emission computed tomography myocardial perfusion imaging indices obtained from Tc-99m sestamibi gated single photon emission computed tomography myocardial perfusion imaging

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Purpose: Phase analysis of gated myocardial perfusion single photon emission computed tomography (GSPECT) images allows the assessment of left ventricle (LV) mechanical synchrony. The aim of our study was to determine whether stress-induced ischemia modifies the two most commonly used phase analysis synchrony parameters: Histogram bandwidth (HB) and Standard deviation (SD) obtained from Tc 99m sestamibi of GSPECT images and to evaluate the correlation between these indices and different amounts of ischemia.

Methods: We included 92 consecutive ischemic patients defined by SDS ≥2 who underwent a two-day stress-rest protocol Tc99 sestamibi GSPECT between August 2011 and July 2012 and we compared them to a group of 22 normal subjects defined as asymptomatic, without known coronary artery disease, with low pretest risk of coronary artery disease, and normal ECG, stress test, left ventricular function and perfusion (SSS: 0), who followed the same GSPECT protocol. Patients with left bundle branch block, ventricular pacing and fixed perfusion defects were excluded. Phase analysis indices HB and SD were obtained from stress and rest images in both groups. We obtained the change (stress minus rest) of SD and HB indices for each patient. The ischemic group was divided into moderate-to-severe ischemia (SDS>5), and severe ischemia (SDS>8).

Results: The ischemic group had a mean age of 63±10 years, 47 were men, 21 had moderate-to-severe ischemia and 10 severe ischemia. Ischemic patients showed higher stress SD and HB values than normal subjects (SD 15.65 vs 11.76, p=0.0002 and HB 47.74 vs 38.04, p=0.002 respectively) and larger amounts of ischemia showed higher values: moderate to severe ischemia (SD 20.08 vs 11.76, p<0.001 and HB 58.61 vs 38.04 p=0.001 respectively) and severe ischemia (SD 19 vs 11.76, p<0.0001 and HB 60.4 vs 38. p<0.0001 respectively). Changes in SD and HB were significantly higher in ischemic patients than in normal subjects (SD -0.19 vs -0.58, p<0.0001; HB 1.27 vs -0.95, p=0.0002 respectively). These differences were even higher in moderate to severe ischemia (SD 2.49 vs -0.58, p<0.0002; HB 4.76 vs -0.95, p<0.0001) and severe ischemia (SD 4.22 vs -0.58, p<0.0001; HB 12.5 vs -0.95, p<0.0001).

Conclusion: In our population left ventricular mechanical synchrony indices obtained by phase analysis of Tc99sestamibi GSPECT imaging, HD and SD are altered in the presence of myocardial ischemia. Larger amounts of ischemia are related to higher dysynchrony values of the phase-derived indices HB and SD.

P2941 | BEDSIDE Evaluation of knowledge-based reconstruction for magnetic resonance volumetry of the right ventricle in tetralogy of fallot

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Purpose: Evaluating right ventricular (RV) volumes and function is important in the clinical management of patients after treatment of Tetralogy of Fallot (TOF) repair. Currently, cardiac magnetic resonance (CMR) using Simpson’s method is the gold standard for RV quantitative assessment. However, this method is time consuming and not without sources of error. Knowledge-based reconstruction (KBR) is a new imaging tool for RV volumetry and has been recently validated on echocardiography. The aim of this study was to assess the feasibility, accuracy, and labor intensity of KBR on CMR datasets in a group of repaired TOF patients by comparison with measurements obtained by Simpson’s method.

Methods: Thirty five patients (mean age 14±3 years) after TOF repair were screened using KBR and Simpson’s method. Parameters analyzed were RV end-diastolic volume (EDV), end-systolic volume (ESV), ejection fraction (EF) and post-processing time. All measurements were compared with the standard Simpson’s method. Intraobserver, interobserver and intermethod variability was assessed using Pearson’s correlation analysis, coefficients of variation and Bland-Altman analysis.

Results: KBR was feasible and highly accurate as compared to Simpson’s method. Intra- and intermethod variability for KBR measurements showed good agreements. When compared with Simpson’s method, volumetry using KBR was faster (10.9±2.0 vs 7.1±2.4 minutes, P<.001, respectively).

Conclusion: In repaired TOF patients, KBR is a feasible, accurate and reproducible method for measuring RV volumes and function. In addition, the post-processing time of RV volumetry using KBR was significantly shorter when compared with Simpson’s method.

P2942 | BEDSIDE Comparison of myocardial perfusion and function with the severity of coronary artery disease between 201TI and 99mTc-agent using a cadmium-zinc-telluride camera

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Background: Although cadmium-zinc-telluride (CZT) camera system (Discovery NM 530c) have recently been introduced in myocardial perfusion imaging (MPI), little study has shown whether perfusion analysis using CZT camera is affected by the type of radotracer or the severity of coronary artery disease (CAD).

Methods: The study group comprised 164 consecutive patients who underwent both stress MPI and coronary angiography within 3 months. Standard dose 1-day 99mTc-radiotracer (370/740MBq) protocol was performed in 74 patients with a 5-min scan time for stress, a 3-min for at rest, while 201TI (11MBq) protocol was performed in 90 patients with a 5-min for stress, a 10-min for at rest. Myocardial perfusion was assessed visually using a 17-segment model, and the changes in LV volume and function with stress were analyzed using a QOS software. High-risk CAD was defined as a Duke CAD Prognostic Index of ≥42 and non-high-risk CAD was defined as those of <42.

Results: Average of Duke CAD prognostic index in patients who underwent 99mTcMPI compared with 201Tl MPI either in patients with high-risk (64.1±7.8 vs 65.3±11.2) or in the non-high-risk CAD (21.3±15.1 vs 20.9±16.1). Summed difference score was less with 99mTc MPI than with 201TI MPI either in patients with high-risk CAD (6.6%±7.8 vs 11.2%) or in the non-high-risk CAD (21.3±15.1 vs 20.9±16.1). LV functional analysis demonstrated that post-stress changes were greater with 99mTc MPI than with 201TI MPI in end-systolic volume (7.9±2.8ml vs 3.2±1.9ml; p=0.03 for high-risk CAD, 3.9±1.6ml vs 0.9±1.6ml, p=0.01, for non-high-risk CAD, respectively) and ejection fraction (-6.9%±3.3% vs -2.6±2.6%; p=0.001, for high-risk CAD, -2.8±4.8% vs 0.0±5.3%; p<0.003, for non-high-risk CAD, respectively). In patients with 99mTc MPI, post-stress changes such as ESV and EF were greater in those with high-risk than in non-high-risk CAD (p=0.001 for ESV and p=0.005 for EF) whereas post-stress changes were similar between those with high-risk and non-high-risk CAD in patients who had 201TI MPI.

Conclusions: These results suggested that although 99mTc MPI using the CZT camera system may underestimate the extent and severity of myocardial ischemia with high-risk CAD, 99mTc is superior to 201TI MPI in the functional analysis to reveal post-ischemic stunning.

P2943 | NON-BEDSIDE Non-contrast angiography of renal artery in 3T magnetic resonance in patients with refractory arterial hypertension before renal denervation

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Introduction: Catheter-based renal sympathetic denervation is a technique for treatment of resistant arterial hypertension. Planning this procedure magnetic resonance (MR) is a non-invasive method without any radiation to reliably image the anatomical conditions like diameters, possible stenosis or abnormalities of renal arteries. Impaired renal function (GFR—<30 ml/min/m²) is a known contraindication for gadolinium based contrast agent due to the risk of nephrogenic systemic fibrosis. To address the question if imaging of the anatomy of renal arteries in 3T MR might be feasible and reliable without using contrast agent the present prospective study was performed.

Methods: 34 Patients with resistant hypertension (taking four antihypertensive drugs including diuretics and long term blood pressure measurement larger than 135/85mmHg) for whom renal denervation was planned were included prospectively.

In 3T magnetic resonance 3D conventional contrast MR angiography (CMRA) was performed after antecubital injection of gadodentatol-dimeglumin during