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The Role of Magnetic Resonance Enterography in the Evaluation of Non-Crohn's Pathologies

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In the young patient population, magnetic resonance enterography is fast becoming a preferred imaging tool for the investigation of patients with non–Crohn's small bowel and mesenteric pathologies. Its advantages include lack of ionizing radiation and high-contrast resolution. This review discusses the range of small bowel and mesenteric pathologies that can be easily demonstrated with this technique.
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Introduction

Magnetic resonance enterography (MRE) is well recognized as the imaging technique of choice in the evaluation of patients with small bowel involvement in Crohn's disease.[1] In the past few years, its role has been extended, with increasing use of MRE in the diagnosis and assessment of non–Crohn's small bowel pathologies.[2] The advantages of MRE over other cross-sectional imaging techniques include the lack of ionizing radiation and better contrast resolution. The supplementary use of diffusion-weighted magnetic resonance imaging (MRI) can also help identify areas of restricted diffusion where inflammation or tumor is suspected.

From our extensive archive of MRE cases (>2500), we present a spectrum of non–Crohn's small bowel and mesenteric pathologies. Our MRE protocol has already been outlined in the earlier article in this issue on MRI in Crohn's disease.

Congenital Abnormalities of the Small Bowel

Malrotation

Malrotation of the small bowel is a type of congenital rotation and fixation anomaly with an incidence of approximately 1 in 500 live births. About 80% of the patients present with acute midgut volvulus in the first month of life resulting in a potentially life-threatening small bowel obstruction.[3] When found in the adult population, it is usually an incidental radiological diagnosis, although chronic symptoms of intermittent abdominal pain or vomiting may be present. Rarely, an adult may present with frank midgut volvulus.

MR appearances of malrotation (Fig. 1) include an abnormally positioned duodenojejunal flexure, right-sided small bowel and left-sided colon positioning, reversal of the normal superior mesenteric artery and superior mesenteric vein relationship (superior mesenteric artery lies to right of superior mesenteric vein), and aplasia of the uncinate process.[4]

Acute Inflammatory Conditions of the Bowel and Mesentery

Appendicitis

Acute appendicitis is the most common surgical emergency, and whereas conventionally a clinical diagnosis, relatively high rates of negative appendectomy (15%-25%)[5] have resulted in an increasing reliance on imaging. Although abdominal ultrasound (for pediatric and young female population) and computed tomography (CT) have been the imaging techniques traditionally used, MRE is a viable effective alternative. Its role in evaluating appendicitis during pregnancy (where ultrasound can be more challenging and CT is contraindicated) and in the pediatric population is evolving fast.[6] In pregnant patients, intravenous contrast is, however, contraindicated (as it can cross the placenta with unknown effects on the fetus) and

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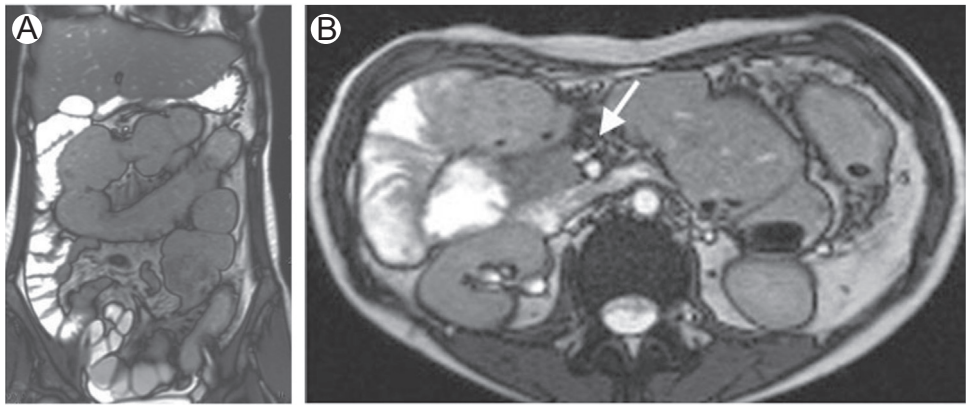

Figure 1 Example of malrotation: (A) coronal true FISP showing large bowel on the left and small bowel on the right side of the abdomen; (B) axial true FISP showing the SMV (arrow) lying anterior to the SMA rather than to the right of it. The duodenum just reaches the midline. FISP, fast imaging with steady-state precession; SMA, superior mesenteric artery; SMV, superior mesenteric vein.

ideally MRI should not be performed in the first trimester because of potential teratogenic effects.

MR features of appendicitis (Fig. 2) are essentially the same as those found in CT and include mural thickening (with the inflamed appendix measuring greater than 7 mm in diameter), mucosal hyperenhancement, and adjacent mesenteric fat stranding. Free fluid or abscess collections can be easily identified. The detection of extraluminal gas in the context of localized perforation is more challenging on MRI when compared to CT. However, the presence of an associated abscess collection or small foci of extraluminal signal void is suggestive of this.

Ileocecal Tuberculosis

Tuberculosis (TB) can affect any part of the gastrointestinal (GI) tract, with the ileocecal junction being the most common location.[7] TB bacteria reach the GI tract via haematogenous spread, ingestion of infected sputum, or direct spread from infected contiguous lymph nodes. MR features (Fig. 3A) include asymmetric thickening of the ileocecal valve and medial wall of the cecum, with contraction of the cecum, extension to the terminal ileum, and ileocecal mural hyperenhancement. The appearance of lymphadenopathy is variable; however, involved lymph nodes typically demonstrate necrosis (Fig. 3B) with characteristic central T2 hyperintensity and T1 hypointensity.[7,8] The presence of caseating nodes in the context of ileocecal TB is an important feature that helps to distinguish this from ileocecal Crohn's disease. Peritoneal TB may also be present, appearing either as ascites (wet type), adhesions (dry type), or omental thickening with loculated ascites (fibrotic type).

Mesenteric Inflammatory Pseudotumor

Pseudotumors are rare, benign lesions of unknown etiology that most frequently occur in the lungs and orbits, but can involve practically any part of the body. The mesentery and GI tract can uncommonly be affected. Pseudotumors consist of localized polypoid masses composed of inflamed fibrous and granulation tissue. Clinical presentation can include weight loss and fevers as well as complications such as intussusception

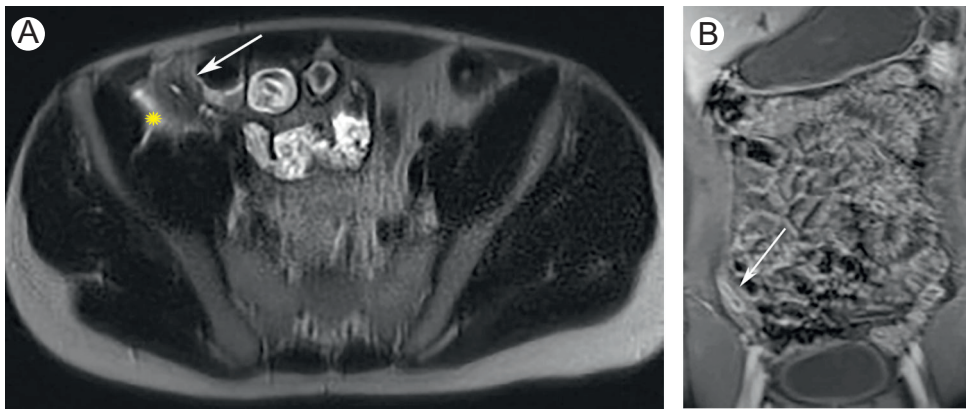

Figure 2 Example of acute appendicitis. (A) Axial Half-Fourier Acquisition Single-Shot Turbo Spin-Echo (HASTE) image showing a thickened appendix (arrow) in the right iliac fossa with a small trace of free fluid (*); (B) coronal T1 fat saturated (FS) postcontrast image showing the thickened enhancing appendix (arrow).