Color-Encoded Semiautomatic Analysis for Multislice First-Pass Magnetic Resonance Perfusion: Comparison to 99m Technetium Single-Photon Emission Computed Tomography and X-Ray Angiography

Background: First pass myocardial perfusion magnetic resonance (MR) has the advantage of a high spatial resolution, which allows differentiation between subendocardial and transmural perfusion defects. Furthermore it is free from attenuation artifacts. However, the absence of efficient, easy and reliable image analysis software is an obstacle for the introduction of this method into clinical practice. Methods and results: Thirty-two patients underwent both 99m Technetium SPECT and first pass magnetic resonance perfusion imaging under rest and stress using adenosine. Offline image analysis was performed in 6 steps on a dedicated workstation using prototype software (EasySolv, Philips Medical Systems, The Netherlands), which allows image analysis in less than 10 min, per slice and displays the results in color-encoded images. Visual interpretation of the color displays was performed by two independent observers and areas of relative underperfusion were reported. All SPECT studies were analyzed in the conventional manner using a subjective scale and results were compared to MR. Taking SPECT as a reference method resulted in a sensitivity of 80%, specificity of 91%, positive predictive value of 68%, negative predictive value of 95% and a total accuracy of 89%. In comparison to X-ray angiography overall accuracy was 87% for MR perfusion and 77% for SPECT to detect significant coronary artery disease with stenosis > 70%. Conclusion: Post-processing of first pass myocardial perfusion MR imaging using a new semiautomatic software, which easily generates the results semi-quantitatively and displays it visually as color-encoded images has a high sensitivity and specificity for detection of perfusion defects in comparison to SPECT and a higher accuracy in detecting significant coronary artery disease. This post-processing method may accelerate the time-consuming analysis of MR perfusion images thus enabling a more widespread clinical utility.

Impact of Blood Pressure on False Positive Results During Exercise Echocardiography: Is There a Gender Difference?

Joon-Han Shin, Takashiro Shiota, Jian Xin Qin, Yoko Eto, James D. Thomas, L. Leonardo Rodriguez, The Cleveland Clinic Foundation, Cleveland, OH

Background: False-positive results of exercise echocardiography (EEx) to diagnose coronary artery disease in women still seems to be higher than in men. Recent studies showed that high blood pressure (BP) at peak exercise is one of the important factors related to false-positive results. The relative impact of BP on females, however, was not evaluated. Therefore, we assessed the hypothesis that response to BP during EEx might influence lower specificity in women.

Methods: We enrolled 446 patients (mean age 61±12 yrs, 162 women) who had both coronary angiography and EEx. retrospectively. All subjects were classified into quartiles of peak systolic BP. ST and SP were determined for each quartile of BP.

Results: With coronary stenosis, % ST change was blunted and reflected a smaller increase in RMBF with dobutamine, compared to without stenosis. Hemodynamics were similar with and without stenosis (Table). Conclusion: A novel, quantitative parameter of regional myocardial function, reliably predicted changes in RMBF with dobutamine stress. MR stress may introduce a new paradigm in the detection of inducible ischemia.

884-2 Delay in Transition From Segmental Contraction to Relaxation Activity (TT) Reliably Predicts Changes in Myocardial Perfusion During Dobutamine Stress

Gabriel W.K. Yin, Rhijy Khatri, Cristina Pihan, Peter Amenomostopoulos, Marek Marnavsky, Patricia Pelikis, James Seward, Theodore P. Abraham, Mayo Clinic, Rochester, MN

Using strain echocardiography (SE) we have previously demonstrated that prolongation in the time to transition (TT; time from R wave on ECG to transition from contraction to relaxation on SE) correlates with regional ischemia in an animal model at rest, and new wall motion abnormalities in humans during dobutamine stress. Aim: In a closed chest animal model, we tested whether % TT change correlates with changes in regional myocardial blood flow (RMBF) at peak dobutamine stress. Methods: Using general anesthesia and fluoroscopy, an angioplasty balloon was inflated to cause a subtotal stenosis in the left anterior descending artery in 6 pigs. Dobutamine infusion (5 to 20 ug/kg/min) was administered before and during stress. Color Doppler (BioPALS) injections and transhiroidal SE were performed at rest and peak dobutamine (without and with stenosis). Using custom software, we measured segmental % TT change, uncorrected for heart rate (baseline TT-peak TT/baseline TT*100). We compared TT(ms) and RMBF (ml/min/g tissue) from the same segments at peak dobutamine, with and without stenosis. Results: With noninvasive stress, % TT change was blunted and reflected a smaller increase in RMBF with dobutamine, compared to without stenosis. Hemodynamics were similar with and without stenosis (Table). Conclusion: TT, a novel, quantitative parameter of regional myocardial function, reliably predicted changes in RMBF with dobutamine stress. TT may introduce a new paradigm in the detection of inducible ischemia.

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Wednesday, April 02, 2003, 10:30 a.m.-Noon McCormick Place, Room S401

10:30 a.m.