DIAGNOSTIC VALUE OF VASODILATOR-INDUCED LEFT VENTRICULAR DYSSYNCHRONY IN THE DETECTION OF MULTI-VEssel CORONARY ARTERY DISEASE USING MYOCARDIAL PERFUSION IMAGING

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Background: Recently, the phase analysis has been developed to allow assessment of LV mechanical dyssynchrony by electrocardiogram-gated SPECT. However, few studies were performed to analyze LV dyssynchrony during pharmacologic stress and at rest, applying the phase analysis using the SyncToolTM to detect multi-vessel coronary artery disease (CAD).

Methods: Adenosine triphosphate (ATP) loading electrocardiogram-gated 99mTc-sestamibi SPECT was performed in 180 patients with suspected or known CAD. All of the patients underwent coronary angiography within 3-months of gated SPECT. LV mechanical dyssynchrony was evaluated using the SyncToolTM implemented in the Emory Cardiac Toolbox, and phase SD and histogram bandwidth were derived.

Results: In 78 patients with multi-vessel CAD, the summed stress score (13.9±6.6 vs 7.6±5.5; p<0.0001), summed difference score (8.3±4.2 vs 4.0±3.2; p<0.0001), the post-stress increase in phase SD (10.5±8.4° vs 4.8±8.9°; p<0.0001) and the post-stress increase in histogram bandwidth (30.8±26.1° vs 13.2±24.4°; p<0.0001) were greater than in 102 patients with insignificant or single-vessel CAD. To detect multi-vessel CAD, the summed stress score of >9 and summed difference score of >5 showed sensitivities of 74%, 74%, and specificities of 71%, 78% respectively, while the increase in phase SD >8.3° and increase in histogram bandwidth >16° after ATP loading had sensitivities of 62%, 74%, and specificities of 77%, 68%, respectively. The multivariate logistic analysis revealed that the combination of the post-ATP increase in phase SD, increase in histogram bandwidth and summed difference score best identified multi-vessel CAD, with sensitivity of 82% and specificity of 76% (chi-square=80.0), compared with summed difference scores only (sensitivity 74%, specificity 78%, chi-square=58.9).

Conclusions: The addition of “post-ATP stress” and “at rest” phase analysis evaluating LV mechanical dyssynchrony to conventional perfusion analysis, helps better identify patients with multi-vessel CAD.