Systematic review: MRI enterography for assessment of small bowel involvement in pediatric Crohn's disease

Giles E, Barclay AR, Chippington S, Wilson DC

CRD summary
This review assessed the diagnostic value of Magnetic Resonance Imaging Enterography in the identification of small bowel involvement in pediatric Crohn's Disease. The authors concluded that this test performed well compared to alternative techniques. These findings from a limited evidence base may have been overestimated and should not be considered reliable until further research has been undertaken.

Authors' objectives
To assess the diagnostic value of Magnetic Resonance Imaging Enterography (MRE) in the identification of pediatric small bowel Crohn's Disease compared to alternative imaging tools.

Searching
MEDLINE, EMBASE, CINAHL and PubMed were searched from inception to April 2012 for relevant studies in English. Search terms were reported. Reference lists of relevant studies and reviews were screened manually. Additional citation searches were undertaken using the Web of Science database. Personal publications, two online journals and abstracts from four journals were searched.

Study selection
Eligible studies assessed use of MRE to investigate patients with known or suspected inflammatory bowel disease. At least 75% of study patients had to be aged under 18 years at the time of imaging. Outcomes of interest were sensitivity (the ability of the test to correctly identify patients with the disease) and specificity (the ability of the test to correctly identify patients without the disease) of alternative imaging (reference) tests in comparison to the index test (MRE).

Included studies were published between 2003 and 2012. Participant details were not reported. Additional investigative tests included ultrasound, barium meal and computerised tomography. Reference tests in all studies were ileo-colonoscopy and histopathology (endoscopy). MRE technical details varied across studies, with some including spasmolytics (muscle relaxants) or bowel preparation. Most studies used one or two blinded radiologists as observers but observer criteria again varied across studies.

At least two reviewers appear to have been involved in screening studies for inclusion.

Assessment of study quality
Two reviewers independently assessed the quality using the 14-item quality assessment of diagnostic accuracy studies (QUADAS) tool. Where discrepancies arose, a third reviewer was consulted.

Data extraction
Data were extracted to calculate study sensitivity and specificity values, along with 95% confidence intervals, for each test comparison. Study authors were contacted where necessary for clarification or further information.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
Where studies were too heterogeneous, a narrative synthesis was presented. Where studies were sufficiently similar, sensitivities, specificities and 95% confidence intervals (CIs) were pooled using meta-analysis. Where data were not available or comparable data were not provided, studies were excluded from the main analysis. The Summary Receiver Operating Characteristic (SROC) curve was calculated.

Results of the review
Eleven studies (495 children, range 28 to 175; 499 MRE investigations) were included in the review. Seven studies were
prospective, three were retrospective case-note reviews and one study had an unclear design. Studies met between six and 13 QUADAS criteria.

Sensitivity ranged from 61% to 91% (one study) to 96% (one study), and specificity ranged from 60% to 90% (one study) to 100% (three studies). MRE showed greater sensitivity and specificity compared to bariatric meal (four studies), while MRE showed equivalent results compared to ultrasound (two studies).

Meta-analysis of six studies showed a combined sensitivity of 0.84 (95% CI 0.77 to 0.90; $I^2=0\%$) and specificity of 0.97 (95% CI 0.91 to 0.99; $I^2=0\%$). The SROC curve showed an area under the curve of 0.95.

The combined sensitivity for bariatric meal was 0.72 (95% CI 0.58 to 0.83; $I^2$ not reported) and specificity was 0.73 (95% CI 0.54 to 0.87; $I^2$ not reported). There was insufficient data to combine data on ultrasound.

**Authors' conclusions**

MRI enterography is a sensitive and specific tool for the diagnosis of paediatric inflammatory bowel disease and is at least equivalent to bariatric meal.

**CRD commentary**

The review question and inclusion criteria were clearly stated. A comprehensive search of the literature was undertaken but this was restricted by language so potentially relevant studies may have been missed (the authors acknowledged this). Study quality was assessed using criteria designed for diagnostic studies and results were discussed but not accounted for in the analyses. Study selection and quality assessment appear to have been performed in duplicate but it was unclear whether this was true for data extraction. Reviewer error and bias cannot, therefore, be ruled out.

Study methods and diagnostic test techniques were fully reported but details on participants were lacking. However, the authors acknowledged that there was marked heterogeneity in terms of patient populations in addition to heterogeneity in study methods and test techniques. The authors' decision to only combine studies that were sufficiently similar was appropriate. The authors did not provide details on the statistical methods used to combine data or methods used to calculate the SROC curve so it was not possible to comment on the appropriateness of the methods used. The results suggest that MRE performed well in comparison to endoscopy, as well as bariatric meal, but it was unclear how appropriate the statistical methods used were. The comparisons between MRE and bariatric meal were indirect so it was not possible to determine the reliability of the findings. In addition, the evidence base was generally small in terms of number of studies and number of participants (which the authors acknowledged).

The authors also expressed concern over the use of ileo-colonoscopy as the gold standard index test. These limitations suggest that the sensitivity and specificity of MRE may have been overestimated and the authors' conclusions should be treated with caution until further research is undertaken.

**Implications of the review for practice and research**

**Practice:** The authors stated that given the lack of radiation exposure, MRE appeared to be the best modality in the absence of an absolute gold standard and the evidence suggested that in centres with adequate expertise MRE should supersede bariatric meal as the small bowel imaging technique of choice.

**Research:** The authors stated that further research is required to optimise bowel preparation and imaging techniques for MRE to increase tolerability and imaging adequacy.

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**Bibliographic details**


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Record Status
This is a systematic review that meets the criteria for inclusion on DARE.