The clinical value of three-dimensional (3D) dynamic MR imaging for the bilateral breasts: Is it worth performing for patients with microcalcifications on mammography?

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Introduction: Stereotactic vacuum-assisted breast biopsy (SVAB) is of sufficient sensitivity and specificity to replace surgical biopsy and offer valuable advantages for the evaluation of mammographically detected microcalcifications (1). In our institute, the SVAB has been performed for breast lesions with microcalcifications, considered as category 3 and over on mammography (2), and not visualized by ultrasonography. In this study, dynamic contrast-enhanced magnetic resonance (MR) imaging for the bilateral breasts was performed before the SVAB to evaluate whether the MR imaging findings can help to predict the presence of malignancy.

Materials and methods: Thirty-seven patients with mammographically detected microcalcifications underwent MR imaging at 1.5T (Signa HD; General Electric, Milwaukee, WI). Dynamic contrast-enhanced MR imaging for the bilateral breasts was performed, using VIBRANT which is three-dimensional bilateral breasts imaging. In the MR image interpretation, we devised a five-point categorical system (category 1: no abnormal enhancement; category 2: bilateral symmetric enhancement; category 3, 4, and 5: asymmetric enhancement, mass or non-mass-like enhancement), referring to BI-RADS and previous reports (2-6). For example, category 5 was assigned for the segmental distribution with clumped or clustered ring enhancement, as a diagnosis of the early cancer like ductal carcinoma in situ. For segmental distribution with other enhancement or focal clustered ring enhancement, category 4 was assigned. Mass was classified by its margin and enhancement kinetics. Non-mass-like enhancement was classified by its distribution and internal enhancement. Two experienced radiologists assigned one category for each breast with microcalifications, on patient-to-patient basis.

Results: SVAB revealed that eight patients had carcinoma and 29 did benign diseases (Table 1, 2). All malignant lesions were diagnosed as MR category 3 and more (Figure 1). In 29 benign lesions, the category 1 or 2 was assigned for 24, and the category 3 for 5. There was no malignant lesion assigned category 2 (bilateral symmetric enhancement). Assuming that the category 4 and 5 were malignant, mammography had a sensitivity of 50%, a specificity of 86%, and an overall accuracy of 78%, whereas MRI had a sensitivity of 88%, a specificity of 100%, and an overall accuracy of 97%.

Discussion: 3D dynamic MRI significantly improved the diagnosis of malignancy as compared to mammography alone, for breast lesions detected as microcalcifications on mammography. Comparative observation for the bilateral breasts is essential for the better MR diagnosis. By adding dynamic MRI to mammography, the application and implementation of SVAB may be altered. Further study will be necessary to establish the clinical value of 3D dynamic MRI for the management of patients showing positive findings on mammography.

Table 1: MRI category	benign	cancer
C-1: no enhancement	13	0
C-2: bilateral symmetric enhancement	11	0
C-3 and more: asymmetric enhancement	5	8
mass	(0)	(2)
non-mass-like enhancement	(5)	(6)
total	29	8

Table 2: non-mass-like enhancement	benign	cancer
C-5 clustered ring or clumped / segmental	0	4
C-4 the other enhancement / segmental, or clustered ring / focal	0	1
C-3 others	5	1
total	5	6

Figure 1: Clumped and linear enhancement is seen in segmental distribution (category 5), corresponding to an invasive ductal carcinoma with predominantly intraductal component.
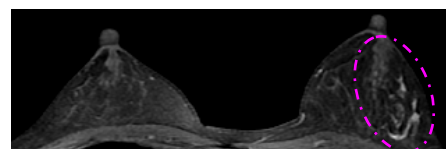
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