

# **Role of MRI enterography in the evaluation of Patients with Crohn's Disease**

Essay

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**Radiodiagnosis**

By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿وَأَنْزَلْنَا إِلَيْكَ الْكِتَابَ  
وَالْحِكْمَةَ وَعَلَّمْنَاكَ مَا كُنْتَ تَعْلَمُ  
وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا﴾

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# Contents

• INTRODUCTION .....	1
• AIM OF WORK.....	4
• ANATOMY OF THE SMALL INTESTINE.....	5
• PATHOLOGY OF CROHN'S DISEASE. ....	21
• TECHNIQUE OF MRI ENTEROGRAPHY . ....	41
• MRI ENTEROGRAPHY RADIOLOGICAL FEATURES OF CROHN'S DISEASE.....	60
• ILLUSTRATIVE CASES.....	77
• SUMMARY AND CONCLUSION. ....	94
• REFERENCES.....	97
• ARABICSUMMARY.....	--

## List of Tables

<b>Tab. No.</b>	<b>Title</b>	<b>Page</b>
Table (1):	The morphological difference between jejunum and ileum (Ryan et al., 2004). ....	7
Table (2):	Symptoms in Crohn's disease vs. ulcerative colitis.....	30
Table (3):	Risk factors in Crohn's disease vs. ulcerative colitis.....	30
Table (4):	Findings in diagnostic workup in Crohn's disease vs. ulcerative colitis .....	31
Table (5):	Differential diagnosis(Ribeiro et al., 1996).....	39
Table (6):	MR Imaging Sequence Parameters for Evaluation of Crohn's Disease (Sinha et al., 2009).....	55
Table (7):	Suggested Protocol for MR Enterography (Damian and Tolan, 2010).....	56

## List of Figures

<b>Fig. No.</b>	<b>Title</b>	<b>Page</b>
Figure (1):	The gastrointestinal tract (Halvorson, 2008).....	5
Figure (2):	Gross features of jejunum contrasted with those of ileum. Relative to the ileum, the jejunum has a larger diameter, a thicker wall, more prominent plicae circulares, a less fatty mesentery, and longer vasa recta .....	8
Figure (3):	Posterior abdominal wall showing peritoneal attachment of mesentery.....	9
Figure (4):	Mesentery of the small bowel .....	10
Figure (5):	Blood supply of the small intestine .....	13
Figure (6):	Lymphatic drainage of the small intestine .....	13
Figure (7):	Pre (up) & post-contrast (down) T1-weighted fat suppressed image of terminal ileum with evident signal intensity increase in wall of cecum and ileum after contrast injection with normal bowel wall thickness (arrows) .....	16
Figure (8):	Coronal T2WI demonstrating well-distended normal jejunal loops. Intraluminal iso-osmotic water solution results in homogeneous high signal intensity, whereas intestinal wall and valvulae conniventes exhibit low signal intensity .....	17
Figure (9):	Coronal (T2WI) HASTE sequence is equal to the true FISP sequence in demonstrating the anatomy of the small bowel .....	18
Figure (10):	Multiple small mesenteric lymph nodes (arrows) and vascular branches exhibit low signal intensity on true FISP images, whereas mesenteric fat exhibits high signal intensity, resulting in excellent contrast resolution of the mesenteries.....	20
Figure (11):	Distribution of gastrointestinal Crohn's disease.....	22
Figure (12):	Showing marked thickening with a loss of pliability of the wall and narrowing of the lumen. Classic example of Crohn's disease of the terminal ileum .....	33

## List of Figures (cont...)

<b>Fig. No.</b>	<b>Title</b>	<b>Page</b>
Figure (13):	Epithelioid granuloma. Haematoxylin-eosin, original magnification $\times 400$ .....	34
Figure (14):	(a–d) Representative images of major histological features in a patient with isolated colonic Crohn's disease. . ....	36
Figure (15):	Low (a) and medium-power (b) view of elastin stain.. ...	37
Figure (16):	1-year-old woman with known Crohn disease.. ....	39
Figure (17):	MRI machine structure.....	44
Figure (18):	Crohn disease of the ileum and cecum in a 39-year-old woman. ....	52
Figure (19):	Mural edema and inflammatory fluid in a patient with Crohn disease. Axial fat-suppressed T2-weighted MR image shows high-signal-intensity bowel wall (arrow) and fluid surrounding the distal ileum (arrowhead) .....	53
Figure (20):	35-year-old man with suspected Crohn disease. Coronal HASTE image with fat saturation (4-mm thickness) shows linear filling defect in bowel lumen (arrow) due to peristalsis .....	59
Figure (21):	Aphthous ulcers. ....	61
Figure (22):	Transmural ulcers and pseudopolyps. ....	63
Figure (23):	MR enterography: coronal high-resolution true-FISP MR image .....	64
Figure (24):	The comb sign. Coronal true FISP MR Image (5.7/2.3, 60° flip angle, 4-mm section thickness) obtained with fat suppression shows extensive fat proliferation around inflamed bowel segments. Engorged mesenteric vessels form the comb sign (arrow).....	66
Figure (25):	Mural abscess in a patient undergoing anti-tumor necrosis factor therapy with infliximab. ....	67
Figure (26):	Internal fistulas. (13a) Coronal high-resolution true FISP MR Image (3.8/1.6, 60° flip angle, 2-mm section thickness) shows inflamed distal and terminal ileum (arrows) and a contrast material-filled fistula.....	70

## List of Figures (cont...)

<b>Fig. No.</b>	<b>Title</b>	<b>Page</b>
Figure (27):	Pseudosacculation. ....	72
Figure (28):	Regenerative polyps in a patient with chronic Crohn disease. ....	73
Figure (29):	MR enterographic detection of active inflammation and fibrosis. A–H, Imaging is depicted from abnormal small-bowel segments (arrows) in two subjects. First subject shows bowel wall T2 hyperintensity .....	75
Figure (30):	Coronal T2-W single-shot fast spin-echo (SSFSE).....	78
Figure (31):	Coronal balanced steady-state free precession MR image reveals abnormally dilated loops of distal ileum containing small bowel feces (asterisks) and suggests small-bowel obstruction. The superior urinary bladder wall is abnormally thickened.....	79
Figure (32):	Coronal precontrast T1-W spoiled gradient recalled echo MR image with fat saturation. Image demonstrates hyperintense signal consistent with fecal material within the thickened superior wall of the urinary bladder.. ....	79
Figure (33):	Early postcontrast axial T1-W spoiled gradient recalled echo MR image with fat-saturation. a Image demonstrates dependent signal hyperintensity consistent with fecal material within the posterior urinary bladder . ....	80
Figure (34):	(a–c) The T2-weighted HASTE image. ....	81
Figure (35):	Coronal and transverse T2-weighted HASTE images ..	82
Figure (36):	A, T2 single shot through the pelvis showing a thickened loop of ileum (arrow).....	83
Figure (37):	A, T2 single shot shows featureless loop of sigmoid with fatty proliferation in the sigmoid mesocolon (arrow). ....	83
Figure (38):	(a, b) T2-weighted RARE transverse images obtained ..	84



## List of Figures (cont...)

Fig. No.	Title	Page
Figure (39):	MR images show (a) Coronal T2-weighted RARE image obtained after oral administration of a negative contrast agent. Recurrent Crohn disease at the level of the anastomotic ileal loop is clearly evident. ....	85
Figure (40):	a) MR fluoroscopic ( $\infty/950$ ) (image shows luminal narrowing of multiple distal ileum bowel loops. ....	86
Figure (41):	Coronal true FISP image shows mucosal irregularity (arrows) as thin lines of high signal intensity oriented longitudinally or transversally (fissure ulcers) within thickened terminal ileum, which is consistent with diffuse ulcerations in Crohn's ileitis. ....	87
Figure (42):	A The axial T2-weighted TSE image shows wall thickening at the level of the sigmoid colon, with marked fibrofatty proliferation displacing the adjacent ileal loops.. ....	88
Figure (43):	MRI. a, b Coronal RF spoiled FAST contrast-enhanced images reveal enlarged mesenteric lymph nodes .....	89
Figure (44):	Coronal gadolinium-enhanced 3-D gradient-echo (THRIVE) MR image shows large abscesses throughout the ischioanal fossa with extension above the laevator ani. The rectum (arrowhead) is shifted to the right .....	90
Figure (45):	Axial balanced steady-state free precession (SSFP). ....	91
Figure (46):	Coronal true fast imaging with steady-state precession image obtained with fat saturation shows engorged mesenteric vessels surrounding inflamed distal ileum forming comb sign (arrow). ....	92
Figure (47):	Coronal true fast imaging with steady state precession image obtained with fat saturation shows ileoileal fistula (arrow). Note that fistula does not contain any fluid or air within patent lumen but appears isointense ..	93

## **List of abbreviations**

CD:	Crohn's disease
CDAI:	Clinical disease activity index
CE-MR:	Contrast enhanced magnetic resonance.
CRP:	C-reactive protein.
DWI:	Diffusion weighted image.
GBCA:	Gadolinium based contrast agent.
HASTE:	Half-Fourier Acquisition Single-Shot Turbo Spin-Echo
MRE:	Magnetic resonance enterography.
NSF:	Nephrogenic systemic fibrosis
ROI:	Region of interest.
SB:	Small bowel
SMV:	Superior mesenteric vein
SSFP:	Steady-state free precession.
SSFSE:	Single shot fast spin echo.
TPN:	Total parenteral nutrition.

## **INTRODUCTION And AIM OF WORK**

Crohn's disease is an idiopathic chronic inflammatory disease of the gastrointestinal tract that has varying levels of severity, diverse manifestations, and an unpredictable course that includes frequent relapses. The etiology of Crohn's disease is complex and likely multifactorial, with genetic, immunologic, infectious, microvascular, and possibly environmental and lifestyle factors contributing (**De Hertogh et al, 2008**); (**Cho, 2008**). It often affects young patients, who are most vulnerable to the potential adverse effects of repeated exposure to ionizing radiation from computed tomography performed for diagnosis and surgical planning. The small intestine is the bowel segment that is most frequently affected, but it is the least accessible with endoscopic techniques.

Clinicians often use medical history, laboratory data, and physical examination to assess disease activity and complications, but these tools are relatively nonspecific. Clinical observations of disease activity are subjective and prone to significant interobserver variability (**Freeman, 2007**). Because the symptoms of active inflammation and those of complications may be indistinguishable, imaging often is needed .

Patients frequently are subjected to multiple imaging examinations in which they are exposed to ionizing radiation; imaging of patients with Crohn's disease traditionally has included a combination of fluoroscopic and computed tomographic (CT) techniques to assess the small bowel. The former method consists of small-bowel follow-through examinations and enteroclysis, which provide views of the bowel lumen and mucosal surface but only limited, indirect information about extraenteric complications. CT provides detailed information about the bowel wall and extraenteric structures at the expense of mucosal detail. Recognizing the complementary nature of these techniques, investigators have sought to combine the best of both in CT enteroclysis and CT enterography **(Rollandi, 1999); (Romano, 2005)**. Despite the diagnostic success attained with these CT techniques, their use is limited because of their dependence on ionizing radiation, a significant liability given the need for repetitive imaging in a subset of young patients with Crohn's disease **(Jaffe, 2007)**.

These challenges highlight the need for a cross-sectional imaging technique that is sensitive enough to allow detection of bowel inflammation and its complications and that allows differentiation between acute disease that can be managed medically and disease that requires surgery. In addition, the ideal imaging test would be reproducible, well tolerated by patients, and free of ionizing radiation.

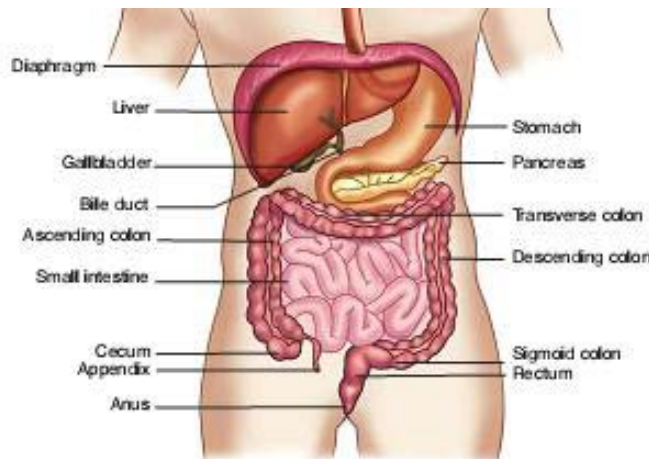
Magnetic resonance (MR) enterography has the potential to safely and noninvasively meet the imaging needs of patients with Crohn's disease without exposing them to ionizing radiation. MRE has improved soft tissue contrast, which is important for detecting subtle pathologic areas. It is particularly helpful for detection, staging and follow-up of perianal fistulae. MRE also enables static and dynamic studies that provide real-time and functional imaging. By using multiphase imaging techniques, bowel peristalsis and distensibility can be evaluated. MRE helps to determine the cause of bowel narrowing, i.e. whether they are due to contractions or to fixed strictures. Due to the safety profile of gadolinium contrast agents, the technique may be preferred in patients who are allergic to iodine contrast medium.

## **AIM OF THE WORK**

**T**o assess the value of MRI enterography in Crohn's disease as a primary diagnostic tool and for follow up of chronic patients and detecting complications.

## Chapter (1)

### Anatomy of the Small Bowel Gross anatomy



**Figure (1):** The gastrointestinal tract (Halvorson, 2008).

The small intestine is that portion of the gastrointestinal tract (GIT) between the pyloric sphincter of the stomach and the ileocecal valve that opens into the large intestine. The length of the small intestine varies from 10-33 feet (3–10 meters). The average length is considered to be approximately 22 feet (6.5 meters) (Gourevitc, 2006).

The mesentery of the small intestine has a 6 inch (15 cm) origin from the posterior abdominal wall and commences at the duodenojejunal junction, just to the left of the second lumbar