

Myocardial Contrast Echocardiography with New Contrast Agent Sonazoid®

Purpose: Myocardial contrast echocardiography (MCE) using a new contrast agent, Sonazoid, was performed. The microbubble of Sonazoid is approximately $\varnothing 2.3 \sim 2.9$ μm of perflubutane with a capsule by a shell of hydrogenated egg phosphatidyl serine. Sonazoid is not collapsed by low to medium acoustic pressure. This enables repeated ultrasound scans per injection. The harmonic signals produced by microbubble resonance due to ultrasonic beams of low acoustic pressure is the main contrast effect, adding to contrast enhanced echo signals.

Method: This study was performed on a total of 24 patients from whom consent for this examination was obtained and coronary angiography had been performed. Normal saline was added until a total volume of the Sonazoid solution attained 2.5 ml (6.4 mL/ml). Because Sonazoid microbubbles are susceptible to destruction by pressure, the 2.5ml volume was injected over 10 sec. Phase-inversion harmonic ultrasonography was performed. Three apex approach (AP) views and 1 parasternal short axis (SAX) view were recorded per injection. The setting of the ultrasonic device included mechanical index (MI): 0.4-0.6 for AP view and 0.22 for SAX view, frame rate/second: 21.2, frequency: 1.5/3.0 MHz. The results were evaluated at the

mid-diastolic point by the time intensity curve. The difference in intensity between pre- and postinjection of Sonazoid was measured for the same site. About the $\geq 75\%$ stenosed coronary artery 55 segments (seg) of 3 AP views (grA) and 51 seg. of SAX views (grB), and about the normal coronary artery 113 seg. of AP views (grC) and 69 seg. of SAX views (grD) were examined. The intensities of all 4 groups of Sonazoid pre and postinjection were compared. Unpaired t test was used to compare groups,

Results: An intensity difference in grApreinjection (grApre) and –postinjection (grApost) was 1.3 ± 3.5 dB and grBpre and grBpost was 0.9 ± 3.3 dB. There was no significant difference of the intensity difference in each pair. In grCpre and grCpost intensities were -33.4 ± 5.1 dB and -22.3 ± 6.8 dB. GrDpre and grDpost were -36.2 ± 4.8 dB and -22.6 ± 10.7 dB respectively. There was a significant difference in each pair (grC 14.1 ± 5.8 dB and grD 11.5 ± 4.3 dB) ($p < 0.001$). An intensity difference ≤ 6.3 dB in AP view could detect stenosis $\geq 75\%$ with a sensitivity :0.98, specificity : 0.94, and accuracy : 0.97. An intensity difference ≤ 5.1 dB in SAX view could detect stenosis $\geq 75\%$ with a sensitivity : 0.97, specificity : 0.96, and accuracy : 0.97.

Conclusion: MCE with Sonazoid is highly sensitive, specific, and accurate after defining optimal signal intensity difference parameters.