Magnetic resonance imaging in acute appendicitis
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Chapter 8

Epiploic appendagitis: MR appearance

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Abstract

Epiploic appendices are pedunculated adipose protrusions from the serosal surface of the colon. An epiploic appendix may undergo infarction followed by secondary inflammatory changes, a process which has been named epiploic appendagitis. Presenting symptoms are non-specific, leading to a presumed clinical diagnosis of diverticulitis or appendicitis in most cases [1].

Misdiagnosis may result in unwarranted surgical procedures and hospitalization, as epiploic appendagitis is a self-limiting disease [2, 3]. Ultrasound (US) and computed tomography (CT) are capable of a reliable diagnosis of epiploic appendagitis [2-4]. This is the first report of the magnetic resonance (MR) imaging features of epiploic appendagitis, in two patients.
CASE REPORTS

Case 1

A 47-year-old man presented with a 2-day history of localized left lower quadrant pain. He denied any other symptoms, and there was no fever. The erythrocyte sedimentation rate was mildly elevated (29mm/h) and the leucocyte count was 9.3 x 10^9/L. The clinical symptoms were suspect for sigmoid diverticulitis and the patient was referred for US.

Sonographically (Fig. 1a), at the spot of maximum tenderness, a hyperechoic non-compressible mass was detected adjacent to the sigmoid colon. The mass also contained some hypoechoic areas. The colonic wall appeared normal without any diverticula, and no other abnormalities were found.

Because the diagnosis was uncertain, a CT was performed (Fig. 1b) which depicted the mass found on US as a small area of inflamed paracolic fat. The lesion contained a subtle ovoid dense ring corresponding to the hypoechoic changes. The adjacent sigmoid colon was normal with no nearby diverticulum. The diagnosis of epiploic appendagitis was made.

For research purposes, MR (1.0T Magneton, Harmony;Siemens, Erlangen, Germany) was performed with informed consent. On T1-weighted imaging (Fig. 1c) the lesion was seen as an ovoid mass of fat intensity, surrounded by a hypointense rim corresponding to the oval dense ring on CT. The lesion was barely depicted on T2-weighted images without fat suppression (Fig. 1d), but was clearly shown on fat suppressed T2-weighted images (Fig. 1e) as a dark mass outlined by hyperintensity suggesting oedematous changes.

Receiving some analgesics only, symptoms completely disappeared within 6 days.
**Fig. 1**  (a) Axial sonogram of the left lower abdomen of Case 1. At the spot of maximum tenderness, hyperechoic noncompressible fat is found (arrowheads) adjacent to the sigmoid colon.  
(b) Axial CT (10mm collimation) depicts a small area of paracolic fat stranding (arrowhead), containing an ovoid dense ring. There are no nearby diverticula.  
(c) Axial T1-weighted GRE fast low-angle shot (FLASH; TR/TE 133/5,5, flip angle 75°) image shows the lesion as being of fat intensity, surrounded by an ovoid hypointense rim (arrowhead).  
(d) Axial T2-weighted turbo SE (TR/TE 3300/108) image without fat suppression barely depicts the lesion (arrowhead).  
(e) Axial T2-weighted fat suppressed turbo SE (TR/TE 3360/108) image demonstrates the lesion as a hypointense mass (arrowhead) with intermediate intensity lining, outlined by hyperintense oedematous changes.
Case 2

A 25-year-old man presented with clinical features of sigmoid diverticulitis. The laboratory data were normal. A CT was performed (Fig. 2a) revealing fat stranding in the left lower abdomen containing a paracolic ovoid ring, similar to the findings in case 1 and characteristic of epiploic appendagitis.

Subsequently MR was performed with informed consent. The lesion displayed the same MR features as in Case 1, appearing as an ovoid mass defined by a hypointense rim on T1-weighted imaging (Fig. 2b), and depicted on fat suppressed T2-weighted images (Fig. 2c) as low intensity fat outlined by bright oedematous changes.

Symptoms spontaneously resolved in 8 days.

**Fig. 2** (a) Axial CT of Case 1 of the lower abdomen demonstrates left-sided paracolic inflammatory changes containing a slightly hyperattenuating ring (arrowhead) characteristic of epiploic appendagitis. The sigmoid colon appears normal. Note quite extensive local reactive thickening of the parietal peritoneum. On (b) axial T1-weighted and (c) axial T2-weighted fat-suppressed images (same imaging parameters as in Case 1) the lesion displays similar imaging characteristics as in Case 1.
Discussion

Epiploic appendagitis is an uncommon condition, due to either torsion of an epiploic appendix along its narrow pedicle or spontaneous venous thrombosis of its draining vein [5, 6]. It may occur at any age, and usually involves one of the lower quadrants because the sigmoid colon and caecum harbour the largest number of epiploic appendices [6]. Clinically, patients with epiploic appendagitis present with abrupt onset of focal abdominal pain in the absence of other clinical findings. The white blood cell count and the eruthrocyte sedimentation rate are normal or moderately elevated. [5]. These findings are non-specific and do not allow clinical differentiation of epiploic appendagitis from diverticulitis, appendicitis or other more common acute abdominal conditions, leading to clinical misdiagnosis in nearly all cases [1].

Epiploic appendagitis has a benign natural history, with only an exceptional report of a complicated recovery [7]. Spontaneous symptom resolution within 1-2 weeks is the rule in patients with epiploic appendagitis [1-3]. Treatment should consist of reassuring the patient and, if necessary, the administration of analgesics. A correct diagnosis is essential to avoid hospitalization, antibiotic therapy or unnecessary surgery.

In contrast to the clinical diagnosis, the US and CT diagnosis of epiploic appendagitis can be made quite confidently [2-4]. US reveals a hyperechoic non-compressible mass suggesting inflamed fat, fixed to the colon and located at the spot of maximum tenderness. CT is usually required to make a definite diagnosis, displaying a paracolic fatty mass containing soft tissue densities, in the absence of specific CT findings suggesting appendicitis, diverticulitis, or any alternative diagnosis. The lesion often contains a characteristic dense ring on CT, representing the thickened inflamed visceral peritoneum surrounding the infarcted epiploic appendix [3].

Pitfalls in the imaging diagnosis of epiploic appendagitis are inflamed fat
secondary to appendicitis, diverticulitis or other inflammatory diseases in which the underlying condition is overlooked. Omental infarction may closely simulate epiploic appendagitis on US and CT, although in omental infarction the inflamed fatty mass is usually larger and there is no dense ring on CT surrounding the lesion. As both conditions have the same benign natural history the distinction has no practical implications [8]. Other potential errors are peritoneal tumor deposits or teratoma, but the clinical circumstances in these diseases are usually very different.

Until recently epiploic appendagitis was considered to be rare, but due to increasing awareness of its imaging features and liberal use of US and CT it is currently diagnosed more often. Epiploic appendagitis has been reported in 2.3–7.1% of patients clinically suspected of having diverticulitis and in approximately in 1% of patients clinically suspected of having appendicitis [2, 4, 8].

US and CT are the primary imaging techniques for the evaluation of patients with acute abdominal pain. US is inexpensive, quick and easy to perform, but is operator dependent and limited in obese patients. The major disadvantage of CT is the use of ionizing radiation. The radiation dose for an abdominal CT examination is high: a typical dose is in the order of 10mSv, an exposure that carries about the same radiation risk as 500 chest radiographs [9]. This gives rise to the question of possible alternative imaging investigations in patients with abdominal symptoms, especially in children and in women of child-bearing age with equivocal US findings.

MR has been described as a valuable non-ionizing imaging technique for evaluation of patients with suspected acute appendicitis [10, 11], and has recently also been reported as a feasible diagnostic tool in patients with presumed acute diverticulitis [12]. As MR is becoming widely available, it is likely its use will increase for the evaluation of acute abdominal conditions in a selected group of patients. In view of this prospect, the MR features of epiploic appendagitis may be useful, as the disease may simulate nearly any acute abdominal condition depending on the location of the infarcted epiploic appendix. In our two patients, epiploic appendagitis
was well demonstrated on T1- and fat suppressed T2-weighted sequences. The characteristic imaging feature of thickened visceral peritoneum surrounding the epiploic appendix was present on MR also.

This report is limited by the lack of surgical and histologic proof, as it concerns a self-limiting disorder. The diagnosis was made on the basis of CT findings which were consistent with pathologically prove cases from the literature, combined with a follow-up period in which symptoms spontaneously resolved and no alternative diagnosis emerged.

In conclusion, epiploic appendagitis is an uncommon but underdiagnosed benign mimicker of an abdominal surgical emergency, in which MR imaging appears capable of making a correct diagnosis.
References
