Contrast-enhanced MR Mammography: improved lesion detection and differentiation with gadobenate dimeglumine compared to gadopentetate dimeglumine

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Purpose: To intra-individually compare 0.1 mmol/kg bodyweight doses of gadobenate dimeglumine and gadopentetate dimeglumine for detection and differentiation of malignant and benign breast lesions on contrast-enhanced MR mammography (CE-MRM).

Materials and Methods: Forty-seven women (mean age: 50.8 ± 12.9 years; range: 30 – 75 years) with breast lesions detected on mammography and/or sonography, which were classified as BI-RADS 3, 4 or 5 for suspicion of malignancy, underwent two identical CE-MRM examinations at 1.5T separated by >48h but <72h. T1w 3D gradient-echo images were acquired pre-dose and at 0, 2, 4, 6 and 8 minutes after the randomized injection of either gadopentetate dimeglumine or gadobenate dimeglumine at an identical flow rate of 2 ml/s. Assessment of randomized image sets (comprising combined non-enhanced, enhanced and subtracted images) was performed blindly by two readers in consensus. The detection of breast lesions and accurate differentiation of benign from malignant lesions was determined against histology data from core or surgical biopsy, or surgical specimens. Comparison of lesion detection rates was performed using Fisher's Exact test. The diagnostic performance of CE-MRM for the differentiation of benign from malignant lesions with both contrast agents was evaluated for lesions characterized at histopathology in terms of sensitivity, specificity, accuracy and positive and negative predictive values (PPV and NPV; respectively). McNemar's Exact test was used to compare the two agents for accurate characterization of benign and malignant lesions.

Results: Histopathology data were available for 78 lesions (50 malignant [26 IDC, 13 DCIS, 4 ILC, 4 LCIS, 2 mucinous carcinomas, 1 medullary carcinoma]; 28 benign [6 fibroadenoma, 6 fibrocystic changes, 6 benign hyperplasias, 5 papillomas, 3 radial scars, 1 adenosis, 1 reactive lymph node]) in the 47 evaluated patients. Significantly (p=0.0018) more malignant lesions were detected after gadobenate dimeglumine (49/50 [98%]) than after gadopentetate dimeglumine (38/50 [76%]). Detection of benign lesions was also superior with gadobenate dimeglumine (26/28 [93%] vs. 24/28 [86%]) but the difference was not significant (p=0.6695).The overall detection of histopathologically-proven benign and malignant lesions was significantly better with gadobenate dimeglumine (75/78 [96%] vs. 62/78 [79%]; p=0.0025). All detected malignant lesions were correctly diagnosed as such after both gadobenate dimeglumine (49/49) and gadopentetate dimeglumine (38/38). Conversely, 20/26 (77%) detected benign lesions were correctly diagnosed as benign after gadobenate dimeglumine compared with 17/24 (71%) detected benign lesions after gadopentetate dimeglumine. The benign lesions misdiagnosed as malignant were the same after both contrast agents (2 papillomas in 2 patients; 1 adenosis, 1 hyperplasia and 1 fibrocystic change in one patient each) apart from one papilloma which was misdiagnosed as malignant after gadobenate dimeglumine but not detected at all after gadopentetate dimeglumine, and two additional fibrocystic changes in one patient which were misdiagnosed as malignant only after gadopentetate dimeglumine. Based on lesions characterized at histopathology, the sensitivity, specificity, accuracy, PPV and NPV for the characterization of detected lesions as malignant or benign was 98.0%, 71.4%, 88.5%, 86.0% and 95.2%, respectively, for gadobenate dimeglumine compared with 76.0%, 57.1%, 69.2%, 76.0% and 57.1%, respectively, for gadopentetate dimeglumine. The difference between the agents in terms of the characterization of lesions as benign or malignant was highly significant (p=0.0001) in favour of gadobenate dimeglumine.

Conclusion: CE-MRM with gadobenate dimeglumine is significantly better than CE-MRM with gadopentetate dimeglumine for the detection of malignant breast lesions and permits more accurate differentiation of benign from malignant lesions.

Gadobenate dimeglumine | Gadopentetate dimeglumine