Evaluation of Late Bypass Graft Patency by Multi Row Detector Computed Tomography

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Background: Multi Row Detector Computed Tomography (MRDCT) was proposed as a method for obtaining non-invasive imaging of the coronary vessels and it could be useful in evaluating the late results of patients undertaken to Coronary Artery Bypass Surgery (CABG). Its actual contribution to this goal, however, is still unknown.

Methods: To evaluate contribution of MRDCT in this role we selected 100 patients in the late follow-up after CABG. We undertook MRDCT with ECG gated acquisitions with the injection of 1 ml/kg of contrast media; images were retrospectively reconstructed. Cardiac catheterization was done one week after MRDCT to evaluate its results. Two independent reviewers compared the results of both imaging techniques.

Results: The age of the patients was 68 ± 9 years and the interval between CABG and MRDCT was 6.4 ± 1.3 years. There were 230 grafts / patient, of which 96 were mammary arteries and 134 veins. Most patients (78) were asymptomatic, 13 had stable angina and 9 unstable angina. MRDCT identified all grafts, showing that 6 mammary arteries and 54 grafts were occluded, 39 vein grafts had severe stenosis, 12 no lesions and the remaining were normal. Invasive angiography showed the same number of occlusions, but identified 33 vein grafts with severe atherosclerosis and 17 with mild lesions. As for the non-occluded grafts, MRDCT was able to detect the presence of non-revascularized segments in 24 patients, while angiography identified 31 cases (5 distal circumflex arteries, 1 diagonal branch and 1 marginal branch, both < 1.5 mm).

Conclusion: MRDCT can assess the patency of the grafts of patients in the late follow-up after CABG, but it overestimates the severity of the stenosis. It may also show progression of disease in native coronary arteries, even though its accuracy is reduced in the distal coronary arteries and in small secondary branches.

Assessment of Myocardial Damage in Non-ST Elevation Acute Myocardial Infarction Using ECG-Gated Multislice Computed Tomography: A Preliminary Study

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Background: ECG-gated computed tomography (MSCT) demonstrated various contrast enhancement patterns in left ventricular myocardium after reperfused Q-wave myocardial infarction (MI). We compared accuracy of MSCT to diagnose small non Q wave MI, defined by ECG analysis and creatine kinase blood level >1500 u/l, to the MSCT SPECT rest myocardial perfusion imaging.

Methods: Ten consecutive patients (mean age 62 yrs) admitted for a non-ST elevation MI were included between 2 and 7 days after MI. Topography of MI was determined by ECG and echocardiographic studies. During MSCT evaluation, a first enhanced image acquisition was followed by delayed acquisition 5 minutes later. For each area, sub-endocardial and subepicardial myocardium were analysed separately and classified as normal, hypoenhanced or hyperenhanced compared to remote non infarcted myocardium. MSCT analysis (Tetrofosmin Tel/00m in 0 pts and Thallium 201 in 2 pts) was used to assess myocardial perfusion and regional wall motion at rest.

Results: Topography of MI was anterior (3), inferior (4) or lateral (2) with a mean evolution of MI by ECG in 3.5 ± 0.7 days. All the patients had left ventricular hypertrophy that demonstrated significant coronary lesions in 5 pts (with 2 multivessel disease) that were revascularized by angioplasty. MSCT showed regional perfusion defect and wall motion abnormalities in 5 patients (defect in 4 pts). Rest perfusion was considered normal in 1 pt. On the MSCT first acquisition, 7 patients had hypoenhancement of subendocardial myocardium. Delayed acquisition demonstrated subepicardial hyperenhancement in all the patients, and its topography correlated with ECG and echocardiographic findings enabling precise localization of SPECT image.

Conclusions: ECG-gated multislice computed tomography showed constant regional delayed subepicardial hyperenhancement early after mild non-ST elevation myocardial infarction. MSCT could be a useful tool for evaluation of myocardial damage in non ST elevation MI and needs larger studies to be evaluated.

Age and Gender Distributions of Coronary Artery Calcium by Volumetric Scoring Detected by Electron-Beam Computed Tomography in 7,370 Asymptomatic Adults

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Background: Quantification of coronary artery calcium (CAC) with electron beam CT (EBCT) is a marker of the severity of coronary atherosclerosis. Measuring progression and regression of coronary atherosclerosis is important to predict the risk of a future cardiovascular event, however this application is hampered by the limited reproducibility of the traditional Agatston method of CAC scoring. The ‘volumetric score’ (VS) is more reproducible and may be especially useful for assessing changes over time and important limitation of VS, however, is the absence of representative population data on CAC distribution by this method.

Objective: The objective of this analysis was to determine age- and gender-stratified CAC scores by VS in asymptomatic individuals.

Methods and Results: We studied 10,126 individuals who underwent EBCT scanning at a single facility between 1999 and 2002. After excluding subjects with known CHD and a medical history suggestive of angina, our final study population consisted of 4839 males (52±9 years) and 2531 females (54±10 yrs). Age- and gender-stratified CAC by volumetric scoring methods are provided in the accompanying table.

Comment: This is the first study to provide normative data on CAC distribution by the more reproducible volumetric method. It can help clinicians in assessing an individual's baseline cardiovascular risk as well as monitor changes over time in asymptomatic individuals referred for EBCT, and guide the aggressiveness of preventive strategies.