Enterography CT without and with water enema in patients with Crohn’s disease in comparison with endoscopy

Laura Maria Minordi, Luigi Larosa, Gianfranco Belmonte, Franco Scaldaferri, Riccardo Manfredi

Department of Bio-Imaging and Radiological Sciences, Radiology Institute, Foundation Policlinic A. Gemelli IRCCS, Catholic University of the Sacred Heart, Rome, Italy.

Purpose

CT is nowadays an examination routinely performed in Crohn’s disease (CD) patients. However, there are several ways to assess gastro-intestinal tract, in particular colonic segments. Aim of this study is to compare enterography-CT performed after oral administration of polyethylene-glycol solution (PEG-CT) versus enterography-CT performed also with water enema via rectum (ECT-WE) in patients with CD.

Material and Methods

• Patients

79 patients with previous histological diagnosis of Crohn’s disease, have performed lower endoscopy within 15 days before the CT so were selected for the study.

• CT technique

CT was performed using 16 or 64-row multidetector CT. Small bowel distension was obtained with oral administration of 2.0 L of PEG, administered in equal doses of 100 ml starting 30-35 minutes before the CT exam. In ECT-WE the patients also obtained colon distension by warm water enema (1-2 L). Administration of 20 mg of an anticholinergic compound just before the CT scan in patients studied by PEG-CT or before colonic distension in patients studied by ECT-WE. Contrast-enhanced CT images were acquired 75 seconds after i.v. injection of 130-150 mL contrast agent: 40-50 ml at a rate of 1 mL/sec followed from a bolus of 80-90 ml at a rate of 3 ml/sec. The I.V. administration of contrast agents was done to evaluate the pattern and extent of wall pathological enhancement. The CT criteria for the diagnosis of bowel disease was the parietal thickening; we analysed density (H.U.), grade (mm) and symmetry of the parietal thickening, and presence of associate extraluminal anomalies.

In particular, we evaluated: diameter of bowel lumen; diameter of the loop; presence of stenosis; presence, site and number of abnormal altered bowel segments; degree of mural thickening; presence of target sign; presence of polyps; presence of comb sign; perienteric stranding; fibrofatty proliferation; fistulas; sinus tract; lymphadenopathy; abscesses and fluid in abdomen. We also looked for bowel distension. The distension of each bowel segment was classified in a four-point scale (0= absent, 1= incomplete, 2=partial, 3= complete). In all patients we evaluated the discomfort from infusion of contrast medium by mouth and/or by rectum. The evaluation was performed by a patient questionnaire: presence and degree of abdominal pain (from 0=no pain, to 3 maximum pain), presence of nausea and vomiting.

• Endoscopy

Lower endoscopy was performed as requested for clinical indication and following bowel preparation according to the Intestinal Bowel Disease (IBD) center where patients were admitted.

Results

37/79 (47%) patients were studied by ECT-WE and 42/79 (53%) by PEG-CT. During the exams, presence and degree of abdominal pain were significantly higher in patients undergone to ECT-WE compared to PEG-CT (p: 0.005) (Table 1). No statistically significant difference was present for vomiting or nausea between the two groups.

	Pain		Nausea		Vomiting	
	PEG-CT n°pt (%)	ECT-WE n°pt (%)	PEG-CT n°pt (%)	ECT-WE n°pt (%)	PEG-CT n°pt (%)	ECT-WE n°pt (%)
No	22 (52)	8 (21,5)	6 (14)	4 (11)	38 (90,5)	33 (89)
Yes	20 (48)	29 (78.5)	36 (86)	33 (89)	4 (9.5)	4 (11)
P value	0.005		0.643		0.850	

Table 1. Presence of discomfort

ECT-WE was associated to greater colonic distension compared to PEG-CT. The judgment given independently by different gastro-intestinal radiologists displayed an agreement higher than 90%. Distension of colon, sigmoid colon and rectum was found to be significantly better in patients studied with ECT-WE than those studied with PEG-CT (p<0.001) (Fig 1) while no other significant differences were found for other sites.

Fig 1. ECT-WE (A, B) shows a good distension of the colon (asterisks); incomplete distension of the colon is evident in this patient studied with PEG-CT (C), especially of the left colon (arrows).

Moreover, overall distension was found to be significantly better in patients studied with ECT-WE than those studied with PEG-CT (p<0.001).

We found 100 pathological loops, 57 in PEG-CT and 43 in ECT-WE. CT findings of the pathological loops are described in Table 2.

	PEG-CT (42 pt)	ECT-WE (37 pt)
Number of thickened large bowel loops	57	43
Mean thickness (mm)	4,95 (+4,07)	3,60 (+4,26)
Mean lumen diameter (mm)	4,75 (+5,89)	6,69 (+8,90)
Mean longitudinal extension (mm)	93,25	87,2
Stenosis	57	43
Target sign	47	40
Polyps	9	4
Comb sign	35	25
Perienteric stranding	8	8
Sinus tract	2	1
Fibro-fatty proliferation	5	4
Number of patients with fistulas	6	5
Number of patients with abscess	3	3
Number of patients with lymph nodes (diameter > 1 cm)	12	9
Number of patients with fluid in abdomen	7	3

Table 2.

Endoscopy was used as gold standard for colonic mucosa assessment (Fig. 2).

Fig 2. ECT-WE in coronal (A) and axial (B) planes shows stenosis of the left colon (arrows) with target sign and fibrofatty proliferation. Endoscopy (C) shows linear deep ulcer in left colon.

Endoscopy was also used to set false positive and false negative cases of the CT. In comparison with endoscopy values of sensitivity, specificity and diagnostic accuracy were respectively 77%, 86.5% and 81% in patients studied with PEG-CT and 89%, 100% and 92% in patients studied with ECT-WE (Table 3).

	PEG-TC 42 patients	ECT-WE 37 patients
True positive (TP)	21	25
False positive (FP)	2	0
True negative (TN)	13	9
False negative (FN)	6	3
Sensitivity (TP/TP+FN)	77% (95% CI: 57.7%-91.4%)	89% (95% CI: 71.8%-97.7%)
Specificity (TN/TN+FP)	86,5% (95% CI: 59.5%-98.3%)	100% (95% CI: 66.4%-100.0%)
Diagnostic accuracy (TP+TN/tot)	81%	92%

Table 3. Diagnostic accuracy of CT

Conclusions

ECT-WE allows to evaluate large bowel as well as small bowel so ECT-WE should be preferred to ECT to assess both the small and large bowel in a single examination. The advantages of CT over MR imaging include greater availability, higher spatial resolution and the ability to simultaneously depict bowel wall inflammation, extra-enteric complications, and abdominal organs in shorter examination times. Moreover, CT is a technique that requires ionizing radiation. Another limitation of ECT-WE is patient’s discomfort and the time needed for all procedures.