CT Enterography in Crohn disease

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Aims and objectives

Crohn disease is a chronic inflammatory bowel disease characterized by transmural and segmental inflammation of the intestinal wall, which involves the small intestine in about 70% of patients. [1,2] As many as 30% of patients with Crohn disease have lesion limited to the small intestine, usually the ileum. [2] Historically, the small bowel examination has some difficulties and the computed tomographic (CT) enterography is an emerging alternative to assess disorders in this area. [3,4,5]

The role of cross-sectional imaging in the diagnosis of Crohn disease has expanded with recent technology advances in CT [6,7], especially with the CT enterography [8]. This technique combines the improved spatial and temporal resolution of multidetector row CT with large volumes of ingested enteric contrast material to permit visualization of the small bowel wall and lumen. [9,10,11,12]

CT enterography helps detect both active and chronic involvement of the small bowel in Crohn disease and it is also useful to identify complications such as suboclusion, fistula and abscess [13]. This technique can demonstrate exactly the diseased bowel wall and extraintestinal complication of Crohn disease, which is important to guide the treatment [14,15,16]. It can also demonstrate the presence or absence of small bowel disease activity and stenosis, which is clinically important. [17,5] Although capsule endoscopy provides better mucosal visualization, it does not allow visualization of abnormalities outside the bowel lumen, and it cannot be used when the presence of obstruction is suspected, [13,18,19] which makes CT enterography a useful method in Crohn disease [20,1,7].

The aim of this study is to describe the use of CT Enterography with polyethylene glycol solution as indicator of active disease, chronic changes and complications of Crohn disease.

Methods and materials

We retrospectively analyzed 13 patients (7 women and 6 men) known to have or suspected of having Crohn disease, aged between 13 and 62 years old, diagnosed with Crohn disease, who needed evaluation of involvement of the small bowel.

Patients undergoing CT enterography were requested to abstain from all food for 6 hours prior to scanning. We administered 1600 ml of polyethylene glycol solution, fractionated into aliquots of 400 ml every 15 minutes, for 1h, with image scanning being performed before and 45 seconds after administration of 1.5 ml/kg of non-ionic iodinated contrast agents. The scanning was performed in 64-channel multidetector row CT scanner.
Images were acquired with a sectional thickness of 2mm and coronal reformatted images were automatically generated.

Mucosal enhancement was considered as asegmental hyperattenuation of distended small bowel loops relative to nearby normal-appearing loops, as described in literature [13].

Two radiologists evaluated the images on high resolution monitors. Disagreement in the interpretation was resolved by consensus after discussion. The observers were blinded to the timeline and the activity of Crohn disease.

**Results**

All patient included in this study ingested all the solution (1600 ml), although the majority of them complained about the flavor and frequency of ingestion. Only three patients (23%) had diarrhea after using it.

Approximately 85% of the patients in analysis (n=11) showed typical findings of small bowel involvement. The findings of active disease (fig. 1-3) identified were: bowel wall thickening associated with (or not) multilayered aspect (n=5), mucosal enhancement (n=2), densification of mesenteric fat (n=1), engorged vasa recta (n=2) and mucosal irregularity (n=2). Regarding chronic changes (fig. 4-6) it was observed: parietal deposition of fat (n=1), stenosis (n=2) and mesenteric fat proliferation (n=2). The main complications (fig. 6-9) detected were intestinal suboclusion (n=7), fistula (n=5) and abscess (n=3). Three patients showed simultaneously both complications, acute and chronic involvement; two showed findings of active disease associated with complications, and one had acute and chronic changes.

**Images for this section:**
Fig. 1: Axial CT enterographic section show small bowel wall thickening associated with multilayered aspect and mucosal enhancement, indicating active disease.
**Fig. 2:** Sagital and Coronal reformatted CT enterographic sections of two different patient show areas of small bowel wall thickening associated with multilayered aspect and mucosal enhancement (arrows and arrows heads) intercalated with normal areas, which is comuns in Crohn disease.

**Fig. 3:** Axial and Coronal reformatted CT enterographic sections of two different patient show engorged vasa recta (arrow head) associated with small bowel wall thickening and mucosal enhancement, indicating active disease.
Fig. 4: Axial CT enterographic section show mesenteric fat proliferation (arrow), indicating chronic disease.
Fig. 5: Axial CT enterographic section show small bowel parietal deposition of fat, indicating chronic disease.
Fig. 6: Oblique reformatted CT enterographic sections show area of stenosis (arrow) associated with intestinal suboclusion (arrow head) indicating chronic disease with complication.
**Fig. 7:** Oblique reformatted CT enterographic sections show entero-enteric fistula in small bowel (arrow and arrow head) associated with wall thickening mucosal enhancement, indicating active disease with complication.
Fig. 8: Axial reformatted CT enterographic section show enterocutaneous fistula arising from distal ileum.
Fig. 9: Axial reformatted CT enterographic section show ano-retal abscess, characterized by hipodense image with peripheral enhancement.
Conclusion

In this study using CT enterography with polyethylene glycol solution to analyze small bowel lesion in 13 patients known to have or suspected of having Crohn disease, the protocol used caused good small bowel distention and proved to be useful to differentiate between active and chronic disease.

Adequate luminal distention of the small bowel is necessary because poorly distended loops can simulate disease or hide pathologic processes. Poorly distended bowel segments may mimic mucosal hyperenhancement or bowel wall thickening and falsely suggest Crohn disease.[13] So a good protocol must cause good distention of the small bowel, especially in the ileum, which is the area most frequently affected.[2]

The use of polyethylene glycol, a neutral oral contrast, was well tolerated, but the majority of the patient complained about the flavor and frequency of ingestion. This fact is in agreement with some studies that say that this is the oral contrast least preferred and most associated with side effects, especially moderate diarrhea. [12] In this study only three patients had diarrhea after using it.

The accuracy and noninvasive nature of CT enterography make it a primary tool in the investigation of Crohn disease and its complications. CT enterographic findings of wall thickening associated with multilayered aspect mucosal enhancement, densification of mesenteric fat and engorged vasa recta associated with active mucosal and mural inflammation are considered indicative of active Crohn disease and are related to symptoms [13]. In the present study three patients (23%) showed simultaneously both complications, acute and chronic involvement; two (15%) showed findings of active disease associated with complications, and one (7.5%) had acute and chronic changes. So the precise identification of these findings is very important in the management of this group of patient[16].

Personal information

References
