CT and MR Enterography: The Present and the Future of Small Bowel Imaging

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Introduction

CT enterography and MR enterography are currently the main imaging methods to evaluate the small bowel. Of them, the importance of MR enterography is increasingly recognized related to the concerns about radiation exposure from CT enterography. The purpose of this lecture is to summarize the current status and role of the two examinations and to discuss CT/MR enterography-related issues to be resolved, hopefully, in near future. Given the time limitation, this lecture will focus on the imaging evaluation of Crohn’s disease and will skip other diseases.

Present

1. CT enterography vs. MR enterography: strengths and weaknesses

Point-by-point comparison between CT enterography and MR enterography is provided in Table 1. The most notable advantage of MR enterography is the lack of radiation exposure. Otherwise, CT enterography has multiple advantages. Therefore, MR enterography is generally most appropriate for evaluating young patients (i.e., <35 years) or in clinical settings that require multiple repeated examinations.

<table>
<thead>
<tr>
<th>CT enterography</th>
<th>MR enterography</th>
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<tr>
<td>Technically more robust and easy</td>
<td>Technically more difficult</td>
</tr>
<tr>
<td>Short examination time</td>
<td>Long examination time</td>
</tr>
<tr>
<td>More accessible</td>
<td>Less accessible</td>
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<tr>
<td>Higher technical and interpretive reproducibility</td>
<td>Relatively lower technical and interpretive reproducibility</td>
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<tr>
<td>Better in evaluating clinically unsuspected pathology outside the bowel</td>
<td>Better suited for organ specific and disease specific (e.g. Crohn’s disease) evaluation</td>
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<td>Works better for acute, severe, complex, and emergent cases</td>
<td>May not work well for acute, severe, complex, and emergent cases</td>
</tr>
<tr>
<td>Less expensive</td>
<td>More expensive</td>
</tr>
<tr>
<td>Causes radiation exposure</td>
<td>No radiation exposure</td>
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</tbody>
</table>

Table 1. Point-by-point comparison between CT enterography and MR enterography
2. Accuracy for diagnosing active bowel inflammation and complications

Both CT enterography and MR enterography have a fairly high accuracy for diagnosing active bowel inflammation and complications of Crohn’s disease. These accuracies are essentially identical.\(^5\)

**Future**

1. Standardized nomenclature for interpreting and reporting CT/MR enterography

Although CT/MR enterography are widely used in the management of Crohn’s disease, it is also true that there is a fairly large heterogeneity and inconsistency in the way that the examinations are interpreted and reported, both between different readers within an institution and across different institutions. Consistency in the interpretation and reporting of the imaging examinations would be especially crucial for accurate consistent patient management and follow-up. Standardized definitions and nomenclature for the findings and disease phenotypes noted on CT/MR enterography are currently being developed through an international multidisciplinary effort.

2. Assessment of bowel inflammatory severity using CT/MR enterography

Despite numerous CT/MR enterography-based scoring systems to (semi-)quantitatively measure bowel inflammatory severity of Crohn’s disease reported in the literature,\(^6-9\) there are still not any robust widely accepted CT/MR enterography parameters to measure bowel inflammatory severity of Crohn’s disease. MaRIA score\(^6,8\) and London score\(^9\) are arguably the two most well-known scoring systems thus far. However, they are not well accepted in daily clinical practice. A more robust imaging parameter or interpretation system should be made.

3. Evaluation of bowel damage and fibrosis

In contrast with the high diagnostic performance of CT/MR enterography for diagnosing bowel inflammation of Crohn’s disease, neither CT enterography nor MR enterography can accurately diagnose and measure bowel damage and fibrosis. More research studies are needed in this area.

**Conclusions**

CT/MR enterography generally provide accurate diagnostic information regarding bowel inflammation and complications of Crohn’s disease. However, there is currently a lack of robust imaging parameters to be used in daily practice to (semi-)quantitatively measure bowel inflammatory severity. CT/MR enterography also has a limited role in evaluating bowel damage and fibrosis. Therefore, more work is needed in these areas in the near future. Standardized nomenclature for CT/MR enterography findings will enhance the clinical impact and utility of CT/MR enterography in the management of Crohn’s disease and this will come soon.

**References**


