

# Inflammatory processes

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Appendicitis Historically , a straightforward clinical diagnosis of appendicitis obviated any need for imaging, but with the proven accuracy of available modalities imaging has become increasingly popular to reduce negative appendectomy rates and to George Kenneth Mallory , 1900–1986, Professor of Pathology , Boston University , Boston, MA, USA. Soma Weiss , 1898–1942, Professor of Medicine, Harvard University Medical School, Boston, MA, USA. demonstrate a calcified appendicolith in the right iliac fossa, it is insufficiently sensitive or specific to be reliable. In children, who typically have a favourable body habitus, ultrasound is the best test as it reduces radiation exposure. This also applies to females of childbearing age, again to reduce radiation exposure, but also because the symptoms may be mimicked by gynaecological pathology , such as ectopic pregnancy , haemorrhagic ovarian cyst and tubo-ovarian abscess, all diagnoses that are best made with ultrasound. The definitive exclusion of appendicitis, however, hinges on the identification of a normal appendix, measuring less than 6 mm in diameter . Retrocaecal appendicitis can readily escape detection with ultrasound, and thus CT is the next modality of choice; indeed, frequently it is the first requested in most adults ( Figure 8.39 ). The diagnosis of appendicitis on CT requires the identification of a thickened appendix (>7 mm), with periappendiceal inflammatory change as evidenced by stranding in the surrounding fat. Other signs that may be sought include free fluid, thickening of the caecal pole, possible localised small bowel ileus and right iliac fossa lymphadenopathy . Both CT and ultrasound can also identify collections if an inflamed appendix ruptures, and can be used to guide percutaneous drainage as a bridge to definitive surgery .

Figure 8.39 Acute appendicitis. Contrast-enhanced computed tomography scan reconstructed in the coronal plane demonstrates a thickened appendix in the right iliac fossa (arrow) with inflammatory changes in the surrounding fat and reactive thickening of the caecal pole.

Inflammation of an obstructed diverticulum typically presents with left iliac fossa pain and pyrexia ( Figure 8.40 ). While some authors have promoted the use of focused ultrasound for this indication, in general it is best diagnosed with a CT scan. The typical CT appearance is of pericolic inflammatory change around a diverticulum, most commonly in the sigmoid colon. Complications of diverticulitis include perforation, abscess formation, fistulation to adjacent structures and strictures in the bowel. CT is also the modality of choice to identify these; as with appendicitis, it can be used to guide percutaneous abscess drainage as a bridge to definitive surgery .

Inflammatory bowel disease The diagnosis of inflammatory bowel disease is made histologically . Radiologically , the diagnosis and monitoring of inflammatory bowel disease has changed significantly in recent years. Previously a barium study of the small bowel, either a follow-through (where barium is ingested orally) or enteroclysis (where dilute barium is infused via a nasojejunal tube) was used as a screening tool if symptoms are vague. If the diagnosis of Crohn's disease is established, barium studies can still be useful to demonstrate the extent of disease, particularly to

demonstrate the length and number of strictures if surgery is planned. Increasingly, however, the role of barium studies has been superseded by cross-sectional imaging, particularly MRI enterography, which entails an abdominopelvic MRI scan.

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distend the small bowel. The other obvious advantage of MRI is the lack of radiation, which is particularly relevant in young patients with Crohn’s disease, who often undergo multiple imaging studies over their lifetime; for this reason it is gaining in popularity for inflammatory bowel disease follow-up. An acute flare-up may also require imaging, and an ultrasound is usually a good first test to look for dilated bowel loops and any abscess, though CT may ultimately be required as gas-filled bowel loops can obscure visualisation of an abscess on ultrasound. MRI is the imaging modality of choice to assess perianal fistulae and abscesses.

**Acute pancreatitis** As with acute appendicitis, when the diagnosis is straightforward clinically there may be no need for imaging, though increasingly it is used to confirm the diagnosis, to assess the severity of the process and to look for complications. While ultrasound may show gallstones and can demonstrate an enlarged pancreas with peripancreatic fluid and inflammatory changes, the optimal modality is CT. CT performed too early in the course of the attack, e.g. in the first 12 hours, can be equivocal and the optimal timing of imaging is 48–72 hours. In mild acute pancreatitis, CT may be normal or may show an enlarged oedematous gland, but in more severe attacks other findings which should be sought include peripancreatic fluid collections, vascular complications such as arterial pseudoaneurysm formation or venous thrombosis and necrosis, either of the gland itself or of the surrounding fat. Necrosis typically develops 48–72 hours after the onset of symptoms and is manifest on CT as lack of enhancement of the necrotic areas. CT with intravenous contrast is therefore essential to look for necrosis, which is potentially catastrophic, particularly if it becomes infected. While CT is not always reliable to diagnose infected necrosis, it is suggested by bubbles of air in the necrotic segment. As with other intra-abdominal inflammatory processes, either ultrasound or more usually CT can be used to guide percutaneous drainage of inflammatory fluid collections.

**Acute cholecystitis/biliary colic/jaundice** While acute cholecystitis is usually due to mechanical obstruction of the cystic duct or gallbladder neck by a gallstone, acute acalculous cholecystitis can occur in critically ill patients from a number of causes. In any case ultrasound is the modality of choice should this diagnosis be suspected, and the classic diagnostic features are of gallbladder distension with wall thickening ( $>3$  mm). A gallstone obstructing the gallbladder neck or cystic duct may be visualised; alternatively, in acalculous cholecystitis sludge may be seen layering in the gallbladder lumen. Associated signs include pericholecystic fluid and hyperaemia on Doppler examination. Ultrasonographic Murphy’s sign refers to tenderness over the gallbladder when

Figure 8.40 Coronal computed tomography reformatted images showing a diverticular perforation. There is stranding around the sigmoid colon with an extraluminal track of gas (arrow). Because of surrounding inflammatory changes diverticular perforation usually leads to pericolic localised gas collections rather than generalised pneumoperitoneum.

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