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8th Gastro Foundation Weekend for Fellows; Spier Hotel & Conference Centre, Stellenbosch

New Horizons in Imaging

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Clinical case

Female, 27 years of age

8 weeks: diarrhoea (4–6 liquid stools/day), abdominal pain, arthralgia

Medical history: no diseases, non-smoker

Lab parameters:
- Leucocytes: 12,380/mm$^3$, lymphocytes: 1600/mm$^3$
- CRP: 17 mg/L (normal <5 mg/L)
- Albumin: 31 g/L
- Stool culture including *Clostridium difficile* toxins A and B: negative

Colonoscopy: no specific findings; terminal ileum intubated for 5 cm; no further ileoscopy possible
Clinical case

Female, 27 years of age

8 weeks: diarrhoea (4–6 liquid stools/day), abdominal pain, arthralgia

WHAT NEXT ???
Imaging modalities for IBD assessment

Endoscopy
- Double-balloon enteroscopy
- Capsule endoscopy

Ultrasound

CT scan

MRI
Bowel ultrasound: The radiologist’s view

Random noise

Iris diagnostics

Reading tea leaves
Comparison of MRI and bowel ultrasonography

Meta-analysis of 68 publications

<table>
<thead>
<tr>
<th></th>
<th>Mean sensitivity estimates for diagnosis of IBD</th>
<th>Mean specificity</th>
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<tbody>
<tr>
<td>US</td>
<td>0.84</td>
<td>0.92</td>
</tr>
<tr>
<td>MRI</td>
<td>0.93</td>
<td>0.90</td>
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MRI, CT, scintigraphy and ultrasound in IBD: Meta-analysis of prospective studies

<table>
<thead>
<tr>
<th></th>
<th>Studies</th>
<th>Patients (n)</th>
<th>Sensitivity % [range]</th>
<th>Specificity % [range]</th>
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<tbody>
<tr>
<td>Ultrasound</td>
<td>9</td>
<td>1000</td>
<td>90 [78–96]</td>
<td>96 [67–100]</td>
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<tr>
<td>Scintigraphy</td>
<td>3</td>
<td>152</td>
<td>88 [76–95]</td>
<td>85 [78–93]</td>
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<tr>
<td>CT</td>
<td>4</td>
<td>113</td>
<td>84 [77–87]</td>
<td>95 [67–100]</td>
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<tr>
<td>MRI</td>
<td>7</td>
<td>292</td>
<td>93 [82–100]</td>
<td>93 [71–100]</td>
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</tbody>
</table>

Imaging

MRI

Ultrasound
“Theoretic” Cumulative Effective Dose of diagnostic radiation exceeds 75 mSv in 15.5% of patients with Crohn’s disease

<table>
<thead>
<tr>
<th>Cumulative effective dose range (mSv)</th>
<th>Number of patients (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No imaging</td>
<td>88</td>
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<tr>
<td>0–25</td>
<td>112</td>
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<tr>
<td>25–50</td>
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<td>50–75</td>
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<td>75–100</td>
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<tr>
<td>100–150</td>
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<tr>
<td>200–300</td>
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<td>300–400</td>
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</table>

Safety

CT scan

10 – 17 mSv

Conservative estimate – 10 mSv:
1 carcinoma in 5000 patients
MRI parameters activity in CD

MaRIA = 1.5 * wall thickness (mm) + 0.02 * RCE + 5 * edema + 10 * ulcers

MaRIA, Magnetic Resonance Index of Activity
Bowel ultrasonography

Terminal ileitis

Ileocolonic anastomosis
Bowel US features: fistula and abscess

Fistula

Abscess

Ileum
Bowel US in clinical practice

High sensitivity and specificity for assessment of IBD manifestations, disease activity and complications

Main uses:
Initial evaluation of suspected IBD
Follow up for assessment of disease activity and complications

Advantages:
Quick and easy, non-invasive, no preparation, no sedation, broadly available, inexpensive, no radiation, real-time movement, structures outside the gut

Limitations:
Sometimes limitations in assessing the jejunum, proximal ileum and pelvis
Sometimes impaired by gas-filled bowel and by large body habitus
Summary: small bowel examinations in CD

Initial diagnosis:
MRI, US, (SBCE)

Follow up, disease activity:
US

Negative findings: MRI

In case of complications: US, MRI, CT
Magnetisation transfer MRI: examples

T2 images (left column), contrast-enhanced T1 images, and parametrical MTR maps (right column)

A) Female patient (18 years of age), with acute inflammation in the terminal ileum

B) Male patient (29 years of age) with chronic-fibrotic stricture (high MT)

C) Male patient (45 years of age), with chronic stricture (high MT)

D) Male patient (37 years of age), with acute inflammation (low MT)
Summary

Imaging for monitoring will be an essential component of future IBD patient care

However, imaging should be problem-driven (“is there a question to answer?” “Will the results of imaging change treatment?”), and not on a strict regular basis

Ultrasound may be used instead of endoscopy in many situations for the monitoring of patients with IBD

MRI – if available – should be preferred over CT scans

New MRI techniques will soon be available
Thank you for your attention