

The Fat Halo Sign¹

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Appearance

The fat halo sign is seen on computed tomographic (CT) scans of the abdomen and appears as a thickened bowel wall demonstrating three layers: an inner and an outer layer of soft-tissue attenuation, between which lies a third layer of fatty attenuation (Figs 1, 2) (1–5).

Explanation

The inner layer of soft-tissue attenuation represents the bowel (small and/or large) mucosa, while the layer of low attenuation (–18 to –64 HU) results from widening and fatty infiltration of the submucosa. The outer soft-tissue attenuation layer represents the muscularis propria and serosa (2,4,6–8).

The fat halo sign can be depicted on CT scans obtained without intravenous (IV) contrast material because of the marked differences in tissue attenuation (3). However, the different layers of attenuation can also be appreciated during the late arterial and early portal venous phases of IV contrast enhancement (3,7).

Discussion

The fat halo sign is seen in various diseases of the bowel in which fatty infiltration of the submucosa is present (8). The sign has been described as typically appearing in patients with chronic inflammatory bowel disease (Crohn disease and ulcerative colitis) (1–4,9). Reports of two other uncommon, acute manifestations (cytoreductive therapy and graft vs host disease) that cause the fat halo sign have been published (1,2,5,6).

The most frequent CT finding in chronic inflammatory bowel disease is intestinal wall thickening. In ulcerative colitis, this finding is symmetric and diffuse, whereas patients with Crohn dis-

ease display eccentric and discrete involvement, with affected intestinal regions alternating with spared areas, referred to as “skip areas” (10). Although the fat halo sign can also be seen in a patient undergoing cytoreductive therapy and in graft versus host disease (1), the observation of this sign in the small intestine is, for all intents and purposes, highly diagnostic of Crohn disease and by itself is a sign of a chronic phase. When found in the colon, this sign is associated with the same diseases as those occurring in the small intestine (eg, cytoreductive therapy, graft vs host disease, and Crohn disease). Nonetheless, ulcerative colitis should be included in the differential diagnosis (1,4).

When this sign is seen in both the small and the large bowel, the fat halo sign is considered evidence of Crohn disease. When only the colon is affected, the degree and geographic distribution of bowel wall thickness are signs used to distinguish ulcerative colitis from Crohn disease (3,4,6,7). According to published data, the presence of the fat halo sign has been reported in 61% of patients with ulcerative colitis and in only 8% of patients with Crohn disease (2).

Intramural fat may exist in both the distal ileum and the colon as a normal variant in patients without gastrointestinal symptoms or a history of gastrointestinal disease. The normal intramural fat layer is generally very thin, usually thinner than the fat layer seen with inflammatory bowel disease. Such a normal appearance was noted in 21 (21%) of 100 patients with no history of inflammatory bowel disease; the observation is most frequently made in undistended or poorly-distended bowel loops (1,6).

Low attenuation secondary to the presence of fat within the bowel wall allows, in most cases, differentiation of

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Figure 1

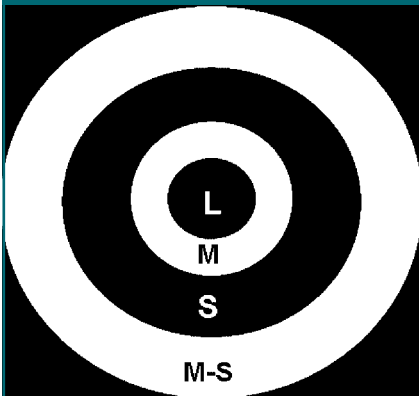


Figure 1: Diagram of the fat halo sign shows the cross-section of bowel wall in benign intestinal disease, with inner mucosal (*M*) and outer muscularis and serosa (*M-S*) layers of soft-tissue attenuation between which is a layer of fatty attenuation (*S*). *L* = lumen.

the fat halo sign from the target sign (1,11).

However, it may occasionally be necessary to measure the attenuation values of the submucosal layer to confirm the presence of values typically found in the fat range (-10 HU) (1,11), in contrast to the clearly positive attenuation values observed in the target sign, and that are secondary to the presence of submucosal intestinal edema (3,10,11).

In conclusion, the fat halo sign may be noted on CT scans of the abdomen and has been described in patients with chronic inflammatory bowel disease.

Figure 2

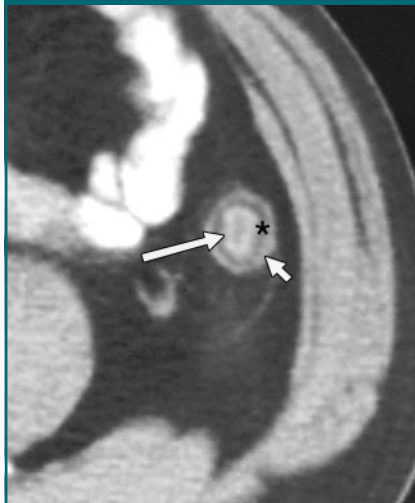


Figure 2: Fat halo sign in ulcerative colitis. Transverse CT scan shows the central fatty submucosal layer of low attenuation (*) surrounded by higher-attenuation inner (long arrow) and outer (short arrow) layers grossly corresponding to the mucosa and muscularis propria and serosa of the descending colon, respectively.

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