

Presenter: Hina Arif, M.D.

Title of Abstract: **Noncontrast MRI versus contrast enhanced CT for evaluation of suspected acute appendicitis in patients <40 years: Cost considerations and impact on emergency department patient throughput.**

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Modality: Multi

Organ System: GI

Intro: MRI offers several advantages compared to CT when evaluating non-traumatic abdominal complaints in the ED including lack of ionizing radiation. However, cost-considerations and reduced availability have discouraged the wide-spread use of MRI vs CT as the primary imaging modality for common entities such as acute appendicitis.

Purpose: To compare noncontrast MRI vs contrast-enhanced CT for ED patients with right lower quadrant pain, with attention on patient throughput and comparative imaging costs during the ED visit.

Methods Used: This study was IRB-approved. Inclusion criteria included all patients at our institution ≤ 40 years presenting to the ED during daytime hours, undergoing noncontrast MRI or IV contrast-enhanced CT as the primary imaging method for evaluation of acute appendicitis between 8-2012 and 3-2013. Exclusion criteria included patients > 40 years and patients without concern for acute appendicitis. MRIs utilized a fast, no oral or IV contrast protocol, including multiplanar non-breath-hold, Half Fourier Acquisition Single Shot Turbo Spin Echo (HASTE) sequences +/- fat saturation utilizing a spectral adiabatic inversion recovery (SPAIR) technique. CTs were performed on a 64 slice scanner with IV but no oral contrast. Data collected included time from ED triage to disposition (admit or discharge) and total number of abdominal imaging examinations performed during the ED stay. Cost-figures for each imaging modality and ancillary imaging tests were determined utilizing regional Medicare rates.

Results of Abstract: There were 33 MRI patients and 42 CT patients. Noncontrast MRI was associated with a significant reduction in ED length of stay compared to IV contrast-enhanced CT (560 min vs. 685 min, $p=0.04$). MRI patients had fewer ancillary imaging exams compared to CT (0.42 and 0.79 per patient, respectively, $p<0.001$), primarily abdominal and pelvic ultrasounds (33 for CT and 14 for MRI). Total abdominal imaging costs during the ED visit were \$810 for MRI and \$458 for CT. The price-point for MRI to be cost-equivalent to CT in our cohort is \$169 per spared ED hour.

Discussion: Evaluation of acute appendicitis with noncontrast MRI resulted in a significant reduction in number of imaging tests and ED length of stay, compared to IV contrast-enhanced CT.

Scientific and/or Clinical Significance? Improvements in ED throughput and reduction in number of imaging tests for patients undergoing noncontrast MRI for suspected acute appendicitis may offset additional MR imaging costs in patients <40 years, compared with contrast-enhanced CT.

Relationship to existing work Advances current understanding of MRI as the primary imaging modality for acute appendicitis, illustrating potential for cost-neutrality compared to CT and improved patient throughput, primarily through reductions in ancillary imaging studies.