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Role and Clinical Usefulness of Elastography in Small Breast Masses

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Purpose: The purpose of this study was to evaluate the diagnostic performance of elastography, B-mode ultrasonography (US) and combination of elastography and B-mode US for differentiation of small breast masses.

Materials and Methods: 315 breast masses smaller than 1cm (267 benign and 48 malignant) in 278 patients who had been scheduled for a US guided core biopsy were examined with B-mode US and elastography from March to October 2009. The histopathologic results were used as a reference standard. Two radiologists retrospectively evaluated the B-mode image according to ACR BIRADS and elastographic images according to elasticity scoring classification proposed by Itoh et al. The strain ratio was calculated by dividing the strain value of the subcutaneous fat by that of the mass. B-mode US and elastography were combined according to the cut off value. The diagnostic performance of B-mode US, elastography and combination of two modalities were compared by receiver operating characteristic (ROC) curve analysis.

Results: The elasticity score for malignant masses (3.02 ± 1.33) was significantly higher than that for benign masses (1.72 ± 0.78) ($p < 0.001$). No significant differ-

ence was found in the strain ratio between benign (2.03 ± 2.04) and malignant (5.83 ± 13.65) masses ($p = 0.060$).

Areas under the ROC curves (Az values) were 0.616 for B-mode US, 0.784 for elasticity score, 0.668 for strain ratio, 0.727 for combination of B-mode US and elasticity score, and 0.701 for combination of B-mode US, elasticity score and strain ratio. The sensitivity, specificity, positive predictive value, and negative predictive value were 93.8%, 51.7%, 25.9% and 97.9%, respectively, when elasticity score and B-mode US were combined as follows; downgrade of B-mode US assessment category in case with elasticity score of 1, no change in case with that of 2, 3 and upgrade in case with that of 4, 5.

Conclusion: Elasticity score alone showed best diagnostic performance, but combination of B-mode US and elasticity score may have predictive value for differentiation of benign and malignant lesions smaller than 1cm.

Clinical Relevance/Application: Combination of B-mode ultrasonography and elasticity would be helpful for the differentiation of benign and malignant lesions smaller than 1 cm.