Investigation into Sonazoid contrast-enhanced ultrasound findings of the breast lesions -Trial of designing a diagnostic flowchart-

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Abstract

Purpose: The study aimed to examine the Sonazoid contrast-enhanced ultrasound (CEUS) characteristics of breast mass lesions and to create a flowchart for differential diagnosis between benignancy and malignancy.

Subjects and Methods: The patients studied had breast mass lesions and had undergone CEUS between August 2010 and November 2012. Patients were excluded if they had preoperative treatment. Fifty remaining patients with 56 nodules (24 benign, 32 malignant) were examined. CEUS findings were evaluated retrospectively using videos of the first minute after Sonazoid injection. The following findings were evaluated: (1) homogenous enhancement of the entire lesion, (2) heterogeneous enhancement of the lesion with clear defect(s), (3) enhancement extending outward beyond the expected borders of the lesion, and (4) pulsation in the lesion. Item (1) was evaluated on a 5-point scale: not enhanced, similarly enhanced as surrounding breast tissue, slightly more enhanced than surrounding breast tissue, clearly more enhanced than surrounding breast tissue, and difficult to evaluate. Items (2)-(3) were evaluated on a 3-point scale: present, absent, and difficult to evaluate.

Results and Discussion: The numbers of nodules and the aforementioned ratings of CEUS findings were (1) benign 5/9/3/6/1 and malignant 0/1/10/20/1; (2) benign 11/3/10 and malignant 12/13/7; (3) benign 23/1/0 and malignant 15/17/0; and (4) benign 17/0/7 and malignant 16/15/1. In many malignant lesions, the lesion was more enhanced heterogeneously than the surrounding breast tissue, and there were pulsatile enhancement, enhancement extending outward beyond the expected borders of the lesion, and heterogeneous enhancement of the lesion with clear defect(s). In many benign lesions, the entire lesion was enhanced homogenously as much as the surrounding breast tissue, and there was no pulsatile enhancement, enhancement extending outward beyond the expected borders of the lesion, or heterogeneous enhancement of the lesion with clear defect(s). These findings were used to create a flowchart for CEUS-based differential diagnosis between benignancy and malignancy. Its sensitivity, specificity, and accuracy were 87.5%, 91.7%, and 89.3%, respectively, showing good diagnostic ability.

Conclusion: The results of our study suggest that CEUS is useful for diagnosis of benignancy and malignancy of breast mass lesions.

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Keywords

Contrast-enhanced ultrasound, Sonazoid, Breast tumor, Diagnosis, Decision tree.

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