Multiparametric MR Enterography Without the Use of Antiperistaltic Agents: Performance and Interpretation

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PURPOSE
To describe how to perform and interpret MR enterography (MRE) without using antiperistaltic agents.

MRE WITHOUT ANTIPERISTALTIC AGENTS
- High sensitivity (85%) and specificity (80%) for the evaluation of Crohn’s disease, similar to studies of MRE with antiperistalsitics.
- High diagnostic confidence, substantial inter-reader agreement and similar results as CT enterography.

Advantages:
- Lower cost, avoidance of side effects, less interruption in work-flow for injections, less complex patient screening for potential contraindications, decreased exam time

Limitation:
- Motion artifact on 3D gradient echo (GRE) sequences

INTERPRETATION: MULTIPARAMETRIC APPROACH
- Motion artifact can be overcome by using a multiparametric approach for interpretation
- T2W images and dynamic post-contrast T1W images have traditionally been relied upon for small bowel evaluation.
- Diffusion-weighted imaging (DWI) and a multiphasic cine sequence are less frequently utilized, but are valuable supplementary sequences

CINE BALANCED STEADY STATE FREE PRECESSION (BSSFP)
- Evaluates bowel motility, functional disorders, adhesions
- Distinguishes luminal narrowing from stricture or active inflammation from temporary contraction
- May increase sensitivity of lesion detection in Crohn’s disease compared to static MRE
- Segmental abnormal motility on cine images corresponds to morphologic abnormalities on static images
- Does not require additional patient preparation or special software
- Acquisition time: 4 minutes or less
- Temporal resolution: 0.6 seconds

SAMPLE CASE 1
Fat-suppressed (FS) T2W image (a) shows mural edema (arrow) involving the terminal ileum in a 20 year-old male patient with Crohn’s disease. Post-contrast FS 3D GRE T1W image obtained in the arterial phase (b) shows mucosal hyperenhancement (arrow). Associated diffusion restriction with hyperintense signal (arrow) on DWI (c, b = 800 mm/s) and hypointense signal (arrow) on the ADC map (d). Findings are compatible with active inflammation. See http://www.mri.tju.edu/CTMRI/ISMRM/Case-1.gif (or scan code) for the cine BSSFP sequence, showing hypoperistalsis of the affected terminal ileum compared to other normal bowel segments.

SAMPLE CASE 2
FS T2W image (a) shows a short segment of hypointense, thickened and narrowed bowel (arrow) in an 18 year-old male with a history of fibrostenotic Crohn’s disease. Note the upstream under-distended segment, which will change during peristalsis, compared to a contracting or under-distended segment, which will change morphology.

DIFFUSION-WEIGHTED IMAGING
- Diffusion restriction corresponds to areas of active inflammation
- Abscesses and lymph nodes are more conspicuous on DWI

SUMMARY
- There are advantages to performing MRE without antiperistalsitics, most notably decreased cost and fewer side effects and contraindications
- No study has shown the diagnostic necessity of antiperistaltic agents
- The major limitation of MRE without antiperistalsitics, motion artifact on 3D GRE sequences, may be minimized by utilizing a multiparametric approach
- Diffusion-weighted imaging and a multiphasic cine sequence are supplements to T2- and dynamic post-contrast T1-weighted images
- With practice and by using multiple pulse sequences, interpretation of MRE without antiperistaltic agents can be as accurate as MRE with antiperistaltic agents

REFERENCES: