Usefulness of contrast transthoracic echocardiography in the assessment of aortic dissection

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The usefulness of contrast transthoracic echocardiography (TTE) in aortic dissection has not been validated. With this aim we studied 86 consecutive patients with aortic dissection who underwent contrast TTE and transoesophageal echocardiogram (TOE). The results were compared with those obtained by MRI or CT.

Results: Contrast TTE diagnosed entry tear located in distal ascending aorta and aortic arch in 29cases. TOE suspected only 8 of these. Contrast TTE defined false lumen entry flow severity in all cases and permitted the assessment of proximal descending aorta but was limited for distal thoracic aorta. In abdominal aorta, contrast TTE facilitated the diagnosis of false lumen drainage and distal re-entry tears. Comparison of proximal and distal descending aorta contrast pattern was very useful for understanding false lumen flow hemodynamics and pressures.

Conclusion: Contrast transthoracic echocardiography is highly useful in assessment of aortic dissection, particularly in the upper third of descending aorta, arch and abdominal aorta. Overall assessment of false lumen flow kinetics with contrast provides information that may be significant for improving management of this disorder.

Factors influencing the degree of left ventricular myocardial microvascularization

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Background: Microvascular disease is caused by hypertension, diabetes mellitus and dyslipidemia and is characterized by a reduced myocardial perfusion reserve. We have previously demonstrated that quantitative myocardial contrast echo (QME) can be used to measure in vivo the relative myocardial blood volume (RMBV) which is the ratio of blood volume within the myocardium and the total myocardial volume. Moreover we have shown that in hypertensive heart disease RMBV is reduced as compared to athlete’s heart. We sought to analyze the influence of demographic, cardiovascular risk factors and medication on the extent of myocardial perfusion and perfusion measured by RMBV.

Methods: 193 patients (18 women and 113 men) were included in the retrospective analysis. 85 patients with coronary artery disease and 66 patients without. Quantitative myocardial contrast echo (QME) was carried out in all patients. The RMBV was calculated as the ratio of the signal intensity within the myocardium to that in the adjacent left ventricle. The mean RMBV was calculated by averaging RMBV of the septal, lateral and inferior segment. Univariate analysis of 29 variables of demographic, hemodynamic, cardiovascular risk factors and medication and laboratory values was performed. Multivariate analysis was carried out by multiple regression analysis with mean RMBV as the dependent variable.

Results: Means±SD patient age was 45±18 years. Univariate analysis revealed a lower value of RMBV for one of the following factors: arterial hypertension (p<0.001), smoking (p=0.004), diabetes mellitus (p=0.003), dyslipidemia (p>0.001), atherectomy/catheter (p=0.03), beta-blockers (p=0.004), angiotensin converting enzyme inhibitors (p=0.014), calcium antagonists (p=0.002), nitrates (p=0.015), diuretics (p=0.034). Multivariate analysis by means of multiple regression showed a lower value of RMBV only for hypertension (p<0.001) and smoking (p<0.001).

Conclusions: Among a multitude of demographic and clinical variables, the extent of myocardial vascularisation, i.e. RMBV, is negatively influenced only by arterial hypertension and smoking.

Detection of apical thrombus after anterior myocardial infarction by left ventricular opacification with contrast echocardiography

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Anterior MI predisposes to apical thrombus formation and systemic embolization. Reliable detection of apical thrombus could modify therapy, influencing the decision to add oral anticoagulation to mainstay antiplatelet medication.

Aim: To evaluate the value of LV opacification using contrast echocardiography (CTRS) in the detection of apical thrombi over noncontrast transthoracic echocardiography (TTE) after anterior MI.

Methods: Ninety-six consecutive patients hospitalized for anterior MI were prospectively enrolled. Inclusion criteria were enzymatic and ECG changes consistent with MI, and substantial subendocardial visualization of apical segments or extensive apical akinesia/dyskinesia by transthoracic echocardiography. All patients underwent NONC with harmonic imaging and CTRST with perfusion and harmonic imaging the same day, within 8 days of MI. The diaphragm images from 4 views (apical 2-, 3-, 4-chamber, and parasternal short-axis at the apex level) were independently reviewed by 2 experienced echocardiographers and rated for apical thrombus as definite thrombus, possible thrombus, absence of thrombus or not interpretable apex. Visualisation was evaluated using the endocardial definition score (EDS; 0 = endocardial border not visible; 1 = poorly visible; and 2 = clearly visible).

Results: Apical thrombi could not be ruled out (rated definite, possible, thrombus, or not interpretable apex) in 62/96 patients (64.6%) with NONC vs. 39/96 patients (41.4%) with CTRST (p = 0.0005). Exams were considered not interpretable for apical thrombus by both readers in 106/106 patients (100%) with NONC vs. 56/96 patients (57.9%) with CTRST (p = 0.18). Interobserver agreement for the qualitative rating of apical thrombus (definite, possible, absent or not interpretable) was 55.2% for NONC vs. 71.9% for CTRST (p = 0.02). Interobserver agreement for absence of apical thrombus was higher with LV opacification with kappa = 0.71 for NONC vs. kappa = 0.94 for CTRST. Analysis of apical segments EDS showed better endocardial visualization in 46.9% of LV apical segments using NONC vs. 59.0% with CTRST (p = 0.0005). Interobserver agreement for apical segments EDS was higher with LV opacification with kappa = 0.68 for NONC vs. kappa = 0.73 for CTRST.

Conclusion: CTRST facilitates exclusive LV apical thrombi and allows enhanced endocardial definition in addition to higher interobserver agreement for endocardial delineation of LV apical segments when compared to NONC in patients with recent anterior MI.

The perfusion score index in the subacute phase as measured with real-time myocardial contrast echocardiography correlates with infarct size in patients with acute myocardial infarction

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Background: Evaluation of myocardial damage is important for risk stratification in patients after acute myocardial infarction (AMI). While assessment of wall motion after AMI is unreliable due to myocardial stunning, assessment of myocardial perfusion with myocardial contrast echocardiography (MCE) may give a more accurate measure of true myocardial damage. We investigated whether MCE accurately predicts myocardial damage in AMI patients in the subacute phase.

Methods: We studied 13 AMI patients with 2D echocardiography, and MCE (Sonovue, HP7500), at rest and during adenosine stress (12 patients) within 2-5 days. Infarct size was estimated with peak concentrations of CK-MB (lg/mL). Myocardial perfusion was analysed (16 segments) by scoring myocardial perfusion as normal (1), patchy (2), or absent (3). Segmental wall motion was analyzed independently and was scored as normal (1), hypokinetic (2), akinetic (3), or dyskinetic (4). A perfusion score index (PSI) and wall motion score index (WMSI) were calculated (total score divided by number of segments) for each patient.

Results: Mean (SD) WMSI was 1.48±0.22. Mean CK-MB was 102±59 μg/L. PSI at rest was 1.99±0.26 at rest and 1.19±0.15 during hyperemia. Significant correlations were demonstrated between the WMSI and the PSI at rest (r=0.76, P<0.01), the WMSI and the PSI during hyperemia (r=0.79, P<0.01), and the WMSI and CK-MB (r=0.71, P<0.01). CK-MB correlated significantly with the PSI at rest (r=0.79, P<0.01), and the PSI at stress (r=0.90, P<0.01)(Fig).

Conclusion: The PSI in the subacute phase after AMI significantly correlates with enzymatic myocardial damage. Assessment of myocardial perfusion, especially during hyperemia may be a more accurate method to assess true myocardial damage than wall motion analysis.

Impact of 4 different reperfusion strategies on microvascular damage after acute myocardial infarct: results from the acute myocardial infarction contrast imaging (A.M.I.C.I) multicenter study

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Background: The restoration of adequate microvascular flow after reperfusion in AMI is the primary condition for the myocardium to stay alive. The aim of this study was to assess the impact of 4 different coronary reperfusion strategies on microvascular damage and myocardial salvage.
Methods: A total of 117 patients with first ST elevation MI (STEMI), treated within 6 hours from symptom onset, were enrolled in the Acute Myocardial Infarction Contrast Imaging (AMI.C.I.) multicenter study. According to the guidelines and cath lab availability, 50 patients were treated with primary coronary stenting (PCI) (group A); 27 with PCI performed on the first day after fibrinolysis therapy (group B), with rescue PCI (group C) and 20 with thrombolysis alone (group D). Microvascular damage was evaluated by myocardial contrast echocardiography (MCE) using continuous infusion of Sonovue (Bracco SpA) in real-time imaging. The endocardial length of contrast opacification (%LOCO) on day 1 after reperfusion was calculated. The extent of wall motion abnormalities (WMA%), LV end-diastolic volumes (EDV), and ejection fraction (EF%) at day 1, and at 3 months follow-up were also calculated.

Results: Time to the first reperfusion treatment was similar in all groups. In group B, PCI was performed within 24 hours after successful thrombolysis while in rescue PCI, within 6 hours after unsuccessful lysis. On day 1 after reperfusion, CDL% was significantly smaller in both primary PCI and in PCI after lysis group as compared to rescue PCI and lysis groups (p < 0.001). At day 1, the extent of WMA% was similar in all groups while at follow-up it decreased significantly only in groups A and B (p < 0.01). Accordingly, EF% was similar in all groups soon after reperfusion but it improved significantly only in group A and B at follow-up (p < 0.05). Finally, the EDV after revascularization was similar in all groups but at follow-up, a significant enlargement of EDV volume was observed in groups C and D (p < 0.05).

Conclusion: Our data suggest that, in STEMI patients, primary PCI and early PCI after thrombolysis, are more effective in reducing microvascular damage and improving LV function than rescue PCI rescue and lysis alone.

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In vitro delivery of plasmid DNA using ultrasound-targeted microbubble destruction. Comparison with standard lipofection
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Background: It has been previously shown that ultrasound (US)-targeted microbubble destruction (UTMD) enhances gene transfer in cultured cells. The aim of this work was to compare the efficiency of the in vitro gene transfer mediated by UTMD with that obtained by standard lipofection. Methods. Lipid microparticles were produced in the presence of increasing concentrations of the pCMV-β-galactosidase expressing plasmid (40 to 2,000 μg/mL). HEK-293 cell suspensions (2x10⁶ cells/2mL DMEM medium) were exposed to 100 ul of DNA-laden lipid microparticles, the number of β-galactosidase positive cells, and β-galactosidase expression. By contrast, in cell suspensions exposed to both US and DNA-laden microparticles, the number of β-galactosidase positive cells increased with the DNA concentration, the duration of US exposure and the amount of US energy applied (Figure). Yet, UTMD-assisted transfection was approximately 200 times less efficient than standard lipofection.

Conclusion: The efficiency of UTMD-assisted DNA delivery is proportionate to the US energy applied, the duration of US exposure and the concentration of DNA in the microparticles. Yet, the transfection efficiency reached by this method is considerably less than what can be achieved with conventional lipofection.

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Comparison of myocardial contrast echo with single photon emission computed tomography for detection of coronary artery disease in hypertensive patients with chest pain
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Adenosine stress testing is currently used for the non-invasive detection of ischemia in patients with coronary artery disease.

Purpose: The aim of this study was to compare the diagnostic accuracy of myocardial contrast echocardiography (MCE) during adenosine stress test with that of TL-201 SPECT in detecting coronary artery disease in hypertensive patients with chest pain and exercise-induced diagnostic ST depression.

Methods: We studied 40 hypertensive patients (mean age 55±4, 28 men) referred for coronary angiography underwent MCE and TL-201 SPECT scintography for assessment of myocardial perfusion during adenosine protocol. Myocardial contrast echocardiographic protocol was performed as follows: At the baseline and over the last 3 min of adenosine protocol, Sonovue (Bracco) infusion was performed at a rate of 0.8 ml/min. Power modulation and a low mechanical index (0.1-0.2) was used. Transient high mechanical index (1.7) imaging was used to destroy microbubbles, allowing the assessment of myocardial replenishment. Pre- and during adenosine infusion MCE perfusion data were compared and graded for each coronary territory.

Results: Of the 40 pts studied, 28 had significant coronary artery disease. All pts had left ventricular (LV) hypertrophy (LVmass index: men >116g/m², women >104g/m²), mean value of LVmass index = 118g/m²). Both MCE and SPECT were analyzable in 62 coronary arteries. MCE adenosine stress test had higher specificity and accuracy compared with SPECT (92 vs 41%, p<0.001, and 67 vs 71%, p<0.01, respectively), and lower sensitivity (80 vs 95%, p<0.01, respectively). Concordance between two techniques for normal vs. abnormal perfusion was 90% (k=0.67) in the LAD territory, 75% in the RCA territory (k=0.54), 64% in the LCx (k=0.48). Discrepancies between the 2 techniques were more notable in the LCx.

Conclusion: Combination of adenosine stress echocardiography and MCE appears to be the most valuable method in detecting coronary artery disease in hypertensive pts with chest pain and positive stress test, whereas false positive perfusion abnormalities are common in the lateral wall. Larger studies on this subset of pts would merit major consideration.

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Simultaneous triplane contrast echocardiography for accurate assessment of left ventricular volumes and ejection fraction. A comparison with magnetic resonance imaging
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Purpose: The aim of this study was to compare the diagnostic accuracy of myocardial contrast echocardiography (MCE) during adenosine stress test with that of TL-201 SPECT in detecting coronary artery disease in hypertensive patients with chest pain and positive stress test, whereas false positive perfusion abnormalities are common in the lateral wall. Larger studies on this subset of pts would merit major consideration.

Methods: Fifty consecutive patients were studied with no selection from baseline image quality. Echocardiography was performed using Vivid 7 Dimension with an M3S transducer for conventional 2D-imaging in the apical 4-chamber and long-axis views, and with a 3V transducer for simultaneously acquiring three apical views, using tissue harmonic imaging and a multipurpose contrast (Optison) application (Coded phase inversion) for both methods. Within one hour, MRI of LV short axis sections was performed. LV endocardial borders were traced manually. Conventional disc summation was used to calculate end-diastolic and end-systolic volumes from MRI and 2D biplane echo. Triplane data, a triangular mesh was constructed by 3D interpolation between outlined contours and volumes calculated by the Divergence Theorem.

Results: Of the study patients (aged 57±9, 48% had regional LV dyssynergy due to previous myocardial infarction. MRI EF was 58±15%. Triplane image acquisition and volume analysis was simple and rapid. The feasibility of precontrast endocardial tracing of triplane was 74% vs 82% for 2D imaging, with contrast 94% and 100%, respectively. 95% limits of agreement for EF between echo and MRI were −17.2 to 9.9% (baseline) and −9.3 to 6.5% (contrast) with 2D biplane, and −16.4 to 7.0 (baseline) and −8.5 to 4.2% (contrast) with triplane imaging (figure).

Conclusion: Simultaneous LV triplane imaging is feasible with rapid image acquisition and volume analysis. Triplane contrast images more accurate then conventional 2D biplane methods, compared to MRI.

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Adverse reactions to ultrasound contrast agents: is the risk worth the benefit?
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Background: Last year, three fatal (0.002%) and nineteen severe, non-fatal adverse reactions (0.012%) were reported in a post marketing analysis of more than
Myocardial contrast echocardiography with adenosine as a tool for the risk stratification in patients with coronary artery disease and permanent left bundle branch block

**Introduction:**
Patients (pts) with coronary artery disease (CAD) and permanent left bundle branch block (LBBB) pattern, reveal a three- to fourfold increase in cumulative cardiovascular mortality, as compared with pts with LBBB but without CAD. In this study, we investigated the prognostic value of myocardial contrast echocardiography (MCE) with adenosine (AD), in pts with CAD and LBBB.

**Methods:**
Thirty-two pts, 21 men, aged 54.4±11.3 years, with permanent LBBB and CAD detected with coronary angiography (>50% diameter stenosis in a major coronary artery) were enrolled. MCE was performed with Levovist® (Bayer, Germany), and analyzed in dysfunctional and non-dysfunctional segments demonstrated homogenous contrast effect, what divided into group A (with dysfunctional segments) and B (with non-dysfunctional segments). For the detection of myocardial microvascular integrity, we hypothesized MCE should correlate with electrocardiographic events specific to reperfusion.

**Results:**
Among pts enrolled 15 constituted group A, whereas those with a negative study group B. No difference was found between the two groups concerning demographic, clinical and angiographic data. Among group A pts, 8 (53%) had a cardiac death, non-fatal myocardial infarction and a revascularization procedure (coronary angioplasty and/or coronary artery bypass surgery).

**Conclusion:**
Conclusion: Severe adverse reactions to contrast agents are relatively common. The safety profile of UCA’s is not worse than that of most other contrast agents. Myocardial contrast echocardiography (MCE) with late gadolinium-enhanced cardiovascular magnetic resonance (LGE-CMR) in detection of myocardial viability.

741 Assessment of myocardial viability by contrast echocardiography in patients with chronic ischemic left ventricle dysfunction. Comparison with late gadolinium-enhanced cardiovascular magnetic resonance imaging (LGE-CMR)

**Purpose:**
Comparison of Contrast echocardiography (MCE) with late gadolinium-enhanced cardiovascular magnetic resonance imaging (LGE-CMR) in detection of myocardial viability.

**Methods:**
15 patients (14 men, age 62±6.8 years) with chronic ischemic left ventricle dysfunction (EF≤30%) underwent MCE (Power Harmonic Doppler) and LGE-CMR. MCE myocardial perfusion was graded semi-quantitatively as 1=normal, 2=patchy and 3=absent (non-viable myocardium). By LGE-CMR, segments were scored according the severity of myocardial scar as 1=non-reperfused, 2=small non-reperfused scar, 3>50% of myocardial thickness, 3+more than 50% of myocardial thickness, which reflects nonviable myocardium. Myocardial images were obtained in apical two- and four-chamber view, and a 12-segment model of the left ventricle was used for the analysis.

**Results:**
For final comparison, 171 segments were used, 9 segments (5%) were excluded due to MCE artefact. Overall agreement between MCE and SPEC T was 71% (kappa 0.69, p<0.001) for viable versus nonviable segments. For the detection of non-viable myocardium by MCE, the sensitivity was 99% and the specificity was 65%.

**Conclusion:**
Conclusion: MCE can reliably assess myocardial viability, however the specificity for this method to detect of non-viable myocardium by MR is moderate.

742 Predictive value of myocardial perfusion contrast echocardiography (MCE), ECG and repolarization arrhythmias for the assessment of global functional recovery of the LV

**Introduction:**
Early restoration of perfusion after AMI reduces mortality and limits the extent of MI.

**Objectives:**
To assess predictive value of MCE, analysis of ST elevation reduction, angiographic analysis of myocardial perfusion and presence of repolarisation arrhythmias for recovery of LV function post AMI.

**Methods:**
The study included 74 consecutive patients with anterior AMI, treated with PCI. Assessment of perfusion was carried out with a MBG scale and assess the extent of reduction in the sum of lactate segment elevation (leads I, AVL, V1-V6). 12-lead ECG was monitored for 24 hours in order to record repolarisation arrhythmias (RA). Myocardial perfusion was assessed by rMCE in dysfunctional segments (RA) and repolarisation index (PSI) defined as the average of myocardial perfusion of these segments was calculated. An increase in LVEF > 2% at follow up divided patients into group A with systemic function recovery (44pts) and group B without (30pts). Microvascular integrity was defined as preserved if <50% of RA demonstrated homogenous contrast effect. At baseline UVE group A and B (43% and 40%, NS), but PSI was higher in group A (1.67±1.23, p<0.001). The highest correlation between LVEF recovery and assessed parameters was found for rMCE (r=0.96, p<0.001), then for ECG (r=0.93, p<0.001). No correlation was shown for MBG, AR.

**Conclusion:**
Our study reveals that r-MCE is a better predictor of global LV functional recovery than the commonly used parameters.
474 Importance of focal zone position for detection of acral ischemia by myocardial real-time perfusion stress echocardiography compared with 99mTc-sestamibi single-photon emission computed tomography

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Background: In low mechanical index, real-time perfusion (RTP) contrast echocardiography, it is most common placing the focal zone in the base of the ventricle since this produces best general image quality of myocardial perfusion. However, acral artificails may occur when the focal zone is positioned in the base of the left ventricle due to overlapping of the ultrasound beams. On the other hand, apical focal zone positioning decreases the image quality in the basal segments. To our knowledge, the impact of focal zone positioning on the frequency of apical perfusion defect artificails from apical myocardial ischemia has not been studied in comparison with an established reference perfusion method.

Objectives: To investigate the frequency of apical perfusion defect artificails with apical compared to basal focal zone positioning, during image acquisition of RTP-adenosine stress echocardiography (RTP-ASE).

Methods: We included 30 patients referred to adenose 99mTc-sestamibi single-photon emission computed tomography (SPECT) due to suspected coronary artery disease. All patients underwent power modulation high resolution grey scale RTP imaging with contrast infusion (Sonovue®), before and during adenose stress, in conjunction with injection of the isotope preceding the SPECT image acquisition. Contrast echocardiography and SPECT were performed at the same visit. The focal zone was first placed close to the base of the LV and, then in the apical part of the LV. Analysis of myocardial perfusion was performed offline in a later occasion, blinded for the SPECT data. The SPECT analysis was used as the reference standard. The focal zone was visually interpreted, comparing rest and hyperaemia images. SPECT images were used as gold standard, and were interpreted according to the clinical routine.

Results: Using the following criterion: concomitant presence of any WMA and any perfusion defects provides the highest agreement with G-SPECT in detecting myocardial perfusion defects. More importantly, concomitant presence of any WMA and any perfusion defects provides the highest agreement with G-SPECT in detecting myocardial perfusion defects.

Conclusions: Using as gold standard, RTP-ASE with apical focal zone positioning more accurately detected apical perfusion defects compared to basal focal zone positioning. We recommended apical focal zone positioning for assessment of apical perfusion defects by RTP-ASE.

475 Myocardial perfusion assessed by contrast echocardiography correlates with angiographic perfusion parameters in patients with first AMI successfully treated with primary angioplasty

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Background: Angiographic flow in an epicardial artery does not define accurately perfusion at a macrovascular level, therefore other techniques assessing flow at a tissue level are to be preferred. In acute myocardial infarction (AMI) lack of myocardial perfusion assessed by contrast echocardiography in patients with first AMI successfully treated with primary angioplasty (PCI) will be evaluated.

Aim: To compare intravenous myocardial contrast echocardiography (MCE) with angiographic methods of assessment of microvascular perfusion in patients with first AMI successfully treated with primary angioplasty (PCI).

Methods: 100 consecutive patients (41 of them with anterior AMI) underwent primary PCI for STEMI, with restoration of TIMI grade 3 flow. Solely patients with single vessel disease were included. Baseline regional wall motion score index (WMSI) and regional contrast score index (RCSI) were calculated using a 16-segment LV model. 1 h after PCI, Opion contrast agent administered via peripheral vein. MCE was performed using a modality of subsequent data acquisition of triggered end-systolic images. Coronary angiograms after PCI were evaluated for concomitant TIMI frame count of PCI, TIMI myocardial perfusion grade (TMPG) and myocardial blush grade (MBG).

Results: Among 717 segments assessed by contrast echocardiography 168 (22%) revealed partial or total lack of perfusion. Patients with anterior AMI had significantly more segments with perfusion defect evaluated with MCE, than patients with inferior myocardial infarction (p=0,001). Regional WMSI, RCSI were 1,6 (0,56), 1,4 (0,57) respectively. Peak CK-MB correlated well with WMSI (p=0,007).

Conclusions: Concomitant presence of any WMA and any perfusion defects provides the highest agreement with G-SPECT in detecting myocardial perfusion defects. More importantly, using as gold standard, RTP-ASE with apical focal zone positioning more accurately detected apical perfusion defects compared to basal focal zone positioning. We recommended apical focal zone positioning for assessment of apical perfusion defects by RTP-ASE.
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Interact size assessment using myocardial contrast imaging, computed tomography and magnetic resonance imaging
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Background: Myocardial perfusion imaging and interact size determination using myocardial contrast echocardiography (MCE), and cardiac magnetic resonance imaging (MRI) are well established techniques. Presently multi-modality cardiac computer tomography (MSCT) is used for morphologic evaluation of the myocardium and coronary arteries, as well as coronary calcium measurement. We hypothesize that MSCT could also determine myocardial perfusion defects and interact size due to reduced resolution of the interaction.

Methods: Seven patients with a first ST-elevation myocardial infarction (MI), and positive myocardial enzymes who were treated with primary percutaneous coronary intervention were included. Within 7 days of the MI all patients had a MCE (real time and triggered imaging with Sonovue) and MRI for perfusion using delayed contrast enhancement, and a cardiac MSCT study. To assess myocardial perfusion defects on MSCT, the window levels of the examination were visually adjusted to maximize the difference between contrast enhanced and less enhanced tissue. Colour coding was performed according to the Hounsfield units of myocardial tissue for the difference between the two obtained in perfusion. The left ventricle was divided into 17 segments, and for each technique performed the segmental myocardial infarct size was classified as: normal, 1) less than 50% transmural of perfusion defect, 2) more than 50% transmural or, 3) transmural defect. The interaction was determined by 3 blinded independent observers.

Results: Wall motion abnormalities were associated with perfusion defects observed with MCE and MRI. There was moderate agreement between MFI and MSCT for perfusion defects at 74% (kappa = 0.49), a good agreement between combined MFI and MRI findings versus MSCT at a kappa value of 0.66 (agreement 91%). The sensitivity and specificity of MSCT to assess myocardial perfusion was respectively 86% and 85%.

Conclusion: MSCT appears to be a promising technique to simultaneously assess myocardial and coronary artery morphology as well as segmental myocardial perfusion to determine interact size.

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Quantitative assessment of perfusion of healthy and LAD-occluded rats with myocardial contrast echocardiography and 99mTc-sestamibi SPECT
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Background: While numerous studies have demonstrated concordance between myocardial contrast echocardiography (MCE) and SPECT in humans and big animals, this concordance has not been studied in rodents.

Aim: To determine the feasibility of high power intermittent imaging (HPI) in detecting myocardial perfusion defects in intacted rats compared with radiocontrast echocardiography (RCE).

Methods: 14 male Wistar rats underwent baseline HPI in short rats view under anesthesia. 4 rats were LAD ligated. A continuous intravenous infusion of Sonovue was used. Digital loops were analysed offline and videointensity (VI) was measured in regions of interest (ROI), defined in end diastole. By increasing pulse interval, VI time curves were obtained for each ROI and myocardial blood volume (MBV), replacement rate (RR) and myocardial blood flow (MBF) were determined. The ratio between septal (S) and anteroseptal (AL) ROIs was calculated for each parameter in all rats. The same rats underwent pinhole Micro-SPECT after injection of 99mTc and a qualitative analysis of perfusion was performed. The ratio between matched S and AL ROIs was calculated for each parameter in all rats. The same rats underwent pinhole Micro-SPECT after injection of 99mTc and a qualitative analysis of perfusion was performed.

Results: 1) Enddiastolic diameter in the normal and occluded group was 0.75±0.06 vs 0.82±0.06 cm (p<0.05) and fractional shortening was 38±5.86 vs 27±6.13% (p<0.05). 2) The S/A ratio was significantly decreased in the occluded group compared to controls (0.46 vs 1.42, p<0.05). 3) The S/A ratio was also significantly decreased in the occluded group compared to normal controls (0.46 vs 0.94, p<0.05). 4) The S/A ratio was also significantly decreased in the occluded group compared to normal controls (0.46 vs 0.94, p<0.05). 5) There was no significant difference in VI and MBV between S and AL ROIs. The ratio between matched S and AL ROIs was calculated for each parameter in all rats. The same rats underwent pinhole Micro-SPECT after injection of 99mTc and a qualitative analysis of perfusion was performed. The ratio between matched S and AL ROIs was calculated for each parameter in all rats, and was compared with MCE values.

Conclusions: HPI myocardial contrast echocardiography enables quantitative perfusion assessment and detects perfusion defects in rats and compares well with quantitative SPECT.

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Detection of impaired myocardial perfusion in patients with dilated cardiomyopathy by myocardial contrast echocardiography

Background: Despite full flow restoration (TIMI 3) in the infarct related artery macrovascular integrity of the infarcted myocardium determines systolic function recovery of the left ventricle (LV) during follow-up. Real-time myocardial contrast echocardiography (r-MCE) is a relatively easy and new imaging modality useful for the identification of viable myocardium after infarction.

Objectives: To evaluate the feasibility of r-MCE in predicting recovery of segmental LV systolic function after myocardial infarction (AMI).

Methods: Seventy four consecutive patients (50 men, 57.6±11 yrs) with a first anterior AMI underwent primary percutaneous coronary intervention (PCI) within 12 hours from symptoms onset. MCE was performed on the second day with the use of Optison bolus (0.5-0.5 ml). After preliminary study, when segmental systolic myocardial perfusion was assessed by wall motion score index (WMSI), myocardial perfusion (MP) (2=homogeneous, 1=decreased, 0=absent) was assessed in dysfunctional segments and perfusion index (PI) defined as the average of MP results was calculated. Segments with homogeneous perfusion were considered as viable. Regional and global LV systolic function measurements were repeated after 1 month and an improvement of segmental function by at least one grade was noted.

Results: At baseline 1184 segments were observed, 344 of which (29%) were dysfunctional. Sensitivity, specificity and accuracy of the r-MCE for predicting segmental function recovery were 74%, 77% and 75%, respectively. High correlation was also observed (r=0.76, p<0.05) between PSI in the baseline study and global function after follow-up.

Conclusion: Real time myocardial contrast echocardiography is reliable in predicting late systolic function recovery of dysfunctional myocardium.

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Myocardial perfusion contrast echocardiography for predicting regional left ventricular function recovery after primary PCI in patients with acute myocardial infarction

Background: Despite full flow restoration (TIMI 3) in the infarct related artery microvascular integrity of the infarcted myocardium determines systolic function recovery of the left ventricle (LV) during follow-up. Real-time myocardial contrast echocardiography (MCE) and cardiac magnetic resonance imaging (MRI) have been reported to be impaired by nuclear and MRI techniques in spite of normal epicardial arteries. In this pilot study we investigated the performance of myocardial perfusion in DCM by real-time myocardial contrast echocardiography (MCE).

Methods: 12 male individuals (6 DCM, 6 healthy volunteers) were examined by MCE with power modulation imaging (ultra low microbubble concentration, Sonovue, Philips). We injected 0.5ml of the contrast agent (CA) Sonovue followed by 10 ml saline as a bolus and digitally recorded the myocardial CA enhancement after a destructive flash in the apical four chamber view. In off-line analysis septal CA enhancement was measured frame by frame corrected, and fitted to a gamma-variate function (y = A * t^-a (alpha)) for determination of alpha and A.

Results: There was no significant difference in heart rate and systolic blood pressure between DCM and controls (69±6 bpm vs. 67±5 bpm, 114±12mmHg vs. 120±7mmHg, all n.s.). DCM showed lower EF (22±8% vs. 53±8%, p=0.001) and higher end-diastolic diameters compared to normal (LVEDD 69±8mm vs. function p<0.001). Myocardial blood volume tended to be lower in DCM but did not reach significance (8.8±5.5ml vs. 11.4±5.5 ml in healthy, n.s.). However, alpha as parameter of myocardial blood flow velocity was significantly higher in healthy volunteers (0.77±0.20 vs. 0.42±0.05 ml/sec, p<0.05).

Conclusion: Myocardial contrast echocardiography enables detection of impaired myocardial perfusion in DCM and may therefore have implications for therapeutic management in relation to the prognostic factor of myocardial perfusion reserve.

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2-D-echo akinesic segments due to myocardial infarction: patterns of myocardial contrast echocardiography and its implications on the myocardial viability
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Background: Wall motion abnormalities are the common features after an acute myocardial infarction (MI), and the infarcted zones (IZ) are often akinetic or "fibrotic" on 2-D echo. By the other hand, is well known that zones of viable myocardium are frequently found within the IZ, and this may have both therapeutic and prognostic implications. So we sought to correlate the perfusion patterns of a 2-D echo, segment, using adenosine contrast echocardiography (ACE), with the clinical follow-up in pts with established coronary artery disease (CAD).

Methods: In 164 pts (104 male, 63±1±4 years, 43±8), with at least one 2-D echo information, ACE following PESDA was obtained to investigate the standard 4-chamber and 2-chamber views and were visually analyzed (2 independent investigators). For each patient 3 LV territories (related to right coronary, circumflex and left anterior descending coronary arteries) were considered. A marked contrast enhancement after ADN was defined as normal perfusion (NP), a decrease contrast enhancement after ADN was a reversible defect (RD), and a...