Effect of Buscopan on Image Quality in Abbreviated Non-Contrast MRE: A Blinded Multireader Analysis

Vishaal Ladva, George Hammerton, Neesha Cooray, Ryan Norman, Joy Barber, Nirav Patel, Jonny Gabriel, Jagadish Kalasthry, Anita Wale, Kunal Patel

St. George's University Hospitals Foundation Trust, City St George's University of London

Current Standards for Bowel Preparation in MR Enterography

- Current best practice standards are for the patient to be prepared with both:
  - Oral contrast (PO mannitol) for adequate small bowel distension
  - Antispasmodic agents (IV Buscopan/IV Glucagon) to reduce bowel motion artefact.

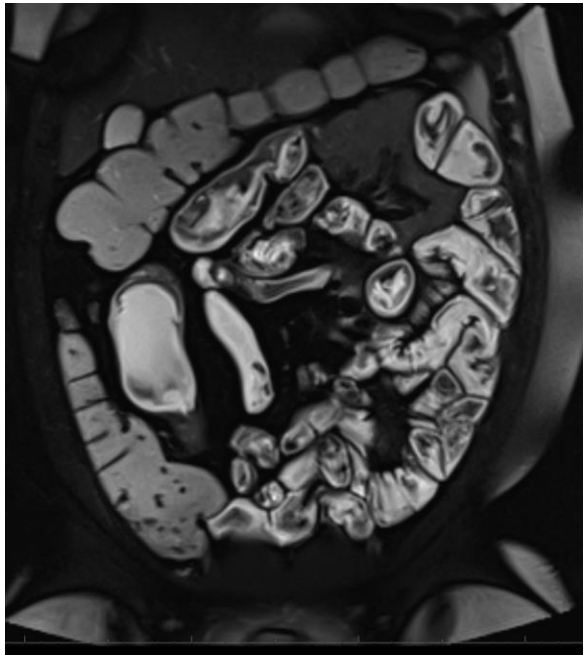
- IV Buscopan and IV Glucagon are equivalently effective antispasmodic agents.

- Very little evidence exists to support the omission of anti-spasmodic agents for suitable sequences.

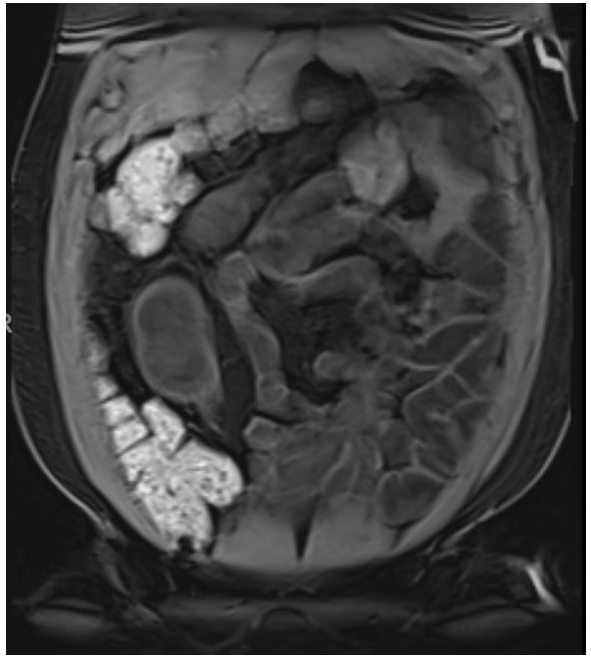
- The advisory statement from ESGAR/ESPR recommends timing of Buscopan administration to be based on how susceptible each sequence is to motion artefacts.

https://doi.org/10.1007/s00330-016-4615-9

Which sequences are most susceptible to motion artefacts?

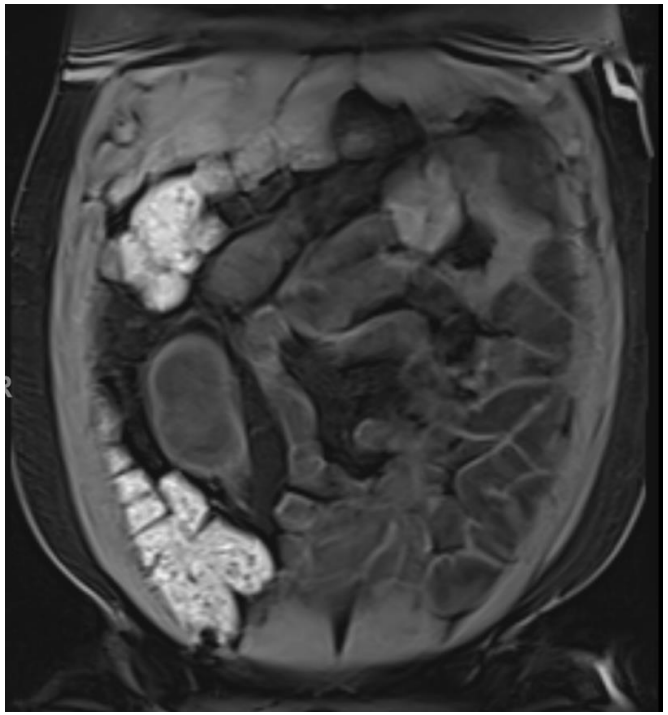


2D sequences are less susceptible to motion artefact as they're acquired in single slices (i.e. T2 weighted in our protocol)

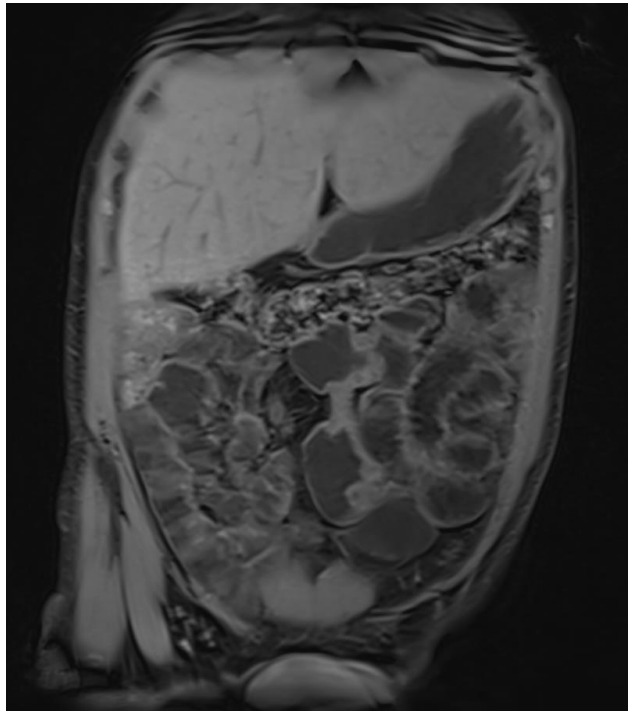


3D sequences are more susceptible to motion artefact, as a volume of data takes much longer to acquire (i.e. T1 pre and post-contrast in our protocol)

T1 Volumetric Sequences are the Most Susceptible to Motion Artefact



Example of T 1 non-contrast without Buscopan: Lots of Bowel Motion Artefacts



Example of T 1 non-contrast with Buscopan: Fewer Motion Artefacts

Hypothesis

Basis:

2D MRE sequences may not be degraded by the omission of IV Buscopan, as they are acquired in single slices, unlike volumetric sequences.

Hypothesis:

The omission of IV Buscopan does not degrade the diagnostic quality of non-contrast MR enterography performed for evaluation of small bowel.

Previous Practice for Non-Contrast MRE – Up to 2024

Localiser Sequences

↓

T2 TruFi Coronal and T2 Motility

↓

Administer: 20mg IV Buscopan (20mg/1ml)

↓

T2 HASTE Axial and Coronal (+/- FS)

+

T 1 Pre-Contrast

Updated Practice from 2025

Localiser Sequences

↓

T2 TruFi Coronal and T2 Motility

↓

~~**Administer:** 20mg IV Buscopan (20mg/1ml)~~

These sequences evaluated for image quality

T2 HASTE Axial and Coronal (+/- FS)

+

T 1 Pre-Contrast

Study Population

Exclusion Criteria:

- Age < 18
- No PGD documentation scanned into RIS (Soliton)
- Missing sequences (T2 HASTE Axial, Coronal, and Coronal FS)
- Indications other than investigation for IBD diagnosis / Follow Up
- More than one study from the same patient

Methods

Each Study given a Random and Unique Identifier Number

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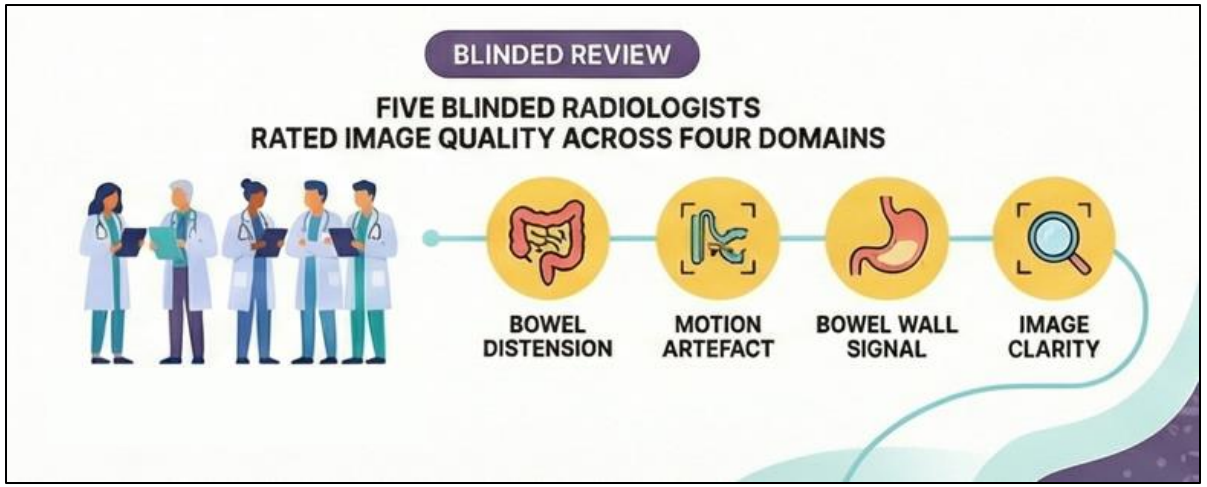
Images Anonymised and Exported in DICOM Format

↓

Cases viewed in MicroDicom Viewer

↓



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Data Analysis using 'R' and 'Python' to compare MREs with and without Buscopan

Likert Scales

Likert scales were used to evaluate each of the following domains:

- Bowel Wall Signal
- Distensibility
- Image Clarity
- Bowel Wall Motion Artefact

Example Scale
5 – Optimal
4 - Slightly less than optimal - does not affect diagnostic quality
3 - Moderately less than optimal - minimal loss of diagnostic quality but no loss in confidence
2 - Significantly less than optimal - some loss of diagnostic confidence but still able to report the scan
1 - Non-diagnostic

Results and Interpretation

Omission of IV Buscopan **did not produce a significant difference in image quality ratings** overall

(OR=0.969, 95% CI 0.573-1.637, p=0.9058)

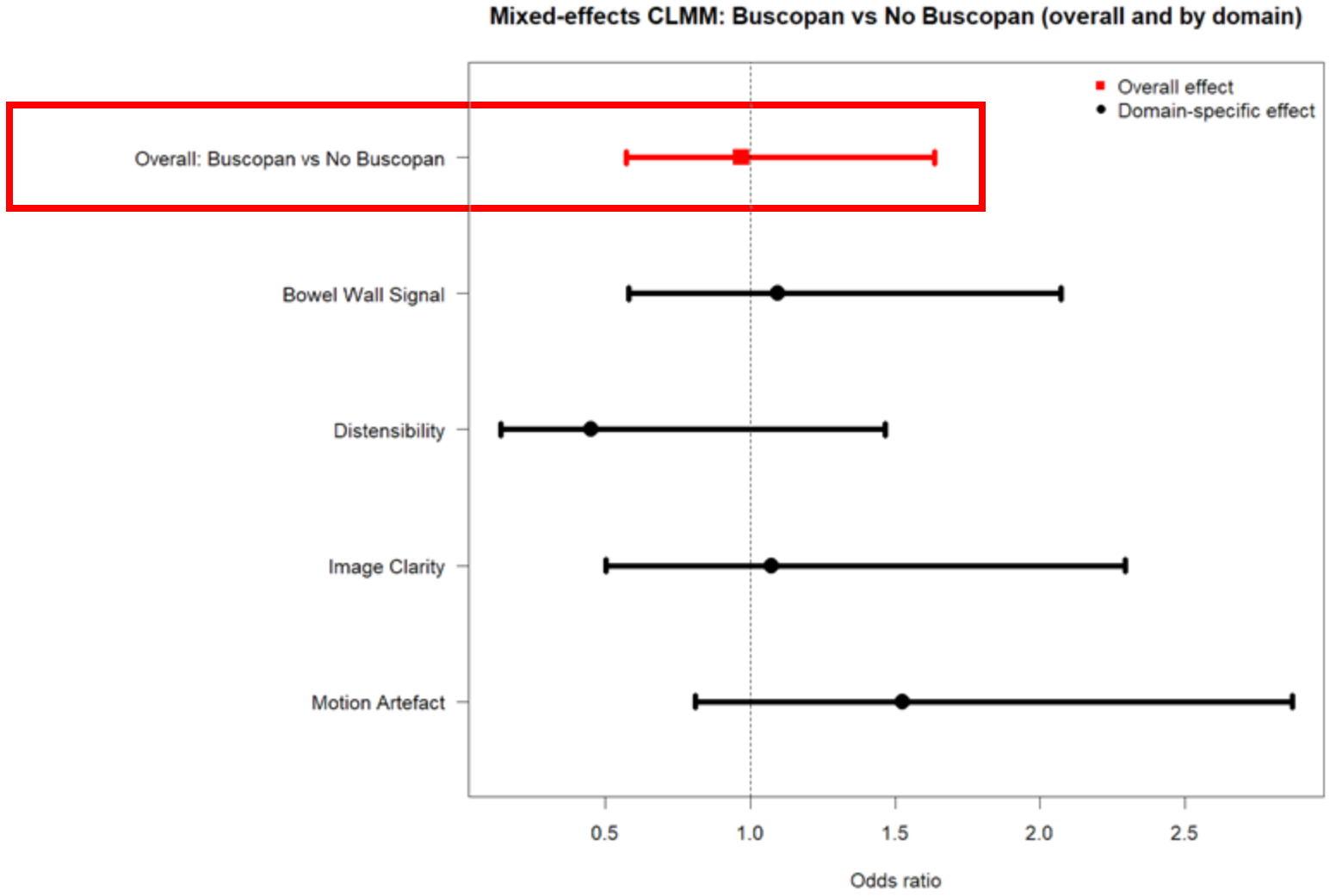


Figure 1 - Forest plot generated by the cumulative link mixed model (CLMM) illustrating the domain-specific and overall effect of Buscopan on image quality

Results and Interpretation

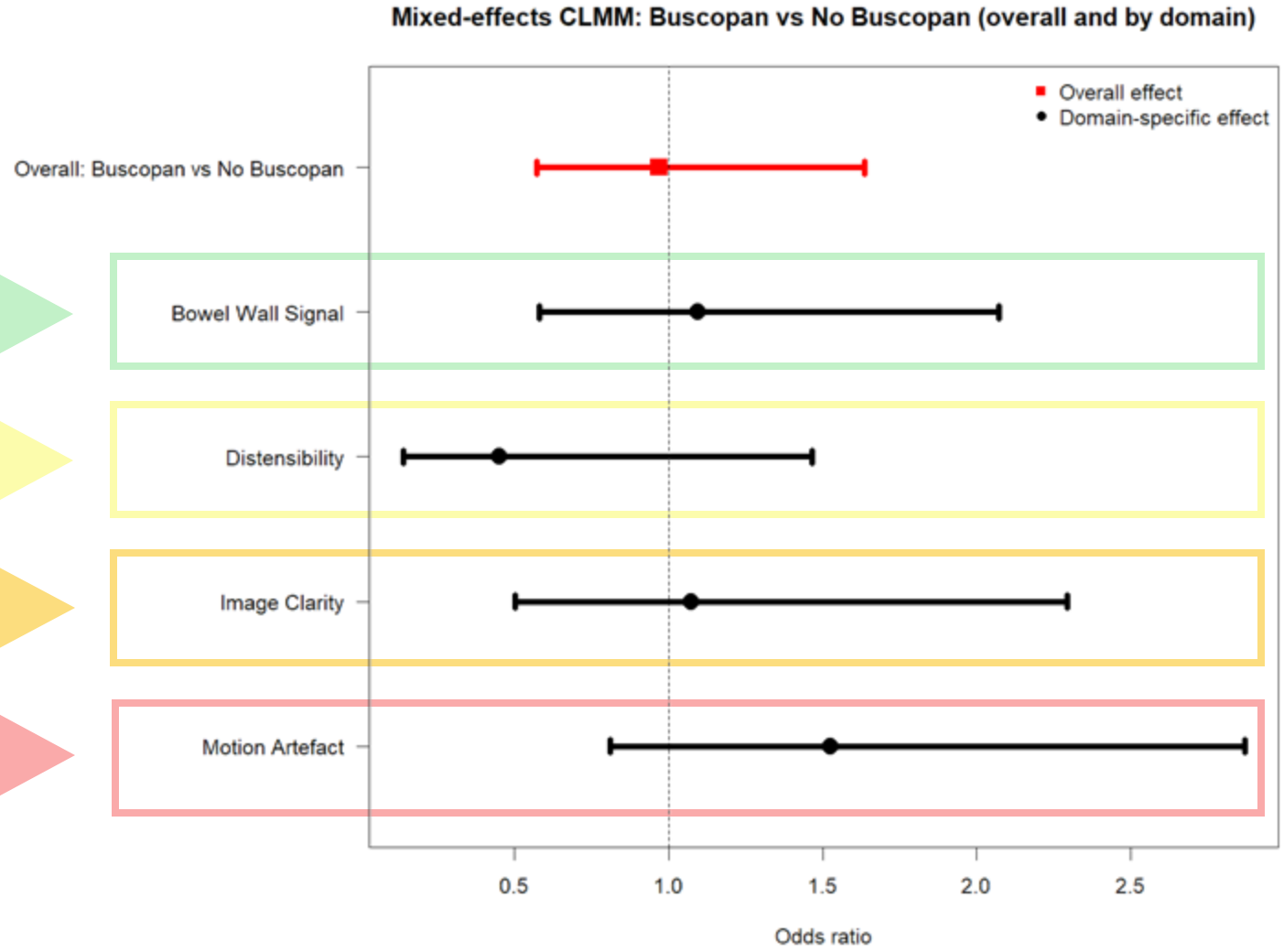
Administration of Buscopan **did not significantly affect image quality ratings** across any of the individual domains:

Bowel Wall Signal
(OR=1.096, 95% CI 0.580-2.072, p=0.778)

Distensibility
(OR=0.45, 95% CI 0.139-1.466, p=0.186)

Image Clarity
(OR=1.074, 95% CI 0.502-2.294, p=0.854)

Motion artefact
(OR=1.527, 95% CI 0.812-2.872, p=0.189)



Conclusion

Omission of Buscopan in Non-Contrast MR Enterography **<u>does not</u>** degrade overall image quality.

Bowel distension, bowel wall clarity, bowel wall signal and the degree of motion artefact is unaffected by the omission of Buscopan.

This has potential cost and time-saving implications, better utilising financial resources, scanner time, and radiographer time.

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