MR colonography for the detection of inflammatory diseases of the large bowel

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INTRODUCTION:

Endoscopic biopsy is considered the gold standard for the detection and quantification of inflammatory bowel diseases (1). However, there are several drawbacks due to its invasiveness, procedure-related discomfort and risk of perforation. MRI of the colon has the potential to overcome these limitations. Recently, 'dark-lumen' MR-colonography (MRC) has been introduced (2). The technique is based on the acquisition of a T1w sequence collected following the administration of a water-enema and the intravenous administration of paramagnetic contrast. The colonic wall enhances brightly and is thus easily delineated against the background of a dark, water-filled colonic lumen. The aim of this study was to assess the diagnostic accuracy of dark lumen based MR-colonography for the detection and quantification of inflammatory bowel diseases in a patient cohort with suspected colitis using endoscopic biopsy and histopathology as the standard of reference.

METHODS:

23 patients with suspected inflammatory bowel disease (Crohn`s disease n = 16, ulcerative colitis n = 7) were examined. Following a standard preparation for bowel cleansing all MR examinations were performed on a 1.5 T MR system (Magnetom Sonata, Siemens Medical Solutions, Erlangen, Germany) in prone position. For bowel distension, the colon was filled with approximately 2000ml of warm tap water. A T1w 3D gradient echo data set was collected in the coronal plane before and 75s after intravenous gadolinium administration. For data analysis, the large bowel was divided into six segments (cecum, ascending / transverse / descending / sigmoid colon, rectum). Employed criteria for bowel wall inflammation included: (a) increased contrast uptake of segmental parts of the colon, (b) bowel wall thickening, (c) presence of perifocal lymph nodes and (d) loss of haustral folds. Each of these four issues were ranked on a four-point scale (0= no pathologic findings, 3= strong inflammatory changes). The over-all MR classification was based on the sum of the single inflammatory parameters (1-4 = light inflammation; 5-8 = moderate inflammation and 9-12 = intense inflammation). Directly after completion of the MR-exam, conventional colonoscopy was performed. Using histopathology as the standard of reference, the accuracy of the MR-colonography exam was assessed.

RESULTS:

Inflammatory colonic segments were found in all 23 patients both by means of conventional colonoscopy / histopathology and MRC. However, by means of MRC 68 segments were rated as inflamed (histopathology 73): light inflammation was found in 28 segments (histopathology 31), moderate inflammation in 23 segments (histopathology 25) and intense inflammation in 17 segments (histopathology 17). There were no false positive readings based on the MR-data sets. Thus, sensitivity and specificity values of MRC regarding the detection of inflammatory bowel disease amounted to 93% and 100% respectively. Fig 1 and 2 provide an example of one patient with ulcerative colitis.

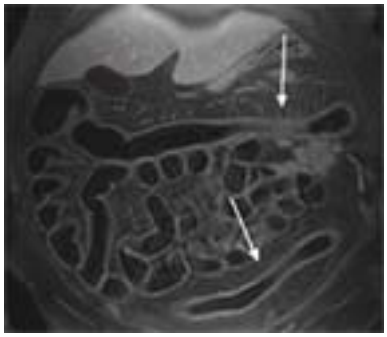

Fig 1: contrast-enhanced T1w GRE data set of patient with ulcerative colitis. Loss of haustral folds in transverse and sigmoid colon as well as bowel wall thickening were detected (arrows)

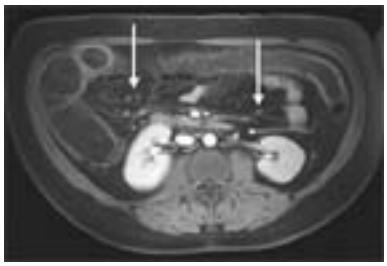

Fig 2: axial reformated data set of same patient as in figure one. Increased number of mesenteric lymph nodes were detected (arrows).

DISCUSSION:

The presented data indicate that 'dark lumen MRC' represents an attractive alternative to conventional colonoscopy and its endoscopic biopsy for the detection and quantification of inflammatory diseases of the large bowel.

REFERENCES:

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