# The fat halo sign

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Intramural stratification with deposition of fat in the submucosal layer of the bowel wall, visualised on computed tomographic (CT) scans of the abdomen, is known as the fat halo sign.[1] Owing to infiltration of the submucosa by fat, the inner layer mucosa are separated from the outer layer of muscularis propria/serosa (both being of soft tissue density) by a layer of fat (of low attenuation) measuring between -18 to -64 Hounsfield units.[1-3]

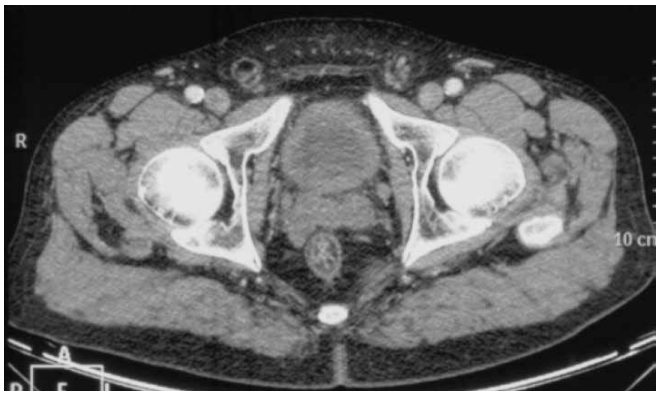


*Fig. 1a. Axial post contrast CT abdomen at the level of the rectum demonstrating the fat halo sign, i.e. the central fatty submucosal layer of low attenuation surrounded by higher attenuation inner and outer layers grossly corresponding to the mucosa and muscularis propria/serosa of the rectum respectively.*


*Fig. 1b. Coronal post contrast CT abdomen of the same patient with oral contrast demonstrates a low-attenuation fat layer in the wall of the caecum, ascending colon and terminal ileum. The patient did not have clinical or radiological features of inflammatory bowel disease, and the fat halo sign was a normal variant.*

Historically, the fat halo sign has been associated with patients suffering from chronic inflammatory bowel disease.[1-3] Less commonly, it has also been associated with cytoreductive therapy, graft-v.-host disease and renal calculi.[1-3] When seen in both the small and large bowel, the fat halo sign has been considered pathognomonic of Crohn's disease.[1,2]

Harisinghani *et al.* conducted a study in 2003 evaluating the presence and frequency of the fat halo sign in patients undergoing abdominal CT for clinical indications unrelated to the gastrointestinal tract.[1] They concluded that 21% of the study population were positive for the fat halo sign, of whom 6 (28%) had renal stone disease and 15 (72%) did not have renal stone disease.[1] The intestinal distribution of the fat halo sign in these patients was the terminal ileum (4%), ascending colon (28%), transverse colon (34%), descending colon (36%), sigmoid colon (14%) and rectum (10%).[1] None of the patients in whom the fat halo sign was demonstrated had previous or current gastro-intestinal symptoms suggestive of inflammatory bowel disease or a history of gastro-intestinal disease.[1-3] This argues the fat halo sign as being a normal variant seen in a certain portion of the population.[1,2] A statistical relationship between the fat halo sign and obesity has also been established.[1]


*Fig. 1c. Axial post contrast CT abdomen of the same patient with oral contrast demonstrates a low-attenuation fat layer in the wall of the caecum and terminal ileum.*

Pitfalls associated with interpretation of the fat halo sign specifically involve intestinal distension. The sign has a tendency to disappear or become less apparent when the bowel lumen is more distended.[1] It is thought that distension of the bowel lumen causes obscuring of the thin fat layer.[1] Therefore, the fat halo sign is best appreciated when the lumen is partially collapsed.[1] Other factors advocating a positive fat halo sign are prone position of the patient, and not using a contrast agent.[1] The constellation of 4 signs that strongly suggests the fat halo sign representing a normal variant, as opposed to inflammatory bowel disease, includes increased prevalence in the collapsed state, decreased prevalence with distension of the bowel lumen either by gravity or gas, disappearance of the fat halo sign with additional distension, and a thin calibre of the fatty layer.[1] The presence of a normal haustral pattern also supports the sign being a normal variant.[1] More commonly, a normal intramural fat layer is seen in the terminal ileum and descending colon.[3] It is generally much thinner than the fat layer seen in inflammatory bowel diseases.[3]

In conclusion: the presence of the fat halo sign may in the absence of clinical and radiological features of inflammatory bowel disease represent a normal finding that may also be related to obesity.

1. Harisinghani MG, Wittenberg J, Lee W, Chen S, Gutierrez AL, Mueller PR. Bowel wall fat halo sign in patients without intestinal disease. AJR 2003;181:781-784.
2. Ahualli J. The fat halo sign. Radiology 2007;242:945-946.
3. Wittenberg J, Harisinghani MG, Jhaveri K, Varghese J, Mueller PR. Algorithmic approach to CT diagnosis of the abnormal bowel wall. Radiographics 2002;22:1093-1109.