

RLQ Abdominal Pain

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QUESTION 1

- A primary appendiceal neoplasm underlying acute appendicitis would be suggested by which imaging finding?
- A. A dilated appendix.
- B. An appendiceal soft-tissue mass.
- C. Inflammation surrounding the appendix.
- D. Calcifications in the appendix.
- E. Free air in the peritoneum.

QUESTION 2

- Which is the most likely explanation for right hydronephrosis and right hydroureter that occur in the setting of acute appendicitis with perforation and abscess formation?
- A. Right ureteral obstruction caused by an intraluminal lesion.
- B. Concurrent pyelonephritis involving the right kidney.
- C. Underlying mucinous appendiceal tumor with direct engulfment of the ureter.
- D. Extrinsic compression with periureteral inflammation.
- E. Ureteral stone disease, because the incidence of appendicitis is significantly increased in the presence of renal stones.

QUESTION 3

- Which statement is true regarding recurrent appendicitis?
- A. Fewer than 1% of patients who undergo appendectomy for appendicitis will have evidence of previous appendicitis.
- B. CT findings of recurrent appendicitis are indistinguishable from those of acute appendicitis.
- C. The recurrence rate after nonoperative percutaneous drainage for acute appendicitis is less than 5%.
- D. Unrecognized malignancy is found in more than 5% of surgical specimens removed for appendicitis.
- E. The recurrence rate after appendectomy is similar to the recurrence rate after nonoperative percutaneous drainage.

QUESTION 4

- Which gynecologic condition most commonly mimics appendicitis both clinically and on CT?
- A. Uterine leiomyoma.
- B. Endometriosis.
- C. Hemorrhagic ovarian cyst.
- D. Cervical carcinoma.
- E. Adenomyosis.

QUESTION 5

- Which CT finding helps differentiate acute appendicitis from Crohn's disease?
- A. Long-segment thickening of the terminal ileum.
- B. Intraabdominal abscess formation.
- C. Inflammatory stranding in right lower quadrant fat.
- D. Enhancement of the cecal wall.
- E. Free intraperitoneal air.

QUESTION 6

- On CT of the abdomen in a woman with clinically suspected appendicitis, which diagnosis is suggested by a right lower quadrant lesion with a fat-fluid level?
- A. Perforated peptic ulcer.
- B. Ruptured ovarian dermoid.
- C. Acute pancreatitis.
- D. Ovarian torsion.
- E. Ruptured ectopic pregnancy.

QUESTION 7

- An enlarged appendix in the right lower quadrant of the abdomen can be simulated on CT by which condition?
- A. Epiploic appendagitis.
- B. Acute pyelonephritis.
- C. Right-sided diverticulitis.
- D. Pelvic inflammatory disease.
- E. Mesenteric adenitis.

QUESTION 8

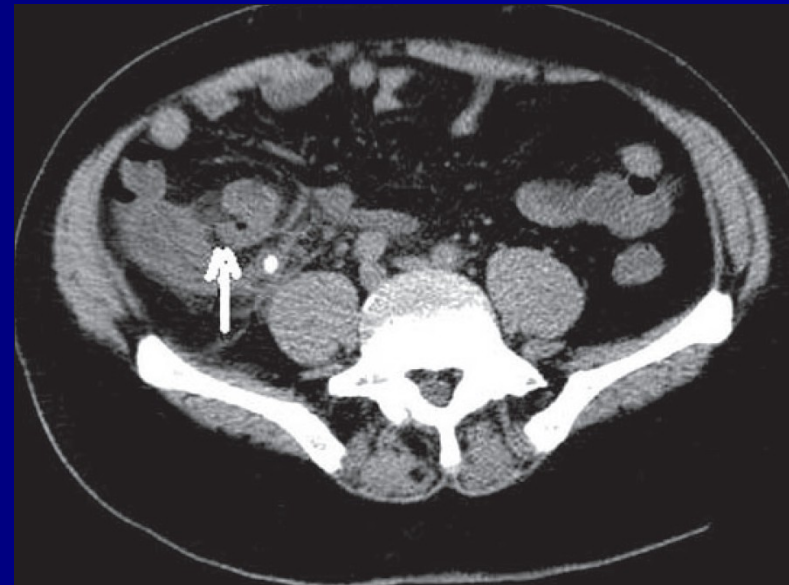
- On CT of the pelvis in a postpartum woman, a dilated tubular structure extending caudad from the inferior vena cava into the pelvis most strongly suggests which diagnosis?
- A. Pelvic inflammatory disease.
- B. Ureteral obstruction.
- C. Crohn's disease.
- D. Typhlitis.
- E. Ovarian vein thrombosis.

QUESTION 9

- In a patient with suspected appendicitis, layered densities of fat and soft tissue inside the bowel lumen on CT of the abdomen suggest which diagnosis?
- A. Intussusception.
- B. Pseudomembranous colitis.
- C. Appendix mucocele.
- D. Cytomegalovirus colitis.
- E. Meckel's diverticulum.

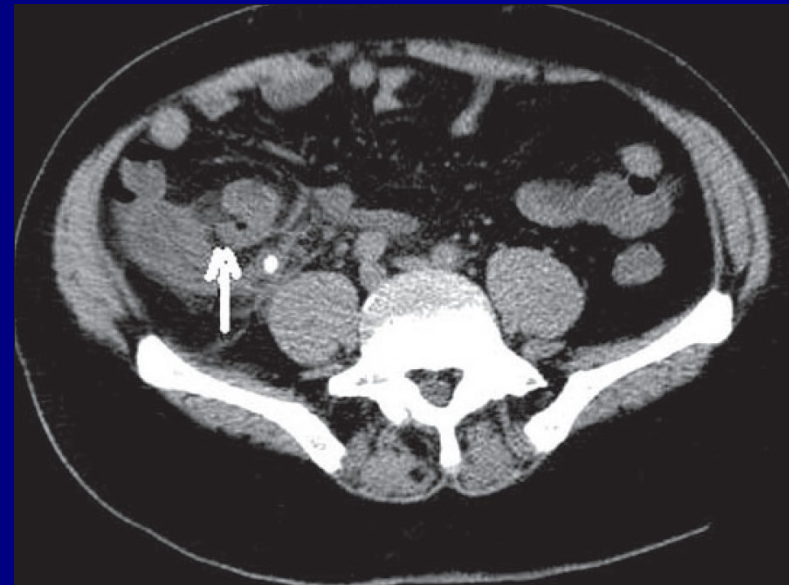
Appendicitis

- On CT, dilated, thick-walled, blind-ending, tubular structure
- with a diameter exceeding 6 mm
- periappendiceal inflammation
- mucosal hyperenhancement
- with or without an appendicolith
- may be thickening of the cecal base or terminal ileum due to contiguous inflammation
- Enlarged mesenteric lymph nodes may be seen in the right lower quadrant



Appendicitis

- Discontinuous wall enhancement or a focal defect in the wall of the inflamed appendix suggest perforation
- Extraluminal air loculi or a loculated fluid collection/abscess may be seen in cases of frank appendiceal perforation
- Can be difficult to diagnose in mild or incipient forms of appendicitis, in which there may be borderline enlargement of the appendix with subtle wall enhancement but without periappendiceal inflammation



Factors Contributing to Confound the Diagnosis of Appendicitis

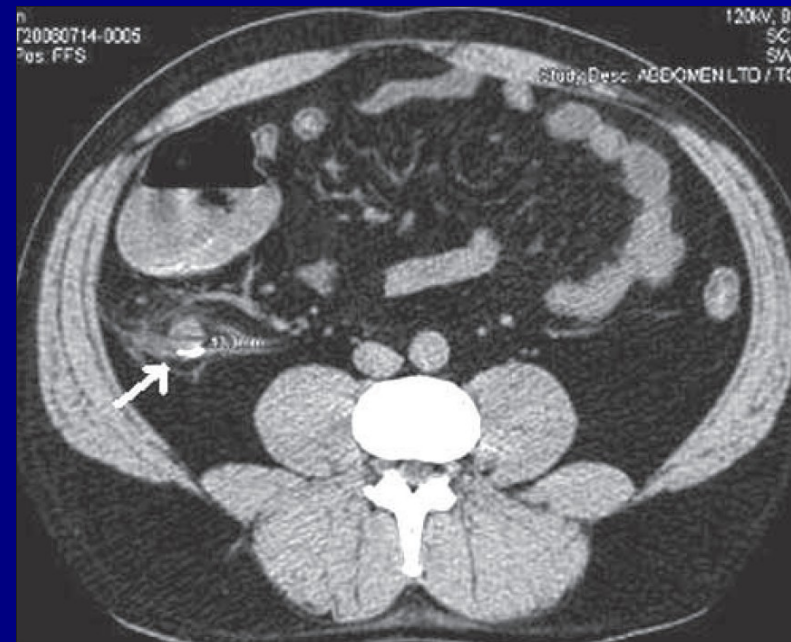
- Anatomic alterations in the location of the appendix:
 - The appendix is most frequently retrocecal in position.
 - In cases of bowel malrotation, the cecum and appendix may be located to the left of the midline.
- Distal appendicitis:
 - Sometimes, the proximal appendix is air-filled and the distal portion is fluid-filled and dilated with focal periappendiceal inflammatory changes
 - Cecal base thickening will be absent in such cases. Therefore, it is necessary to completely trace the appendix from the cecal base to its distal-most portion to make a correct diagnosis.

Factors Contributing to Confound the Diagnosis of Appendicitis

- Paucity of intraabdominal fat
 - Usually, in children and patients with lean body habitus, there is relative paucity of intraabdominal fat
 - may result in nonvisualization of the appendix or of the periappendiceal inflammatory changes.
 - In patients with less body fat, use of oral/rectal contrast is important. The small bowel opacified with oral contrast may help identify a nonopacified distended appendix.
- Small bowel dilatation or abscess formation:
 - In acute appendicitis, there may be small bowel dilatation in the right lower quadrant, which may mimic small bowel obstruction.
 - Therefore, if there is small bowel dilatation in the right lower quadrant without a definite cause of obstruction, the diagnosis of acute appendicitis should be considered.
 - Ruptured appendicitis should be suspected in the presence of extensive inflammatory changes with phlegmon and abscess formation, despite a nonvisualized appendix.

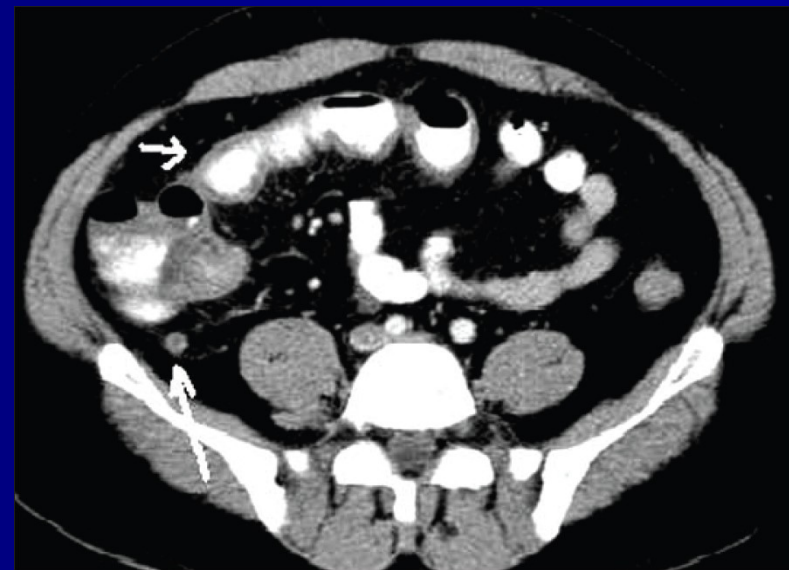
Factors Contributing to Confound the Diagnosis of Appendicitis

- Stump appendicitis:
 - Acute inflammation of the appendiceal stump is a rare complication of appendectomy.
 - With the increasing use of laparoscopic appendectomy, there is an increase in the number of cases of stump appendicitis. A residual stump of greater than 5 cm increases the chances of stump appendicitis.
 - CT features include pericecal inflammation with fat stranding, adjacent to the appendiceal stump
 - In view of this, it is important to understand that a past history of appendectomy does not necessarily exclude the diagnosis of appendicitis.



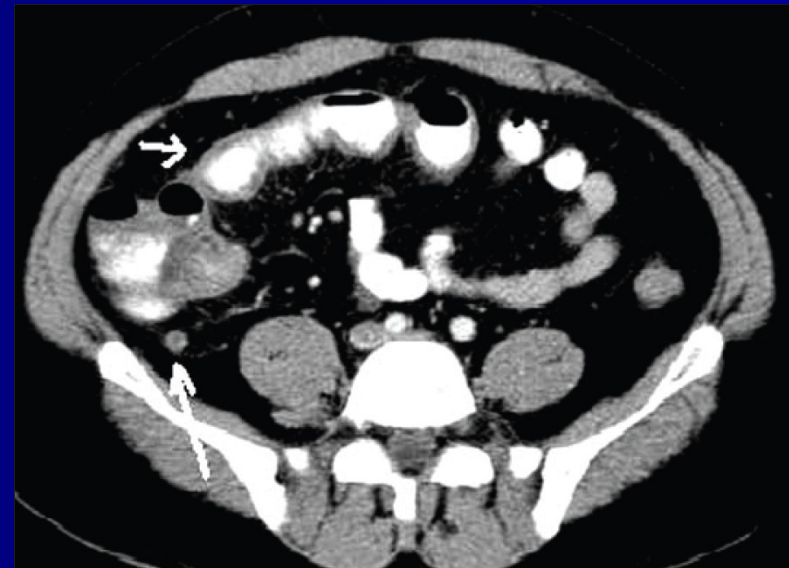
Inflammatory bowel disease

- Crohn's disease is an inflammatory bowel disease, presenting most commonly in the second and third decades of life.
- It commonly involves the terminal ileum and can clinically mimic appendicitis.
- CT findings include bowel wall thickening, increased attenuation of mesenteric fat, skip lesions, mesenteric fibrofatty proliferation (creeping fat), and mesenteric lymphadenopathy



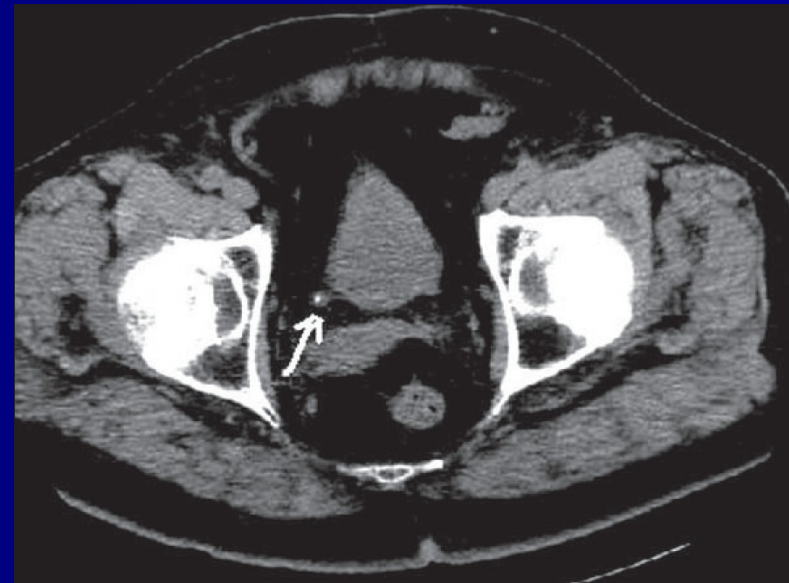
Inflammatory bowel disease

- Abscess and fistula formation are known complications
- The visualization of a normal appendix, the presence of the epicenter of inflammation away from the appendix, with predominant pericecal inflammatory changes and terminal ileal wall thickening are findings that favor a diagnosis of inflammatory bowel disease.



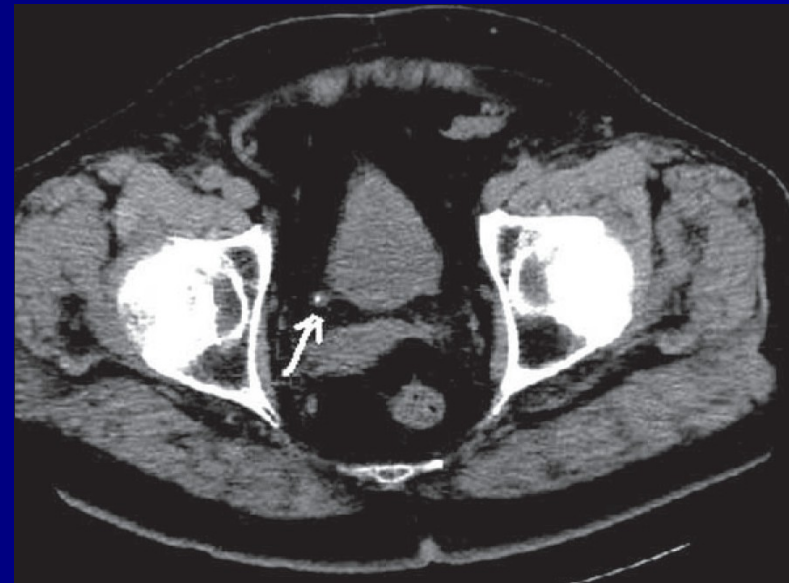
Right ureteral obstruction

- This commonly presents with right flank or lower quadrant pain.
- Ureteral or collecting system dilatation and direct visualization of the stone at the level of obstruction help clinch the diagnosis of ureteral calculus.
- The “soft tissue rim” sign, i.e., the presence of soft tissue density around the ureteral calculus at the site of obstruction, which is secondary to ureteral wall edema is helpful in differentiating a ureteral calculus from a phlebolith.



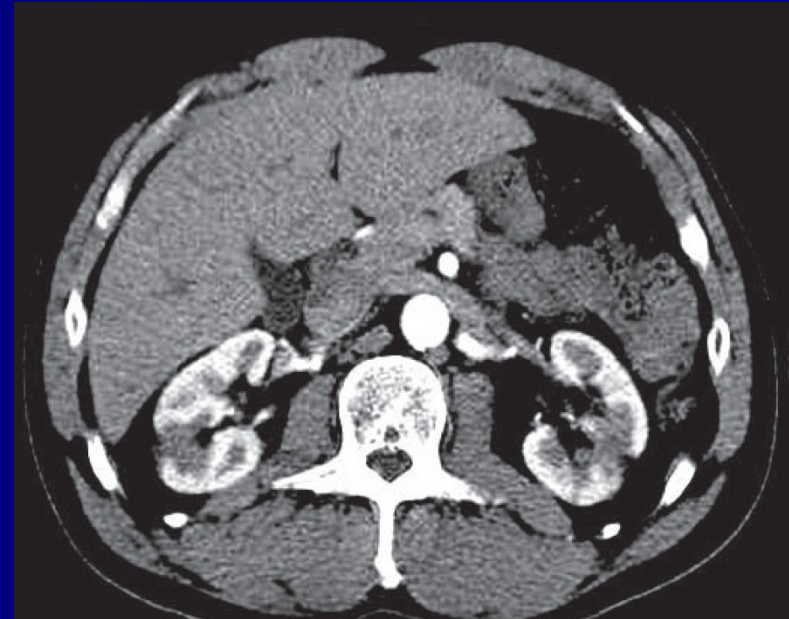
Right ureteral obstruction

- The other secondary signs of ureteral obstruction include perinephric fat stranding, renal enlargement, and reduced attenuation by more than 5 HU as compared to the nonobstructed kidney. This difference in attenuation is related to edema in the obstructed kidney (pale kidney sign).



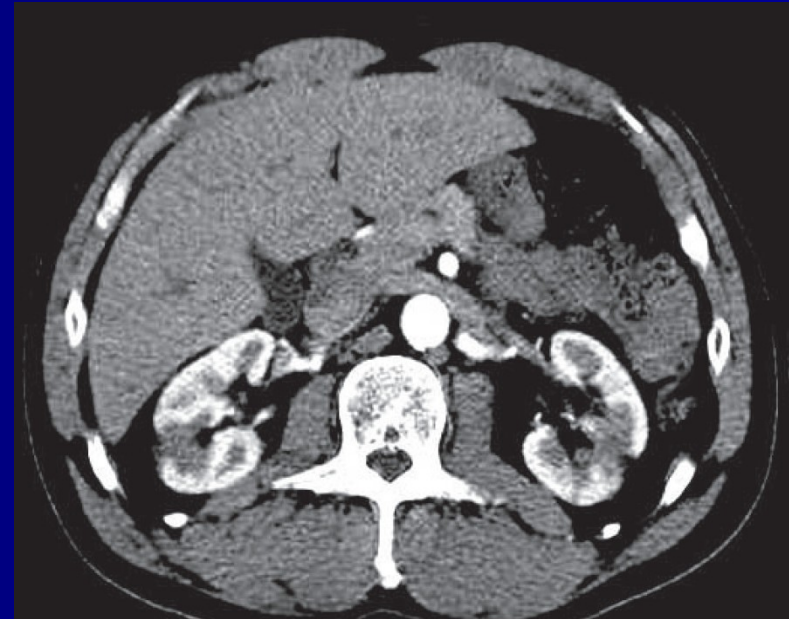
Acute pyelonephritis

- Acute pyelonephritis can present with right flank pain or lower abdominopelvic pain.
- Noncontrast CT may demonstrate normal or enlarged kidneys.
- Perinephric fat stranding and thickening of the renal fascia are seen.



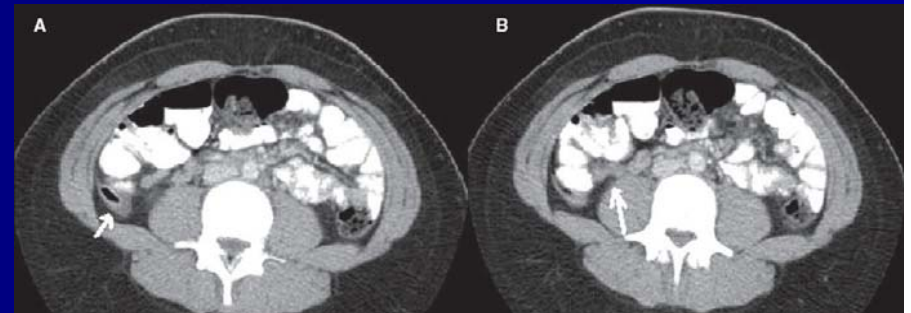
Acute pyelonephritis

- Occasionally, on unenhanced CT, high attenuation areas may be seen, suggesting hemorrhage.
- On contrast-enhanced CT, wedge-shaped areas of decreased parenchymal enhancement, with focal or diffuse renal enlargement
- A striated pattern of alternating linear increased and decreased attenuation in the kidney (striated nephrogram) may also be seen.



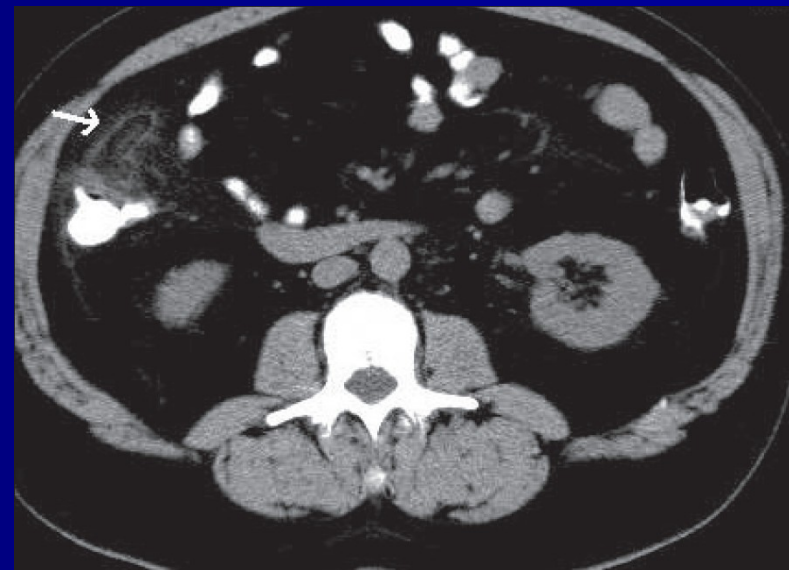
Mesenteric adenitis

- This is a benign infection or inflammation of lymph nodes within the mesentery.
- Its clinical presentation mimics appendicitis.
- Diagnostic criteria are enlarged mesenteric lymph nodes in the right lower quadrant (short axis diameter >5 mm; 3 or more in number) with or without associated ileal or ileocecal wall thickening, in the setting of a normal appendix



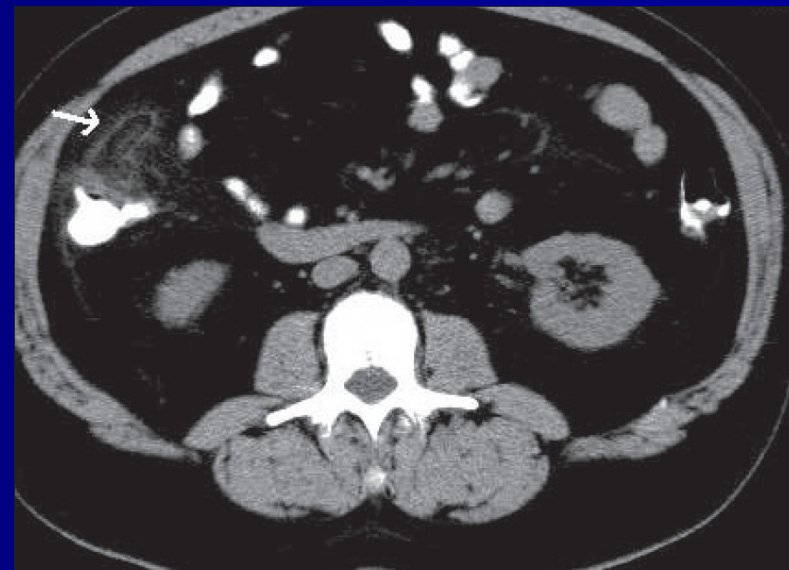
Epiploic appendagitis

- It is a benign self-limiting condition due to spontaneous torsion, inflammation, or venous thrombosis of the draining vein of one of the epiploic appendages of the colon.
- CT demonstrates a pericolonic lesion with fat-attenuation, with a well-defined hyperattenuating rim and associated mild periappendageal fat stranding



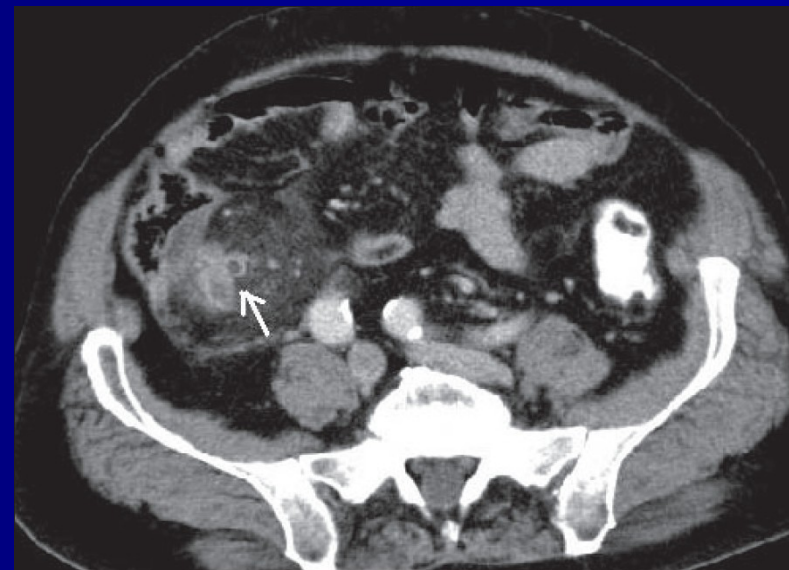
Epiploic appendagitis

- Sometimes there may be focal thickening of the adjacent colon and mild thickening of the adjacent parietal peritoneum.
- Typical CT features of epiploic appendage inflammation and a normal or nonvisualized appendix suggest this diagnosis.



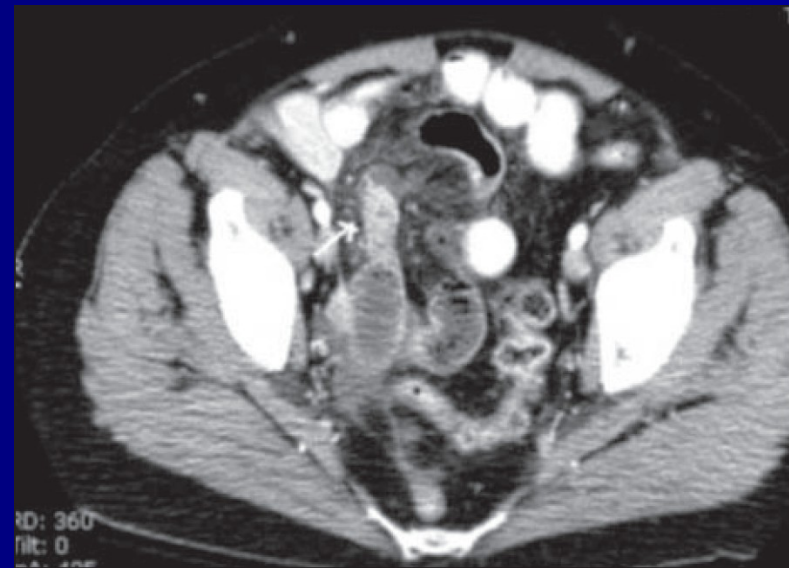
Right-sided diverticulitis

- Diverticular disease is more common in the Western population, 95% involving the left colon and 1-5% the right
- The presence of colonic diverticuli, focal colonic wall thickening, and pericolic inflammation in the setting of a normal appendix, suggest this diagnosis
- Complications of diverticulitis include pericolic abscess, phlegmon formation, and perforation.



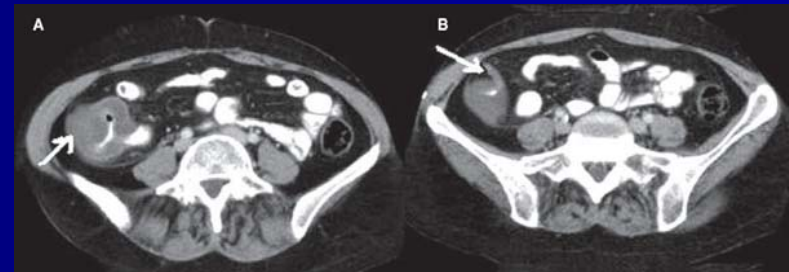
Meckel's diverticulitis

- Meckel's diverticulum arises from the antimesenteric border of the small bowel as a blind-ending tubular structure, containing fluid, air, or particulate material;
- it may be located in the right lower quadrant or near the midline.
- CT findings include an inflamed diverticulum with mural enhancement, thickening, and associated inflammatory changes in the mesentery (the epicenter being more towards the midline) in the setting of a normal appendix.



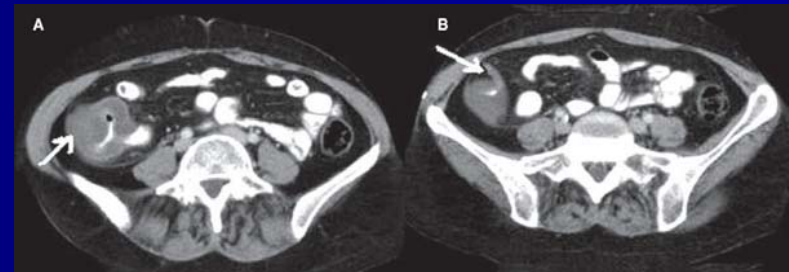
Right-sided colitis

- Inflammatory and infective conditions may involve the right colon and simulate appendicitis.
- However, the extent of colonic wall thickening is much greater than with appendicitis.



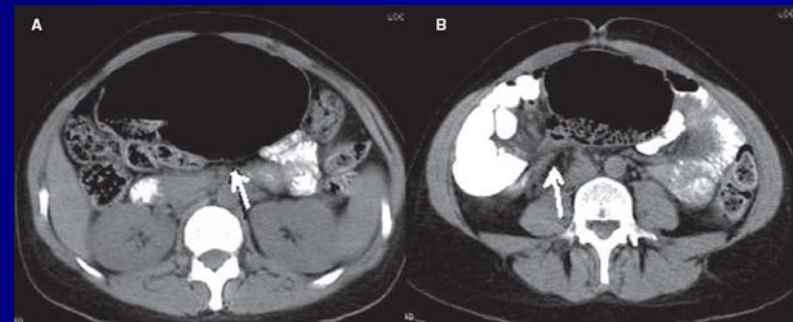
Right-sided colitis

- CT findings include circumferential wall thickening of the colon with adjacent pericolic fat stranding
- Neutropenic typhlitis (ileocecocolitis or neutropenic colitis) is seen in neutropenic patients or patients on immunosuppressive therapy and presents on CT with ileocecal wall thickening, pericolic fat stranding, and pericolic fluid collections, along with pneumatosis coli and intramural abscesses in more advanced cases



Cecal volvulus

- Cecal volvulus accounts for 10% of all large bowel obstruction.
- It commonly occurs in patients with incomplete right colon fixation, which leads to excessive cecal mobility and the potential for vascular compromise.
- CT findings include an abnormally dilated cecum, which is comma or bean-shaped, located most frequently to the left of the abdomen.
- There is associated small bowel obstruction in 50% of cases.



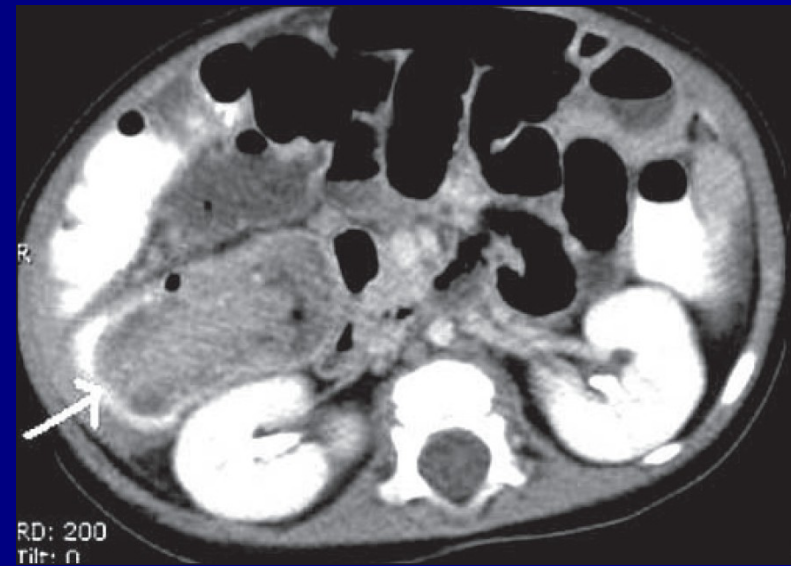
Cecal volvulus

- The 'whirl sign' (whirled configuration of the fatty mesentery and mesenteric vessels at the site of torsion) and 'beak sign' (converging point of afferent and efferent loops of the dilated cecum at the point of torsion, resembling a bird's beak) help diagnose cecal volvulus
- The volvulus may sometimes be associated with signs of vascular compromise, which includes mural thickening, pneumatosis coli, and mesenteric fat stranding



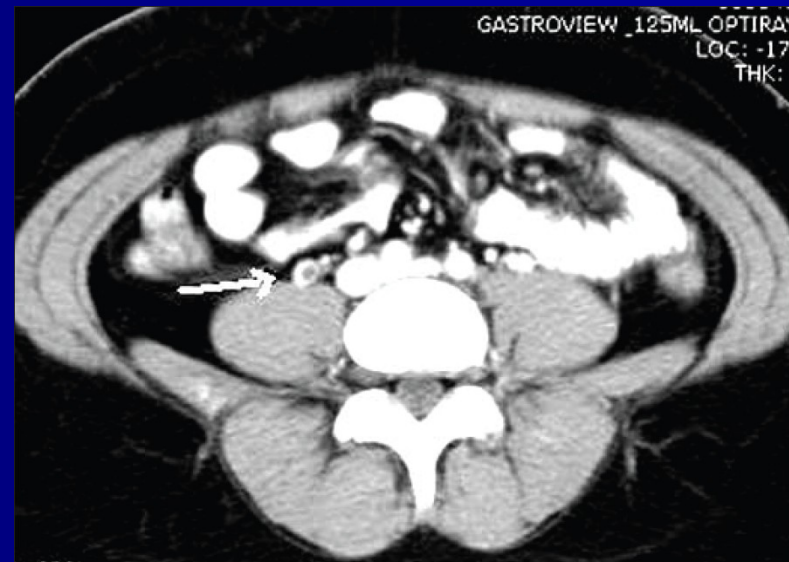
Bowel intussusception

- Intussusception is a condition in which a portion of the bowel invaginates into an adjacent segment of bowel.
- Intussusception is primarily a disease of infants and children and only about 5% of cases occur in adults.
- On CT, intussusception appears as an abnormal target-like mass and may be associated with small bowel obstruction.
- The lead point may or may not be seen. The presence of a 'bowel-in-bowel' configuration, with or without mesenteric fat or vessels, is a diagnostic CT finding



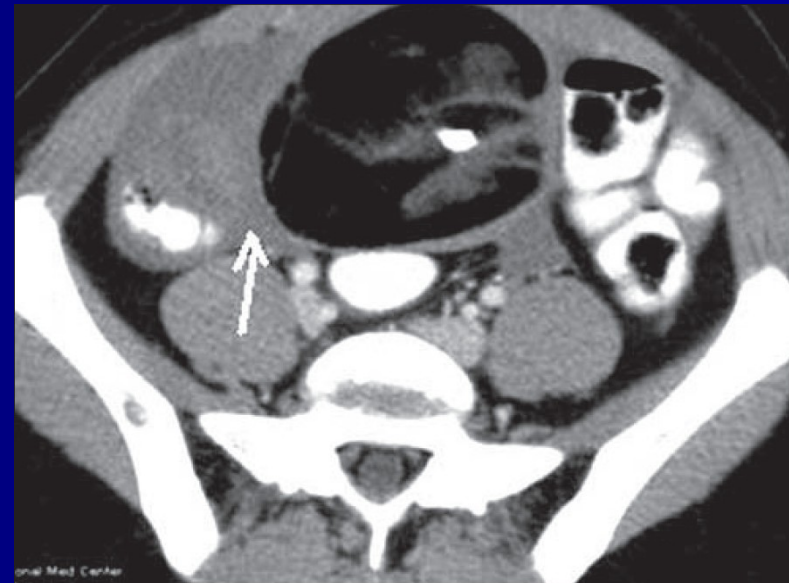
Right ovarian vein thrombosis

- Ovarian vein thrombosis is an uncommon disorder, usually associated with pelvic conditions such as recent childbirth, pelvic inflammatory disease, malignancies, and pelvic surgery.
- The right ovarian vein is involved in almost 90% of cases.
- On contrast-enhanced CT, the ovarian vein is enlarged and demonstrates a central hypodensity which extends from the level of the pelvis to the infrarenal inferior vena cava, with associated perivascular fat stranding



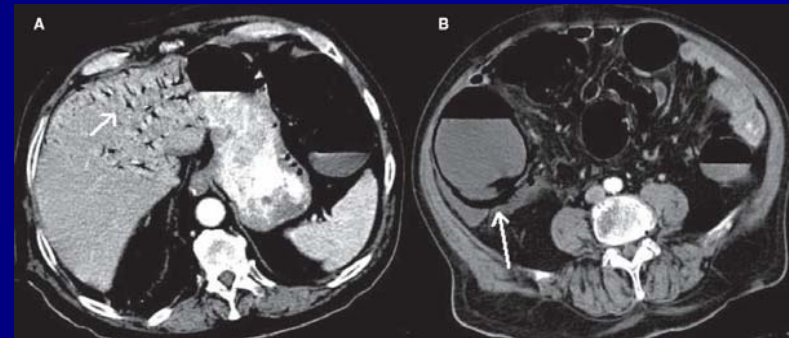
Ovarian mass/cyst

- Complications of ovarian masses and cysts include rupture, torsion, or hemorrhage, all of which usually present as acute lower quadrant pain.
- On CT, the presence of an ovarian mass with areas of fat attenuation, calcification, teeth, or fat-fluid levels confirms the diagnosis of dermoid
- Ectopic pregnancy may present as right lower abdominopelvic pain.
- CT findings include presence of an adnexal mass, enlarged uterus, and hemorrhagic free fluid (in case of rupture). However, this diagnosis is most accurately made on US.



Bowel ischemia

- Bowel ischemia is a common cause of acute abdomen in the elderly population.
- CT findings include bowel wall thickening due to edema or hemorrhage, with lack of enhancement, along with portal venous gas and pneumatosis coli, which indicate infarction
- Pneumoperitoneum may be seen in cases of perforation. Contrast-enhanced CT may demonstrate a thrombus in the involved vessel.



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