Strain and strain rate for evaluating of right ventricular functional profile in patients with COPD and metabolic syndrome

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Introduction: The association between COPD and metabolic syndrome (MS) are frequently seen in daily clinical practice, but the cardiac impact on right ventricular (RV) functional profile using strain and strain rate of free wall is poorly studied in this group of patients.

Methods: Thirty-two patients with COPD (FEV1= 48.9±0.4; sPAP= 32.8 ±0.4; 6-MWD= 391.9±3.9) was compared with thirty-one patients with MS (FEV1= 42.8±0.8; sPAP= 32.8 ±0.4; 6-MWD= 391.9±3.9) regarding mean CS and time to peak were higher in patients with AM as defined as acute chest pain, elevated troponin, normal coronary angiogram and presence of epicardial inflammation (1) and with an LAD stenosis of IS (55 ± 5% diameter stenosis, QCA) were pros-pected in at least two segments identified patients with AM with a specificity of 90%, a sensitivity of 100% and an accuracy of 95%.

Conclusions: This pilot study suggests that STE may be useful in the diagnosis of AM, particularly when using a composite index of CS values >9% or time-to-peak of CS >30° in at least two segments.

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Evaluation of Coronary CT scans radiation dose and image quality using different scanning protocol on a 256-slice CT scanner

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Introduction: Cardiac CT scan is a new, performing, non invasive and accurate coronary imaging method to detect the presence or absence of coronary lesions in symptomatic or asymptomatic patients. It has been hardly criti-cized about the patients radiation dose. New acquisition protocols have been developed to decrease the delivered radiation dose.

Objective: To evaluate the estimated radiation dose and image quality difference of prospective ECG-gating (step-and-shoot) mode and retrospective ECG-gating (helical) coronary computed tomography angiography (CCTA) on a 256-slice scanner.

Methods: Radiation doses were estimated for 373 patients routinely scanned with either prospective or retrospective ECG-gating. Only patients with heart rate less than 65 bpm were scanned using step-and-shoot technique. All examinations were performed on the same computed tomography scanner using the standard injection protocol. Image quality was assessed objectively using the signal-to-noise ratio on axial coronary images and subjectively by coronary segment quality scoring into a 3 grade score.

Results: It was found that radiation doses associated with prospective ECG-gating were highly significantly lower than retrospective ECG-gating (3.5 ± 1.4 mSV versus 15.4 ± 4.6 mSV respectively, p<0.0001). No statistically significant differences in image quality were observed between the two scanning protocols for objective quality assessments but the image quality was highly statistical significant better in prospective ECG-gating in comparison to retro-spective ECG-gating (p<0.0001) for subjective scanning evaluation.

Conclusion: prospective ECG-gating using a ‘step-and-shoot’ protocol effectively reduces radiation doses in 256-slice CT coronary angiography with better image quality. This is a definite answer cardiac CT over irradiation. When applicable this should be the standard acquisition protocol.

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Comparison between non invasive coronary flow reserve and fractional flow reserve in the setting of left anterior descending artery stenosis of intermediate severity

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Introduction: Cardiac MRI is the current gold standard for diagnosis of acute myocarditis (AM) but is often not available in the emergency setting. Ultrasound imaging using new imaging modalities such as STE is a potential alternative.

Objective: Our aim was to test whether speckle tracking echocardiography (STE) can assist in the diagnostic of AM.

Methods: Patients admitted for AM (n = 10), defined as acute chest pain, elevated troponin, normal coronary angiogram and presence of epicardial delayed enhancement (EDE) with cardiac MRI, and control patients (n = 10) were studied. For each patient, left parasternal short axial views were acquired in 2D mode at basal, mid-ventricular and apical levels and divided into a 16-segment model. Circumferential strain (CS) and radial strain (RS) were auto-matically calculated for each segment (n = 320) using a dedicated workstation. Results and strain rate analysis in the basal and mid segments of lateral wall of RV were performed in both groups using Velocity Vector Imaging technique. All results are expressed as mean ±SE using 15.0 SSPS version.

Results: Strain and strain rate in all segments of RV lateral wall were sig-nificantly decreased in COPD and MS group (strain basal and mid: -23.3±0.2 respectively -22.4±0.2; strain rate basal and mid: -1.4±0.0 respectively - 1.2±0.0) compared with COPD alone (strain basal and mid: -18.6±0.2 respectively -16.8±0.2; strain rate basal and mid: -1.2±0.0 respectively -1.0±0.0) (p<0.001). In the COPD and MS group, decreased of 6-MWD correlated signifi-cantly with basal strain reduced strain rate of RV (r=0.38, p=0.03) and elevation of sPAP correlated significantly with basal and mid reduced strain of RV (r= -0.51, p=0.01 respectively r=-0.41, p=0.02).

Conclusions: The assessment of strain and strain rate of free wall of RV is a good clinical tool in evaluating of right functional cardiac profile and may be in prediction of exercise capacity in patients with COPD and MS.

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Speckle tracking echocardiography as a potential diagnostic method for acute myocarditis: a pilot comparison to cardiac MRI

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Introduction: Cardiac MRI is the current gold standard for diagnosis of acute myocarditis (AM) but is often not available in the emergency setting. Ultrasound imaging using new imaging modalities such as STE is a potential alternative.

Objective: Our aim was to test whether speckle tracking echocardiography (STE) can assist in the diagnostic of AM.

Methods: Patients admitted for AM (n = 10), defined as acute chest pain, elevated troponin, normal coronary angiogram and presence of epicardial delayed enhancement (EDE) with cardiac MRI, and control patients (n = 10) were studied. For each patient, left parasternal short axial views were acquired in 2D mode at basal, mid-ventricular and apical levels and divided into a 16-segment model. Circumferential strain (CS) and radial strain (RS) were auto-matically calculated for each segment (n = 320) using a dedicated workstation. Time to peak of CS was measured for each segment and expressed as degrees of RR cycles (= 360° ). In patients with AM, segments were categorized as with or without EDE.

Results: Mean CS and time to peak were higher in patients with AM as compared to control patients (-15.3 ± 2.5 % vs. -20.8 ± 1.4 % and 5 ± 10°, p < 0.05; respectively), whereas RS was similar (42.8 ±12.7 % and 55.7 ± 13.4 %; p = 0.07). In patients with AM, cardiac segments with EDE had a lower CS and delayed time to peak as compared to segments with no delayed enhancement (6.4 ± 8.2 % vs. -16.7 ± 7.1 %, 23 ± 27° vs. 4 ± 11°; respectively; p = 0.05), but similar RS values (37.7 ± 16.8 % vs. 38.4 ± 15.9 %, respectively; p = 0.86). CS ≥ -9 % or time-to-peak of CS > 30° in at least two segments identified patients with AM with a specificity of 90%, a sensitivity of 100% and an accuracy of 95%.

Conclusions: This pilot study suggests that STE may be useful in the diag-nosis of AM, particularly when using a composite index of CS values ≥ -9 % or time-to-peak of CS > 30° in at least two segments.
significant lesion, despite the high prevalence of vascular risk factors. The evaluation of the coronary tree has a very high sensitivity to detect a non significant lesion defined by a normal FFR were high (94.5% and 87.5 % respectively) in this setting.

Conclusion: In pts with LAD stenosis of IS, discordant results between CFR and FFR were not unusual, and the anatomic determinants of the stenosis were better correlated to CFR than to FFR. However, CFR which is a global evaluation of the coronary tree has a very high sensitivity to detect a non significant lesion, despite the high prevalence of vascular risk factors.

Detection of coronary in-stent restenosis by 64-slice Computed Tomography in asymptomatic patients after acute myocardial infarction treated by primary angioplasty using stents with thin struts.

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The occurrence of in-stent restenosis (ISR) after myocardial infarction (MI) treated by primary angioplasty is considered as a factor of poor prognosis. The methods to detect ISR are still debated in asymptomatic patients in whom functional scintigraphic or ultrasound investigations are usually proposed. Our study sought to evaluate the effectiveness of anatomic diagnosis of ISR by 64-slice Multidetector Computed Tomography (MDCT) in patients (pts) treated with one or more stents whose thickness of strut is less than 100 µm. The diagnosis of ISR by MDCT was controlled by coronary angiography, pts without ISR at MDCT were followed clinically by physicians according to their practice.

We included from January 2007 to June 2009 54 pts (50 men and 4 women) of 53.0 ± 10.8 years old. The culprit coronary lesion of MI was treated with 1.4 ± 0.6 stents (3.1 ± 0.4 mm diameter and 19.9 ± 9.7 mm length). Seventy four stents with strut of 84.6 ± 8.1 µm thickness were implanted on culprit lesions. The treated artery was LAD in 19 pts (35.2%), circumflex in 8 pts (14.8%) and RCA in 27 pts (50%). MDCT was performed 206 ± 136 days after MI. Seventeen pts (31.4%) received beta-blocker before acquisition, heart rate was 58.7 ± 7.2 bpm and effective radiation dose was 16.3 ± 1.5 mSv. Two stents (2.7%) were considered nonassessable in 2 pts (3.7%). MDCT showed ISR in 14 pts (26.9%). Coronary angiography performed in 12 pts confirmed ISR in 9 pts 55 ± 50 days after MDCT. The positive predictive value of anatomic ISR after MDCT was 75%. Thirty eight pts without ISR were followed during 392 ± 200 days. No patient died, 2 pts experienced MI in relation to a definite late stent thrombosis, no patient had revascularization for ISR.

Thus 64-slice MDCT could be a useful tool in systematic detection of ISR after MI in asymptomatic patient treated with thin strut stents. An evaluation of MDCT in addition to conventional functional methods should be discussed on a larger population.

Sublingual nitrates should be used systematically before multislices computed coronary imaging.

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Background: Coronary multislices CT (MDCT) has limited spatial and temporal resolution, which hampered the analysis of coronary artery (CA) segments. By increasing CA geometry the use of nitrates before acquisition could improve analysis quality, which is heart rate (HR) highly dependant.

Objective: The aim of this study was to evaluate safety, hemodynamic effects and imaging efficacy of systematic use of sublingual nitroglycerin just before a 256 slices CA scanner acquisition.

Method: Thirty six consecutive patients had a coronary MDCT acquisition after a spray of sublingual nitroglycerin (Natspray/0.30mg) (group 1). HR and mean arterial blood pressure (MBP) were measured before and after spray. Global imaging quality assessment, number of analyzeable segments according to the syntax score segmentation, mean diameter and area of each segments was done by two blinded operators and compared to a control group of 36 consecutive patients (group 2) examined with the same machine, but without nitrates.

Results: Both groups were similar considering age, sex ratio, BMI and beta-blocker used. In group 1 nitrates did not change heart rate (62±5 vs. 61±4 bpm) nor MBP (100.7± 15 mmHg vs. 94.9±12 mmHg). A total of 536 and 531 segments were analyzed respectively in group 1 and 2. Global imaging quality assessment was equal in both groups (good quality: 93.1% vs. 91.7%, group 1 and 2 respectively). There was <1% of missed segments in group 1 compared to 3% in group 2 (p<0.002), this represents 2.1% vs. 7.2% of secondary segments, p=0.03. Per segments mean diameter and area was greater in group 1 than group 2 (3.2mm±0.1 vs. 2.8mm±0.1, p<0.0001; 8.6mm±0.3 vs. 6.2mm±0.3, p<0.0001).

Conclusion: Sublingual nitroglycerin significantly improves CA geometry and number of assessable segments, especially in smaller secondary segments, with no quality deterioration. Thus, sublingual nitrates should be systematically used before a coronary MDCT.