K. Gaspar Carvalho da Silva Jr.
Dr. med.

Real-time myocardial contrast echocardiography in the evaluation of functionally relevant coronary stenosis

Geboren am 18.11.1974 in Rio de Janeiro, Brasilien
Staatsexamen am 07.11.2006 an der Universität Heidelberg

Promotionsfach: Innere Medizin
Doktorvater: Prof. Dr. med. H. Kücherer

Little is known about the diagnostic accuracy of quantitative real-time myocardial contrast echocardiography (MCE) as an adjunct to stress testing. This study was performed to evaluate the agreement between MCE and technetium 99m–sestamibi single photon emission computed tomography (SPECT) for detection of perfusion defects and to investigate whether quantitative assessment of myocardial perfusion can increase the diagnostic value of MCE.

MCE was performed at rest and during peak adenosine stress in 50 unselected patients undergoing SPECT imaging. Concordance between the 2 methods was assessed using κ statistics. MCE images were analyzed quantitatively, measuring peak intensity (A) and maximal rise of signal intensity (β).

Myocardial blood flow reserve was estimated by calculating the ratios of Aadenosine / Abaseline (A reserve), βadenosine / βbaseline (β reserve), and A x βadenosine / A x βbaseline (A x β reserve). Visual analysis of MCE agreed well with SPECT (κ = 0.67) with sensitivity of 64%, specificity of 97%, and overall accuracy of 87%.

Quantitative analysis showed that peak signal intensity A significantly increased under adenosine stress in SPECT-normal segments (2.6 ± 1.9 vs 3.0 ± 1.6 dB, P < .0001), tendencially decreased in reversible (3.0 ± 2.0 vs 2.4 ± 1.2 dB, P = .07) and remained unchanged in fixed (0.9 ± 0.9 vs 0.8 ± 0.9 dB) defects.

β Increased markedly under adenosine in normal segments (0.4 ± 0.4 vs 1.4 ± 1.3, P < .0001) but not in segments with reversible or fixed defects.

Receiver operating characteristic showed that β reserve and A x β reserve, but not A reserve, are sensitive parameters for detecting perfusion defects with areas under the curve of 0.84, 0.85, and 0.61, respectively.

Cut-off values of 1.9 for β reserve and 2.3 for A x β reserve yielded sensitivity rates of 79% and 80%, specificity rates of 75% and 78%, and overall accuracy rates of 76% and 79%, respectively.

The study performed in this doctoral thesis demonstrates that the quantitative estimation of myocardial blood flow reserve by MCE parameters corresponds to the evaluation of myocardial perfusion by nuclear imaging, and that it can increase the sensitivity but not the overall accuracy of contrast echocardiography.