Getting the Steak Without the Sizzle: Is MR Enterography as Good as CT Enterography?

Siddiki HA, Fidler JL, Fletcher JG, et al. Prospective comparison of state-of-the-art MR enterography and CT enterography in small-bowel Crohn's disease. Am J Roentgenol. 2009;193:113–121.

Several recent studies have identified an accelerating rate of radiation exposure in patients with poorly controlled complicated small bowel Crohn's disease (CD), largely due to abdominal and pelvic computed tomography (CT) scans performed in local emergency departments with potentially long-term clinical consequences.[1–3] This has motivated active research into alternatives for disease activity assessment, including magnetic resonance enterography (MRE).

Dr. Siddiki et al designed this study to assess whether MRE is as accurate as CT enterography (CTE) in assessing disease activity. They performed clinical evaluation, ileocolonoscopy, CTE, and MRE in 30 patients (3 were unable to complete all 3 studies). The radiologist readers were blinded to clinical information when reading each scan. The interobserver agreement was substantial for both MRE (0.63, 95% confidence interval [CI] 0.31–0.92) and for CTE (0.76, 95% CI 0.5–1.0). MRE had a sensitivity of 90.5% (95% CI 70–99) and specificity of 66.7% (95% CI 30–93) and CTE had a sensitivity of 95.2% (95% CI 76–100) and specificity of 88.9% (95% CI 52–100) for detecting small bowel disease activity. Twenty-three (77%) patients underwent MRE the same day as the CTE. The remainder underwent MRE within 21 days of CTE.

The endoscopy was performed without input from the study team, and therefore no endoscopic disease severity scoring was performed, and biopsies were not consistently obtained. MRE and CTE scans identified disease activity in 8 patients (24%) with normal endoscopy, and in an additional 3 patients who did not have ileal intubation on colonoscopy. A composite ''clinical reference standard'' of active, inactive, or absent small bowel CD was constructed based on the impression of the treating clinician, the findings on endoscopy, biopsies (if taken), and readings of the CTE and MRE (after they had already been scored). Twenty-two patients (67%) had active disease, 2 (6%) had inactive disease, and 9 (27%) had no evidence of CD. MRE and CTE had similar sensitivities for detecting active small bowel inflammation.

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COMMENT

Dr. Siddiki et al compared CTE and MRE head-to-head in 30 patients with suspected inflammatory bowel disease and recent ileocolonoscopy in order to determine whether MRE is capable of replacing CTE as the diagnostic imaging test of choice for CD. Although there is no single gold standard for disease activity, comparison with a global clinical impression that takes into account both endoscopic and clinical as well as imaging findings is the most practical gold standard for disease activity in CD.

However, neither the ''comprehensive clinical reference standard'' nor the endoscopic and biopsy assessment were standardized, and the absence of a consistent method for determining the activity leaves the reliability of this reference standard shaky. A similar study by Lee et al[4] used more consistent definitions of endoscopic disease severity and found MRE to be similarly comparable to CTE. Ippolito et al's[5] study used Crohn's Disease Activity Index (CDAI) scores as a reference standard and found MRE and CTE to be fairly similar, with CTE better for fatty proliferation and MRE better for fistulizing disease.

MRE suffered somewhat in image quality, and did not provide high-quality images as consistently as CTE. The use of buscopan in Europe may substantially improve the quality of MRE by limiting peristalsis, but buscopan is not available in the US.[6] Quality improvement initiatives at our center are actively trying to identify combinations of glucagon with other medications to replicate the effects of buscopan. MRE trended toward a lower specificity for disease activity versus CTE, without reaching statistical significance. The interobserver agreement of the various specific imaging features of MRE and CTE were good, but it remains to be seen how consistent radiologic readings will be outside of academic centers. The 1 comparison that may be clinically significant was that MRE had a substantially

higher kappa score for penetrating disease than CTE. This would imply that MRE is more consistently able to detect penetrating disease than CTE, a feature that has been suggested in other studies.[5,7]

Despite the limitations of this small study, it does show roughly similar accuracy of MRE and CTE in patients with suspected small bowel CD, consistent with other comparative studies. Five immediate issues remain unaddressed. Can MRE motion artifact be reduced and image quality be improved? Can these scans predict clinical outcomes? Can the cost be reduced? Can this accuracy be replicated outside of academic centers? And will MRE be accurate in children, who are inherently more susceptible to ionizing radiation?[1–3] At this point, MRE appears comparable to CTE, although it might have slightly less specificity for disease activity. In patients who have complicated small bowel CD at centers with expertise in MRE, the choice of MRE trades a small loss of specificity and increased cost for the elimination of radiation exposure. In patients with complicated small bowel CD, this can often be a worthwhile tradeoff.

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