Noninvasive Imaging

**1151-143**

**Regional Wall Motion Abnormalities During Dobutamine Stress Echocardiography in Patients With Systemic Sclerosis**

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**Background:** Systemic sclerosis (SSc) is a chronic connective tissue disorder of unknown etiology, characterized by cutaneous and visceral involvement. The pathogenesis of the cardiac lesion in SSc is controversial, but the primary disorder of microvascularity with diffuse arteriolar and capillary lesions could precede any fibrosis, thus causing ischemic disorder to the heart. Dobutamine stress echocardiography (DSE) is a sensitive predictor of coronary artery disease. This study was performed to assess the value of DSE for noninvasive diagnosis of cardiac involvement in patients with SSc without clinical evidence of heart disease and to determine if abnormal responses to dobutamine can be explained by a decreased coronary flow velocity reserve (CFVR).

**Methods:** We studied 27 patients with SSc without clinical evidence of heart disease, (15 with diffuse form and 12 with localized form of SSc), age 54±12. All patients underwent high dose DSE testing (5-40 mcg/kg/min) and evaluation of CFVR in the left anterior descending coronary artery with contrast transthoracic Doppler during adenosine infusion (140 μg/kg/min in 5 minutes). Patients were divided into two groups based on the absence (group A; n=15) or presence (group B; n=12) of regional wall motion abnormalities (RWMA) on DSE.

**Results:** 13 of 28 pts (46%) with SSc, we found RWMA during DSE with patchy distribution. Both groups showed normal CFVR values (group A, 2.76±0.7; group B, 2.26±0.4), but CFVR in group B was statistically reduced compared to group A (p=0.03).

**Conclusion:** This study showed that many patients with SSc, without clinical evidence of heart disease, have indoluble RWMA during DSE with patchy distribution. Furthermore, CFVR reduction suggests the role of a partial coronary microvascular dysfunction in these group of patients.

**1151-144**

**Distal Left Anterior Descending Flow Reserve by Dobutamine Versus Adenosine Transthoracic Doppler Echo During Conventional Dobutamine Echocardiography: Feasibility and Accuracy for Left Anterior Descending Patency**

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**Background:** There are a few data for coronary flow reserve (CFR) post dobutamine (D)fusion.

We aimed to evaluate the diagnostic accuracy for significant LAD stenosis using CFR either during DSE or post adenosine (AD)fusion.

**Patients-Methods:** We studied 101 consecutive pts (age 59±9, 17 women) with known or suspected CAD who were referred for DSE.

**CFR was estimated:**
1. at the stage of 30mg/kg/min of DSE (CFRd/do)
2. 30 minutes post DSE after adenosine (CFRfad).
3. All pts underwent coronary angiography within a period <3months.

**Results:**
1. Distal LAD flow was detected in all 101 pts (feasibility 100%). In 4/101 pts, contrast had to be used. Distribution of LAD stenosis was as follows: 70%: 21 pts (12 with a >90% stenosis).
2. ROC analysis for prediction of LAD % diameter stenosis gave the following results:

<table>
<thead>
<tr>
<th>LAD diameter stenosis</th>
<th>CFR</th>
<th>Cut off</th>
<th>Sens</th>
<th>Spec</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50</td>
<td>aden</td>
<td>1.82</td>
<td>0.51</td>
<td>0.98</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>&gt;50</td>
<td>dob</td>
<td>1.3</td>
<td>0.80</td>
<td>&lt;0.06</td>
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<td>&gt;70</td>
<td>aden</td>
<td>1.8</td>
<td>0.92</td>
<td>0.94</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>&gt;70</td>
<td>dob</td>
<td>1.3</td>
<td>0.52</td>
<td>0.84</td>
<td>&lt;0.0001</td>
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</table>

**1151-145**

**Accuracy of Strain Rate Techniques for Identification of Viability at Dobutamine Stress Echo: A Follow-Up Study After Revascularization**

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**Background:** Myocardial viability (VM) assessment based on wall motion scoring (WMS) with dobutamine echo (DSE) is difficult and subjective. New quantitative techniques such as strain rate imaging (SRI) correspond with isotopic techniques but their ability to predict functional recovery (FR) after revascularization is unclear.

**Methods:** Stable post-MI pts (n=49, age 63±9, EF 36±6%) underwent SRI during DSE. WMS evaluation of VM was based on low dose adenosine at DSE. SRI, end-systolic strain (ESS), post-systolic strain (PSS) and timing were aligned at rest and low dose in abnormal segts. Pts were followed for 9±12 months; FR was defined as segt improvement on post-revascularization images.

**Results:** Of 180 segts with abnormal resting function, 83 showed FR and 97 did not. Resting parameters were not predictive of recovery; resting post-systolic shortening had a sensitivity and specificity <50%. Viable vs nonviable segts showed differences in low-dose SR (0.9±0.6 vs 0.4±0.5, p<0.001, optimal cutoff >0.6), SR increment (0.5±0.5 vs 0.1±0.6, p<0.001, cutoff >0.25), ESS increment (11.6±9.3 vs 4.7±4.9, p<0.001, cutoff >4.3), ESS (4.9±9.9 vs 7±6.2, p<0.001, cutoff >3.4) and time to ES (0.3±1±0.9 vs 0.3±0.9, p<0.001, cutoff >0.32). Sensitivity and specificity of quantitative parameters were comparable to VM analysis (Table).

**Conclusions:** SR and strain responses to DSE are a feasible marker of viability, comparable to VM assessment.

**1151-146**

**Assessment of Myocardial Viability in Patients With Myocardial Infarction: Comparison of Contrast-Enhanced Magnetic Resonance Imaging With Dobutamine Stress Echocardiography**

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Background: Contrast-enhanced magnetic resonance image (CE-MRI) has been shown to identify necrotic tissue in ischemically damaged myocardium. Low-dose dobutamine stress echocardiography (LDSE) is used for assessment of myocardial viability. Objective: We sought to compare CE-MRI with LDSE for assessment of myocardial viability in patients with myocardial infarction. Methods: Fifty-two patients with acute myocardial infarction underwent CE-MRI and LDSE. All patients treated with angioplasty and stenting in the acute phase. Delayed contrast enhancement and hyperenhancement more than 75% transmural extent of hyperenhancement were detected by delayed CE-MRI (Gd-DTPA). LDSE protocol (5 and 10 ug/kg/min in 5-minute) was used. The transmural extent of hyperenhanced regions was postulated to represent the transmural extent of non-viable myocardium. The extent of regional contractility at the same locations was determined by LDSE. Regional wall motion was assessed with a 16-segment model. Results: Three hundred sixty three of the 832 myocardial segments were analyzed to infarct segments, and 263 infarct segments analyzed had viability by LDSE. Two hundred forty nine of the 263 viable myocardial segments (95%) had subendocardial hyperenhancement by delayed CE-MRI. By LDSE, 100 infarct segments were analyzed to non-viable myocardium, and 87 of the 100 non-viable segments (87%) had the transmural extent of hyperenhancement by delayed CE-MRI, and the remain 13 segments had hyperenhancement more than 75% transmural extent of myocardial tissue (mean: 82±4%). Conclusions: Delayed CE-MRI and LDSE allow assessment of myocardial viability with myocardial infarction. LDSE and delayed CE-MRI have a good correlation in evaluation of myocardial viability.

**1151-147**

**Incremental Value of Transient Poststress Left Ventricular Dysfunction After Dobutamine-ATropine Stress Echocardiography**

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**Background:** Dobutamine stress echocardiography (DSE) is an established technique for the diagnosis of coronary artery disease (CAD). Ischemia is defined by regional reduction of myocardial thickening or inward motion of endocardial borders. However, the evaluation of DSE is subjective and experience dependent and would be improved by additional objective parameters. The aim of the study was to test the additional role of volume echocardiograms during DSE for the assessment of the extent of viable myocardium.

**Methods:** The study includes 100 consecutive patients with suspected or known CAD (mean age 61±11 years; 73% males) referred for DSE: 50 patients with and 50 without stress-induced ischemia assessed by new wall motion abnormalities, using a 16-segment, 5-point score. All cardiac risk factors and hemodynamics during DSE were noted. Ventricle volumes were measured with Simpson’s method at the main DSE stages (rest, low dose, peak, and recovery).

**Results:** In 50 patients with documented ischemia male gender, angina pectoris were more frequent (p < 0.001). No differences were noted between the two groups in respect...
Feasibility of Using New Real-Time Volume Rendering Three-Dimensional Dobutamine Stress Echocardiography

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Background/Rapid acquisition of echocardiographic images is necessary for accurate wall motion assessment during stress echocardiography. Real-time three-dimensional (RT3-D) transthoracic echocardiography with full volume acquisition (Phillips SONOS 7500) offers important potential advantages over standard 2-dimensional echocardiography when assessing left ventricular wall motion. This is the first study to evaluate the feasibility of RT3-D imaging during pharmacological stress testing using this system.

Methods: Six consecutive patients undergoing dobutamine stress echocardiography (67% women; age 63 ± 11.7 years) were studied. Apical full volume and short axis 3-dimensional images were obtained during rest, low dose, and peak dose dobutamine infusion. The images were reviewed separately by 2 experienced echocardiographers to assess image quality (adequate or inadequate) using standard 16 segment American Society of Echocardiography (ASE) criteria.

Results: The apical full volume and short axis volume sets were analyzed. 98% of the 16 segment ASE wall segments during rest, 96% during low dose dobutamine infusion and 91% during peak dobutamine infusion protocol could be adequately visualized. Use of only the apical volume set allowed for 96%, 95%, and 91% visualization of all segments during rest, low dose, and peak dose dobutamine infusion respectively. The time to image optimization and acquisition for apical full volume and 3-D short axis volume sets was 21.8 ± 3.7 seconds and 24.5 ± 5.3 seconds at rest, 19.3 ± 2.5 seconds and 22.2 ± 1.7 seconds at low dose, and 19.5 ± 1.4 seconds and 21.5 ± 1.8 seconds at peak dose dobutamine infusion protocol.

Conclusions: RT3-D dobutamine stress echocardiography 1) is feasible, 2) quickly acquires full data sets and 3) may become a more frequently used imaging modality for assessment of LV wall motion.