TCT-305
Quantification of Coronary Artery and Myocardial Deformation Due to Cardiac Motion using Cardiac-gated Computed Tomography Data
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Background: Knowledge of cardiac contractility is crucial for functional assessment of myocardial dysfunction. Since coronary arteries conform to the myocardium, quantification of coronary deformation may be useful for assessing myocardial function. The purpose of this study was to develop methods to estimate myocardial contractility with coronary artery deformation.

Methods: Epicardium and endocardium surfaces, and the left anterior descending coronary arteries (LAD) of 6 patients were extracted from cardiac-gated computed tomography data using level set segmentation methods. Between systole and diastole, curvature changes of the LAD centerlines were quantified, as well as myocardium thickness changes by computing distances between the epicardium and endocardium surfaces along the LAD. Support Vector Machine (SVM) learning algorithm was utilized to estimate the myocardial deformation from other geometric features of the coronary artery.

Results: From diastole to systole, coronary curvature values increased by 0.040±0.036 mm-1 and myocardial thickness increased by 3.9±2.2 mm. Using metrics of curvature, curvature changes, and distance of the coronary to the epicardial surface, heart base, and ventricular septum, the SVM algorithm resulted in a correlation of R=0.77 of prediction to local myocardial thickness change for all 43 bend points along the 6 LADs.

Conclusions: The SVM algorithm shows that myocardial contractility is strongly correlated to geometric information of the coronary arteries and epicardium. These methods may provide a new framework to evaluate myocardial function from coronary artery deformations.

TCT-306
Pulse Wave Velocity and Augmentation Index are predictors of the Coronary Atherosclerosis and Impaired Cerebrovascular Reactivity.
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Background: Pulse wave velocity (Pwv) and augmentation index (Aix) are well known predictors of cardiovascular and cerebrovascular morbidity and mortality. The aim of our work was to analyze correlation between those two parameters of arterial wall stiffness, coronary atherosclerosis and cerebrovascular reactivity, which is the marker of subclinical cerebrovascular disease.

Methods: 187 patients, referred for elective coronary angiography, were randomised to the study. All of them were examined by a cardiologist and underwent selective coronaryography, transcranial doppler ultrasound with estimation the cerebrovascular reactivity (using breath-hold-index BHI) and assessment of arterial stiffness using the Arteriograph TensoMed device. Gensini score and number of significant lesions (more than 50%) were used for evaluation of the coronary atherosclerosis. Data were analysed with Mann-Whitney U-test, Spearman correlation, Kruskal – Wallis test and ROC analysis. Significance level was p < 0.05.

Results: Differences in Pwv and Aix between groups SCG 0 and groups SCG 1-3 were statistically significant (p=0.015 resp. p<0.001). Significant was also the correlation between Pwv, Aix and Gensini score. Spearman correlation coefficient was 0.6 (p<0.05) for Aix and 0.43 (p<0.05) for Pwv. ROC analysis of Aix >5.5% had 86% sensitivity and 75% specificity. In prediction of coronary atherosclerosis, Pwv >10.5% had 76% sensitivity and 66% specificity. Significant correlation of Aix and Pwv with BHI was proven by linear regression. Spearman correlation coefficient was Aix 0.6 (p<0.05) and 0.42 (p<0.05).

Conclusions: There is a significant correlation between values of pulse wave velocity, augmentation index, presence of coronary athersclerosis and impaired cerebrovascular reactivity.

TCT-307
Intracryle CT Motion Correction Algorithm in the evaluation of Coronary artery disease
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Background: The purpose of this study is to demonstrate that coronary CT angiography (CCTA) employing a novel intracryle motion compensation algorithm (Snap Shot Freeze (SSF)) will be superior to CCTA without intracryle motion compensation algorithm (conventional CCTA) for image quality and diagnostic accuracy.

Methods: Forty patients with known or suspected coronary artery disease were studied with CCTA and invasive coronary angiography (ICA). CCTA scans were performed on a 128-slice CT scanner (Discovery CT 750HD, GE Medical Systems) using prospective or retrospective ECG-gating depending on the patients’ heart rate. In the prospective ECG mode, padding of 100 ms was used, while in the retrospective ECG mode, cardiac X-ray current was ECG-triggered between 40% to 75% of the R-R interval. First, SSF-CCTA scans were analyzed; 2 weeks later in a random and blinded way the conventional-CCTA scans were evaluated. The per-vessel and per-segment diagnostic interpretability and image quality of SSF-CCTA and conventional CCTA was calculated. A 17 coronary artery anatomy model classification was used for the analysis. Dichotomization of the five-point Likert scale was performed by grouping scores 1 and 2 into the “non-diagnostic” category and scores of 3, 4 and 5 into the “diagnostic” category. The paired Student t-test was used to determine the diagnostic differences between CCTA scans. P < 0.05 was referred to statistically significant.

Results: From the 40 patients studied, 584 coronary segments were analyzed. SSF-CCTA had 5 coronary segments non-evaluable whereas conventional CCTA had 33 coronary segments. The coronary segment assessability was 99% vs 94% respectively. Conventional-CCTA had an average 5 coronary segments non-evaluable whereas conventional-CCTA had 33 coronary segments. The coronary segment assessability was 99% vs 94% respectively. There was statistical difference between SSF-CCTA and conventional-CCTA for all coronary arteries (p<0.0002 for RCA; p<0.0016 for LAD; p<0.0135 for LCX). Global p value for all coronary arteries was < 0.0001. Conventional-CCTA had an average coronary segment analysis of 3.1 versus 3.8 of the SSF-CCTA.

Conclusions: SSF-CCTA allowed better visualization of the coronary arteries especially of the RCA. SSF-CCTA also reduced the number of non-evaluable coronary segments in comparison to conventional-CCTA.

TCT-308
Prevalence and Distribution of Obstructive Pelvic Arterial Lesions by Computed Tomographic Angiography in 261 Patients with Erectile Dysfunction
Endovascular Therapeutic Implications
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Background: Pelvic arterial insufficiency is widely present in patients with erectile dysfunction. In this study, we would like to confirm our previous observations