

MR COLONOGRAPHY WITHOUT BOWEL CLEANSING: IMPACT OF AN ORAL AND RECTAL STOOL SOFTENER

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ABSTRACT:

Aim of this study was to assess the effect of stool softeners on MR colonography (MRC) without colonic cleansing. 10 volunteers underwent MRC with and without the oral administration of lactulose and a rectal enema consisting of ducosat sodium. Both substances led to a decreasing SNR of feces on T1w data sets. The combination of oral lactulose and rectal ducosat sodium, however turned out to provide lowest SNR values of stool. Thus, feces hardly could be distinguished from the dark rectal enema and assessment of the colonic wall is reliably possible.

INTRODUCTION:

MR colonography (MRC) has been found to detect colonic pathologies with high accuracy (1). Despite the non-invasive character of MRC, patients acceptance remains limited because of the need for bowel cleansing. To avoid bowel cleansing, new approaches have been developed based on the modulation of signal characteristics of fecal material. This can be achieved by adding contrast modifying substances to regular meals (fecal tagging). One recent approach in conjunction with fecal tagging has been based on the oral application of bariumsulfate (2). Thus, signal of feces in T1w data sets can be decreased and stool becomes invisible due to similar signal characteristics as the water-consisting rectal enema. However, barium based fecal tagging is limited due to certain drawbacks: fairly large amounts of barium need to be ingested over a long time range of up to 72 hours prior to the MR examination. Furthermore, patients acceptance is reduced because of the unpleasant taste of high concentrated barium formulas. Aim of this study was twofold: to assess whether the signal of fecal material can be adequately modified by the rectal administration of a stool-softener (ducosat sodium). Secondly, we intended to evaluate if ingesting small amounts of lactulose resulted in a synergic effect for the reduction of signal intensity.

METHODS:

10 healthy volunteers without any history of colorectal pathologies underwent MR colonography without bowel-cleansing on four separate days. There was a minimal time lag of seven days between two single examinations. To standardise the primary consistence of feces volunteers were asked to eat similar foodstuff two days prior to MRC. Examinations were performed on a 1.5 T system (Magnetom Sonata, Siemens Medical Systems, Erlangen, Germany). As a first set of experiments, a baseline examination was performed without oral or rectal administration of stool-softening agents. After the placement of a rectal tube the colon was filled in the prone position with 2000 ml of tap water. Paramagnetic contrast was intravenously administered at a dosage of 0.2 mmol/kg Gd-BOPTA and a flow rate of 3ml/s. Following a delay of 75 seconds a T1 weighted 3D gradient echo data set was acquired over 22 s in a single breathhold. 10 minutes later, a further data set was acquired with identical examination parameters. In a second set of experiments, all volunteers ingested 60ml of lactulose 24 hours prior to the MR examination. For the third examination, water as a rectal enema was replaced by a solution of 0.5% ducosat sodium. Eventually, the fourth MR examination was performed both in conjunction with the oral administration of lactulose and the rectal application of ducosat sodium. To assess the effect of both substances, signal-to-noise ratios (SNR) of stool were calculated for six colonic segments including cecum, ascending / transverse / descending / sigmoid colon and rectum.

RESULTS

Neither the oral nor the rectal administration of lactulose / ducosat sodium adversely affected volunteers acceptance. High image quality was achieved in all sets of experiments. Without the application of lactulose or ducosat sodium mean SNR of feces amounted to 71 on the first data set and to 63 after a 10-minute delay (fig 1). The only rectal administration of ducosat sodium resulted in mean SNR values of 68 (51 at 10min). The only oral administration of lactulose led to a decreased SNR of 56 (50 at 10min). The use of both the oral and rectal stool-softener revealed the highest loss of SNR (fig 2) with average values of 54 (43 at 10min) thereby allowing a reliable discrimination between the colonic lumen and the colonic wall.

DISCUSSION:

The signal intensity of fecal material in the colon can be significantly decreased by both the oral administration of lactulose or the use of a rectal enema consisting of a ducosat sodium solution. The administration of both substances is well accepted and did not lead to any harmful side-effects. Following the rectal enema consisting of ducosat sodium, a delay of 10 minutes before starting the data acquisition is useful in order to obtain best results. Due to the simple examination protocol, a high patient acceptance can be achieved for MR colonography without the need of bowel cleansing.

REFERENCES:

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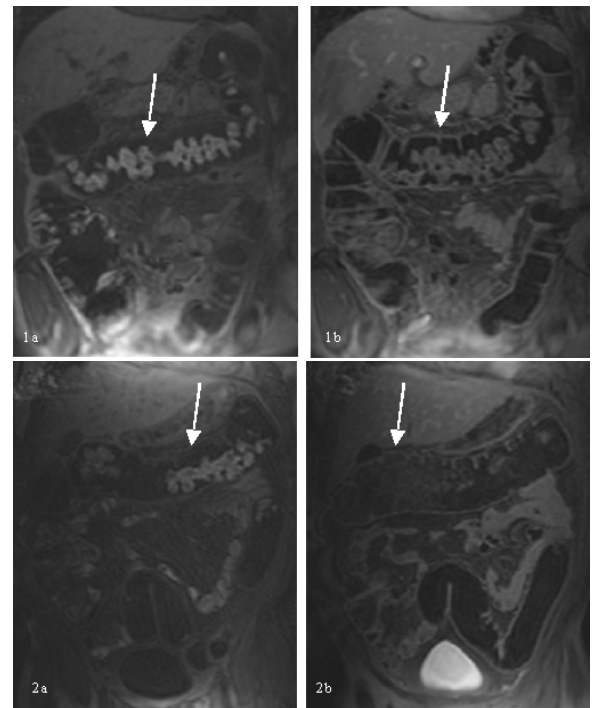


Fig. 1: Baseline MR examination without administration of oral or rectal stool-softener. Bright colonic stool impedes the assessment of the bowel wall (arrow).

Fig 2: Decreasing SNR of feces after the oral administration of lactulose and the use of a rectal enema consisting of ducosat sodium (fig 2a), which is even lower 10 minutes after the application of the rectal enema (fig 2b).