

Dark lumen MR Colonography: Comparison between water and air enema

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Synopsis:

Water used to distend the colon for MR-Colonography harbours the risk of spillage and may be associated with more discomfort than air or CO₂. Using a short TE-sequence to mitigate susceptibility effects, five volunteers and five patients underwent air-distended MR colonography. The volunteers were examined a second time using water for colonic distension. Following intravenous administration of paramagnetic contrast image quality was sufficient with both techniques to assess the enhancing colonic wall and detect colorectal masses. Colonic wall enhancement was superior with water distension however ($p < 0.05$). Discomfort levels for air and water were not different.

Introduction:

Distension of the colonic lumen for MR colonography has to date been accomplished with water (1). In addition to harbouring the risk of spillage on the MR-table, it has been suggested that distending the colon with water is associated with more discomfort compared to air or CO₂, which are used for CT-colonography (2). The potential of compromised image quality due to susceptibility effects at air/tissue interfaces have prevented the use of air or CO₂ for MR-colonography. The availability of high performance gradients now permits the use of short-TE sequences capable of mitigating or even eliminating susceptibility effects. The purpose of this study was to prove the feasibility of air-distended MR colonography and to compare the resultant image quality with that achieved with water-distended MR-colonography. Furthermore, discomfort levels were compared.

Methods:

MR-colonography was performed in five volunteers and five patients with a suspected colorectal mass following standardized colonic cleansing. MR-colonography was based on a T1-w 3D VIBE sequence (TR/TE/FA: 3.1/1.2ms/12°) collected with a 1.5 T Scanner (Sonata, Siemens, Erlangen, Germany) using the torso phased array coil for signal reception. All examinations were performed in the prone position using approximately 3000 ml of air to distend the colon. Air insufflation was accomplished manually with an air pump. For comparative analysis, the volunteers were examined a second time using approximately 3000 ml of warm tap water to distend the colon. All exams were performed following the intravenous administration of Gd-BOPTA (MultiHance^R Bracco, Italy) at a dose of 0.2 mmol/kg. The 3D data set was acquired before and 75 sec after contrast administration. For quantitative analysis SNR and CNR values were determined for the colonic wall with respect to the colonic lumen.

Results:

Both MR colonography techniques were well tolerated by all subjects. MR image quality was rated diagnostic in all air-distended as well as water-distended exams. Volunteer acceptance for the air distension was not different to that associated with water distension. A small polyp was readily identified in the sigmoid colon in one patient examined with air. No susceptibility artefacts corrupted image quality in the air-filled data sets. Signal augmentation following the administration of paramagnetic contrast, however, was superior with water-distension compared to the air-distended images. Thus, the mean CNR of the colonic wall relative to the colonic lumen was 15,5 for air and 27 for water ($p < 0.05$).

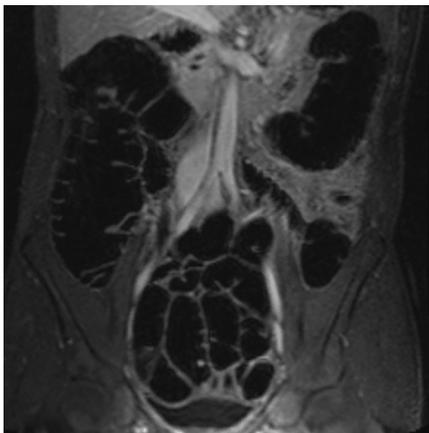


Fig. 1a

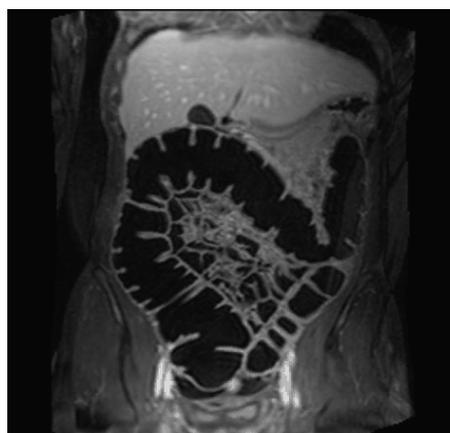


Fig. 1b

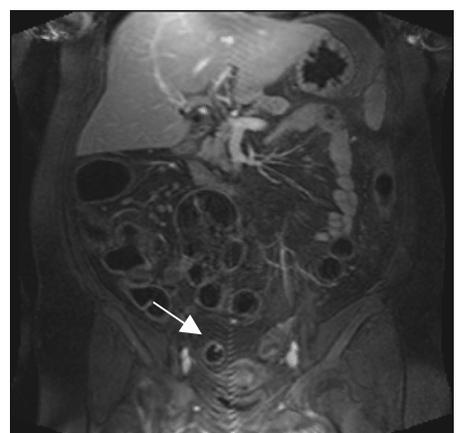


Fig. 2

Fig. 1: Coronal MR-C images of the same volunteer, examined once with air (a) and a second time with water (b). Colonic wall enhancement is more pronounced with water. Fig. 2 a patient with small polyp in sigmoid colon.

Conclusion:

The diagnostic concept underlying MR colonography based on a dark colonic lumen in conjunction with a brightly enhancing colonic wall can be fulfilled using either water or air as the distending agent. Although enhancement of the water distended colon was superior, both techniques permit assessment of the colonic wall and identification of colorectal masses. Discomfort levels seem similar for both techniques.

References:

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2. David J Lomas, Rohit R Sood, Martin J Graves: Colon carcinoma: MR Imaging with CO₂ Enema. *Radiology* 2001; 219:558-562