CT enterography: farewell to colonoscopy? - diagnostic accuracy of qualitative predictors of inflammatory bowel disease and its activity (prospective study from a tertiary centre)

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Purpose

To study the CT Enterography (CTE) findings in inflammatory bowel disease (IBD) for diagnosis and accuracy of qualitative imaging features of primary disease, its activity and complications in comparison to histopathology of the affected segment.

Imaging is an integral tool in diagnosis of inflammatory bowel disease and has evolved from the plain radiograph to immunofluorescence coupled endoscopic techniques (High definition white light endoscopy, Chromoendoscopy) in the current scenario. Popularly; imaging for the evaluation of the bowel has been used by clinicians in limited situations a) when there are contraindications for active enteroscopy or colonoscopy e.g. in toxic megacolon/ acute obstruction/ massive gastrointestinal bleed precluding visualization of the lumen b) to assess segments of large and small bowel that are inaccessible to endoscopic visualization either due to tight stricture or fungating endoluminal malignancy causing narrowing of the lumen. The earliest real time method of choice was the small bowel enteroclysis study; however, it was limited by its exclusive intraluminal nature, patient non-compliance due to complex nasojejunal intubation, difficulty in ingesting large volumes of oral contrast, reduced detection of strictures and diseased segments and long exam times. Due to these factors, the CT and MR enterography techniques came into vogue as non invasive cross sectional modalities which were able to provide information regarding different layers of the bowel with accurate visualization of each layer of the bowel and its characteristic properties along with disease progression. MR enterography has been widely examined and analysed for its accuracy and predictability of IBD due to its superior soft tissue contrast resolution compared to CT, its capability in providing functional information and characterize bowel wall tissue composition (with the help of diffusion weighted imaging and newer sequences). The primary objective of our study was to analyse and further propose an imaging based predictability criteria using qualitative markers on CT enterography for accurate diagnosis of IBD and compare it to the results of tissue biopsy obtained via colonoscopy/ enteroscopy. This would secondarily assess the feasibility of utilising CTE as the single and foremost and investigation for diagnosis of IBD. In future, it would further enable the clinician to assess the disease activity and response to therapy with the help of the radiologist.
Methods and materials

A prospective study of 230 patients who were referred to the Radiology department for CTE in gastrointestinal symptoms suggestive of IBD was performed from January 2010-16 at a super specialty hospital.

**Inclusion criteria:** Patients who underwent CT enterography study for suspicious bowel related symptoms. Out of these only those patients who underwent enteroscopy or colonoscopy within a week after the imaging (n=106) were prospectively followed up.

**Exclusion criteria:** Patients with other aetiologies' of inflamed bowel e.g. non specific, viral or bacterial colitis, edematous bowel e.g. portal colopathy-enteropathy and acute or chronic mesenteric ischemia with mesenteric congestion and ischemic bowel were excluded. Patients’ with known IBD or who were on follow up for similar bowel related infections or colitis were excluded. Pregnant females and children less than 18 years were not included in the study group due to radiation concerns from CTE.

**Patient preparation:**

Optimum bowel distension is the single most important factor in conducting a successful and informative CT enterography study. We follow a study protocol using neutral oral contrast agent: polyethylene glycol (PEG) for bowel distension and visualization. It is available in packed powder form which can be easily dissolved by dividing the quantity in the packet (138gms) into two portions which are dissolved in 2 separate bottles of water measuring 1 liter each. These are consumed (1 liter with dissolved PEG) each, the night before the procedure and on the morning of the procedure. The patient is encouraged to drink regular water and clear fluids in case they would like to, however no food is allowed. Adequate small and large bowel distension is obtained with this procedure; however rectal neutral water is administered on the CT table for complete distension of the recto-sigmoid and descending colon before intravenous contrast injection.

**Imaging Technique:**

Single phase CTE study was performed on a 64#row spectral CT scanner. Scan parameters included: 120 kV with automated mA, 0.6 s rotation time, speed 55 mm/rotation, pitch of 1.375:1, detector coverage of 40 mm, and matrix size of 512 x 512. Low osmolarity non-ionic contrast medium @1.5-2.0 ml/kg body weight with iodine concentration of 400 mg/ml was administered intravenously. A whole abdomen scan from the domes of diaphragm upto the pubic symphysis was obtained in the spectral mode at 70keV with a time delay of 60 seconds post injection of contrast. The study was read after reconstruction of post contrast slices @1 mm thickness. **Virtual non contrast images** were reconstructed from the spectral dataset to help reduce the overall radiation dosage per scan.
Data analysis: Prospective study of patients who underwent CTE and colonoscopy/enteroscopy with simultaneous histopathology analysis, was statistically analyzed for various imaging parameters for predictability of the confirmed diagnosis of IBD: Various parameters studied were as follows:

- Submucosal fat replacement: defined as layer of fat within the enhancing mucosal and mural layer with replacement of normal soft tissue attenuation of the submucosa, seen as an early sign of IBD. It is well visualized on non enhanced CT due to contrast of fat against the soft tissue muscle and mucosa itself (Figure 1a, b)

![Figure 1a](image1a.png)  ![Figure 1b](image1b.png)

**Fig. 1:** Figure 1: Spectral CT scan of the whole abdomen with virtual non contrast reconstruction on post processed images depicting advantage of spectral CT in reducing radiation dosage by acquisition in singe phase 1a. Coronal reconstruction of the whole abdomen showing submucosal fat replacement (yellow bold arrow) extending along the entire rectosigmoid and left hemicolon seen in Figure 1b (yellow bold arrow with black outline)

**References:** Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

- Figure 1: Spectral CT scan of the whole abdomen with virtual non contrast reconstruction on post processed images depicting advantage of spectral CT in reducing radiation dosage by acquisition in singe phase
1a. Coronal reconstruction of the whole abdomen showing submucosal fat replacement (yellow bold arrow) extending along the entire rectosigmoid and left hemicolon seen in Figure 1b (yellow bold arrow with black outline)
- mural thickening and loss of haustrations (Figure 2)

**Fig. 2:** Figure 2: Contrast enhanced CT scan of the whole abdomen before CTE preparation (2a-c) showing faecal filled and loaded colon in a patient suspected to have bowel disease and after complete preparation (2d-f) with distended bowel lumen 2a-c: Non contrast coronal reconstructions of CT abdomen in a 40 year old patient showing air and faecal filled segments (bold yellow arrows) of descending and transverse colon without preparation with Peglec and water solution 2d-f: Coronal reconstructions of CT Enterography in a 40 year old patient showing well visualized mural thickening involving the left hemicolon (bold yellow arrows with black outline) seen after adequate distension of the bowel lumen with protocol Peglec ingestion and rectal neutral contrast opacification

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- Figure 2: Contrast enhanced CT scan of the whole abdomen before CTE preparation (2a-c) showing faecal filled and loaded colon in a patient
suspected to have bowel disease and after complete preparation (2d-f) with distended bowel lumen

- 2a-c: Non contrast coronal reconstructions of CT abdomen in a 40 year old patient showing air and faecal filled segments (bold yellow arrows) of descending and transverse colon without preparation with Peglec and water solution
- 2d-f: Coronal reconstructions of CT Enterography in a 40 year old patient showing well visualized mural thickening involving the left hemicolon (bold yellow arrows with black outline) seen after adequate distension of the bowel lumen with protocol Peglec ingestion and rectal neutral contrast opacification
- mural stratification (Figure3)

**Fig. 3:** Figure3: Axial section of contrast enhanced CT Enterography in a 35 year old female patient showing well defined mural layers, in the form of enhancing mucosa and hypoattenuating submucosa (white bold arrow) followed by thin enhancing serosal layer (bold yellow arrow)

**References:** Radiodiagnosis, Institute of Liver &Biliary Sciences, Institute of Liver &Biliary Sciences - New Delhi/IN
Figure 3: Axial section of contrast enhanced CT Enterography in a 35 year old female patient showing well defined mural layers, in the form of enhancing mucosa and hypoattenuating submucosa (white bold arrow) followed by thin enhancing serosal layer (bold yellow arrow)

- hyperenhancement (Figure 4)

Fig. 4: Axial section of contrast enhanced CT Enterography in a 44 year old female patient depicting intensely enhancing mucosa (bold yellow arrow) involving the rectosigmoid (4a, b) colon

References: Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

Figure 4: Axial section of contrast enhanced CT Enterography in a 44 year old female patient depicting intensely enhancing mucosa (bold yellow arrow) involving the rectosigmoid (4a, b) colon

- colonic vascular congestion (Figure 5)
Fig. 5: Figure5: Sagittal (5a) and coronal (5b, c) contrast enhanced CT Enterography study of the abdomen in a 38 year old male patient with well visualized distended left hemicolon showing diffuse antimesenteric (bold blue arrows, Figure 5a), mesenteric border (bold orange arrow, Figure5b) and peri-rectal (Figure5c) vascular congestion

References: Radiodiagnosis, Institute of Liver &Biliary Sciences, Institute of Liver &Biliary Sciences - New Delhi/IN

Figure5: Sagittal (5a) and coronal (5b, c) contrast enhanced CT Enterography study of the abdomen in a 38 year old male patient with well visualized distended left hemicolon showing diffuse antimesenteric (bold blue arrows, Figure 5a), mesenteric border (bold orange arrow, Figure5b) and peri-rectal (Figure5c) vascular congestion

• nodes (Figure6)
Fig. 6: Figure6: Coronal (6a) contrast enhanced CT Enterography study of the abdomen in a 33 year old female patient showing multiple enlarged homogenously enhancing lymph nodes in the mesentery (bold yellow arrow) 6b. Axial section of contrast enhanced CT Enterography in a 33 year old female patient depicting mesenteric fibrosis (bold blue arrow) with surrounding increase in mesenteric fat in the same location

References: Radiodiagnosis, Institute of Liver &Biliary Sciences, Institute of Liver &Biliary Sciences - New Delhi/IN

Figure6: Coronal (6a) contrast enhanced CT Enterography study of the abdomen in a 33 year old female patient showing multiple enlarged homogenously enhancing lymph nodes in the mesentery (bold yellow arrow)

6b. Axial section of contrast enhanced CT Enterography in a 33 year old female patient depicting mesenteric fibrosis (bold blue arrow) with surrounding increase in mesenteric fat in the same location

• extra-intestinal manifestations

These were assessed for diagnostic accuracy 'as qualitative predictors' of IBD and its activity

Statistical analysis:

Categorical data was described as frequency and proportion. Continuous data was presented as mean with standard deviation or median with interquartile range. The comparison of proportion in two groups was done by Chi square test or Fisher exact test, as required. The comparison of mean was done by student T test or Mann Whitney U Test as required.
Fig. 1: Figure 1: Spectral CT scan of the whole abdomen with virtual non contrast reconstruction on post processed images depicting advantage of spectral CT in reducing radiation dosage by acquisition in single phase 1a. Coronal reconstruction of the whole abdomen showing submucosal fat replacement (yellow bold arrow) extending along the entire rectosigmoid and left hemicolon seen in Figure 1b (yellow bold arrow with black outline)

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Fig. 2: Figure 2: Contrast enhanced CT scan of the whole abdomen before CTE preparation (2a-c) showing faecal filled and loaded colon in a patient suspected to have bowel disease and after complete preparation (2d-f) with distended bowel lumen 2a-c: Non contrast coronal reconstructions of CT abdomen in a 40 year old patient showing air and faecal filled segments (bold yellow arrows) of descending and transverse colon without preparation with Peglec and water solution 2d-f: Coronal reconstructions of CT Enterography in a 40 year old patient showing well visualized mural thickening involving the left hemicolon (bold yellow arrows with black outline) seen after adequate distension of the bowel lumen with protocol Peglec ingestion and rectal neutral contrast opacification

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Results

Out of 203 patients, 106 (67 males, age 41.9±14.6, range 12-73 years) were found to have IBD (Ulcerative colitis 47%, Crohn’s disease 42.5%, indeterminate disease 10.4% patients) on histopathology.

Crohn’s disease was more commonly seen in the small bowel, however few of our study group patients revealed large bowel Crohn’s disease in 12.2% patients e.g. (Figure 7).

Fig. 7: Coronal reconstructions of contrast enhanced CT Enterography study of the abdomen in a 36 year old male patient showing hypervascularity of the...
large bowel wall with loss of normal haustrations and pericolonic congestion. Imaging features suggestive of inflammatory bowel disease. Patient was confirmed to have large bowel Crohn's disease on histopathology.

**References:** Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

Figure 7. Coronal reconstructions of contrast enhanced CT Enterography study of the abdomen in a 36 year old male patient showing hypervascularity of the large bowel wall with loss of normal haustrations and pericolonic congestion. Imaging features suggestive of inflammatory bowel disease. Patient was confirmed to have large bowel Crohn's disease on histopathology.

Histopathology was the gold standard of diagnosis.

Most common site of involvement was sigmoid colon (65.1%) followed by rectum (60.4%). Ulcerative colitis of large bowel was seen in 85.4% patients and no patients showed indeterminate disease.

On follow up of these patients, complications were observed on CTE. Commonest complication included stricture formation with secondary intestinal obstruction. (Figure 8)
Fig. 8: Isolated colonic stricture with ulcerative colitis Coronal (8a) and Sagittal (8b) reconstructions of contrast enhanced CT Enterography study of the abdomen in the same patient as figure 7, on follow up at 2 years, shows development of left descending colon stricture (bold yellow arrows, 8a) (bold orange arrow, on Sagittal section, 8b)

References: Radiodiagnosis, Institute of Liver &Biliary Sciences, Institute of Liver &Biliary Sciences - New Delhi/IN

Figure8. Isolated colonic stricture with ulcerative colitis

Coronal (8a) and Sagittal (8b) reconstructions of contrast enhanced CT Enterography study of the abdomen in the same patient as figure 7, on follow up at 2 years, shows...
development of left descending colon stricture (bold yellow arrows, 8a) (bold orange arrow, on Sagittal section, 8b)

Pancolitis was present in 11.7% of patients. These patients usually presented as active disease with index presentation to the clinics and imaging department. Many of them were clinically unsuspected. (Figure 9)

**Fig. 9**: Figure 9. Pancolitis Coronal reconstructions of contrast enhanced CT Enterography study of the abdomen in a 50 year old female patient showing involvement of the complete colon with pericolonic hypervascularity (bold yellow arrows)

**References**: Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

Figure 9. Pancolitis

Coronal reconstructions of contrast enhanced CT Enterography study of the abdomen in a 50 year old female patient showing involvement of the complete colon with pericolonic hypervascularity (bold yellow arrows)

Increased mucosal enhancement (53% Vs 27%) and mural thickening (71.1% Vs 30%) were found to be predictors of IBD with odds of 3.13 (95% CI, 1.03-4.91) and 3.16 (95% CI, 1.07-5.72), respectively. Pericolonic vascular congestion (58.5% Vs 19.7%)
showed borderline significance with OR of 2.74 (CI 0.91-5.23). Other indices were not significant.

Toxic megacolon was seen in 5% Vs 0.9%. Approximately 7.5% Vs 3.1% patients underwent surgery for emergency and elective management. Elective management was more often performed for stricture formation which was seen in 9.6% of patients. Surgery for stricture of large bowel causing acute presentation was done in 7.8% of the patients.

For large bowel ulcerative colitis, ileal pouch formation with neo-rectum formation was performed. Few of these patients showed recurrent disease on follow up imaging studies. (Figure 10)

**Fig. 10:** Figure 10. Ileal pouch formation showing recurrence post hemicolecotomy for Ulcerative colitis (bold yellow arrows)

**References:** Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN
Figure 10: Ileal pouch formation showing recurrence post hemicolectomy for Ulcerative colitis (bold yellow arrows)

**Disease activity:** Active disease was found in 88.1% patients on histopathology and 11.9% patients showed disease in remission. CTE was accurately able to predict disease activity as active, inactive or in remission in 76.4% patients. We could partly predict the segments or part of bowel affected with regard to activity in 15.1% and could not correlate our data with biopsy reports in the remaining patients within our study group.

(Figure 11, 12)

**Fig. 11:** Figure 11 Active disease on Imaging 11a. Coronal reconstruction of contrast enhanced CT Enterography study of the abdomen in a 49-year-old female patient showing involvement of the left hemi-colon with pericolonic hypervascularity (bold yellow arrows) and mural thickening with suggesting disease activity 11b. Sagittal reconstruction of contrast enhanced CT Enterography study of the abdomen in the 49-year-old female patient showing involvement of the left hemi-colon with increase in presacral space (bold yellow arrows) suggesting of disease activity 11c. Coronal reconstruction of contrast enhanced CT Enterography study of the pelvis in the 49-year-old female patient showing involvement of the rectum with increase in peri-rectal vascularity and enlarged lymph nodes (bold yellow arrows) suggesting disease activity 11d. Axial contrast enhanced CT Enterography study of the pelvis in the 49-year-old female patient showing involvement of the recto-sigmoid with increase in peri-rectal vascularity and enlarged lymph nodes (bold yellow arrows) suggesting disease activity

**References:** Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN
Fig. 12: Figure 12. Inactive disease on Imaging 12a-c. Coronal reconstruction of contrast enhanced CT Enterography study of the large bowel in the 49 year old female patient showing involvement of the entire large bowel with decreased haustrations, subtle increase in mural thickening and no peri-colonic vascularity (bold white arrows). Enlarged lymph nodes have also disappeared suggesting remission or disease inactivity.

References: Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

Figure 11 Active disease on Imaging

11a. Coronal reconstruction of contrast enhanced CT Enterography study of the abdomen in a 49 year old female patient showing involvement of the left hemi-colon with pericolonic hypervascularity (bold yellow arrows) and mural thickening with suggesting disease activity.

11b. Sagittal reconstruction of contrast enhanced CT Enterography study of the abdomen in the a 49 year old female patient showing involvement of the left hemi-colon with increase in presacral space (bold yellow arrows) suggesting of disease activity.

11c. Coronal reconstruction of contrast enhanced CT Enterography study of the pelvis in the 49 year old female patient showing involvement of the rectum with increase in peri-rectal vascularity and enlarged lymph nodes (bold yellow arrows) suggesting disease activity.
11d. Axial contrast enhanced CT Enterography study of the pelvis in the 49 year old female patient showing involvement of the recto-sigmoid with increased peri-rectal vascularity and enlarged lymph nodes (bold yellow arrows) suggesting disease activity.

Figure 12. Inactive disease on Imaging

12a-c. Coronal reconstruction of contrast enhanced CT Enterography study of the large bowel in the 49 year old female patient showing involvement of the entire large bowel with decreased haustrations, subtle increase in mural thickening and no peri-colonic vascularity (bold white arrows). Enlarged lymph nodes have also disappeared suggesting remission or disease inactivity.

CTE revealed a sensitivity and positive predictive value (PPV) of 83.3% and 86.2% respectively in diagnosis of IBD. Sensitivity and PPV for determination of disease activity was 83.7% and 88.5% respectively.

Current roles of imaging in IBD patients include: (1) Defining extent of disease (2) at the time of initial diagnosis to distinguish UC from CD; (3) to assess and track progression of extraintestinal IBD manifestations; (4) to visualize penetrating complications of disease that extend outside the bowel wall; and (5) to assess disease activity in patients with known IBD during symptomatic recurrence.

Disease extent is important to define at the time of initial diagnosis of IBD in order to classify patients as having UC or CD. Small bowel involvement, most commonly of the terminal ileum, is diagnostic of CD. Imaging plays an important role in defining overall disease extent as patients with distal ileal disease on colonoscopy can have more proximal involvement in areas that are not accessible to endoscopic visualization. CD involvement of the proximal small bowel is important to recognize because it can be associated with symptoms related to malabsorption (vitamin deficiencies, weight loss and steatorrhea) and is associated with increased risk of stricture formation, altered bowel behaviour and multiple bowel surgeries. In addition, imaging is helpful for determining overall length of bowel involvement in CD, which can impact the decision whether to perform surgical resection of bowel that is refractory to medical therapy and the potential risk of short gut syndrome.

Similarly, in ulcerative colitis, the length of the colon involved, e.g. in (Figure 9) determines the management protocol and planning for surgery. In a patient with pancolitis the usual treatment of choice involves neo-rectal pouch formation with ileal anastomosis. CTE may be used successfully to demonstrate the postoperative reactivation of IBD in such patients and help track progression of the disease within this subset of patients. (Figure 10)
Disease complications are an important area where imaging and CTE play an important role. These are commonly seen as stricture formation (Figure13)

**Fig. 13**: Figure13. Isolated stricture in a known case of pancolitis 13a-c. Coronal reconstruction of contrast enhanced CT Enterography study of the large bowel in a 38 year old male patient showing involvement of the entire large bowel (pancolitis) (bold white arrows) with decreased haustations, increase in mural thickening and peri-colonic vascularity with isolated stricture in the descending colon (bold yellow arrow)

**References**: Radiodiagnosis, Institute of Liver &Biliary Sciences, Institute of Liver &Biliary Sciences - New Delhi/IN

Figure13. Isolated stricture in a known case of pancolitis

13a-c. Coronal reconstruction of contrast enhanced CT Enterography study of the large bowel in a 38 year old male patient showing involvement of the entire large bowel (pancolitis) (bold white arrows) with decreased haustations, increase in mural thickening and peri-colonic vascularity with isolated stricture in the descending colon (bold yellow arrow), pneumoperitoneum from known tight stricture, most often seen in small bowel strictures (Figure14)
Fig. 14: 14a,b. Coronal and axial scan non contrast CT scan in a known case Crohn’s disease with pneumoperitoneum (bold yellow arrow) and associated perforation of small bowel stricture. 

References: Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

14a,b. Coronal and axial scan non contrast CT scan in a known case Crohn’s disease with pneumoperitoneum (bold yellow arrow) and associated perforation of small bowel stricture, pseudopolyp formation in patients of ulcerative colitis. (Figure 15)

Fig. 15: 15a-c. Axial sections of contrast enhanced CT Enterography in a known case Ulcerative colitis with pseudopolyps seen within the lumen of the sigmoid colon and corroborated on colonoscopy and histopathology (bold yellow arrows)

References: Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

15a-c. Axial sections of contrast enhanced CT Enterography in a known case Ulcerative colitis with pseudopolyps seen within the lumen of the sigmoid colon and corroborated on colonoscopy and histopathology (bold yellow arrows)
Extraintestinal manifestations and associations of IBD are also well visualised on CT and MRI, however CTE serves as a wholesome single modality for analysing the bones, liver and other organs which may be synchronously involved in the disease process. An example of this may be seen in (Figure 16)

**Fig. 16**: 15a-c. Axial sections of contrast enhanced CT Enterography in a known case Ulcerative colitis with pseudopolyps seen within the lumen of the sigmoid colon and corroborated on colonoscopy and histopathology (bold yellow arrows)

**References**: Radiodiagnosis, Institute of Liver &Biliary Sciences, Institute of Liver &Biliary Sciences - New Delhi/IN
Figure 16 a. Axial CT scan in a suspected case of IBD who underwent CTE and was found to have changes of bilateral sacroilitis at the same sitting of CT (bold yellow arrow).

16b, c. Sagittal of contrast enhanced CT Enterography in a suspected case of IBD shows mural thickening, hyperenhancement and pericolonic congestion in the left hemicolon (bold white arrows) where a patient with suspected IBD underwent CTE and was found to have changes of bilateral sacroilitis at the same sitting of CT.

In our study group we also found CTE study to be useful in patients presenting with unexplained diarrhea and unsuspected IBD, where imaging protocol for CTE could also help in diagnosis of primary sclerosing cholangitis (Figure 17). MRI had to be used only sparingly for confirmation of the diagnosis.

Fig. 17: Skip areas of narrowing and dilatation in (bold yellow arrows) the liver suggestive of primary sclerosing cholangitis in an index case of IBD, ulcerative colitis (bold white arrows) showing imaging pattern of UC in the left hemicolon.

References: Radiodiagnosis, Institute of Liver & Biliary Sciences, Institute of Liver & Biliary Sciences - New Delhi/IN

Figure 17 a: Skip areas of linear bileduct dilatation and narrowing suggestive of changes of primary sclerosing cholangitis (yellow bold arrows) in an index case of ulcerative colitis (bold white arrow) showing loss of haustral pattern and other changes in the left hemicolon.

Our study found that CTE was a one stop shop for the imaging of the entire spectrum of IBD, its diagnosis, progression, complications, relative state of activity and management progression on subsequent scans.
Conclusion

Our study revealed that CTE and its qualitative indices are accurate in diagnosis of IBD and its activity and have the potential to replace invasive scopic studies and histopathology.
Personal information

No disclosures
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