

MR colonography with fecal tagging: Do individual patient characteristics influence image quality?

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Introduction:

MR colonography (MRC) required bowel cleansing in a manner similar to colonoscopy. Since more than half of patients undergoing bowel preparation complain about symptoms ranging from 'feeling unwell' to 'inability to sleep' (1), patient acceptance was negatively impacted. To assure high patient acceptance of virtual MR-colonography, strategies to eliminate bowel cleansing were introduced. This could be achieved with fecal tagging – a concept based on altering the signal intensity of stool by adding contrast modifying substances to regular meals. The feasibility of MRC in conjunction with barium based tagging substances has already been demonstrated (2). However, diagnostic image quality was still hampered in some patients due to an insufficient effect of the tagging agent. We aimed to evaluate if different patient properties (including age and weight) have an influence on image quality of fecal tagging based MRC.

Materials and Methods:

397 asymptomatic patients (205 woman, 192 men; mean age 58 years) underwent MRC with fecal tagging. Preparation for MRC included the ingestion of 200ml of a contrast solution containing 5% gastrografin, 1% barium and 0.2% locust bean gum with every main meal starting two days before the MR examination. MRC was performed on a 1.5 T MR system (Magnetom Sonata, Siemens Medical Solutions, Erlangen, Germany) in patients' prone position. For spasmolysis, 40mg of scopolamine (Buscopan; Boehringer Ingelheim, Germany) was intravenously administered to minimize bowel peristalsis and to reduce colonic spasms. After the placement of a rectal tube, the colon was filled with approximately 2500ml of warm tap water. A T1w 3D GRE sequence was acquired before and 75s after i.v. gadolinium administration. Four segments of the large bowel (ascending, transverse, descending and sigmoid colon) were assessed as for the presence of non-tagged stool particles, which can impede a reliable assessment of the colonic wall. To that, every bowel segment was evaluated according to a 5-point scale: 1= no visible fecal material, 2= little visible fecal material, but fully diagnostic image quality, 3= slightly reduced image quality, 4= considerably reduced image quality, 5= not-diagnostic image quality due to extensive non-tagged stool). Ratings were correlated with patients' characteristics including patients' age (younger / older 55 years), body-mass-index (more / less than 25). Statistical analysis was performed using a Mann-Whitney-U-test.

Results:

1586 colonic segments were evaluated. 400 segments (25%) did not contain any visible non-tagged stool particles. Extensively non-tagged stool and consecutively non-diagnostic image quality was found in 81 segments (5%). The mean value for image quality was 2.3. Best image quality was found in the sigmoid colon (mean value: 1.9), while image quality of the ascending colon turned out to be worst (mean value: 2.6). However, results of different patients group both concerning patients' age and BMI failed to prove any statistically significant difference.

Conclusion:

MRC in conjunction with barium-based fecal tagging led to diagnostic image quality in 95% of all colonic segments. However, there was no proven influence of patient characteristics such as age and body-mass-index on image quality.

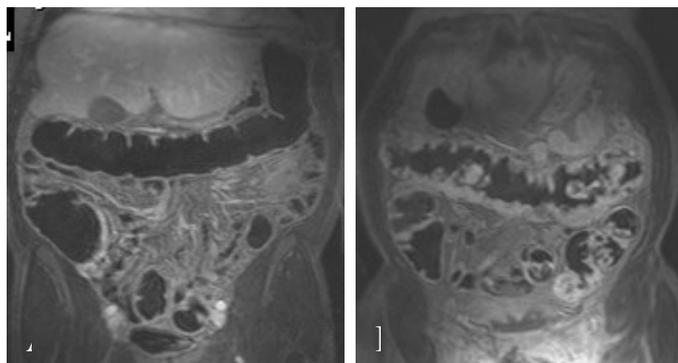
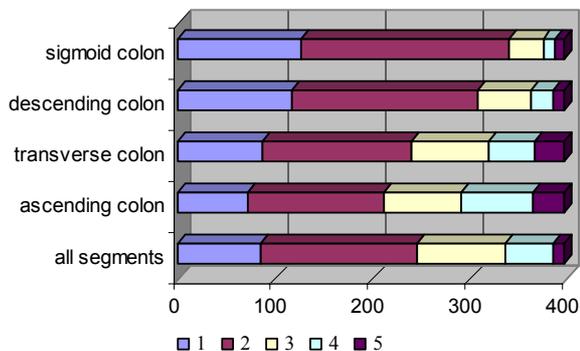


Fig. 1: Contrast-enhanced T1-weighted sequence in a patient with no identifiable stool residuals (A) and a patient with non-tagged stool residuals (B). Image quality in patient B is not diagnostic, because the colonic wall can not be differentiated from the bright fecal material.



References

1. Elwood MJ, Ali G, Schlup MT et al. Flexible sigmoidoscopy or colonoscopy for colorectal screening: a randomized trial of performance and acceptability. *Cancer Detection and Prevention* 1995;19:337-347
2. Lauenstein TC, Debatin JF. Magnetic resonance colonography with fecal tagging: an innovative approach without bowel cleansing. *Top Magn Reson Imaging*. 2002; 13:435-44.

Fig. 2: Effect of fecal tagging according to a five-point scale (1=very good image quality, 5=not-diagnostic image quality). Best results were found in the sigmoid, while the effect of fecal tagging was less efficient in the ascending colon.