Evaluation of contrast-enhanced ultrasound in the differential diagnosis of breast lesions

Megumi Satoh1,2, Mutsumi Nishida2,3, Yusuke Kudou2,3, Satomi Omotehara2,3, Tatsunori Horie1,2, Fumi Kato4, Mitsuchika Hosoda5, Kanako Hatanaka6, Hiroshi Arai1, Hiroko Yamashita5

Abstract

【Purpose】To evaluate the significance of contrast-enhanced ultrasound (CE-US) with Sonazoid® in the differential diagnosis of malignant and benign breast lesions.

【Subjects and Methods】Seventy-five patients (all women, mean age 56 years) with 81 histologically confirmed breast lesions (66 malignant and 15 benign) were evaluated. The enhancement patterns of the lesions were stored for 1 minute after bolus injection of the micro bubble contrast agent “Sonazoid®”. Enhanced signals from lesions were assessed for the degree of intensity, which was compared to surrounding breast tissue, and the size of the enhanced area was compared to lesions recognized in the B mode by visual observation. Time intensity curve (TIC) analysis was performed by placing the regions of interest (ROI) at lesions and using breast tissue as a reference. The following seven items were calculated: time to peak (TTP, s), ascending slope (AS, 10^{-5} AU/s), peak intensity (PI, 10^{-5} AU), mean transit time (MTT, s), area under the curve (AUC, 10^{-5} AU), area under the wash in (AUWI, 10^{-5} AU), and area under the wash out (AUWO, 10^{-5} AU). Each value was compared between benign and malignant lesions.

【Results】The degree of intensity in malignant lesions was significantly higher than that in benign lesions (p < 0.001). The enhanced area in malignant lesions was significantly larger than that in benign lesions (p < 0.001). The AS, PI, AUC, AUWI, AUWO values in malignant lesions were all significantly higher than those in benign lesions. There were no significant differences in TTP and MTT values between malignant and benign lesions.

【Conclusion】CE-US might be useful in the differential diagnosis of breast lesions.

Keywords
contrast-enhanced ultrasound, breast, diagnosis, time intensity curve.

1Hokkaido University Hospital Department of Radiology, 2Diagnostic Center for Sonography, 3Department of Clinical Laboratory and Transfusion, 4Department of Diagnostic and Interventional Radiology, 5Department of Breast Surgery, 6Department of Surgical Pathology
Kita 14 Nishi 5, Kita-ku, Sapporo, Hokkaido, 060-8648, JAPAN
Received on March 31, 2014; Revision accepted on October 17, 2014