Ultrafast Abdominal MR Imaging in Children and Young Adults with Multitransmit MR

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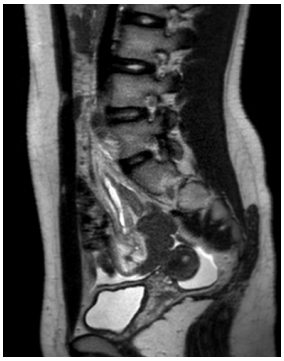
Purpose: Compare routine fast MR abdominal imaging at 3.0T with ultrafast Multitransmit MR in children and young adults who presented to the emergency room with acute abdominal pain.

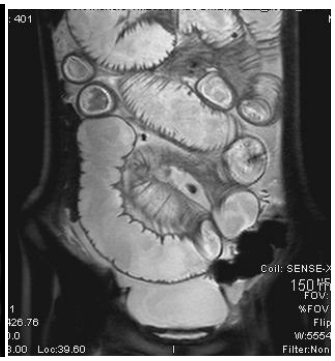
Materials and Methods: In this prospective study with IRB (institutional review board) approval, 10 pediatric and young adult patients (4-27 yrs, 6 female, 4 male, average age 14.5 yrs) with acute abdominal pain were imaged at 3.0T with and without multitransmit MR. For all scans, 16 channel XL Torso coil and SENSE parallel imaging with fat-suppressed T2 single shot turbo spin echo (TSE) sequences in the axial, coronal, and sagittal planes were performed along with an axial T2 TSE. There was no sedation. Scans were done without oral or intravenous contrast. Patients had CT as "gold standard" within 24 hours of the MR exam. Multitransmit MR had shorter TR for given TE with range of 825-1300 for average scan time of 2 minutes 30 seconds. Non-mulitransmit MR had TR range of 1495-2175 with average scan time of 4 minutes 49 seconds. All scans had FOV 230 to 300 mm, pixel 0.8/0.8, slice thickness 3mm. MR exams interpreted by two, board-certified radiologists blinded to patient information.

Results: 5 patients had normal study. 2 had acute appendicitis, 1 had SBO (small bowel obstruction) due to adhesions from prior appendectomy, and 2 had mesenteric adenitis. The radiologists made the correct diagnosis in all cases. Multitrasnsmit MR was judged same or better than routine fast MR imaging in all cases. One radiologist rated multitransmit better in 7 cases, and the other in 3 cases due to improved uniformity of fat signal, better contrast in fluid signal, and less dielectric shading effects. Multitransmit MR overall exam times were 48% faster on average, and all sequences were less than 60 seconds.

Routine MR
1 min 39sec



Multitransmit MR
49 sec scan
appendix better seen



Case of SBO
Multitransmit MR
51 sec scan

Conclusion: Ultrafast abdominal MR Imaging at 3.0T with multitransmit shows promise as an alternative imaging modality for the diagnosis of acute abdominal pain in young adults and children, which eliminates the need for sedation and CT-associated radiation exposure. All scans require no oral or intravenous contrast, and overall average scan time was 2 minutes 30 seconds.