thickening (case courtesy Dr. Christopher Schierney, Lahey Clinic).
Normal jejunum vs. true thickening

- Small bowel wall is often indiscernible when distended on CT, should not measure greater than 3 mm in thickness
- If partially collapsed, should measure between 2-3 mm in thickness on CT, and should be circumferentially symmetric [10]
- Proximal and distal segments of jejunum should be assessed to compare to the collapsed portion of small bowel, but problematic if a diffuse process involves an entire segment of small bowel, versus diffuse pseudo-thickening [8]
- Extraluminal fat stranding on CT, if present, helps distinguish between the two possibilities, as entitis will typically demonstrate some degree of fat stranding due to edema, as well as possible enlargement of regional lymph nodes [27]

Peristalsis/underdistention vs. inflammatory small bowel stricture or mass

- Peristaltic contractions in the small bowel occur frequently on CT, making accurate diagnosis difficult, and potentially leading to false-positive interpretations; also a routine problem in the colon on CT
- Contractions within air-filled loops of bowel can specifically create an artifact resembling an enhancing mass, due to motion and beam-hardening artifacts
- Careful observation of an inconsistent mass in the axial and coronal planes, with streaky margins [16]
- Contractions can also mimic inflammatory strictures; however, inflammatory strictures tend to be asymmetric with adjacent inflammation, compared with peristalsis, which resolves on repeat CT (focal, with thin cuts, can give oral contrast) [16]

79-year-old woman with three-week history of abdominal pain

- Initial CT was prospectively misinterpreted as pyloric thickening/possible neoplasm (left)
- Repeat CT with thin cuts and optimized IV contrast administration shows normal pylorus with normal wall architecture which is just non-distended, no focal mass (right)

True small bowel abnormality vs. normal findings

- When small bowel pathology is suspected, alternative imaging techniques include CT enterography (CTE), or ideally magnetic resonance enterography (MRE), may be the next best step
- MRE scans the small bowel multiple times in a single examination without ionizing radiation exposure; also can do cine imaging
- Similarly, a small bowel series or capsule endoscopy may be considered for further evaluation [15]

Pill fragments versus a mass

- ingested foreign material, such as pills, may simulate an enhancing intraluminal mass, leading to a false-positive CT finding on a single-phase IV contrast-enhanced CT
- With ingested pills, peristalsis will cause the pill(s) to move distally, clarifying the absence of a true mass, which would remain stationary [17]
- In both cases, a follow-up short-term non-contrast CT with low-dose radiation may be used for verification

Focal lipoma versus lipomatosis of the ileocecal valve

- Lipomas: very common, slow growing, fat-density mass, 5th-7th decades of life
- Colon is the most common site of lipoma formation, specifically at the cecum
- Due to this location, a true lipoma of the ileocecal valve region/cecum should be differentiated from the far more frequent lipomatosis of the valve
- In a true lipoma, the fat is encapsulated, which causes a well-defined mass to protrude from the valve on CT; may have linear soft-tissue stranding at its base
- Lipomatosis of the ileocecal valve demonstrates a more generalized enlargement [18]
- Very uncommonly, lipomas may ulcerate, bleed, or act as a lead point of obstruction/intussusception, especially if they become medium or large
Lipomas of the GI tract

- Small bowel: second most common location for lipomas of the GI tract (20-25%), most commonly within the duodenum [18]; need to distinguish from ingested fat; usually incidental/small, but can act as a leading point for intussusception
- Some lipomas have prominent fibrous septa and nodularity, but this is uncommon [19]
- Patients with malabsorption, particularly celiac disease, ingested fat may reach the small bowel undigested, often mimicking a lipoma(s)
- Unemulsified fat will coat the small bowel and colon, giving an encrusted appearance; distinguishes from lipoma by general nature of the ingested fat adhering along bowel wall
- Much more commonly ingested focal fat adhering to the bowel wall, projecting into the bowel lumen, may contain small pockets of air, distinguishing it from a solid lipoma [20]
- However, when a solid piece of fat is ingested, it may mimic a lipoma on CT [20]

Colonic intussusception due to underlying lipoma

88-year-old woman with incidental gastric lipoma

Transient SB intussusception vs. intussusception with an underlying lead point

- SB intussusceptions relatively frequently occur transiently in adults as is seen on CT; resolve without any intervention
- May occasionally be difficult to differentiate an innocuous transient small bowel intussusception versus one due to a focal lead point
- CT findings of SB intussusception: a target appearance with focal telescoping of bowel; reniform pattern; and sausage pattern, depending on the plane of imaging [42]
- Transient SB intussusception on CT: 1) short soft-tissue density structure extending into bowel lumen; 2) triangular or crescent-shaped area of fat density due to eccentrically-placed mesentery; 3) normal caliber or slight dilation of involved bowel; and 4) normal caliber of proximal loops of small bowel [41]

Transient SB intussusception vs. intussusception with an underlying lead point

- Transient small bowel intussusceptions in adults occur within the jejunum
- This area normally has higher peristaltic activity
- Focal lead point may be the cause of a small bowel intussusception - much less commonly
- Any focal polyp or mass within the small bowel wall may act as a focal point, and can invaginate into the adjacent small bowel, leading to an intussusception [41]
- There is overlap in lengths/diameters of transient intussusception vs. those with a lead point, but look for associated focal mass on CT
- Also look for bowel wall thickening/edema; inflammation of the adjacent fat; heterogeneity of the SB wall

Transient small bowel intussusception
32-year-old man with history of Peutz-Jeghers syndrome

- Two relatively long-segment SB intussusceptions due to hamartomatous polyps

Appendicitis vs. mucocele vs. mucocele with appendicitis

- Mucoceles may be confused for acute appendicitis without an underlying mass
- Mucoceles may lead to appendicitis, and usually present without a known diagnosis of underlying mucocele
- A large inflamed appendix can alternatively be mistaken for a mucocele with or without appendicitis
- May alter the surgical approach if a mucocele is believed to be present (with or without appendicitis) - minimize chances of rupture and development of pseudomyxoma peritonei
- CT findings: low attenuation, encapsulated cystic/ovoid mass, with occasional wall calcifications, arising from the cecum [23]

Scan continued

89-year-old woman with incidental appendiceal mucocele

- Note wall calcification and anterior soft-tissue thickening; no evidence for associated appendicitis

32-year-old woman with a mucocele, a 2 cm lith, and appendicitis

Appendicitis vs. mucocele vs. mucocele with appendicitis

- Absence of inflammatory changes, including wall thickening and periappendiceal stranding, may help to distinguish between them, although as noted they can coexist
- If appendix is larger than 15 mm in diameter, a neoplasm is more likely, although early/impending perforation from appendicitis may be present without a mucocele [45]
- Mucocele should be considered, especially in middle-aged and older patients [21], and particularly if the appendix is quite large
- CT should be evaluated for findings of tumor spread, including for omental and mesenteric soft-tissue nodules and masses
Incidental appendicolith(s)

- Appendicoliths are commonly identified on CT in conjunction with acute appendicitis, but can be incidentally discovered on CT performed for other reasons.
- An appendicolith is therefore neither sensitive nor specific for acute appendicitis; should not be relied upon exclusively for diagnosis.
- Additional CT findings must be used to diagnose true acute appendicitis.
- An isolated appendicolith or abscess may be present due to a resolved, conservatively treated episode of appendicitis, inspissated material, and/or occasionally an ingested foreign body.
- Need to correlate with patient history and physical examination.
- Incidental appendicoliths are NOT considered an indication for subsequent “prophylactic” appendectomy.

21-year-old man with right flank pain

- Unanticipated appendicitis on non-contrast CT, note appendicolith.

Colonic underdistention vs. true thickening

- Bowel preparation is not performed in the emergency setting, and with oral contrast increasingly not being used, leads to routine inadequate distention of the colon.
- Even when oral contrast agents are used, they often do not reach the large bowel, especially distally, leading to areas of underdistended colon [26].
- This can lead a radiologist to falsely diagnose a portion of underdistended, collapsed bowel as a segment of bowel wall thickening, or the reverse, leading to missing a true focal abnormality.
- When the large bowel is collapsed, the wall can measure up to 5 mm, compared to the normal measurement of 1-2 mm when well distended [8].
- True bowel wall thickening can be caused by a number of etiologies, and should be inspected for features which help confirm the diagnosis and then potentially narrow the differential diagnosis.
- The length of apparent involvement, the extent of apparent thickening, symmetric or lack of symmetric involvement, attenuation pattern, and pericolonic inflammation, should all be considered [27].

54-year-old woman with abdominal pain

- Prominent transverse colonic haustra, and questionable colitis, on CT with oral contrast only.

Colonic underdistention vs. true thickening

- Fecal contents, fluid, redundant tissue, and underdistention can make measuring the true thickness very difficult on CT.
- Important to accurately diagnose or exclude true bowel thickening, and/or the presence of malignancy.
- Degree of colonic wall thickening on CT should be determined: benign causes usually produce focal thickening < 2 cm, vs. focal wall thickening greater than > 3 cm is usually due to malignancy, but this can be variable [27].
- Follow-up imaging (e.g., CT with bowel preparation/oral contrast/rectal contrast/CT colonography) or optical colonscopy is needed to exclude true bowel wall thickening.

Colitis on non-contrast CT

- Although the colon is collapsed, note the submucosal edema, and the pericolonic edema.
Colitis on CT – collapsed colon

- Initial CT (left) shows constipation
- 3 days later – patient has worsening abdominal pain following bowel preparation for optical colonoscopy, and undergoes repeat CT (right) - c/w cathartic colitis

Colonic underdistention vs. true thickening

- When bowel is inadequately distended, diffuse colon collapse can make it difficult to assess for mild colitis – a VERY common potential pitfall
- Becomes important to assess extraluminal aspects of the abdomen for subtle clues, although it may be difficult if not impossible to diagnose or exclude mild colitis; correlate with history (diarrhea, elevated serum WBC)
- Mesenteric fat stranding and dilated mesenteric vessels should be evaluated on CT - points to colitis, although can have the latter in colonic diverticulosis and in chronic colitis [40]
- Without IV contrast, the target sign may be absent or subtler in a patient who has colitis

Colitis vs. diverticulitis

- A common problem on CT is the differentiation of long-segment diverticulitis versus regional colitis
- Initial management is similar if uncomplicated, but management may differ in the longer term
- Inflamed diverticulum or diverticula are frequently present on CT, other patients may have focal regional colitis with incidental adjacent diverticulosis
- Colitis tends to demonstrate a greater degree of bowel wall thickening compared to fat stranding

Colitis vs. diverticulitis

- In colonic diverticulitis, the opposite is true
- Pericolic fat stranding is disproportionate to the degree of bowel wall thickening [48]
- Mesenteric vessels may be engorged due to hypoxemia in diverticulitis, but can occur in both conditions, and, as noted, in diverticulosis without diverticulitis
- Abscess and/or fistula formation further point to diverticulitis, but Crohn disease can present similarly [34]
- In addition, diverticulitis tends to involve a shorter segment of colon as compared to the various forms of colitis, although this is somewhat variable [35]

82-year-old woman with descending diverticulitis

- There is also a right-sided colonic malignancy – previously unknown

Colonic diverticulitis vs. neoplasm

- CT of colonic diverticulitis (typically sigmoid/descending colon): involved segment longer than 10 cm, sloping transition zone, wall thickness < 1 cm, fluid within the colonic mesentery, mesenteric vascular engorgement, and absence of enlarged pericolic lymph nodes [32]
- Pericolic inflammation with a phlegmon or abscess strongly favors diverticulitis
- Smooth thickening of the root of the sigmoid mesentery favors diverticulitis
- An underlying tumor may be difficult to exclude on CT, however, and may be causing inflammatory changes (e.g. local vascular stasis, localized ischemia, perforation, and secondary infection) with concurrent, incidental diverticulosis not directly related to the tumor, which can be confused with primary diverticulitis without neoplasm
42-year-old woman with previous renal colic, with new left flank pain: sigmoid diverticulitis

- No obvious underlying neoplasm

Colonic diverticulitis vs. neoplasm

- With colonic diverticulitis, muscular hypertrophy may also cause a thickened segment of colon, which should be differentiated from true thickening due to a neoplastic process
- CT features which indicate colon cancer include a focal concentric mass with enlarged pericolonic lymph nodes [33]
- Patients should be referred to undergo optical colonoscopy or CT colonography if the CT findings are believed to be equivocal and/or when clinician and/or radiologist suspicion is high for a neoplastic process
- Distinction between a benign and malignant process can be difficult on the basis of a "routine" CT alone

Polyp/mass vs. stool

- Differentiating between stool and a polyp or mass is important but is often difficult without oral contrast or bowel preparation
- Even with oral contrast present, can still be difficult
- Stool can commonly both simulate as well as obscure colonic abnormalities
- Residual fecal material may take shape as a round, oval, or lobulated configuration, and may be mistaken for a polyp on CT, and can hide even large masses

87-year-old man with an incidental very large sigmoid colonic mass

- Proved to be a villous tumor with frank areas of carcinoma

Incidental colon cancer (left) and polyps (center and right) detected prospectively by radiologists in my practice on ‘routine’ A/P CT

Polyp/mass vs. stool

- Most stool does not closely adhere to the bowel wall and will change in position if the patient is moved from supine to prone position and reimaged
- However, retained stool may not contain any gas, and/or may not move in some patients on CT, simulating a polyp or mass [49]
- Most importantly, the colon should be examined with abdominal and lung windows in the axial and coronal planes on EVERY adult who undergoes CT, regardless of the indication
- Although certainly uncommon, my colleagues and I have correctly identified multiple incidental colonic polyps and masses, and we have also seen multiple colonic polyps and masses which were identifiable in retrospect, but which were not seen prospectively
True colonic pneumatosis

- The presence of mucosal separation due to bowel wall gas is crucial in diagnosing true pneumatosis, and is depicted on CT as a thin curvilinear line
- Pseudopneumatosis tends to display an irregular gas pattern, and does not extend beyond the superior border of an intra-luminal air-fluid level
- Additional CT with patient repositioning or a very short-term interval CT follow-up may be very useful, as bowel gas should remain in place with true pneumatosis, but may dissipate with pseudopneumatosis [39]

Pneumatosis vs. ‘pseudopneumatosis’

- True pneumatosis in general is concerning for bowel ischemia, although there is a broad differential diagnosis [36]
- However, “pseudopneumatosis” may simulate true pneumatosis, i.e. gas trapped in the lumen, but not the wall, of the large and/or small bowel
- When evaluating for true vs. “pseudopneumatosis” intestinalis, examine CT for extension of gas into the portal and mesenteric veins (in particular), mesenteric stranding, and ascites
- These latter findings point to true pneumatosis due to bowel ischemia [37]
- Bowel wall thickening, vascular occlusion, and bowel obstruction or other etiologies also need to be evaluated for

Pneumatosis vs. ‘pseudopneumatosis’

- While true gas within the bowel wall is a potential emergency, pseudopneumatosis may be present which mimics true pneumatosis
- Typically, pseudopneumatosis presents as pockets of gas on CT along the dependent portion of bowel between stool and the bowel wall
- Occasionally, the gas may extend along the non-dependent segment, further clouding differentiation between these two possibilities [38]

Conclusion

- Patients with acute abdominal and/or pelvic pain often undergo “routine” CT of the abdomen and pelvis for a workup of an acute abdomen, and in other circumstances
- The absence of oral contrast for these examinations, which is increasingly the case, combined with the absence of any bowel preparation, and especially in the emergency setting, leads to underdistention of the luminal GI tract, causing difficulty in assessment for the radiologist
- Fortunately, assessing both luminal and extraluminal findings can otherwise help distinguish between normal anatomy and abnormal and potentially missed entities, even when the bowel is collapsed, although definite assessment may not be possible
Conclusion

• Additionally, repositioning the patient, and interval re-imaging may help to evaluate some potential pitfalls.

• It is important to be familiar with the commonly encountered underdistended GI tract on CT, and how to handle interpretation and patient management.

• Thank you for your attention!

References


