NEW SUBTRACTION ALGORITHMS FOR EVALUATION OF BREAST LESIONS ON DYNAMIC CONTRAST ENHANCED MR MAMMOGRAPHY

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Purpose: To evaluate new subtraction algorithms for detection of enhancing lesion on dynamic contrast-enhanced MR mammography (CE-MRM).

Materials and Methods: This prospective study included 25 patients with suspicion of breast disease. All patients underwent CE-MRM using fast low-angle shot three dimension sequence including whole breasts. The scout images were obtained and then repeated six times after bolus injection of contrast medium (3mm-slice thickness, no gap, 34-48 slices, every 60-90 seconds). Modified serial subtraction (CE image minus scout image), step-by-step subtraction (CE image minus just previous image), and reverse subtraction (CE image minus the last CE image) were obtained. Two radiologists analyzed subtraction images by agreement on the differentiation of benign from malignant lesions. The diagnostic criteria were dynamic and morphologic pattern.

Results: All cases underwent new subtraction algorithms. Mean post-processing time was 9 minutes. Subtraction images of all cases permitted better visualization of contrast enhancement and enhancing pattern. Eleven of all cases histopathologically confirmed as 7 malignant and 4 benign lesions. The sensitivity, specificity, and accuracy on confirmed cases were 85.7 %, 100 %, and 90.9 %.

Conclusion: For the evaluation of malignant lesion, new subtraction algorithms can be a valuable adjunct to the standard sequences and as a practical alternative to dynamic study with contrast medium.
MRI OF BREAST IMPLANT-RELATED COMPLICATIONS

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Purpose: To assess the usefulness of MRI in the preoperative diagnosis of breast implant-related complications.

Materials and Methods: Thirty-four breast implants in 17 patients were examined. Eight breasts had a history of repeated surgery due to rupture and in eight others, simultaneous interstitial silicone injection had been performed. MR images of the 34 implants were prospectively analyzed for implant-related complications, without prior clinical information, and the findings were compared with the results of surgery.

Results: The implant-related complications seen on MRI were infections in three cases, seromas in two, and implant malposition in two. The linguine sign was seen in eight cases and intraparenchymal silicone in 17. Among the 32 removed implants, rupture was genuine in ten cases (nine, extracapsular; one, intracapsular). In evaluating the MR findings of implant rupture, the linguine sign showed 80% sensitivity, 100% specificity and 93.8% accuracy. Intraparenchymal silicon also, revealed high sensitivity (90%), but relatively low specificity and accuracy (63.7% and 71.9%, respectively): this was due to the difficulty in differentiating granulomas after a previous rupture from injected silicone material. MRI was useful for visualization of implant migration, the direct relationship of extended or extruded silicone in extracapsular rupture and the localization of silicone granulomas, as seen on multiplanar images. The extent of infection was clearly demonstrated on contrast-enhanced scan. There was relatively good correlation between the degree of contracture seen on physical examination and that seen on MRI.

Conclusion: MRI was an effective and useful method for the preoperative evaluation of implant-related complications: degree of contracture was successfully predicted.
MR GALACTOGRAPHY USING THREE-DIMENSIONAL FAT-SUPPRESSED T2-WEIGHTED SINGLE SHOT FAST SPIN ECHO TECHNIQUE: COMPARISON WITH CONVENTIONAL GALACTOGRAPHY AND SONOGRAPHY

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Purpose: To evaluate the ability of MR galactography in comparison with conventional galactography and sonography.

Materials and Methods: In 28 patients with nipple discharge, 3-dimensional fat-suppressed T2-weighted imaging using single shot fast spin echo technique was prospectively performed (axial and sagittal scans, TR/TE = 61891/190, 256X192 matrix, 2 mm thickness, 14 cm FOV) without intraductal injection of MR contrast medium. All patients subsequently underwent conventional X-ray galactography (two views) after intraductal injection of 0.5-1.5 ml iodinated contrast medium and sonography. Findings of MR galactography, conventional galactography, and sonography were compared by two radiologists. Pathological confirmation was made in 13 patients.

Results: MR galactography depicted intraductal lesions in 5 patients. Pathologic findings revealed intraductal papilloma in 8 patients, ductal dilatation and fibrocystic change in 4, intraductal carcinoma in 1. Sensitivity, specificity, and diagnostic accuracy of MR galactography based on findings of conventional galactography and sonography were 27.8%, 100%, and 53.6% respectively. Sensitivity, specificity, and diagnostic accuracy of MR galactography based on pathologic findings were 33.7%, 75%, and 46.2% respectively in 13 patients, while sensitivity, specificity, and diagnostic accuracy of conventional galactography and sonography based on pathologic findings were 77.8%, 25%, 61.5% for conventional galactography and 33.3%, 0%, 63.6% for sonography respectively.

Conclusion: Three-dimensional MR galactography using single shot fast spin echo technique is not sensitive, but more specific in detection of intraductal abnormalities compared with conventional galactography and sonography.
MRI OF MULTIPLE FIBROADENOMA IN BREASTS: COMPARISON WITH COLOR DOPPLER IMAGES AND HISTOLOGIC FINDINGS

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Purpose: To understand the different signal intensities seen on contrast enhanced magnetic resonance imaging (MRI) in multiple fibroadenomas of the breast, and to compare these with color Doppler ultrasonographic (CDUS) and histologic findings.

Materials and Methods: MRI (1.0 Tesla, T1WI, T2WI, 3D-gradient echo dynamic contrast enhancement study) findings of 24 histologically proven cases of fibroadenomas in five patients were evaluated and compared with the histologic components (myxoid, adenomatous, fibrous). In addition, vascular flow was compared.

Results: The observed degree of signal intensity was classified into three groups, as follows: negative, 8.3%; mild to moderate, 54.2%; marked, 37.5%. On histologic section, the greater the fibrotic component, the higher the intensity of MRI enhancement, the greater the glandular component, and the intensity. CDUS showed vascular flow in only one tumor larger than 3cm in diameter. Vascular patterns of tumors on CDUS were dots in mass and detouring pattern, but in this case and in strongly enhanced cases, tumor vascularity-as seen on histologic section-showed no significant increase.

Conclusion: Different signal intensities seen on contrast enhanced MRI in multiple fibroadenoma of the breast may be related more to the amount of glandular and fibrotic component than to increased tumor vascularity.
DIAGNOSTIC VALUE OF 3D-GRADIENT ECHO DYNAMIC CONTRAST ENHANCED MRI IN BREAST CANCER

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Purpose: To assess the usefulness of 3D-gradient echo dynamic contrast enhanced MRI (3D-DMRI) in diagnosis (Dx) of breast cancer.

Materials and Methods: 3D-DMRI with Gd-DTPA were obtained in 38 breast cancers, 22 fibroadenomas and three normal volunteers on a 1.0T MR unit. We retrospectively evaluated DMRI findings according to the speed, contrast enhancement (CE) on delayed phase, and compared the diagnostic accuracy.

Results: There was no significant difference of signal intensity between fibroadenoma (FA) and carcinoma on conventional MRI. Rapid CE (within one minute) was noted in 35 lesions (92.1%) of cancer, but relatively low and slow CE (after five minutes) was noted in three lesions (7.9%) of cancer. Gradual CE was noted in 21 lesions (95.5%) of FA, but moderate degree of rapid CE was noted in one case (7.9%) of FA. The maximal amount of CE showed no significant difference between FA and cancer on delayed enhanced phase of 3D-DMRI. On 3D-DMRI, irregular, spiculated border with high CE was noted in all cases of cancer. Especially, irregular thick peripheral CE with central necrosis is noted 11 cases (28.9%) of cancer.

Conclusion: 3D-DMRI is a useful technique in diagnosis of breast cancer. On DMRI, morphologic change after CE was the most useful parameter for diagnosis of breast cancer.