CORONARY FLOW

1062 Transesophageal Doppler assessment of coronary blood flow in the diagnosis of main coronary artery stenoses
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The purpose of our transesophageal Doppler echocardiography (TEDE) was assessment of coronary blood flow in main coronary arteries with the elaboration of criteria of proximal coronary artery (PCA) stenoses >50%.

Methods: 175 CAD patients with PCA stenoses >50% (all men, mean age 51±8 years) were selected. TEDE was performed using a 7.4 MHz multi-plane probe connected to the Philips HDI 5000 SonocT and Ultramark 9 HDI CV systems. Peak diastolic coronary blood flow velocity (Vd) in the left main coronary artery (LMCA), proximal left anterior descending artery (LAD), circumflex artery (Cx) and right coronary artery (RCA) was determined. All patients underwent coronary angiography after TEDE.

Results: Coronary blood flow in the LMCA, LAD, Cx and RCA was registered successfully in 174 (99%), 163 (93%), 125 (71%) and 102 (58%) patients, respectively. LMCA, LDA, Cx and RCA stenosis >50% was revealed in 19 (11%), 83 (47%), 31 (18%) and 28 (16%) patients, respectively. In all stenotic PCA Vd was much higher than in the same PCA without stenosis (table). A highly significant correlation between the catheterization-derived stenosis percentage and Vd for the LMCA (r=0.67, p<0.001), LAD (r=0.36, p<0.01), Cx (r=-0.60, p=0.001) and RCA (r=0.30, p=0.01) was found. A Doppler marker of stenosis >50% was Vd in the LMCA, >1.4 m/s (83% sensitivity and 96% specificity), in the LAD >0.9 m/s (38% and 92%), in the Cx >1.1 m/s (57% and 96%) and in the RCA >0.4 m/s (27% and 95%), respectively.

Conclusion: Transesophageal Doppler assessment of peak diastolic coronary flow velocity in proximal coronary arteries allows us to reveal proximal stenosis >50% with a very high specificity.

Table 1
Coronary arteries/Peak diastolic coronary blood flow velocity, m/s

<table>
<thead>
<tr>
<th></th>
<th>without stenosis</th>
<th>stenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMCA</td>
<td>0.81±0.29</td>
<td>1.65±0.67***</td>
</tr>
<tr>
<td>LAD</td>
<td>0.38±0.15</td>
<td>0.89±0.56***</td>
</tr>
<tr>
<td>Cx</td>
<td>0.60±0.22</td>
<td>1.25±0.67***</td>
</tr>
<tr>
<td>RCA</td>
<td>0.21±0.08</td>
<td>0.33±0.18***</td>
</tr>
</tbody>
</table>

*** - p<0.001

1063 Simultaneous Doppler and pressure measurements to explain differences in the haemodynamic properties of the left and right coronary arteries
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Background: In the left coronary artery (LCA) the majority of flow occurs in diastole as can be seen from examining the flow velocity waveform. In the right coronary artery (RCA) this waveform appears to be different. Differences in the microcirculation may account for this. Until recently, it was not possible to unambiguously assess the contribution of the microcirculation to the flow velocity waveform. We present and apply a new technique, wave intensity analysis which can do this and may help explain the differences in these velocity waveforms.

Methods: In 13 subjects sensor-tipped intra-coronary wires were used to measure simultaneous pressure and Doppler velocity in the RCA, proximal left main stem (LMS), left anterior descending (LAD) and circumflex (LCX) arteries. We calculated the velocity time integral in systole and diastole. Wave intensity analysis, calculated from simultaneous measurements of pressure and flow velocity, was used to evaluate the microcirculatory contribution.

Results: The diastolic velocity time integral was less in the RCA (0.164±0.138 m) than in the LCA (LMS 0.351±0.307 m, LAD 0.303±0.250 m, LCX 0.214±0.152 m, mean LCA 0.284±0.217 m, p<0.002). The systolic velocity time integral did not differ between the RCA (0.120±0.60m) and the LCA (0.107±0.47 m, p=0.4). The microcirculatory contribution in diastole was smaller in the RCA (-7.7±6.8x106 W m-2 s-2) than the LCA (-18±13x106 W m-2 s-2, p<0.003).

Conclusion: The reduced diastolic flow velocity in the proximal RCA can be explained by the observed smaller diastolic microcirculatory contribution. This may be because much of the myocardium supplied by the RCA generates smaller pressure changes in diastole than that supplied by the LCA.

1064 The prognostic value of coronary flow reserve in patients with single vessel disease and intermediate stenosis severity: a stress echo study
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Background: Coronary flow reserve (CFR) and regional function can be simultaneously assessed during vasodilator stress echo. Aim: to assess the additional prognostic value of CFR in patients with single vessel disease and stenosis of intermediate severity.

Methods: 103 patients (68 males; age 66±9) with single vessel disease and stenosis of intermediate (50 to 75%) severity of the left anterior descending artery (n=72) or of right coronary artery (RCA, n=31) underwent stress echocardiography with dipyridamole (up to 0.84 mg/kg), including wall motion analysis by 2-dimensional echocardiography and coronary flow reserve (CFR) evaluation of the affected artery by Doppler. A new regional wall motion abnormality in > or =2 contiguous segments was required for 2-dimensional echocardiographic positivity. CFR was evaluated as the ratio of dipyridamole to peak diastolic coronary blood flow velocity at rest. All patients were followed-up for a median of 29 months.
1065 Comparison of transthoracic Doppler echocardiography to intracoronary Doppler guide wire measurements for assessment of coronary flow velocity reserve in patients with previous myocardial infarction

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Background: Current data suggest that the coronary flow reserve (CFR) measurements with transthoracic Doppler echocardiography (TTDE) correlated highly with those obtained by invasive Doppler guide wire.

Objective: The aim of this study was: 1) to assess feasibility of TTDE CFR measurements and 2) to compare TTDE CFR results with CFR obtained by invasive technique of thermodilution (CFRthrm) and 3) to compare these data with left ventricular recovery.

Methods: Study group included 26 patients with previous myocardial infarction. LAD was the IRA in 17 pts and RCA in 9 pts. Measurements of CFR was performed before angioplasty, immediately after stenting with CFRthrm during papaverine vasodilatation and after first 24h with TTDE during dipyrindamide vasodilatation in the distal part of IRA. CFR was defined as the ratio of peak hyperemic to basal averaged peak velocity in the distal part of IRA. A criterion for myocardial viability was improvement in resting WMSI>0.20 at third month follow-up comparing to values before PCI.

Results: The feasibility for TTDE CFR assessment in LAD was 88%, and in RCA 66%. Feasibility was 96% by CFRthrm. There was no statistical difference in CFR values obtained by TTDE and CFRthrm before (1.57±0.33 vs 1.46±0.38 respectively, p=ns) and after angioplasty (2.83±0.90 vs 2.27±0.61 respectively, p=ns). Interestingly, TTDE derived CFR values were slightly but not significantly higher 24h after the procedure, than CFRthrm measured immediately after the procedure (2.83±0.90 vs 2.27±0.61 respectively, p=ns). Before stenting TTDE CFR and CFRthrm showed good correlation, r=0.63, p<0.05. Again, good correlation was found between both methods after stenting r=0.55, p<0.05. WMSI decreased at follow up (1.24±0.27 vs 1.45±0.22 before PCI, p<0.0001). Negative correlation was found between CFRthrm immediately after the procedure r=-0.67, p<0.01, and TTDE and WMSI at third month, r=-0.51, p<0.05.

Conclusion: Noninvasive measurements of CFR using TTDE accurately reflects invasive measurements of CFR by thermodilution. Noninvasive and invasive measurements of CFR accurately represents the microvascular condition and correlates well with left ventricular recovery. This suggest that TTDE could be useful noninvasive method to evaluate the effectiveness of angioplasty in patients with previous myocardial infarction.

1066 Red wine enhances coronary flow reserve

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Background: Current data suggest that the coronary flow reserve (CFR) related highly with those obtained by invasive Doppler guide wire.

Objective: To determine whether moderate treatment with Irbesartan in patients with hypertension reduces CFR and serum adiponectin levels.

Methods: Two hundred forty eight CFR measurements were performed with intracoronary Doppler guide wire (CFRthrm) and non-invasive CFR measurements with transthoracic Doppler echocardiography (CFR). In all patients, the renin-angiotensin system (RAS) was activated by acute infusion of angiotensin II type 1 receptor blockers (ARBs) and the increase in plasma adiponectin levels were assessed.

Results: Red wine enhanced CFR from 5.9±2.2 to 7.0±2.5 and 7.6±3.5 (p<0.01) after the moderate and heavy doses, respectively. Plasma adiponectin increased 27.5±14.7% (p<0.001) after red wine. De-alcoholized red wine activity was associated with increased plasma adiponectin activity. Cognac increased plasma adiponectin activity 7.6±11.8% (p=0.01), but CFR was not altered. Overall, the increase in plasma adiponectin activity correlated with the increase in CFR.

Conclusion: A moderate dose of red wine enhances CFR and the improvement is associated with an increase in plasma adiponectin activity. Since de-alcoholized red wine had no effect on either CFR or blood adiponectin activity, ethanol is required to elicit the favorable effect of red wine.

1067 Influence of weight-loss on coronary flow reserve and adiponectin in obese women

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Background: Obesity is an independent risk factor for cardiovascular disease. Adiponectin (AD) has antithrombotic and anti-inflammatory properties and its plasma levels are reduced in obesity. The aim of our study was to evaluate the effects of weight loss, in obese women, on coronary flow reserve (CFR) and serum AD levels.

Methods: Two sedentary obese women (age 24-40 years, BMI>30) were included in this study. Exclusion criteria was: diabetes mellitus type 2, hypertensive or ischemic cardiovascular disease, drug or alcohol addiction. They were randomized into two groups. Group A underwent a diet with mean daily caloric intake 1250-1350 kcal and a specific physical activity. Group B continued usual caloric intake and physical activity. All the women underwent non-invasive CFR study and adiponectin serum levels measurements at baseline and after three months. Resting glucose and lipids were also measured. The flow velocity in the distal left anterior descending coronary artery was measured by transthoracic Doppler echocardiography both at rest and during intravenous infusion of dipiridamole (0.56 mg/kg in 4 min). CFR was calculated as the ratio of hyperemic to basal peak diastolic flow velocity.

Results: There were no differences between the two groups, at baseline. After three months, women in group A had a significant loss of weight (85±5 vs 96±10 kg, p<0.05). They also had a significant raise in mean serum adiponectin levels (9.1±1.6 vs 5.0±1.4 mg/ml, p<0.05) and in CFR (3.1±0.5 vs 2.6±0.8, p<0.005). Serum lipids and mean blood pressure did not significantly change, while fasting glucose significantly reduced (5.0±0.5 vs 5.6±0.5 mmol/l). No statistically significant differences occurred in Group B.

Conclusion: Weight loss, with a combined program of diet and physical training leads to a rise in CFR and circulating adiponectin in obese women, improving their cardiovascular risk.

1068 Coronary flow reserve is significantly improved after 3 months of treatment with irbesartan in patients with hypertension

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Background: The renin-angiotensin system (RAS) has demonstrated to play an important role in the cardiovascular system by influencing the vascular tone, cardiac hypertrophy and cell growth, remodelling and apoptosis. Angiotensin II type 1 receptor blockers (ARBs) exert a specific blockade of the RAS and inhibit its effects like vasoconstriction, aldosterone secretion and cell growth, without affecting Angiotensin II type 2 receptor mediated effects, such as vasodilatation and inhibition of cell growth. There are consistent histopathological data from animal studies describing reduction of intussus and perivascular fibrosis under treatment with ARBs. However, so far clinical effects of ARBs on the coronary microvascular perfusion in humans have not been evaluated.

Methods: 20 hypertensive patients (pts) without clinical suspicion of relevant coronary artery disease were investigated. In the treatment group...
11 pts (8 men, mean age 60±11 years) received on top of their unchanged medication the ARB Irbesartan (300 mg two times daily, after a titration phase of 16±6 days) for a period of 3 months. The control group consisted of 9 pts (7 men, mean age 57±12 years) on antihypertensive treatment except ARBs or ACE-inhibitors. Exclusion criteria were relevant left ventricular hypertrophy (septum thickness >13 mm), ARB- or ACE-inhibitor treatment in the last 3 months, ejection fraction <40%, previous myocardial infarction or atrial fibrillation. In all pts coronary flow reserve (CFR) was measured in the left anterior descending artery at baseline and at the end of the study non-invasively by transthoracic Doppler echocardiography (TDE) (Siemens-Acuson, Sequoia C512); hyperemia was induced by 140 µg/kg bodyweight adenosine i.v. All TDE were performed by the same experienced investigator.

Results: Baseline CFR results did not differ in the treatment group (mean CFR=270%, range 220-350) compared to the control group (mean CFR=280%, range 240-340). In the treatment group CFR increased by more than 40% at the end of the study after 3 months to a mean CFR of 375% (range 350-410, p<0,001); the control group showed no significant difference compared to the baseline examination (mean CFR=270% at study end). Septum thickness remained unchanged in both groups.

Conclusions: RAS blockade by the ARB Irbesartan over 3 months significantly increases CFR in pts with arterial hypertension, demonstrating improvement of coronary microvascular function independent of hypertrophy reduction.

1069 Comparison of angiography, IVUS, coronary flow reserve measurement by TEE in angiographically borderline lesions

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Background: The angiographic assessment of proximal left anterior descending artery (LAD) stenosis can be difficult for borderline lesions in the 30 to 60% range at visual assessment. Intravascular ultrasound (IVUS) and transesophageal coronary flow reserve measurement (TEE-CFR) could offer an alternative diagnostic study. Our case was designed to evaluate the potential correlations between IVUS, quantitative coronary angiography (QCA) and TEE-CFR measurement in assessing angiographically borderline LAD lesions.

Methods: Forty-two patients (mean age 62±9 years, 25 males) with lesions referred for IVUS examination of proximal LAD entered in the study. Exclusion criteria were: severe left ventricular hypertrophy, angiographically significant left main and ostial LAD stenosis and a contraindication to dipyridamole. IVUS measurements were taken using a 40 MHz Atlantis Plus (Boston Sci.) IVUS catheter. Standard IVUS and routine QCA measurements were assessed before the intervention. During TEE the standard dipyridamole stress protocol (0.56 dipyridamole over 4 minutes) was employed. The coronary flow reserve was calculated as the ratio of the peak/resting diastolic velocities measured in the left anterior descending artery coronary flow velocities at rest and following adenosine stress. IVUS and angiographic borders were post processed with dedicated software (Echo-PAC BT v6.05) and their distance was compared.

Results: Nine patients were excluded from the study due to significant left main or proximal LAD lesions. The average lumen LCSA assessed by IVUS was 3.66±1.38 mm² for proximal LAD. Baseline mean doppler velocity in the proximal LAD was 54.79±21.44 cm/s, and increased to 94.56±25.86 <p<0.01. The average CFR measured by TEE was 1.90±0.42. The average diameter stenosis assessed by QCA was 37.92±10.43%. IVUS-derived LCSA was unrelated to angiography-derived stenosis (r=0.15, p=ns). TEE-CFR was better correlated to IVUS-derived LCSA (r=0.49, p<0.05) than to angiography-derived stenosis (r=0.12, p=ns).

Conclusion: Angiographic and intravascular ultrasound based assessment of coronary stenoses can be substantially unrelated in angiographically borderline proximal LAD disease. TEE-CFR provides an alternative physiologic approach, better related to intravascular than to angiographic appearance of the stenosis.

1070 Increase of coronary flow after levosimendan infusion is associated with improvement in cardiac performance in patients with compensated heart failure

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Levosimendan is a novel calcium sensitizer which improves cardiac contractility independently of increasing myocardial oxygen demand. We examined the effects of levosimendan infusion on coronary flow and the relation between changes in coronary flow and the reciprocal changes in BNP, in echocardiographic and clinical indices of cardiac performance after levosimendan infusion in patients with compensated heart failure.

Methods: We studied 42 patients, of mean age 62±12 years, with heart failure (NYHA III-IV) refractory to conventional therapy and LV ejection fraction (EF) 22±16%. Patients were randomized to receive levosimendan 0.1 µg/kg/min (n=21) or placebo (n=21) for 24 hours. Before and 48h after each treatment patients underwent: A) assessment of max, mean and time integral (VTI) of the coronary flow velocity (CFV) in LAD using a 7MHZ transducer during colour-coded Doppler imaging using 2D-echocardiography, of RV systolic pressure (RVSP) by means of Doppler echocardiography, of EF/E’ ratio using tissue Doppler imaging of mitral inflow velocity and tissue Doppler imaging of the mitral annulus and of LVEF; B) measurement of plasma BNP levels.

Results: There were no differences in baseline characteristics between patients receiving levosimendan or placebo. ANOVA showed that there was a greater increase in max, mean and VTI -CFV, and decrease in BNP levels, RVSP and E/E’ after levosimendan than after placebo (table, p<0.05). Compared to baseline, increased VTI-CFV was related to an improvement in EF, E/E’, and BNP after treatment in patients receiving levosimendan (r=0.68, r=0.4, r=0.80; p<0.05 respectively).

Conclusions: Short-term levosimendan therapy improves coronary flow in patients with improved in cardiac function parameters in patients with heart failure.

Table 1

<table>
<thead>
<tr>
<th>Levosimendan</th>
<th>Placebo</th>
</tr>
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<tbody>
<tr>
<td>Max-CFV (m/sec)</td>
<td>10.3±2.6</td>
</tr>
<tr>
<td>VTI-CFV (m/sec)</td>
<td>59.8±7.8</td>
</tr>
<tr>
<td>RVSP (mmHg)</td>
<td>135±5.3</td>
</tr>
<tr>
<td>E/E’ (%)</td>
<td>25.7±7.5</td>
</tr>
<tr>
<td>BNP (pg/ml)</td>
<td>1115±611</td>
</tr>
</tbody>
</table>

4th POST 4.03±0.16 12.3±1.6 51.7±6 13.5±3 33.4±2.9 588±471

0.017 0.002 0.002 0.01 0.01 <0.01 0.01

1071 Transcoronary three-dimensional imaging of coronary artery flow

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The determination of the coronary flow reserve by transthoracic Doppler echocardiography during adenosine stress offers the possibility of detecting of restenosis mainly in the left anterior descending artery (LAD). However, there is only a small number of hospitals in Germany performing this non-invasive measurements of coronary flow reserve by ultrasound mainly due to the necessary expertise and training of this procedure. One problem for visualization of coronary arteries using 2D-echocardiography is the three-dimensional course of the vessels. Thus, the aim of the present study was to analyse the feasibility of three-dimensional visualization of coronary artery flow by 3D4D color coded echocardiography.

Methods and results: Investigations were performed in 15 patients (pts) using a Vivid 7 ultrasound system (GE Healthcare) with the 3D-probe. In all pts 2D visualisation of parts of the coronary arteries was possible by 2D color-coded imaging. A full color coded volume set was acquired within a time interval of 8 heart cycles during breathhold. Complete coronary artery flow was illustrated by changing tissue transpansion of the full data set. In all pts flow velocities of the LAD could also detected with 2D colored imaging using the 3D probe, but in only 11 of 15 pts a threedimensional flow reconstruction was possible. The distal parts of the right coronary artery (RCA) were detected in only 2 pts. The 3D reconstruction of RCA flow was only partially possible. In one case the direct visualization of a stenotic flow was detected as could be shown by angiography after the echocardiography.

Summary: 3D visualization of coronary artery flow is possible. Thus, an increasing diagnostic feature for coronary angiography and echocardiography is available. However, for clinical routine technical improvements are still necessary.

1072 Independent association between coronary flow velocities at rest and left ventricular filling pressure in arterial hypertension

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Purpose: Hypertensive patients free of coronary artery disease often present altered coronary blood flow (CBF) because of pressure overload and left ventricular (LV) hypertrophy. Little is known about the influence of LV filling pressure (LVFP) on CBF in hypertension. Aim of the present study was to evaluate possible association between LVFP and CBF at rest by Tissue Doppler and transthoracic Doppler assessment of distal left anterior descending artery (LAD) in a population including both normotensive and hypertensive subjects.

Methods: After exclusion of patients with coronary disease (angina and/or ECG signs at rest/maximal treadmill exercise), diabetes mellitus, congestive heart failure and primitive/valvular cardiomyopathy, 12 normotensive subjects and 33 recently onset, never treated hypertensive patients, underwent a Vivid 7 ultrasound system (GE Healthcare) with the 3D-probe. The patients were divided in 2 groups: 31 with normal LVFP (=E/Em ratio<8) and 14 with increased LVFP (E/Em ratio>8).

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**Results:** The two groups were similar for sex, age, heart rate, body mass index, systolic and diastolic blood pressure (BP), LV mass, relative wall thickness, left ventricular ejection fraction, and decrease in LV mass index at rest was higher in patients with E/E' ratio > 2.8 (26.0±0.6 vs. 23.6±0.4) than in those with E/E' ratio < 2 (22.3±0.6 cm/s) (p<0.01). In the overall population, resting CBF diastolic velocity was positively related with E/E' ratio (r=0.40, p<0.01). This association remained significant even after controlling for diastolic BP and LV mass (r=0.37, p<0.02).

**Conclusions:** In uncomplicated arterial hypertension CBF at rest is increased in presence of increased E/E' ratio, independently of BP values and LV hypertrophy. These findings indicate that the increase of LV filling pressure occurring during pressure overload is able itself to induce elevation of coronary microvascular resistance and, thus, of CBF velocities at baseline condition.

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**1073**

**Translational doppler analysis of coronary artery poststenotom flow characteristics in the mid and distal left anterior descending coronary artery**

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This study was performed to noninvasively assess coronary artery hemodynamics distal to coronary artery stenosis.

**Methods:** High-frequency transluminal echocardiography was used to assess blood velocity patterns in the mid and distal segments of the left anterior descending coronary artery (LAD) of 42 consecutive patients (mean age = 58 years, 40 men and 2 women) who underwent coronary angiography for investigation of angina.

**Results:** Biphase Doppler velocity patterns were obtained in 22 patients (52%) in mid LAD and 30 patients (76%) in distal LAD without contrast enhancement using ultrasound diagnostic system Vivid 7 (GE). Obstructive (>50%) proximal or mid LAD stenosis was determined in 26 patients, unobstructive stenosis (<50%) in 16 patients. Patients with obstructive stenosis demonstrated near poststenotic increase of the diastolic component of blood flow velocity in the mid LAD compared to patients with unobstructive stenosis (table). The peak diastolic velocity in mid LAD >0.7 m/s has 82% sensitivity and 100% specificity for other proximal or mid LAD stenosis detection. There was no significant difference in any measurements of distal LAD systolic and diastolic blood flow velocity in patients with unobstructive LAD stenosis and obstructive stenosis (table).

**Conclusions:** Measurements of flow velocities in the distal LAD only does not allow us to reveal proximal and mid obstructive LAD stenosis. At the same time, transluminal Doppler analysis of coronary flow in mid LAD may be correctly performed at more than 50% patients and poststenotic increase of the diastolic component of blood flow velocity in the mid LAD is a good marker of proximal or mid LAD obstructive stenosis.

### Table 1

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Obstructive Stenosis</th>
<th>Unobstructive Stenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak diastolic velocity in mid LAD, m/s</td>
<td>0.91±0.07*</td>
<td>0.43±0.24</td>
</tr>
<tr>
<td>Mean diastolic velocity in mid LAD, m/s</td>
<td>0.66±0.01*</td>
<td>0.25±0.15</td>
</tr>
<tr>
<td>Mean diastolic velocity in distal LAD, m/s</td>
<td>0.33±0.19</td>
<td>0.34±0.15</td>
</tr>
<tr>
<td>Mean diastolic velocity in distal LAD, m/s</td>
<td>0.25±0.14</td>
<td>0.24±0.11</td>
</tr>
</tbody>
</table>

* p<0.005 intergroup comparison

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**1074**

**Prognosis value of transluminal coronary flow reserve in patients with proximal LAD stenosis of intermediate severity**

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**Background:** Transluminal coronary flow reserve (T- CFR) is a reliable tool to assess the functional significance of left anterior descending artery (LAD) stenosis. However, its prognostic value is less well established.

**Objective:** This study sought to determine the prognosis value of T-CFR > 2 in medically treated patient with an angiographically intermediate (50 to 70% QCA) proximal LAD stenosis.

**Methods:** 49 consecutive patients (66±11 years, 71% men, left ventricular ejection fraction 60±6%) with an angiographic intermediate LAD stenosis (54±4%), no previous anterior myocardial infarction, and with a T-CFR >2 were prospectively included. CFR was measured in the distal part of the LAD after intravenous administration of adenosine (0.14 mg/kg/min within 2 minutes). All patients were treated medically without revascularisation and completed follow up (15±8 months).

**Results:** The mean CFR was 2.7±0.5. During the follow up period (range 4 to 35 months), 4% patients (80%) remained free of cardiac events and the percent estimated survival free from death or target vessel-related events was 89±2%.

**Conclusion:** In patients with proximal LAD stenosis of intermediate severity, the T-CFR is an interesting prognostic parameter. When T-CFR is >2 in this setting, deferral of angioplasty is associated with low coronary event rate.

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**1075**

**Non invasive assessment of the coronary microcirculation in the setting of tako-tsubo cardiomyopathy**

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**Background:** The clinical features of the tako-tsubo cardiomyopathy or transient left apical ballooning syndrome (LABS) are well described but the mechanisms remain unknown. Myocardial stunning is suggested. Whether the coronary microcirculation is involved is still unclear.

**Objective:** To assess prospectively the coronary microcirculation in the LABS, at the acute phase and after functional recovery, using transluminal coronary flow reserve (T-CFR).

**Methods:** Five consecutive patients (all women, mean age 66±8 years) who fulfilled the criteria for LABS (acute chest pain, ECG abnormalities, transient balloon-like left ventricular wall motion abnormalities at the apex of the ventricle, normal coronary angiography and a stressful event), underwent T-CFR in the distal part of the left anterior descending coronary artery (LABS). The procedure was performed after 4 months in the third case and the remainder case was left unoperated. A myocardial perfusion scintigraphy was performed after 5 months in the third case and the remainder case was left unoperated. In all patients, the T-CFR was measured at baseline (peak LV filling pressure), during high-dose (>8) administration of adenosine (0.14 µg/kg/min over 2 min), in the acute phase (<48 h after symptom onset) and 24±5 days apart.

**Results:** The peak CFR was increased in these 2 examinations: from 2.3±0.2 in the acute phase to 2.9±0.1 (p<0.0019), while WMS decreased (from 31±8 in the acute phase to 16±8±0.8, delta WMS =14.7±2, p=0.01). All patients exhibited an increase of the CFR between the 2 exams (delta CFR=0.56±0.2, range from 0.3 to 0.82), and the correlation tends to be significant between delta CFR and delta WMS (r=0.86, p=0.058). No significant changes of the hemodynamic variables occurred between the 2 examinations.

**Conclusion:** Serial non invasive CFR measurements performed in these 5 patients with LABS suggest transient microcirculatory impairment during the acute phase of the syndrome. The wall motion improvement parallels to the dynamic change of the microcirculation, suggest a relationship between these 2 variables.

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**1076**

**Determinants of impaired coronary flow reserve in patients with type 2 diabetes mellitus without epicardial coronary artery abnormalities**

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1Naples Italy; Villa dei Fiori Hospital, Cardiology Dept., Naples, Italy; 2Federico II University Hospital, Clinical and Experimental Medicine Dept., Naples, Italy

**Purpose:** Coronary flow reserve (CFR) may be reduced in diabetes mellitus. Aim of the present study was to investigate the determinants of CFR impairment in patients with type 2 diabetes mellitus without epicardial coronary artery stenosis.

**Material and methods:** Twenty-five patients with type 2 diabetes mellitus (M/F=18/7, mean age =54 years) and normal coronary angiography and 12 normal subjects, comparable for sex prevalence and age, underwent transluminal coronary flow reserve including color-guided Doppler measurement of coronary diastolic peak velocities in distal left anterior descending artery, both at rest and after hyperemic stimulation by high-dose (0.84 mg/kg) adenosine infusion during echocardiographic examination (normal WMS =16).

**Results:** T-CFR increased between the 2 examinations: from 2.3±0.2 in the acute phase to 2.9±0.1 (p<0.0019), while WMS decreased (from 31±8 in the acute phase to 16±8±0.8, delta WMS =14.7±2, p=0.01). All patients exhibited an increase of the CFR between the 2 exams (delta CFR=0.56±0.2, range from 0.3 to 0.82), and the correlation tends to be significant between delta CFR and delta WMS (r=0.86, p=0.058). No significant changes of the hemodynamic variables occurred between the 2 examinations.

**Conclusion:** Serial non invasive CFR measurements performed in these 5 patients with LABS suggest transient microcirculatory impairment during the acute phase of the syndrome. The wall motion improvement parallels to the dynamic change of the microcirculation, suggest a relationship between these 2 variables.

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**Eur J Echocardiography Abstracts Supplement, December 2006**
Conclusions: In type 2 diabetes without epicardial coronary artery stenosis the impairment of coronary flow reserve is mainly due to the increase of left ventricular mass, expression of the changes in myocardial texture and able to condition the hyperemic stimulation of myocardial blood flow.

1077 The independent prognostic value of contractile and coronary flow reserve in dilated cardiomyopathy: a dipyridamole stress echo study
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1Hospital Umberto I, Mestre, Italy; 2University Federico II, Napoli, Italy; 3CNR, Institute of Clinical Physiology, Pisa, Italy; 4Lucca Hospital, Lucca, Italy

Objectives: The aim of the study was to evaluate the prognostic value of Doppler echocardiographic derived CFR over inotropic response in patients with DCM.

Methods: We evaluated 132 DCM patients (90 male; age 62±11 years) with transthoracic dipyridamole (0.84 mg/Kg in 10') stress echocardiography. All patients had an ejection fraction 0.25. All patients were followed-up for a median of 24 months.

Results: Mean CFR was 2.0±0.5. At individual patient analysis 48 patients had normal (CFR>2) and 84 had abnormal CFR. Resting WMSI was 2.0±0.33 and decreased to 1.8±0.4 at peak dipyridamole dose (p<0.001). Forty-two (32%) patients had inotropic response. During follow-up, 19 patients died and 34 showed worsening of NYHA class. The worst outcome was observed in those patients with an abnormal CFR and no inotropic reserve at high-dose dipyridamole (HR=2.3, 95% CI=1.06-5.1) were correlated with the increase of NYHA class (HR=2.0, 95% CI=1.1-3.7), abnormal CFR (HR=2.8, 95% CI=1.3-9.8) and the absence of an inotropic reserve at high-dose dipyridamole (HR=2=3, 95% CI=1.06-5.1) were independent predictors of survival.

Conclusions: In DCM patients, CFR is often impaired. A reduced CFR and the absence of an inotropic response during vasodilator stress are additive in predicting a worse prognosis.

1078 Three-month Nebivolol therapy induces improvement of both left ventricular filling pressure and coronary flow reserve in hypertensive patients without coronary artery disease
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1Naples, Italy; 2Federico II University Hospital, Clinical and Experimental Medicine Dept., Naples, Italy

Purpose: This study analyzed the effects of Nebivolol (NB), a beta-blocking agent provided of NO-mediated vasodilating properties, on transthoracic Doppler derived coronary flow reserve (CFR) and on left ventricular (LV) filling pressure (LVPF) in uncomplicated arterial hypertension.

We studied 34 patients, mean age 52±15.1, 21 men, without history of coronary artery disease and with negative echo-stress. We used an Alaska (Japan) alfa-10 prosound echo-machine. LAD doppler velocities have been recorded at the distal segment of the vessel by phased array transducer. The following parameters have been evaluated: ratio between diastolic peak velocity (D) and systolic peak velocity (S), (D/S); ratio between velocity time integral of diastolic component (VTI-D) and systolic component (VTI-S) of distal left anterior descending artery.

We observed at baseline: VTI-D = 2.7±0.7 cm in the distal left anterior descending artery, and 84±25 cm/s (mean veloc. 77±10 cm/s) in the dia-stolic peak velocity (Em) of left ventricular lateral wall. After 3 months of treatment, mean age 52±15.1, 21 men, in all patients VTI-D increased to 3.2±0.8 cm (p<0.01). NB therapy significantly improves coronary flow reserve in hypertensive patients without coronary artery disease.

Conclusions: Three month NB therapy significantly improves CFR and LVPF in uncomplicated hypertensives. The association between changes of CFR and LVPF demonstrates that the improvement of coronary microcirculation induced by NB could be at least partially mediated by changes of myocardial diastolic properties or, viceversa, that the reduction of LVPF could be facilitated by the restoration of coronary microcirculation due to the drug.

1079 Relationship between coronary flow velocity and vascular stiffness
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Background: It has been hypothesized that an increase in stiffness of great vessels is associated with reduced coronary blood flow. Animal studies are conflicting, and no human evidence, particularly by non invasive technique, has been provided.

Objectives: To assess the relationship between arterial wall stiffness measured by a non-invasive new tool, e-trackin, Akaza, Japan, and basal coronary blood flow evaluated in the left anterior descending artery (LAD) by transthoracic doppler echocardiography.

Methods: We studied 34 patients, mean age 52.8±15.1, 21 men, without history of coronary artery disease and with negative echo-stress. We used an Akaza (Japan) alfa-10 prosound echo-machine. LAD doppler velocities have been recorded at the distal segment of the vessel by phased array transducer. The following parameters have been evaluated: ratio between diastolic peak velocity (D) and systolic peak velocity (S), (D/S); ratio between velocity time integral of diastolic component (VTI-D) and velocity time integral of total flow (VTI-Tot), expressed as percentage (VTI-D/VTI-Tot %). Parameters of vascular stiffness have been evaluated by e-tracking with the same echo-machine, at the level of the common carotid artery just before bifurcation.

The following parameters have been evaluated: Beta (stiffness parameter); AI (augmentation index); PWV (pulse wave velocity). The value of blood pressure (systolic and diastolic), evaluated in the left arm, have been included in the system for evaluation of these parameters.

Results: Our results showed an inverse correlation between vascular stiffness parameters and coronary blood flow velocities patterns. These preliminary data needs of further studies to be confirmed.

Table 1

<table>
<thead>
<tr>
<th>D/S</th>
<th>PWV</th>
<th>AI</th>
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<tr>
<td>0.7</td>
<td>0.64 &lt;0.001</td>
<td>0.61 &lt;0.001</td>
</tr>
<tr>
<td>0.68</td>
<td>0.48 &lt;0.001</td>
<td>0.61 &lt;0.001</td>
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<tr>
<td>0.7</td>
<td>0.64 &lt;0.001</td>
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<tr>
<td>0.68</td>
<td>0.48 &lt;0.001</td>
<td>0.61 &lt;0.001</td>
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</tbody>
</table>

Inverse correlation between vascular stiffness parameters and coronary blood flow velocity.

1080 Relationship between intramural coronary artery blood flow velocity and left ventricular workload in patients with aortic valve stenosis: preliminary results
C. De Gregorio 1; G. De Simone 1; A. Curro 2; P. Grimaldi 2; F. Rigo 1; S. Gherardi 1; M. Galderisi 2; L. Pratali 3; L. Cortigiani 4; R. Sicari 1
1Univ. of Messina, Medicine & Pharmacology Dept., Messina, Italy; 2Messina, Italy

Introduction: Modern ultrasound devices allow investigating blood flow velocity in the left descending coronary artery (LDDA), and the small intramural arteries (IMCA) as well. We have previously demonstrated that IMCA diastolic velocity can be related to systolic obstructive gradient in patients with hypertrophic cardiomyopathy. In the present study we sought to assess whether this relationship also occurs in patients with aortic valve stenosis (AVS).

Methods: Twenty-five patients, 72±10 y, 13 M, were studied at high resolution Doppler echocardiography. Exclusion criteria were previous myocardial infarction, primary hypertrophic cardiomyopathy, dilated heart disease, systolic dysfunction, diastolic dysfunction, or non-obstructive coronary microvascular dysfunction.

Consequently, all patients were included. Standard measurements were taken. Coronary blood flow velocity was recognized in the distal segment of the LDDA and in some apical IMCA by using high-frequency (3.5/7.0 MHz) transducers, harmonic imaging, but no contrast enhancement. Peak (PSG) and mean (MSG) systolic velocities were calculated by aortic valve velocity. Moreover, the actual systolic workload of the left ventricle (LV-SW) was calculated by adding systolic blood pressure to PSG.

Results: Seven patients had severe (28%), 10 moderate (40%), 8 mild (32%) AVS. Avered LV-end diastolic diameter was 4.7±0.6 cm, LV-end systolic diameter 2.7±0.7 cm, LV ejection fraction 71±9%, interventricular septum thickness 1.5±0.3 cm, posterior wall thickness 1.0±0.2 cm. Average aortic valve area was 1.0±0.09 cm², with PSG of 68±34 mm Hg, and MSG of 40±21 mm Hg. Coronary peak diastolic velocity was 44±11 cm/s (mean velocity 31±8 cm/s) in the LDDA, and 84±25 cm/s (mean veloc-
 Coronary artery reactivity to cold provocation enhances after pravastatin therapy

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2Turku University Hospital, Clinical Physiology Dept., Turku, Finland

**Purpose:** We sought to determine whether noninvasively measured cold pressor test induced coronary artery flow velocity response enhances after 4-month pravastatin therapy compared to placebo in type 1 diabetic patients.

**Methods:** In this randomized, double blind study, coronary artery flow velocity was measured at rest and during cold pressor test with transthoracic echocardiography in 42 patients with type 1 diabetes before and after 4-month treatment with pravastatin 40 mg/day or placebo. Coronary artery flow was measured noninvasively with transthoracic Doppler echocardiography. In cold pressor test the right hand was immersed in ice water (0°C) for 120 seconds.

**Results:** Figure shows the coronary artery flow during the 120-second cold pressor test as compared to the baseline value. There was no difference in coronary artery flow responses at baseline and after placebo. After 4-month pravastatin treatment coronary artery response to cold pressor test was enhanced as compared to the baseline (p<0.001).

**Conclusions:** Transcranial Doppler echocardiography during cold pressor test is an promising new tool to evaluate coronary artery flow reactivity for physiological responses. Pravastatin treatment enhances the reactivity of coronary arteries in type 1 diabetic patients.

Contrast echocardiography for pulmonary arteriovenous malformations (pavms) screening in hereditary hemorrhagic telangiectasia (hht)

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3Tampere University Hospital, Clinical Physiology Dept., Tampere, Finland

**Background:** HHT is a dominantly inherited disease with a high prevalence of PAVMs, causing right-to-left shunt and leading to stroke, brain abscess and hemorrhage. Contrast Echocardiography with second harmonic imaging (CE) is a useful tool for the identification of PAVMs in HHT.

**Aim of the study:** To compare the diagnostic value of CE with multislice thoracic CT, which is regarded as sensitive and specific as pulmonary angiography for the diagnosis of PAVMs; to evaluate the significance of semiquantitative analysis of right-to-left shunt.

**Methods:** In the context of our multidisciplinary HHT family screening protocol, 127 consecutive subjects were screened for PAVMs with CE in supine position by injection of 10 ml agitated saline solution. Images were obtained in the apical four-chamber view. A positive CE finding was defined as the appearance of any bubbles in the left atrium later than 3 cardiac cycles after initial opacification of the right chambers. A semiquantitative analysis of the shunt size was performed according to the contrast echo opacification of the left-sided chambers: grade 0, no bubbles; grade 1, occasional filling; grade 2, moderate filling; grade 3, complete opacification. All patients had multislice chest CT scan performed; pulmonary angiography (PA) was indicated on the basis of CT, CE and clinical findings results.

**Results:** 72 HHT patients had positive CE (48 grade 1, 11 grade 2, 13 grade 3). CT identified PAVMs in 22 patients with positive CE grades 2-3. There was an agreement between CE grade and presence of PAVMS on CT (Cohen’s K index=0.91; 95% CI: 0.87 to 1.00). To date 19 patients with CE+/CT- have been addressed to PA: one patient declined referral for PA, in another case CT showed PAVMs smaller than 3 mm, not amenable to embolization. One patient with CE+/CT- and previous cerebral abscess was addressed to PA. Among CE+/CT- three patients had patent foramen ovale (PFO). Antibiotic prophylaxis and closer follow-up was indicated in all subjects with CE+/CT-

**Conclusions:** Our study confirms CE is an extremely sensitive, noninvasive procedure for the detection of PAVMs; CE grading may be used to guide decision in the PAVMs screening protocol; cases with low positivity score, more than one third, probably reflect the presence of microscopic PAVMs which clinical significance is unknown.

Real time imaging of targeted microbubbles to human endothelium of umbilical cord vein in an ex vivo model

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1University Hospital Bern, Cardiology Dept., Bern, Switzerland

**Background:** Clinically used hemodynamic indices such as fractional flow reserve, coronary flow reserve and collateral flow index are based on simplified models of the coronary circulation. In particular, myocardial resistance is assumed to be independent of the perfusion pressure. Objective of this study was to quantify the influence of perfusion pressure on myocardial blood volumes (MBV) that reflect microcirculatory resistance.

**Methods and results:** 30 patients with coronary artery disease underwent measurement of intracoronary perfusion pressures and MBV of 32 coronary arteries and their territories during and after angioplasty. MBV was measured in ml blood per 10 g tissue by quantitative myocardial contrast echocardiography as recently validated by our group. During angioplasty, perfusion pressures, i.e. the distal occlusive pressure, and MBV varied between 9-57 mm Hg (27±12 mm Hg) and 1.2-15.2 ml/100 g (6.8±3.9 ml/100 g). After successful angioplasty, perfusion pressures and MBV varied between 64-118 mm Hg (94±12 mm Hg) and 3.9-18.2 ml/100 g (10.3±3.5 ml/100 g). MBV and perfusion pressures correlated positively (Figure, dotted lines) in 25 cases and negatively (Figure, solid lines) in 7 cases, suggesting perpendicular microembolisation of the latter. In agreement with animal data,
mean MBV variation was 0.04 ml/100 g per 1 mm Hg. Thus, a coronary pressure drop of 60 mm Hg reduces MBV by approximately 30%.

**Conclusions:** The human coronary microcirculation is distensible, the fact of which may challenge the use of coronary hemodynamic indices for clinical decision making.

### 1085

**Quantification of specific adhesion to human endothelium of targeted anti-Cd9 microbubbles. Results from an „In Vitro“ model**

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¹Hospital Universitari Vall d’Hebron, Cardiology Dept., Barcelona, Spain; ²Hospital de la Princesa, Immunology Dept., Madrid, Spain

Microbubble (µB) based contrast agents (CA) are used in ultrasound molecular imaging to identify specific targets. The aim of this study was to test microbubbles ability to bind to human endothelial cells (EC) and to evaluate the specificity and efficacy of their adhesion.

**Methods:** Attachment of 5 different CA was assessed in an inverted flow chamber: albumin shell (AS), lipid shell (LS) and a biotinylated shell (BS) that was not used conjugated (naked) or conjugated with 2 monoclonal antibodies: antiCD9, specific for EC receptor CD9, and antiCD19, as a control since CD19 is not expressed by EC. Three types of culture dishes were prepared: Fibronectin (FN), as a control for non-specific chemical adhesion, and monolayers of EC isolated from umbilical cords, resting (rEC) and TNF-activated (aEC). Infusion of CA was recorded with video-microscopy. Wall shear stress was increased (0.5-5 dyn/cm²) at 10 intervals of 1 minute. To rinse unspecific attachments, a washing period of 3 min with buffer up to 3 dyn/cm² was completed. As number of particles is determinant for interactions with EC, concentration of CA was kept between 3 x 10⁶ - 6 x 10⁷ MB/ml.

**Results:** Specific adhesion to both rEC and aEC was higher using antiCD9 than antiCD19, both in proportion (p<0.04) and strength (p<0.02). No differences were found at binding, neither proportion nor strength, for conjugated CA in rEC vs aEC. Unspecific adhesion to FN of naked CA was not significantly higher than conjugated CA (p<0.25).

**Conclusion:** Specific adhesion to human endothelium of antiCD9 conjugated contrast agent is higher than with control agents. Lower degrees of non-specific adhesion are possible with naked agents. Some unspecific and labile binding may be expected with the use of targeted contrast agents for ultrasound molecular imaging.

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<tr>
<td>FN</td>
<td>2+ (1)</td>
<td>1+ (0)</td>
<td>2+ (1)</td>
<td>4+ (1)</td>
<td>4+ (0)</td>
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<td>1+ (0)</td>
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### 1086

**Resting perfusion defects in pharmacological stress echocardiogram: nonspecific or meaningful?**

J.D. Herbasz¹; P. Lipiec¹; J. Wojtas¹; W. Wejner-Mik¹; M.M. Plewka¹; M. Kozinska-Paluka¹; M. Ciesieleczyk¹; J. Drozdz²

¹Medical University, 8 Chair of Cardiology, Lodz, Poland

Contrast perfusion imaging (CPI) extends the diagnostic capabilities of echocardiographic detection of myocardial ischemia. However, the significance of resting as opposed to inducible perfusion defects is much less established. We performed a prospective study of high-dose dipiridamole/ atropine stress echocardiography (DSE) with CPI to test their diagnostic accuracy for the detection of coronary artery disease (CAD).

**Methods:** 200 unevaluated pts (62 females, 138 males, age 57±9, mean CCS class 2.3) underwent diagnostic DSE with CPI at baseline and peak stress (0.84 mg/kg dipiridamole; when negative, 1 mg atropine i.v. was added) using ECG-triggered endystolic harmonic imaging (HI, N=97, 1.4, in low energy monitoring dual screen mode) or real-time (CPS, N=103). Contrast enhancement was obtained by repeated boluses of 0.3-0.5 ml Optison and visually scored in 18 segments (the same as those used for scoring of wall motion abnormalities, WMA). Coronary angiography performed within 4 weeks from DSE was used as a reference for CAD (with diagnostic cutoff of 50% stenosis).

**Results:** After the exclusion of patients with obvious history of myocardial infarction, we analyzed the subset of 108 pts. CAD was present in 70% of patients (20% 1 vessel -1VD, 24% 2 vessels, 26% 3 vessels). Using standard WMA criteria DASE had 64% accuracy (60% sensitivity, Se; 50% Se for 1VD and 72% specificity, Sp) and positive for CAD (including the presence of resting WMA) in 69% of patients and had 75% accuracy (79% Se, 69% Se 1VD and 64% Sp). Resting defects were present in 32/108 pts, in 22/32 (69%) with concomitant WMA. Expectedly, positive predictive value was low (34%). However, 26/32 (81% total, 73% for HI, 88% for CPS, p=NS) defects in all coronary artery perfusion beds had corresponding significant coronary disease, including 10 occlusions and 16 significant stenoses. 4/10 resting defects did not WMA and only 2/22 with WMA were false positive (p=0.06).

**Conclusions:** In patients without obvious history of MI simple and novel CPI modalities improve the diagnosis of coronary ischemia when resting contrast defects are visually assessed. Combined resting perfusion and wall motion abnormality offer the best accuracy for supporting the diagnosis of CAD at 81% positive predictive value. Supported from KBN grant P05B 03623.

**Abstracts S187**
1089 Lack of immune response following CARDIOsphere(r) infusion in healthy subjects
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1Point Biomedical Corp., Clinical Dept., San Carlos, United States of America; 2PDD Development, LLC Clinics Dept., Austin, United States of America

Background: The ultrasound contrast agent CARDIOsphere (CS) is intended for use in myocardial perfusion echocardiography. CS consists of microspheres containing cross-linked human albumin, a structural polymer, and nitrogen gas in the core. The objective of this study was to assess the safety and the immunologic response to multiple administrations of the CARDIOsphere microspheres using clinical dosages.

Methods: 25 healthy adult subjects (mean 31 years, 12 females) with a negative skin test response to albumin saline and a positive skin test response to histamine were studied. All subjects received three single intravenous infusions of CS diluted in 150 ml Dextrose using a standard clinical dose (0.175 mg/kg) at 4-weekly interval. The first infusion was a potential priming immunization; the second had the potential for boosting immunization, and the third represented an antigen challenge to a potentially primed and boosted immune system. Immunologic evaluations were performed before and 4h following each CS infusion. Evaluations included IgE-mediated immediate-type hypersensitivity, ELISA measurements of total immunoglobulin (IgG, IgM, and IgA), mast cell activation (serum tryptase), and complement activation (measured by serum CH50, C3, C4). Adverse events (AEs) were monitored from throughout the study.

Results: There were no signs of IgE-mediated hypersensitivity such as urticaria, angioedema, or anaphylaxis. Total immunoglobulin levels (IgG, IgM, and IgA) did not indicate any changes with repeated infusions of CS. Tryptase levels indicated no mast cell activation. Finally, there was no evidence of complement activation with successive exposure to CS. Only mild AEs were reported.

Conclusion: This study of 25 healthy subjects showed that CS infusion did not cause any immunologic response or severe adverse effects after multiple administrations.

Table 1. Immunology parameters

| Parameter | 1Baseline | Change post CS | 2Baseline | Change post CS
<table>
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<td>IgG (mg/dl)</td>
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<td>IgM (mg/dl)</td>
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<td>C4 (mg/dl)</td>
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1090 Evaluation of ventricular function and echocardiographic resolution with contrast in morbid obese patients
A. Camarozzo 1 ; L.H. Weitzel 1 ; D. Bastos 1 ; C. Nascimento 1 ; B. Tura 1
1National Heart Institute, Cardiology Dept., Rio De Janeiro, Brazil

Background: The echocardiographic contrast allows for a better imaging and is widely recommended for patients with limited acoustic windows.

Methods: Thirty-five patients on the list for pre-operative bariatric surgery were examined and referred to transthoracic echocardiogram. The equipment employed was the Sonos 5500 with harmonic imaging and software for contrast; the contrast used was Definity. The parameters evaluated in the Groups A (without contrast) and B (with contrast) were: diameter by M-mode assessment, LV volume by 2-D echocardiogram, quality of the image in the apical view (4 and 2 chambers) done by two different examiners, number of the well viewed segments, ejection fraction (EF) and symptoms. For statistical analysis the paired student’s t-test was employed.

Results: Patients’ mean age was 42 years (+9) with 74% female; mean weight was 140 kg; IMC 51 and body surface 2.5. Of the 140 cuts analyzed 22 showed good imaging and 58% were bad prior to contrast. This status changed after contrast to 88% good and 11% bad imaging, which represented an increase of approximately 46% in image resolution. Only 42% of the Group A patients had their volumes analyzed by two-dimensional echocardiography compared to 95% of the patients of Group B, which allowed for a better evaluation of the EF. The EF showed a better agreement between Groups A and B by M-mode, with no statistical difference (p=0.4), but obtained of the volumes in Group A was much harder and inaccurate by the two-dimensional echocardiogram. The number of well viewed segments was significantly higher in Group B (p<0.0001). No patients complained of any symptoms.

Conclusion: The use of contrast allowed for a better viewing of the myocardial segments in both quality categories (global and regional analysis) in the sub-group of morbid obese patients. The analysis of the LV volumes by 2-D echocardiogram was also made easier and more precise with the use of the contrast.

Table 1. Paired Samples Test: Groups A and B

<table>
<thead>
<tr>
<th>Statistic</th>
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<th>group B</th>
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<tr>
<td>p value</td>
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<td>-7.95</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
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<td>0.00</td>
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</table>

1091 Use of myocardial contrast echocardiography for quantification of myocardial blood flow in mice
K.K. Poh1 ; M.J. Raher2 ; H. Thibaut2 ; R. Luu2 ; G. Derumeaux2 ; M.H. Picard1 ; M. Scherrer-Crosbie1
1Massachusetts General Hospital, Cardiac Ultrasound Lab, Boston, United States of America

Background: Myocardial contrast echocardiography (MCE) has been validated in the quantification of myocardial blood flow (MBF) in human and large animals. Although mice are used to elucidate genetic mechanisms in cardiovascular disease, assessment of MBF has been limited by lack of validated noninvasive techniques. Our goal was to compare MCE with the invasive measurements of MBF using microspheres both at rest and with vasodilators.

Methods: MCE was performed in C57BL6 wild-type mice, at rest (n=5) or after intravenous infusion of adenosine (140 µg/kg/min). Definity® was infused at a rate of 1-3 µl/min. Parasternal long axis views were acquired (14 MHz probe, mechanical index 0.24, frame rate 25-30 Hz). Time versus intensity (i in dB) replenishment curves were obtained after a burst of 10 high energy frames and the beta coefficient (microbubble velocity in/ and I plateau (A) were calculated. Immediately following MCE, 180,000 fluorescent 10 µm microspheres were injected into the left ventricle (LV) with simultaneous withdrawing of a reference blood sample at a rate of 200 µl/min. After euthanasia, the LV was digested and processed for microsphere quantification.

Results: There were no differences in blood pressure and heart rate between control and adenosine-treated mice. Higher microsphere-derived MBF rate, beta and the product of A*beta were documented in mice infused with vasodilators compared to mice at rest. Beta and A*beta correlated closely with MBF rate as quantified by microspheres (both r>0.69, p<0.001).

Conclusions: MCE is able to detect myocardial perfusion in mice at rest and its increase after adenosine-induced coronary vasodilation. MCE parameters correlate closely with myocardial flow rate by microspheres, potentially allowing noninvasive and rapid quantification of MBF.
1092
The value of myocardial contrast echocardiography compared with 99mTc MIBI single photon emission computed tomography in detecting myocardial perfusion defects in patients with acute myocardial infarction

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Background: The microvasculature damage after myocardial infarction has crucial implications. There is a range of both non-invasive and invasive parameters facilitating flow assessment at tissue level. Myocardial contrast echocardiography (MCE) offers a promising modality for non-invasive evaluation of myocardial perfusion. The study aimed to assess the efficacy of intravenous contrast echocardiography (MCE) in detecting myocardial perfusion defects in patients with acute myocardial infarction compared with 99mTc MIBI SPECT study.

Material and methods: 86 patients (mean age 58±11.2) underwent primary percutaneous coronary (PCI) for acute anterior myocardial infarction. TIMI grade flow, myocardial blush grade (MBG), corrected TIMI frame count (CTFC), wall motion score index (WMSI), ST-segment resolution and segmental perfusion were estimated in real time before and immediately after PCI, using low MI (0.3) after 0.3 ml bolus injections of Intravenous Option®. MCE was repeated on the third day after PCI. All patients underwent a rest 99mTc MIBI SPECT study (SPECT) on the third day after PCI.

Results: A MCE perfusion defect size after PCI >25% of the MCE perfusion defect size before PCI was used to define myocardial non-reperfusion. Based on MCE, 54 patients had reperfusion (‘reflow’ group) and 32 had non-reperfusion (‘no-reflow’ group). Patients from the non-reperfusion group showed a higher creatine kinase peak (p=0.0034), higher creatine-MB (p=0.0033) and higher troponin level (p=0.0629), longer time span between the onset of pain and reperfusion (p<0.0001), and worse baseline regional contractile function (p=0.138). All angiographic parameters were worse in this group before as well as after PCI. more often TIMP 0 or 1, TIMP 0 or 1 and in patients from ‘no-reflow’ group was observed. These patients had higher cTFC than ones from ‘reflow’ group. The agreement between MCE and SPECT for detecting perfusion abnormality was 67%.

Conclusions: MCE facilitated identification of myocardial perfusion abnormalities in patients with acute myocardial infarction, whereas serial MCE facilitated identification of patients with early and late improvement of myocardial perfusion. MCE correlated very well with SPECT images in assessing perfusion defect.

1093
Accuracy and safety of myocardial perfusion imaging during dipyridamole stress echocardiography

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1 Medical University of Lodz, II Chair And Dept. Of Cardiology, Lodz, Poland

Myocardial perfusion imaging is considered feasible for analysis at baseline and peak stress but the safety of this technique with pharmacological stress imaging during dipyridamole stress echocardiography (DSE) with triggered and real-time (cDSE+MPI) during contrast stress in detecting myocardial perfusion is well tolerated and safe technique with higher accuracy for evaluating patients with known or suspected CAD. No excess adverse reactions are observed as compared to standard dipyridamole protocol.

Table 1. Parameters at rest vs after hyperemia

<table>
<thead>
<tr>
<th></th>
<th>Rest</th>
<th>Adenosine P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure (mm Hg)</td>
<td>102±8</td>
<td>98±7</td>
</tr>
<tr>
<td>Heart rate (beats/min)</td>
<td>557±40</td>
<td>549±23</td>
</tr>
<tr>
<td>Microspheres-derived myocardial flow rates (ml/min/g)</td>
<td>5.1±0.4</td>
<td>13.2±4.0</td>
</tr>
<tr>
<td>Goodness of fit of MCE curve</td>
<td>0.94±0.05</td>
<td>0.90±0.06</td>
</tr>
<tr>
<td>beta (%)</td>
<td>0.4±0.1</td>
<td>0.7±0.1</td>
</tr>
<tr>
<td>A (dB)</td>
<td>10.5±4.1</td>
<td>11.9±2.6</td>
</tr>
<tr>
<td>A’beta (dB/s)</td>
<td>4.5±1.3</td>
<td>8.2±2.8</td>
</tr>
</tbody>
</table>

1094
Contrast microbubbles for assessment of left atrial appendage morphology and function during pre-cardioversion transesophageal echocardiography: useful or not?

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Background: Transesophageal echocardiographic (TEE) assessment of left atrial appendage (LAA) for thrombus in atrial fibrillation (AF) can be problematic in marked LAA enlargement, poor contractility and spontaneous echocardiographic contrast (SEC). Objectives: A pilot study to evaluate feasibility, safety, and incremental value of intravenous contrast microbubbles (Definity®) during precardioversion TEE for evaluation of LAA and detection of thrombus in AF patients.

Methods: From July 2005 - Jan. 2006, we prospectively included 31 patients (21 males, mean age 69±11 years, 95% CI 65-73) with AF (mean duration 36±50 days, 95% CI 12-99). After TEE, real time imaging using Definity® was done. LAA measurements were determined. Patients were followed for mean of 4.7±3 months for occurrence of cerebrovascular events.

Results: Contrast use was not associated with complications. Contrast completely filled LAA within mean of 23.7±15 sec (95% CI 19-30). LAA measurements and image quality parameters are shown (Table 1). LAA thrombus was noted by TEE in 2/31 (7%) and confirmed by contrast, which precisely outlined the thrombi. Contrast reduced artifacts in 5/68 (73%) patients and improved LAA SEC in 16/18 (89%). All patients except those with thrombi underwent cardioversion. No cerebrovascular events were reported during follow-up, while AF recurred in 6 /29 (21%) patients.

Conclusion: Contrast use during precardioversion TEE is feasible, safe and improves 2-dimensional image and Doppler signal quality. LAA volume measurements were substantially underestimated without the use of contrast. Contrast clearly delineated LAA thrombi, and differentiated artifacts.

Table 1. Left Atrial Appendage (LAA) Measurements

<table>
<thead>
<tr>
<th></th>
<th>Without Contrast</th>
<th>With Contrast</th>
<th>Mean Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean LAA Length (mm)</td>
<td>4.4</td>
<td>4.8</td>
<td>0.53 (0.18,0.87)</td>
</tr>
<tr>
<td>Mean LAA Ostium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diameter (mm)</td>
<td>1.88</td>
<td>2.1</td>
<td>0.210 (0.45)</td>
</tr>
<tr>
<td>LAA Minimum Area (mm²)</td>
<td>4.2</td>
<td>5.3</td>
<td>1.185 (1.5,1.7)</td>
</tr>
<tr>
<td>LAA Maximum Area (mm²)</td>
<td>6.0</td>
<td>8.1</td>
<td>1.96 (1.27,2.66)</td>
</tr>
<tr>
<td>Mean LAA Peak Emptying Velocity (cm/s)</td>
<td>39.99</td>
<td>41.75</td>
<td>1.77 (10.78,4.31)</td>
</tr>
<tr>
<td>Mean LAA Peak Inflow Velocity (cm/s)</td>
<td>29.6</td>
<td>39.2</td>
<td>9.66 (7.21,26.52)</td>
</tr>
<tr>
<td>Poor Image Quality (%)</td>
<td>11/31 (35.4%)</td>
<td>6/31 (19.4%)</td>
<td></td>
</tr>
<tr>
<td>Presence of Spontaneous Echo Contrast</td>
<td>18/31 (58.1%)</td>
<td>2/31 (6.5%)</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Presence of Arts cm² (%)</td>
<td>6/31 (19.4%)</td>
<td>1/31 (2.2%)</td>
<td>0.032**</td>
</tr>
</tbody>
</table>

1095
Regional alterations in diastolic endocardial contour (RADEC): a novel finding in contrast echocardiography and relation to cardiovascular risk

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Background: The use of contrast agents enhances interpretation of regional systolic wall motion abnormalities (RWMA) during contrast stress echocardiography (CSE). Regional alterations in diastolic endocardial contour (RADEC) observed during CSE is a unique finding and may enhance detection of abnormalities earlier in the ischemic cascade. The
purpose of this study was to evaluate the association between RADEC and cardiovascular risk in subjects with normal systolic wall motion during CSE.

Methods: 68 patients (mean age 48±15 years; 34 females), with negative CSE [no systolic wall motion abnormality at rest or during/after peak stress; exercise in 31 (46%), dobutamine in 37 (54%)] were included in the study. The study group comprised 103 patients (pts) (68 male, mean age 58±9 years) with suspected stable CAD (mean CCS class 2.2). All pts underwent G-SPECT and rapid high dose dipyridamole (0.84 mg/kg iv over 4 minutes) - atopine (up to 1 mg iv) stress real-time MCE (Contrast Pulse Sequencing, Siemens Sequoia C256) using repeated iv boluses of Option. Perfusion defects in 18 segments of the left ventricle were visually assessed by consensus of 2 investigators. The segments were divided into 3 coronary territories (LAD, CX, RCA) based on typical coronary flow distribution. Inducible abnormalities were noted in coronary territories developing new defects at peak stress (with normal perfusion at baseline) or those which showed worsening of abnormalities were noted in coronary territories developing new defects at peak stress.

Results: 2DE and 3DE segments were determined on segmental level and on the territory level. 3DE data in full volume (FV) with simultaneous 2DE apical 2, 3- and 4-chamber projections were collected at baseline and at peak stress. Sonovue (Bracco), a microbubble contrast agent with baseline, low dose, peak dose and recovery images simultaneously from multiple simultaneous planes and/or full volume acquisition from a single position, which is advantageous in dobutamine-atropinestress echocardiography (DASE). Intravenous infusion of a contrast agent has also potentially an incremental value for improved wall motion detection and perfusion data during DASE. This pilot study tests the efficacy and feasibility of 3DE contrast echo during DASE in comparison with 2Dimensional echocardiography (2DE).

Material and methods: 21 consecutive DASE patients were included in the study. 3DE data in full volume (FV) with simultaneous 2DE apical 2, 3- and 4-chamber projections were collected at baseline and at peak stress. Sonovue was infused at 0.5-0.8 ml/min during registration. Low mechanical index (MI) was used for 2DE (MI = 0.08-0.11) and medium-low MI for 3DE (MI = 0.16-0.23). For reading purposes the 2DE images were presented as a quad view with baseline, low dose, peak dose and recovery images simultaneously presented one projection at a time. 3DE was presented in a nine-slice view from a FV acquisition using baseline, low dose and peak dose. 3DE and 2DE images were assessed by segment by segment in a 18 segment model evaluating wall motion and perfusion. The level of agreement between the 2DE and 3DE segments were determined on segmental level and on the territory level in the three major coronary arteries.

Results: One patient was excluded due to poor 3D image quality. Both image acquisition and the reading procedure was significantly faster with 3DE compared to 2DE. Contractility was evaluated using wall motion analysis. 355 segments out of 378 were in agreement. Perfusion agreement was seen in 361 segments out of 378. When assessing the concordance to coronary distribution of ischemic areas there was an excellent agreement between 2DE and 3DE. Using 2DE as gold standard the sensitivity and negative predictive value for 3DE was 100%. The specificity was 63% and the positive predictive value was 40%.

Conclusion: 3DE is a promising tool for fast stress echo reading with a high negative predictive value and thus could be used as a first step in stress echocardiography. Further studies are needed to confirm these results.

1098 Myocardial perfusion imaging: comparison of stress time-real myocardial contrast echocardiography and gated single-photon emission computed tomography

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1Medical University of Lodz, II Char And Des Pt. Of Cardiology, Lodz, Poland
Background: Gated 99mTc-sestamibi SPECT (G-SPECT) is considered one of the reference methods for assessment of myocardial perfusion. The diagnostic potential of stress myocardial contrast echocardiography (MCE) has not yet been fully established.

Object: To evaluate the diagnostic value of stress real-time MCE for detection of perfusion defects compared with G-SPECT.

Material and methods: The study group comprised 103 patients (pts) (68 male, mean age 58±9 years) with suspected stable CAD (mean CCS class 2.2). All pts underwent G-SPECT and rapid high dose dipyridamole (0.84 mg/kg iv over 4 minutes) - atopine (up to 1 mg iv) stress real-time MCE (Contrast Pulse Sequencing, Siemens Sequoia C256) using repeated iv boluses of Option. Perfusion defects in 18 segments of the left ventricle were visually assessed by consensus of 2 investigators. The segments were divided into 3 coronary territories (LAD, CX, RCA) based on typical coronary flow distribution. Inducible abnormalities were noted in coronary territories developing new defects at peak stress (with normal perfusion at baseline) or those which showed worsening of perfusion at peak stress. Fixed defects were noted in coronary territories showing defects of the same magnitude at rest and peak stress.

Results: Assessment of MCE was feasible in 95% of segments. In a patient-by-patient analysis the agreement between G-SPECT and MCE was 80% (κ = 0.618) in detecting perfusion defects at rest and 84% (κ = 0.650) at stress. In perfusion beds of LAD, CX and RCA the agreement was 84% (κ = 0.552), 90% (κ = 0.730) and 85% (κ = 0.681) in detecting perfusion defects at rest and 73% (κ = 0.459), 89% (κ = 0.642) and 86% (κ = 0.626) at stress, respectively. In a patient-by-patient analysis the concordance between analyzed methods was 68% (κ = 0.329) in detecting inducible perfusion defects and 82% (κ = 0.482) in detecting any (inducible or fixed) perfusion defects. In perfusion beds of LAD, CX and RCA the concordance was 75% (κ = 0.448), 86% (κ = 0.429) and 73% (κ = 0.394) in detecting inducible perfusion defects and 73% (κ = 0.459), 89% (κ = 0.642) and 81% (κ = 0.605) in detecting any (inducible or fixed) perfusion defects, respectively.

Conclusions: Stress MCE offers acceptable agreement with G-SPECT in detecting perfusion defects in patients with suspected coronary artery disease.
1099
Contrast echocardiography reduces the interobserver variability in measurements of ejection fraction observations from the PREMIER Study
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1The Cleveland Clinic Foundation, Cardiovascular Medicine Dept., Cleveland, United States of America; 2Henry Ford Hospital, Cardiovascular Medicine Dept., Detroit, United States of America

Contrast Echocardiography is used for endocardial border definition. Rigorous evaluation of its impact on left ventricular volume (ESV, EDV) and ejection fraction (EF) measurements are lacking. We sought to determine the incremental value of using contrast echocardiography in comparison to non-contrast enhanced echocardiography in the setting of a controlled clinical trial.

Methods: The multicenter international PREMIER trial (253 patients) used echocardiographic parameters as an endpoint to evaluate the impact of the PG-116800 (MIP inhibitor) in the treatment of post myocardial infarction patients. 48 pairs echocardiograms (contrast and non-contrast) were done at pre-specified times and used as echo core lab data for evaluation of interobserver variability in the quantitative measurement of ESV, EDV and EF. Both OPTISON® and DEFINITY® were used as contrast agent in this study. Each Echocardiogram was blindly reviewed and analyzed by two physicians/sonographer teams. Stident test was used to detect significant differences in the absolute errors using the two echocardiographic methods.

Results: See table.

Conclusion: Contrast echocardiography improves the interobserver variability in measurements of EF even when a standardized echo lab is used. A significant interobserver variability reduction was not seen for errors in measurements of ESV and EDV. When EF is used as an endpoint, this advantage of contrast echocardiography may be used to reduce the sample size needed in a clinical trial to observe true differences in outcomes.

Table 1. Percentage Error

<table>
<thead>
<tr>
<th>ESV (ml)</th>
<th>EDV</th>
<th>EF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Contrast</td>
<td>9.88</td>
<td>6.36</td>
</tr>
<tr>
<td>Contrast</td>
<td>8.94</td>
<td>6.66</td>
</tr>
<tr>
<td>P</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

1100
Prognostic value of myocardial contrast echocardiography in comparison with other risk factors of adverse cardiac events in patients after acute MI treated with primary PCI
K. Wita 1; Z. Tabor 1; A. Rybicka-Musialik 1; M. Turski 1; M. Nowak 1; W. Kwansiewski 1; A. Dziewiecka-Gerber 1; M. Trusz-Gluza 1
1Silesian Medical School, 1st Department of Cardiology, Katowice, Poland

Long term outcome after MI treated with early primary PCI is not adequately assessed. The current study addresses frequency and risk factors for major adverse cardiac events (MACE) defined as death, reinfarction, rehospitalisation for heart failure/EF or sustained ventricular tachycardia/VT/VTI in the occurrence in this population. Consecutive 115 patients (aged 58±11, 86 males) admitted with the first infarction, only anterior wall, undergoing successful primary PCI were enrolled. Angiographic MBF perfusion, echocardiographic sum of ST segment depression reduction at 60 min. after PCI (ST50%), time of 50% ST segment reduction from lead with maximum elevation (dST50%), second day LV ejection fraction (LVEF), wall motion score index (WMSI) and biplane EF were calculated. The patients were assessed up to 6 months.

Results: 18 MACE's occurred: 3 pts died, 2 had reinfarction, 11 were rehospitalised for cardiac cause, stroke over 6-month of follow-up.

Conclusion: The current study addresses frequency and risk factors for major adverse cardiac events (MACE) in patients with acute MI treated with primary PCI. The result of the study may be useful for risk stratification in HD patients.

1102
Effect of recent onset diabetes on myocardial blood flow reserve assessed by myocardial contrast echocardiography in rats
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1AZ VUB, Cardiology Dept., Brussels, Belgium

Recent studies have suggested an impaired coronary vascular reserve in spontaneously diabetic rats. It has been shown that myocardial contrast echocardiography (MCE) allows the quantification of myocardial blood flow (MBF) at rest and during dipyridamole infusion (DIP). The aim of the study was to determine the MBF reserve in normal rats compared with recently induced diabetic rats using MCE.

Methods: We studied 29 Wistar rats, 10 normal controls and 19 diabetic rats (induced by intravenous streptozoxycin, 2 weeks before). All rats underwent baseline and stress (DIP: 20 mg/kg) high power intermittent imaging (HIP) in short axis view under anesthesia. A continuous intravenous infusion of Sonovue® with a dedicated pump was used. Digitally loops were analysed offline and videointensity (VI) was measured in a region of interest (ROI) defined in end systole. By increasing pulse interval, VI time curves were obtained for each ROI and myocardial blood volume A, replenishment rate B and myocardial blood flow A were all determined. All these parameters were compared at rest and after DIP in both populations. The MBF reserve was also calculated and compared in the 2 groups.

Results: After 3 days, all the diabetics had an elevated glycemia. At the time of the study, the mean glycemia was 422±52 mmol/l. 2. As shown in the table, there was no significant difference for the measured parameters between normal and diabetics at rest and after DIP. The MBF reserve was slightly but not significantly reduced in diabetic (2.33±1.6) vs normal rats (3.0±2.1).

Conclusions: In this animal model of induced diabetes, as early as 2 weeks after the onset of the disease, there is a slight although non significant reduction of MBF reserve assessed by MCE.

Table 1

A vs? A

<table>
<thead>
<tr>
<th></th>
<th>Normal rest</th>
<th>Normal DIP</th>
<th>Diabetes rest</th>
<th>Diabetes DIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7.8±1.2</td>
<td>0.29±0.21</td>
<td>7.2±1.7</td>
<td>0.48±0.28</td>
</tr>
<tr>
<td>A?</td>
<td>9.8±1.3</td>
<td>0.58±0.31</td>
<td>5.6±3.3</td>
<td>3.5±2.4</td>
</tr>
</tbody>
</table>

1103
Contrast echocardiography improves interobserver agreement for wall motion score index and correlation with ejection fraction
A.R.T Van De Ven 1; T.W. Galemna 1; R.T. Van Domburg 1; W.B. Vetters 1; B.J. Krenning 1; F.J. Ten Cate 1; M.L. Geleijnse 1
1Erasmus MC, Thoraxcenter, Cardiology Dept., Rotterdam, Netherlands

Background: Left ventricular ejection fraction (LV-EF) measurements are time-consuming and often a wall motion score index (WMSI) is pro-
vided as a surrogate marker for LV EF. Unfortunately, there are only few data on the relation between the WMSI and LV EF. In addition, poor nonspecific enhanced echo windows can make the WMSI (and LV EF) unreliable. The value of contrast imaging for WMSI assessment was not investigated before.

**Methodology:**
The study comprised 100 consecutive patients (mean age 57±13 years, 65 males) who underwent both SH and SonoVue LVO echocardiography for clinical evaluation of LV function. Two independent physicians assessed segmental quality and wall motion for both the SH and LVO studies according to a 17-segment model. Systolic wall motion was defined as (1) normokinesia, (2) hypokinesia (systolic inward endocardial motion <7 mm), (3) akinesia, and (4) dyskinesia. LV EF was assessed from the LVO images according to the biplane modified Simpson's method by a blinded physician.

**Results:**
Of the 1,700 analyzed segments, 453 (26.6%) were poorly visualized with SH imaging, and 173 (10.2%) with LVO imaging (p<0.0001).

The two independent observers agreed on segmental wall motion score in 1,299 of the 1,700 segments (agreement 76%, kappa 0.60) with SH imaging and in 1,491 of the 1,700 segments (agreement 88%, kappa 0.78) with LVO imaging. Interobserver correlation (R²) was 0.86 for the SH-imaged WMSI and 0.93 for the LVO-imaged WMSI. The limits of agreement for interobserver LVO-imaged WMSI (mean relative difference -1.0%±6.8%, agreement -14.6%, 12.0%±5.2%) corresponded better than those for SH-imaged WMSI (mean relative difference 2.3%±11.0%, agreement -25.5, 17.9). The LVO-imaged WMSI correlated well with LVO-imaged LV EF (R²=0.71). LV EF could be estimated according to the formula 1.01-0.32xWMSI. The limits of agreement for interobserver correlation (R²) was 0.86 for the SH-imaged WMSI and 0.93 for the LVO-imaged WMSI. The limits of agreement for interobserver correlation (R²) was 0.86 for the SH-imaged WMSI and 0.93 for the LVO-imaged WMSI.

**Conclusion:**
Echo contrast improves interobserver agreement for wall motion and WMSI scoring. The LVO-imaged WMSI correlates well with LVO-imaged LV EF.
1107
Assessment of aortic elastic properties in patients with erectile dysfunction by conventional and colour tissue Doppler echocardiography
E. Seyfeli 1 ; N.K. Tsirikos 1 ; G. Kottis 2 ; A. Kalantaridou 2 ; D. Chaniotis 2 ; G. S. I. T. Toumanidis 1 ; 2; N. K. Tsirikos 1 ; G. Kottis 2 ; A. Kalantaridou 2 ; D. Chaniotis 2
1 Ultrasound Division Dept., Vienna, Austria; 2 Institute of Pathology, Graz, Austria; 3 Siemens Medical Solutions, Ultrasound Division Dept., Vienna, Austria

Background: With the advent of transgenic technology, genetically altered mice with remarkable cardiovascular phenotypes are available now. To benefit from the full potential of these genetically engineered mice, it is crucial to have approaches to an accurate and reproducible assessment of cardiac anatomy and performance. Cardiac ultrasound is a well established technique for non-invasive evaluation of left ventricular (LV) morphology and function in different species. In this particular study, we used transgenic aortic valve echocardiography (TTE) for phenotyping mice in order to establish a method to follow aortic valve dysfunction.

Material and methods: TTE was performed in non-anesthetized mice (12 knock-out, 11 wild-type, age range 59-136 days) using an Acuson Sequoia 512 equipped with a 15 MHz linear transducer (15LH). The heart was imaged in the two-dimensional (2-D) mode in the parasternal long- and short-axis view. From short-axis view, motion-mode (M-mode) images were obtained for measurement of LV enddiastolic and endsystolic diameter as well as interventricular septum (IVS) and left ventricular posterior wall (LVPW) thickness during diastole and systole. From these M-mode dimensions, LV fractional shortening (FS), LV ejection fraction (EF), IVS and LVPW thickening, systolic wall thickness as well as chamber dimensions were calculated.

Results: Aortic strain, AI and S wave velocity of aortic upper wall were statistically different in ED group than control group (4.8±6.6 vs 8.7±3.6, p=0.002; 13.1±5.8 vs 8.2±7.0, p=0.007; 6.3±1.5 cm/s vs 4.8±1.3 cm/s, p=0.001, respectively). A statistically significant correlation between S wave velocity of aortic upper wall and AI (r=0.389, p=0.004), aortic strain (r=0.444, p=0.001) and elasticity (r=0.504, p=0.001) were found. On the other hand, significant correlation between mitral lateral annulus S wave velocity and AI (r=-0.472, p=0.001), and aortic strain (r=0.533, p=0.001) were found.

Conclusion: Aortic stiffness index is higher, aortic diastensibility and strain is lower in erectile dysfunction with vascular origin.

1108
A new function index to evaluate acute left ventricular remodelling following ligation of the anterior descending coronary artery
S.T. Tourmadis 1 ; N.K. Tsirikos 1 ; G. Kottis 2 ; A. Kalantaridou 2 ; D. Chaniotis 2 ; C.O. Tria 2 ; D. Bramos 1 ; S.D. Mouloupoulos 2
1 "Alexandra" Ho, Athens Medical School, Clinical Therapeutics, Dept., Athens, Greece; 2 Athens Medical School, 1st Dept. of Anesthesiology, Athens, Greece

Purpose: A new index is proposed [namely ‘function index’ (FI)] to express acute left ventricular (LV) function following ligation of the left anterior descending coronary artery (LAD).

Methods: Ligation of the LAD was performed in 20 pigs for 75 min. LV long(LA)- and short(SA)-axis fractional shortening (FS) and ejection fraction (EF) were measured (EF, [1 Simpson]) pre and post LAD ligation at 5, 15, 45, 75 min by the epicardial subxiphoid 4-chamber view 2D echo were calculated. FI was specified as the ratio of LAFS/%SASF. Mean percentage changes from the pre LAD ligation (control) values in every post LAD ligation stage were calculated. In 8 out of the 20 Pigs DOB infusion (5 µg/kg/min) was used immediately after ligation.

Results: In experiments without DOB infusion, LAFS (62.46±17.87%; EF (29.51±10.0%) and FI (59.95±9.11) decreased significantly immediately after (5 min) ligation and remained reduced during the whole study period (LAFS -35.14±18.70%, EF -24.84±11.67%, FI -41.17±12.29% at 75 min; FI =9.68, F=20.92 and 7.97, p<0.001 respectively). On the contrary, SAFS increased (significantly at 45 min +40.63±48.35%, p<0.01) during the post LAD ligation period. In animals with DOB infusion, LAFS 3.43±31.53% at 75 min, F=17.01, p<0.001, EF (63.73±38.57% at 45 min, F=15.78, p<0.001) and FI (2.08±9.46%, F=5.76, p<0.001) returned to the pre LAD ligation values after the initial reduction, while SAFS did not change significantly during the whole study period (p=ns). FI changes during DOB infusion were best bivariately correlated (r=0.72, p<0.001) and independently associated in multiple regression analysis (b=0.45, p<0.001 with EF changes.

Conclusions: FI appears to be a reliable and simple index to evaluate acute functional remodeling changes during DOB infusion after LAD ligation. Its significant correlation with EF permits the accurate evaluation of LV function, especially in cases with poor echocardiography.

1109
Echocardiographic phenotyping in a transgenic mouse model
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1 Cardiology Dept., Graz, Austria; 2 Institute of Molecular Biosciences, Graz, Austria; 3 Institute of Pathology, Graz, Austria; 4 Siemens Medical Solutions, Ultrasound Division Dept., Vienna, Austria

Echocardiography is a diagnostic tool that is used together with a diagnostic technique for the detection of coronary artery disease. The aim of our study was to evaluate the aortic stiffness and aortic elastic properties by conventional (CE) and colour tissue Doppler echocardiography (TDE) in patients with erectile dysfunction (ED) who had vascular origin. Materials and methods: Thirty patients with ED (mean age 52±8 years) and thirty healthy subjects as control group (mean age 49±3 years) were enrolled in the study. To assess the elastic properties of aorta, systolic (AoS) and diastolic (AoD) dimensions of the LAD were measured by M-mode echocardiography. Colour tissue Doppler velocities (S. E. A. cm/s) of aortic upper and inferior wall were measured by colour TDE. Aortic strain, aortic stiffness index and aortic elasticity were calculated by formulas as following: (Aortic strain%)=100x(AoS-AoD)/AoD, aortic stiffness index (ASI)=ln(SBP/PPxAoD), aortic elasticity=2x(AoS-AoD)/PPxAoD, where PP: pulse pressure. Results: Aortic strain, AI and S wave velocity of aortic upper wall were statistically different in ED group than control group (4.8±6.6 vs 8.7±3.6, p=0.002; 13.1±5.8 vs 8.2±7.0, p=0.007; 6.3±1.5 cm/s vs 4.8±1.3 cm/s, p=0.001, respectively). A statistically significant correlation between S wave velocity of aortic upper wall and AI (r=0.389, p=0.004), aortic strain (r=0.444, p=0.001) and elasticity (r=0.504, p=0.001) were found. On the other hand, significant correlation between mitral lateral annulus S wave velocity and AI (r=-0.472, p=0.001), and aortic strain (r=0.533, p=0.001) were found.

Conclusion: Aortic stiffness index is higher, aortic diastensibility and strain is lower in erectile dysfunction with vascular origin.

1110
A systematic review of the cost-effectiveness of echocardiography as a diagnostic technique for the detection of coronary artery disease
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Purpose: Echocardiography is a diagnostic tool that is used together with other imaging techniques for the detection of coronary artery disease (CAD). Sensitivity and specificity of these diagnostic techniques has been established in clinical studies. Information on the cost-effectiveness of diagnostic...
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Assessment of left ventricular systolic dysfunction by tissue Doppler imaging and measurement of plasma type B natriuretic peptide levels in patients with Emery-Dreifuss muscular dystrophy

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Background: Emery-Dreifuss muscular dystrophy (EDMD) is characterized by muscle and cardiac involvement.

Objectives: We aimed to evaluate the left ventricular systolic function by tissue Doppler imaging (TDI) and plasma natriuretic peptide measurements in patients with EDMD.

Material and methods: We included 19 pts with genetically confirmed EDMD (16 pts with a X-linked inheritance [defect in EMR1]) and 3 pts with autosomal dominant form [defect in LMX1A] at the age of 9±12 years old. Twenty healthy volunteers. In TDI we performed and natriuretic peptides levels (BNP and NT-proBNP) were measured in EDMD pts and in 10 control subjects. For each wall, the peak strain (%) and strain rate - SR (s⁻¹) were assessed in basal and mid segments. The mean values were calculated.

Results: The mean left ventricular ejection fraction (LVEF) was 52.4±9.3% and 66.4±4.8 for EDMD pts and for controls respectively (p=0.0001). The mean plasma levels of BNP were 24.1±32.7 pg/ml and 6.4±2.2, while of NT-proBNP they were 146.9±119 pg/ml and 21.3±8.4 (p=0.003) for EDMD and controls (p=0.02) respectively. We identified two subgroups of EDMD patients: 1 - LVEF<45% (n=7) and 2 - LVEF ≥45% (n=12) accompanied by group 3 (controls, n=10). In group 1 we observed lower SR as compared to group 2 (3.2±1.7 vs 4.2±2.1; p=0.007), but also pts with persistent LVEF (group 2) had lower SR than controls (3.2±1.7 vs 4.9±2.1; p=0.05).

Similar differences were observed with the peak strain.

Conclusions: Clinical cardiac dysfunction is common in EDMD pts. Natriuretic peptides measurements and TDI technique may be useful tools for the assessment of systolic dysfunction. The quantitative assessment of myocardial strain and strain rate can be helpful in the early detection of regional systolic alterations in EDMD pts with normal LVEF.

1112

Correlation of echo measurements and quality of life in patients before and 6 months after pacemaker implantation

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The popularity of pacemaker implantation is increasing year by year. The role of echocardiography was confirmed both before and directly after implantation in e.g. adjusting AV delay. However, there is no research answering the question - do echo measurements correlate with quality of life (QoL) in the follow-up period?

Purpose of study: To correlate echo measurements with QoL in patients directly before pacemaker implantation and after 6 months.

Methods: Agreement of the medical committee No. 6-691-23/05 was obtained. 120 patients (median age 71.2) with AV blocks. SND (sinus node dysfunction) syndrome and optimal pharmacological treatment of existing heart disease were included in the study. Excluded were patients with other serious illness which can interfere with the results of QoL. In all patients DDD(R) pacemakers were implanted (Sigma SD 303 or Vita 2) with bipolar electrodes. None of the special functions for the pacemaker model was activated. All echo exams were performed by an experienced doctor on Vivid 7 ultrasound system (GE Healthcare). Reference echo examination was performed 1-2 days before implantation. Three days after implantation AV delay optimisation was done. These parameters of echo were analyzed: all calf diameters, EF (Simpson), TAPSE, all valve regurgitations, cardiac output (CO) and cardiac index (CI). Measured in the rest. QoL was measured using the SF-36 scale on the first day of hospitalization, before pacemaker implantation. After 6 months (<2 weeks) a follow-up echo was done on all pacemakers and QoL was repeated with full checking of parameters of the pacemaker.

Results: Significant correlation was found between QoL after a 6-month follow-up and such echo parameters measured before implantation as: EF (r=0.71), area of the RV (r=0.91) and area of the LV (r=0.62). An insignificant rise of degree of tricuspid regurgitation was observed (p=0.13). Patients 6 months after implantation have a higher value of TAPSE (24±2.6 vs 22±1.7 mm after; p<0.05) and CI (2.4±0.6 L/min/m² vs 2.7±0.5 L/min/m²; p<0.05).

Conclusion: The correlation of QoL and in our opinion should be evaluated in each patient before pacemaker implantation.

1113

Gender differences in carotid intimal-medial thickness in patients with suspected coronary artery disease

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Background: The selection of patients for coronary angiography by suspected coronary artery disease represents an important challenge, due to its frequent atypical clinical presentation and false positive rate of non-invasive tests, particularly in women.

Objectives: To evaluate if there is a difference between genders in risk factors for coronary artery disease and in carotid intimal-medial thickness (IMT) for the prediction of coronary artery disease.

Methods: Prospective study of 270 consecutive patients with stable angina submitted to elective coronary angiography, with a mean age of 65±10 years, 35% female. All patients had a carotid ultrasound study. We compared demographic and risk factors for coronary artery disease. The presence of significant coronary artery disease was defined by a stenosis >70%. Carotid IMT was measured at the common carotid artery bilaterally and we considered the highest value between both sides.

Results: Women were elderly, with higher body mass index (BMI) and were less smokers. There were no differences in other risk factors. The prevalence of cardiovascular disease, as well as carotid IMT was higher in males. By analysis of ROC curves, the best carotid IMT cut-off for detection of significant coronary artery disease was 1.35 mm (AUC 0.68, 95% CI 0.59-0.73, p<0.001), with a low sensibility (13%) but high specificity (92%). By logistic regression, in women, carotid IMT was associated with coronary disease (OR 8.67, 95% CI 1.71-41.0, p=0.009), as well as men (OR 3.07, 95% CI 0.99-9.58, p=0.05).

Conclusions: Women with stable angina had a lower carotid IMT compared with men, as well as lower coronary artery disease prevalence. Carotid IMT can predict coronary artery disease in both genders.

Table 1

<table>
<thead>
<tr>
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<th>Females (n=90)</th>
<th>Males (n=175)</th>
<th>p</th>
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<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>30.2±5.3</td>
<td>27.8±3.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Coronary (%)</td>
<td>48</td>
<td>76</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Carotid IMT (mm)</td>
<td>0.90±0.35</td>
<td>0.99±0.35</td>
<td>0.05</td>
</tr>
</tbody>
</table>

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Short- time pacing seems to have no acute effects on ventricular functions: A pulsed-Doppler tissue echocardiography and brain natriuretic peptide study

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Background: The unfavorable effects of right ventricular pacing on left ventricular performance have been extensively studied. Tissue Doppler echocardiography (TDE) has been recently reported to be useful for the
assessment of ventricular functions. Brain natriuretic peptide (BNP) which is secreted from the ventricles is a useful marker in the diagnosis of heart fail- lure. The aim of the present study is to investigate the effects of short-time cardiac pacing on ventricular functions in patients with preserved or im- paired ejection fraction (EF’s).

Methods: Forty-four patients (mean age 63.6±10.4, 19 female) with dual chamber pacemakers or defibrillators (lower 20% ventricular pacing within the previous 6 months, mainly on sinus rhythm) were included in the study. All participants underwent conventional echocardiographic and grouped into two. Group 1 included 23 patients with preserved EF, group 2 included 21 patients with low EF. Conventional echocardiography and tissue Doppler of mitral and tricuspid annulus were recorded. Then, atrioventricular (AV) delay were abbreviated to achieve >90% ventricular pacing at an optimal AV interval for 4 hours. After 4 hours echocardiographic examination was repeated. Blood samples for BNP were obtained before and after pacing.

Results: Baseline and after short time pacing BNP values and EF of the groups were given in table 1. Tricuspid and mitral E-wave velocity, A-wave velocity; aortic and pulmonary maximal velocity; tricuspid annulus TDE systo- le, early, and atrial; systole, early, and atrial TDE of the mitral annulus from interventricular septum, lateral, anterior, and inferior walls did not change significantly after pacing within the groups (p>0.05).

Conclusion: Short - time RV pacing seems to have no acute effects on ventricular functions in patients with preserved or impaired LV EF.

1115

BNP as a tool for the assessment of pulmonary capillary wedge pressure in patients with systolic heart failure and a non predictive mitral E/Ea ratio

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Purpose: Recent investigations have shown that invasive hemodynamic monitoring with Swan-Ganz catheterisation to guide treatment decisions in heart failure patients is irrelevant in terms of prognosis and could be hazard- ous. In this study, we assessed the clinical utility of B-type natriuretic peptide (BNP) in the estimation of left ventricular filling pressures in patients where Doppler data are not conclusive.

Methods: Our study population consisted 50 patients with systolic heart failure. Among them 25 were admitted in the coronary care unit for acutely decompensated heart failure (group A) and the remainder were clinically stable outpatients under optimal medical therapy (group B). All patients underwent simultaneous pulmonary capillary wedge pressure (PCWP) de- termination, BNP measurement, m mode-2D echocardiography, Doppler and Doppler tissue echocardiography (TDE). With pulse wave TDI the ratio of the early transmitral velocity to the tissue Doppler mitral early diastolic veloc- ity (E/Ea) was calculated. In all pts, the average of the measurements obtained from the medial and lateral annulus was not predictive of the PCWP (i.e. between 8 and 15). The ability of BNP compared with Doppler data and STRESS to predict filling pressures was subsequently assessed.

Results: In group A patients BNP correlated with all variables measured, i.e: PCWP (r=0.803, p=0.000), DT (r=0.602, p=0.001) and STRESS (p=0.565, p=0.003). However, in multivariate analysis, DT and STRESS had not any additional contribution and only BNP correlated with PCWP (p=0.023). In group B patients no correlation was found between BNP and PCWP or STRESS (r=0.060, r=0.976 and r=0.100, p=0.638 respectively), while correlation was found between DT and PCWP (r=-0.817, p=0.000) and BNP and DT (r=0.8, p=0.000).

Conclusions: BNP levels constitute a useful non-invasive tool for PCWP prediction in patients with acutely decompensated systolic heart failure. On the contrary, in asymptomatic patients, under optimal medical therapy DT, but not BNP correlates with PCWP.

1116

Epicardial adipose tissue measured by echocardiography is an useful parameter predicting vascular events after stent implantation

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Background: Several studies suggested epicardial adipose tissue was a source of several inflammatory mediator in cardiovascular disease patients. The aim of this study is to determine whether echocardiographic epicardial adipose tissue (EAT) plays a role for the prediction of vascular events after percutaneous coronary intervention (PCI) with drug-eluting stent (DES).

Methods: We measured thickness consecutively in 26 vascular event patients compared with in patients without events (5.5 ± 2.5 mm vs 4.5 ± 2.4 mm, p = 0.04). Vas- cular event rate was significantly higher in group A (13%; 20 over 159 pa- tients) than un group B (5%; 6 over 116 patients) (p = 0.04).

Conclusion: In conclusion, EAT thickness, which can be measured easily during echocardiographic examination, might be one of factors to predict vascular event after PCI with DES.

1117

Mitrail and tissue Doppler evaluation of diastolic filling response during rest and submaximal exercise in trained and untrained subjects

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Purpose: We aimed to investigate the effects of short-time RV pacing on ventricular functions in patients with preserved or impaired LV EF.

Table 1

<table>
<thead>
<tr>
<th>Baseline</th>
<th>After pacing</th>
<th>p</th>
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<tbody>
<tr>
<td>EF (%)</td>
<td>&lt;50%</td>
<td>33.8±12.7</td>
</tr>
<tr>
<td>75%</td>
<td>55.9±3.7</td>
<td>54.7±3.6</td>
</tr>
<tr>
<td>BNP (pg/ml)</td>
<td>&lt;50%</td>
<td>319±146.97</td>
</tr>
<tr>
<td>75%</td>
<td>55.5±3.3</td>
<td>55.5±3.4</td>
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</table>

EF and BNP values before and after pacing

Abstracts

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Results: There were 21 deaths over a follow-up period of 2.2±0.7 years. There were 14 cardiac deaths and 6 major adverse cardiac events: 4 myocardial infarctions, 1 sudden death, 2 unexplained deaths (arrhythmic events) and 6 in patients with MAC. Patients with MAC had significantly higher all-cause mortality (p = 0.04, log rank test). MAC was also associated with significantly increased cardiac mortality and major adverse cardiac events (p = 0.01, log rank test). Patient with MAC were older (p < 0.001), had larger LV end systolic (p = 0.000) and LV end diastolic (p = 0.04) diameter, larger left atrial diameter (p = 0.001), lower LV fractional shortening (p = 0.003), larger LV mass index (p = 0.04) and higher mitral E/Ea ratio (p = 0.03) compared to those with no MAC. Calcium-phosphate product (p < 0.001), cardiac troponin T (p = 0.03) and N-Terminal Pro-B-Type Natriuretic Peptide (p = 0.04) concentrations were higher in those with MAC but gender, total cholesterol, haemoglobin and creatinine were similar in the 2 groups. The proportion diabetic (p = 0.05) and on dialysis (p = 0.05) was similar in both groups. The CAD fraction of group with MAC was 58% compared to 20% in group without MAC. Stepwise logistic regression analysis identified severe CAD (OR 15, 95% CI 3.30, p = 0.001) as the only independent associate of MAC. Conclusions: MAC occurs in a proportion of patients with ESRD and is associated with increased total mortality, adverse cardiac events and the presence of severe CAD. These patients have increased LV cavity size, poorer LV systolic function, higher LV filling pressures compared to patients without MAC. There is also an association with diabetes and high calcium-phosphate product.

1119 Echocardiographic parameters influencing quality of life 5 years after myocardial revascularization M. Zdravkovic 1; D. Zdravkovic 2; N. Milinic 3; P. Sosnowski 1; T. Trapl 4; V. Adrianovici 5; G. Farkas 6; M. Zajek 7; I. Keszthelyi 8; T. Orban 9; L. Klink 10; G. Ruzek 11; I. Ruzic 12; I. Kralj 13; I. Oster 14; J. Pajic 15; A. Maciag 16; K. Gepner 17; I. Kowalik 18; C. Sosnowski 19; H. Szedl 20; 1Medical Center Bezanjska Kosa, Cardiology Dept., Belgrade, Serbia and Montenegro, 2Institute for Cardiovascular Diseases, Cardiosurgery Dept., Belgrade, Serbia and Montenegro, 3Institute for Medical Statistics, Belgrade, Serbia and Montenegro

Introduction: Quality of life (QoL) is an important measure of effectiveness of treatment and very important in everyday life. However, the predictors of QoL after myocardial revascularization are not completely clear. Echocardiographic parameters can easily be obtained preoperatively.

Aim: The aim of the study was to evaluate which echocardiographic parameters influence quality of life after myocardial revascularization.

Methods: 250 patients with myocardial revascularization, operated in 1999, and 2000, were followed up for 60 months. 5 years survival was 84.2%. The power of the study was more than 80%. Using questionnaires SF-36 seven dimensions of quality of life were investigated: physical functioning, physical role, body pain, general health, vitality, social functioning, emotional role and mental health. Echocardiographic parameters: dimensions of left ventricle and left atrial, ejection fraction, segmental disorders of contractility, existence of dilatative ischemic cardiomyopathy and severity of mitral regurgitation were analyzed.

Results: There was a very important negative correlation between all dimensions of quality of life and left atrium dilatation (p < 0.001), as well as left ventricle dilatation (p < 0.001), low ejection fraction (p < 0.001), multisegmental disorders of left ventricle (p < 0.001), existence of dilative cardiomyopathy (p < 0.01) and severe mitral regurgitation (p < 0.001).

Conclusion: Echocardiographic parameters can easily be obtained preoperatively and they have strong predictive value in determination of quality of life. Echocardiography can be useful tool for early diagnosis of primary cardiac tumors in pediatric patients. The locations of tumor involve varied by types of tumor. Fetal cardiac tumors can be detected by echocardiography.

1121 Symptomatic patients with indications for cardiac pacing and no atherosclerosis manifestations: ultrasonographic evaluation of carotid and vertebral arteries flows R. Dabrowski 1; A. Maciag 1; K. Gepner 1; I. Kowalik 1; C. Sosnowski 1; H. Szedl 1

1Medical Center of Cardiology, Poznan, Poland

Background: Type of conductive disturbances and clinical symptoms determine treatment with cardiac pacing. Syncope, faintness, other neurological symptoms or Stokes-Adams episodes are of multifactorial origin. The aim of the study was to evaluate the influence of carotid and vertebral arteries flows on symptoms in patients before pacemaker implantation. We analyzed type of conductive disturbances, modes of pacing stimulation, symptoms and flow disturbances in carotid and vertebral arteries in these patients.

Methods: In 152 consecutive patients (84 men and 68 women) admitted for pacemaker [PMK] implantation from January 2003 till June 2004, ultrasonographic and color Doppler examinations were performed using SONOS 5500 ultrasonograph with linear probe 7.5 MHz H-P. 105 patients had no atherosclerosis clinical manifestations (heart infarction, stroke history etc). Patients' medical history and symptoms were evaluated using uniform questionnaire. They were divided into 3 groups: A with light symptoms (31%, age 71.1±0.6), B with faintness (38%, age 70.7±9.4) and C with Stokes-Adams attacks (31%, 72±10.0).

Results: Prevalence of either common or internal carotid artery stenosis >50% was significantly higher in group C (with Stokes-Adams attacks): 41%, 31% in group B vs 3% in group A (p = 0.001). Stenosis lesions 20-50% were detected in 53% group C patients, 38% of group B vs 19% of group A (p < 0.05). No atherosclerotic lesions were seen in 3% of group C, 19% of group B vs 58% of group A (p = 0.0001). Low flow velocity in carotid and vertebral arteries was detected in 42% of group B patients, in 41% of group C and in 29% of group A (ns). In group A (light symptoms patients) the main reason of PMK implantation was sinus node dysfunction: 53%, most frequent modes of pacing were DDD: 72% and VVI: 17%. In group B (patients with light symptoms) main reason of pacing were second degree type II atrio-ventricular (AV) block and complete AV block: 58%, prevailing modes of pacing were DDD: 53% (atrial fibrillation) and DDD: 38%. In group C (with Stokes-Adams attacks) main reasons for pacing were second degree type II AV block and complete AV block: 62% and main modes of pacing were: DDD (38%) and VVI (38%).

Conclusions: In spite of no atherosclerosis manifestations and cardiovascular risk factors, sonographic examination of carotid arteries should be considered in all symptomatic patients with indication for pacemaker implantation. Older age and presence of symptoms are main determinants of high risk of possible carotid lesions in this group of patients.

1122 Coronary athrogenic plaque characterization with virtual histology: is there a difference according to risk factors and in the group with predominant fibro-lipidic component? A.T. Timoteo 1; C. Fondo 1; L. Sousa 2; A. Farias 2; L. Patricio 2; M. Fereira 3; J. Quirinha 4

1 Lisboa, Portugal, 2 Santa Marta Hospital, Cardiology Dept., Lisbon, Portugal

Background: Athrogenic plaques have a very diverse composition, some of them associated with plaque instability (and major acute coronary events), such as fibro-lipidic plaques. Intra-coronary echocardiography with histological characterization allows for the assessment of stenosis grade and also plaque composition.

Objectives: Compare the athrogenic plaques composition for each risk factor and particularly the charactersistics of patients with predominant fibro-lipidic plaques.
Methods: Prospective study in 51 patients (58±16 years, 31% male) with stable angina and myocardial ischaemia in non-invasive tests, submitted to elective coronary angiography. Virtual histology data were obtained by in-tracoronary ultrasound with a 30 MHz probe and analysed with the VolcanoTM system. This system codes by colours four types of plaque composition (Fibrous - F, Fibro-lipidic - FL, Necrotic - N and Calcified - C). Plaques with at least 25% of fibro-lipidic component were considered as predomin-ant fibro-lipidic plaques (11 patients) and these patients were compared in terms of age, gender, risk factors for coronary artery disease and quantita-tive vessel characteristics (vessel diameter, lumen diameter, lumen area, plaque/blood and calcium percentage).

Results: In this population, 71% were hypertensive patients, 27% diabetics, 27% smokers and 67% had hyperlipidaemia. In hypertensive patients (vs non-hypertensive), mean composition of the plaque (in percentage) was: F 58% vs 45%, FL 15% vs 18%, N 16% vs 14%, C 11% vs 9%, Mann-Whitney p=NS.

Conclusions: Data were expressed as “mean value ± standard de-

1123 Patients with heart failure and ventricular tachycardia: the clinical and the echocardiographic profiles

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Hippokration Hospital, Cardiology Dept., Athens, Greece

Introduction: Patients (P) with heart failure (HF) are prone to a variety of arrhythmias, symptomatic and asymptomatic, that have an important bear-ing on the prognosis and the management of these P. The purpose of this study is to define the clinical and the echocardiographic features of P with HF who develop ventricular tachycardia (VT).

Methods: 122 consecutive hospitalized P with HF (94 males and 28 females of mean age 62.27±13.90 years) were eligible for the study for a 2.5-year period and were evaluated regarding their HF-etiology, functional capacity and cardiac function. 53 P manifested VT and 69 P did not. The two groups did not differ concerning sex, age, any concomitant conditions, blood param-
ters and adherence to therapy. Left ventricular (LV) ejection fraction (EF) by 2-D echocardiography -using the Teicholz method- was considered as LV systolic performance index. E/A ratio of the transmitral flow (TMF) by pulsed-wave Doppler echocardiography -E and A are respectively the early and the late peak diastolic velocity of TMF (cm/sec) -was considered as LV diastolic performance index; the restrictive TMF pattern (E/A >2) represents advanced diastolic abnormalities. Data were expressed as „mean value ± standard de-

1125 Asymptomatic patients referred for echocardiography have a low incidence of pathology

L.H.B. Baur 1; C. Lodewijks 1; T. Lenderink 1; J. Nijhof 1; J. Stoffers 1; F. Soomers 2 On behalf of: The working group on open access echocardiography in the Parkstad area

1Atrium Medical Center Parkstad, Cardiology Dept., Heerlen, Netherlands;

2University Maastricht, General Practice, Maastricht, Netherlands

Introduction: General Practitioners (GPs) see a growing number of patients with dyspnea complaints. This is to some extent due to people with left ven-
tricular dysfunction, but other causes of dyspnea have not been neglected. In the elderly population also the number of people with cardiac murmurs of unknown origin is increasing. An appropriate diagnosis in general practice is difficult without imaging facilities. Therefore, we gave the GPs in the refer-ring area of our hospital the possibility to have free access to echocardiography for the indications dyspnea of unknown origin, a new cardiac murmur or peripheral edema.

Methods: GPs, who participated in the project were able to ask for an echocardiogram without referring the patient to a cardiologist if they sus-
pected the patient of having heart failure or a cardiac murmur. The results of the eco-Doppler examination were returned to the general practitioner with a comment how to handle the patient.

Results: Between december 2002 and january 2006, from a total group of 378 pts, 98 pts were referred with the diagnosis dyspnea, 151 pts with a cardiac murmur, 7 with peripheral edema and 49 with a dyspnea and a murmur. The rest of the pts had other reasons for referral and are not men- tioned here. The results can be seen in the table.

Conclusions: Left ventricular dysfunction was only present in 15% of pa-tients with dyspnea. However, the incidence of diastolic dysfunction was much higher. Important aortic and mitral valvular disease were present in 20-29% of symptomatic patients with a cardiac murmur. Peripheral edema was never due to a cardiac cause. Open Access Echocardiography is an easy way to preselect patients with dyspnea or cardiac murmurs and avoid unnecessary referrals.

Table 1. Incidence of pathology in pts referred

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<tr>
<th>N</th>
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<td>8%</td>
<td>37%</td>
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*p<0.01 compared to cardiac murmur alone; #p<0.05 compared to dyspnea alone

1126 Myocardial ultrasonic tissue analysis in patients with complete atrioventricular block

N. Yildirim 1

1Zonguldak Karadeniz University, Cardiology Dept., Zonguldak, Turkey

Aim: Acquired complete atrioventricular block (CABV) is most commonly id-iopathic in origin, and corresponds to a segmental avulsion of the fibrous skeleton of the heart shown by postmortem pathologic examinations. The aim of this study was to evaluate the role of fibrosis in idiopathic CABV in vivo by means of integrated backscatter (IBS) analysis.
Material and methods: Twenty-five consecutive patients (13 male, mean age 68±3 years) with idiopathic CAVB (Group I) and 17 age-matched healthy volunteers (9 male, 65±3 years) with sinus rhythm (Group II) were included in the study. Exclusion criteria were the presence of congestive heart failure, cardiomyopathy, diabetes mellitus and hypertension. IBS was performed by using an ultrasonic imaging system (Hitachi EUB 6000). Analysis of IBS amplitude and cyclic variation index (CVI) (dB) in the parasternal long axis view of the anteroseptum and posterior wall were measured. CVI was calculated by (diastolic IBS-systolic IBS/diastolic IBS) x 100 formula.

Results: Compared to the healthy individuals in group 2, patients in group I have higher diastolic IBS amplitude (93.8±15.5 dB vs 82.8±15.9 dB, p=0.040) and lower CVI (-5.5±9.5 dB vs 3.1±6.5 dB, p=0.040) of mid anteroseptum which was related to an increase in collagen deposition.

Conclusions: Myocardial texture characterization performed by analysis of ultrasonic backscatter signal may contribute to the understanding of mechanism involved in the development of CAVB.

1127 Ultrasound guided transcatheter closure of femoral pseudoaneurysm
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1Hospital Universitario de GC Dr. Negrín, Cardiology Dept., Las Palmas De Gran Canaria, Spain

Introduction: The incidence of inguinal bleeding or femoral pseudoaneurysm after percutaneous coronary revascularization procedures is 0.8-2.2%. This occurs despite the current therapies with less aggressive antiaggregation or anticoagulation. We describe a transcatheter coil-embolization technique for femoral pseudoaneurysms using vascular ultrasonic guidance.

Methods: 8 patients (6 male; mean age 65 years, all with high blood pressure) suffered from a femoral pseudoaneurysm 24-48 hours after percutaneous coronary revascularization with stent. This diagnosis was confirmed by ultrasonic study that showed the presence of the pseudoaneurysm (30±10 mm) and the entry tract from the femoral artery. None of the patients discontinued the therapy with low molecular weight heparin, clopidogrel nor aspirin.

Procedure: Local anesthesia was administered, we localized the optimum puncture site by eco-guidance using an ultrasonic vascular transducer (L7540 HP Sonos 5500III) covered by a sterile protecting bag (Biopsy Protect, Siemens®) and sterile gel (K-Y lubricating Johnson&Johnson®). After confirming that we were inside the pseudoaneurysm by the injection of normal saline, spiral coils were introduced through the femoral needle to the pseudoaneurysm (2.4 tugsten coils per patient were needed, 30 cm long and 10 mm diameter). All the procedures were monitored by ultrasonic guidance. At the beginning of the procedure partial thrombosis of the pseudoaneurysm was observed, and it was complete at 24 hours of the follow up.

Conclusion: Transcatheter closure of post-catheterization femoral pseudoaneurysms with coils guided by ultrasound is safe and effective and is an alternative to fluoroscopic-guided closure, avoiding the use of angiographic contrast and radiation.

1128 Clinical impact of the hand-carried echocardiography as an extension of cardiac physical examination
N. Cortes-Dias 1; S. Fernandes 1; M. Fiuza 1; R. Victorino 1; M.G. Lopes 1; M.J. Metraas 1
1University Hospital Santa Maria, Cardiology Dept., Lisbon, Portugal; 2University of Lisbon, Cardiology Center, Lisbon, Portugal

Background: The aim of this study was to evaluate the real clinical impact of this method as an extension of cardiac physical examination, determining the extent to which the clinical decisions are altered by HCU and whether using HCU improves health outcomes for patients in a Medicine Department of an acute patients Hospital.

Material and methods: An aleatory sample of acute patients admitted in the Internal Medicine Department was clinically evaluated (clinical interview and cardiac physical examination) and the HCU examination was performed. Studies were accomplished by 2 medical residents trained in cardiac ultrasound and all confirmed by a level III echocardiography cardiologist. The HCU report was immediately given to medical staff and diagnostic and therapeutic changes introduced due to those results were collected by questionnaire. Findings were compared with those given by the standard echocardiography (SEcho) every time it was performed. The number of the SEcho dismissed because of the information given by the bedside examination was evaluated, and the effect on the mean time to discharge was determined.

Results: Of the 100 patients (48% women; mean age 74±16.1 years), there was clinical suspicion of congestive heart failure in 30. The physical examination suggested significant cardiac disease in 32, classified as moderate or severe in 10 and 8, respectively. Formal indication to SEcho (ACC/AHA/ASE 2003 Guidelines) was recognized in 55, class I and IIa in 46 and 9, respectively. HCU examination was performed 1.8±1.43 days after admission, and changes were detected in 87. In addition, unsuspected clinically but relevant echocardiographic findings were found in 38, mainly pericardial effusion (n=6), significant valvular regurgitation (n=4) or stenosis (n=3), valvular vegetations (n=3), systolic (n=2) and diastolic (n=2) ventricular dysfunction, and severe hypotension (n=1). Systemic congestion was present in 30 patients, besides unsuspected in 9 of them. The HCU report changed diagnostic strategy in 29, although potential diagnostic implications are retrospectively recognized in more 20. Cardiac disease clinically unsuspected was excluded in 23, and the mean mensal number of SEcho falls from 22 to 10 (reduction of 54.6%). There was modification of the therapeutic strategy in 21 patients, in particular in cardiac failure management and fluids therapy. The mean time to discharge was reduced from 8.1 to 7.3 days.

Conclusions: HCU can provide rapid, readily available and important clinical information in a Medicine Department, with diagnostic, therapeutic and probably economical impact.

1129 Does the new international diabetes federation definition of metabolic syndrome improve prediction of coronary artery disease and intimal-media carotid thickening?
A.T. Timoteo 1; R.S. Santos 1; S. Lima 2; A. Mamede 1; R. Fernandes 1; R. Ferreira 2
1Lisboa, Portugal; 2Santa Marta Hospital, Radiology Dept., Lisbon, Portugal

Background: Metabolic syndrome (MS) is an entity that is associated with an increase in diabetes and atherosclerotic complications. The new definition by the International Diabetes Federation (IDF), as opposed to the definition by NCEP - ATP III, enlarges the population included in this entity.

Objectives: To study the incidence of coronary artery disease and carotid intimal-medial thickness (IMT) in patients with and without MS, according to the NCEP - ATP III definition and the new IDF definition.

Methods: We studied 270 consecutive patients admitted for elective coronary angiography due to suspicion of coronary artery disease, based in the presence of angina and/or the presence of positive non-invasive test for cardiac ischemia. All patients underwent an ultrasound study of the carotid arteries to measure IMT (we considered the highest value obtained between left and right carotid). A significant coronary lesion was considered as a lesion with a stenosis >70%.

Results: By the ATP III definition, 14% of patients had MS. There was no difference in terms of age and male gender between groups. The incidence of significant coronary disease was higher in the group with MS (67% vs 63%, p=0.004). There was no significant difference in terms of carotid IMT (0.23±0.36 mm vs 0.25±0.35 mm, p=0.19). With the IDF definition, 61% of patients had MS, with a slight increase in age (66±23 vs 63±11 years, p=0.04) and in female gender (39% vs 29%, p=0.08). There was no difference in terms of coronary disease (68% vs 63%) and in carotid IMT (0.97±0.34 vs 0.96±0.39 mm). With logistic regression analysis, and with correction for age and gender, ATP III definition remains as a predictor of coronary artery disease (OR 4.76, 95% CI 1.71-13.25, p=0.003). Using the same analysis for IDF definition, it does not remain as a predictor for coronary disease (OR 1.29, 95% CI 0.74-2.27, p=0.37). By ROC curve analysis, carotid IMT can predict the presence of coronary disease with an AUC of 0.658 (p<0.001), for 1.35 mm, with a very good specificity (92%), but very low sensitivity (13%).

Conclusion: The new IDF definition of MS, enlarged significantly the population included, especially women, decreasing the capacity to predict the presence of coronary artery disease. In our population, neither the ATP III nor the IDF definition showed differences in terms of carotid IMT. Carotid IMT is not a good tool to predict coronary disease.
1130
Apiral strain and strain rate investigation with non-Doppler derived methods in A.M. Moretti 1 ; G.G. Galanti 1 on behalf of: Sport Medicine Centre digital echo lab, there are specific dividends and cost savings that echo-(-83%). Thus, in addition to benefits for clinicians derived by viewing images present images with those obtained in previous studies with digital organi-change appointments and search for lost dates in 3±1 sec compared to
Using the electronic agenda to schedule patients, the secretary is able to form their duties before and after the implementation of the digital echo-lab. During
lab, which completed the transition to full digital in December 2004. During the transition to digital. Accordingly, we analyzed the activity of our echo
ect to a 2D echo- exam at rest and during an hand grip (hg) performed at increase in apical performance with significant improvement in S, S/R than in
also imports alphanumeric information from the echo machine, as well as automated report generation, eliminating the need for dictation or transcrip-
recognized these differences.

1132
Gender difference in characteristics of atherosclerotic coronary plaque analyzed by intravascular ultrasound in Korean J.-H. Choi 1 ; S.Y. Choi 1 ; S.J. Takh 1 ; M.H. Yoon 1 ; B.J. Choi 1 ; S.J. Kang 1 ; Z.G. Zheng 1 ; J.H. Shin 1
University of Florence, Sport-Medicine Dept., Florence, Italy; 2Sport Medicine Center, Emergency Dept., Florence, Italy
Background: We compared plaque characteristics assessed by intravas-
ular ultrasound (IVUS) in both gender with coronary artery disease (CAD).
Methods: Patients with CAD revealed more than 50% stenosis on coronary angiogram (CAD) were sequentially enrolled and underwent IVUS analysis for qualitative and quantitative assessments of lesion, and both proximal and distal reference segments were also analyzed for assessing vascular remodeling. To consider confounding factors, all patients were completely investigated to have any cardiovascular risk factors such as age, body mass index, presence of hypertension, diabetes, dyslipidemia, or history of smoking.
Results: 307 target lesions in 283 patients (75 women, mean age 62±10 years) were performed CAG and IVUS analysis. Women were more likely to be older (p<0.01); to have higher BMI (p=0.02); to have a history of hypertension (p<0.01), hypercholesterolemia (p<0.01); were less likely to be smokers (p<0.01) than their male counterparts. Women were less likely to present initially with AMI than men (p<0.01). IVUS analyses showed that women were likely to have smaller plaque burden (PB) (69±16% vs 74±15%, p=0.02); but were more likely to have larger PB at reference segments (29±10% vs 26±10%, p=0.04) than men. The lesion length didn’t showed the difference in percentage with significant increase in S %, S/R (23±10% vs 21±10%, p=0.04) and in V (77±10% vs 75±10%, p=0.04). Women seemed to be strongly associated with a lesser frequency of ec-
centric plaque (77% vs 85% who had eccentric index ≥0.75, p=0.04) and hard plaque (40% vs 27%, p=0.02). They had the lower vascular remodel-
ing index (0.85±0.18 vs 0.92±0.25, p=0.04) than men.
Conclusions: In conclusion, the plaque, by assessing IVUS in Korean women with CAD demonstrated more multicentric, hard, small and diffuse plaque than men.

1133
Subclinical systolic dysfunction in HIV patients - a study by tissue doppler imaging V. Carmelo 1 ; J. Toste 1 ; S. Ferreira 1 ; R. Palma Reis 1 ; S. Longo 1 ; N. Cardim 1 ; T. Ferreira 1
Hospital Pulido Valente, Cardiology Dept, Lisbon, Portugal
HIV infection can cause dilated cardiomyopathy (DCM), connected both to the virus and to its therapeutic. HIV patients (p) with DCM have clear reduc-
tion of survival rate due to death by congestive heart failure, when compared with idiopathic DCM p. The early diagnosis of systolic dysfunction becomes very important when it is still potentially reversible. Tissue Doppler Imaging (TDI) allows the evaluation of the longitudinal function using the mitral annu-
lus motion.
Objectives: To characterize the longitudinal systolic function using the TDI in HIV patients (p) with normal systolic function in conventional echocardiography by comparing them with a healthy group of volunteers.
Methods: We analyzed the mitral annulus motion by TDI in 4 places using the apical view in 25 HIV p with no cardiac pathology and in 22 healthy volunteers, comparing the time delay between the first and the second aortic valve opening index (0.85±0.18 vs 0.92±0.25, p=0.04) than men.

Conclusions: The systolic function by TDI is globally preserved in HIV pa-
tients with normal systolic function by conventional echocardiogram. How-
ever, 10 patients (40%) have function impairment in at least one annulus place and in 2 p (8%) there is s wave average velocity inferior in 2 standard deviations. TDI can detect systolic function sub-clinical changes. The regu-
lar follow-up of systolic function in these patients is very important and es-
ter to therapy monitoring.

Table 1
<table>
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<th>Wave (cm/s)</th>
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<th>Imp</th>
<th>LW</th>
<th>N</th>
<th>Imp</th>
<th>IW</th>
<th>N</th>
<th>Imp</th>
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<th>Imp</th>
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<td>9.8±2.0</td>
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<td>IVS = Interventricular septum; LW = Lateral wall; IW = Inferior wall; AW = Anterior wall</td>
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1134  
Right ventricular function and its relation to pulmonary artery stiffness in patients with systemic lupus erythematosus  
D. Duman 1; S. Masatlioglu 1; R. Demirtunc 1; S. Tokay 2
1Hospital Garcia de Orta, Cardiology Dept., Almada, Portugal; 2Marmara University, Cardiology Dept., Istanbul, Turkey

Background: Pulmonary hypertension and right heart failure are severe complications of systemic lupus erythematosus (SLE). The potential mechanisms of these complications are multifactorial and may include increased pulmonary artery stiffness (PAS). In this study, we tested the hypothesis suggesting that PAS is increased in patients with SLE, which may determine right ventricular myocardial performance index (RV MI) as an echocardiographic parameter summarizing right ventricular function in these patients.

Methods: We studied 24 patients with SLE with no cardiac symptoms (age: 33.6±8.4 years) and 24 normal control subjects by echocardiography. RV MI, defined as the sum of isovolumetric contraction and relaxation time divided by ejection time, was measured by using Doppler echocardiography. To estimate PAS, echocardiographic records of the pulmonary flow trace were obtained and evaluated, and the frequency shift of pulmonary flow divided by acceleration time. Correlation between RV MI and the PAS, right ventricular ejection fraction, age, heart rate, body surface area and the duration of disease were determined by linear regression analysis.

Results: Patients versus control subjects had increased PAS and RV MI. In linear regression analysis, RV MI was significantly correlated with PAS and the duration of disease (r=0.62, p<0.005 and r=0.53, p<0.01). Conclusions: These results suggest that the increased PAS may be an important pathogenetic factor, which may contribute the RV dysfunction in patients with SLE.

1135  
New and old formula for predicting mean pulmonary artery pressure from Doppler-assessed flow parameters in comparison with hemodynamic parameters  
L. Lenartowska 1; J. Lewczuk 2; P. Pilszko 1; M. Stoprya-Poczatek 1; J. Kowal 2; B. Ludwik 1; D. Drozdz 1; J. Jagas 1
1County Hospital, Cardiology Dept., Wroclaw, Poland

There is continuous need for reliable and noninvasive estimation of systolic, and particularly mean pulmonary artery pressure (MPAP) by using new formula (MPAP=0.61 PASP +2 mm Hg) by comparison of Doppler-assessed flow parameters (ECHO) and MPAP determined by catheterization (HEMO) in 32 patients, 20 females, mean age 66.2 years (range from 26 to 85 years) with pulmonary embolism and MPAP ranging from 14 to 70, with pulmonary hypertension due to pulmonary embolism.

Results: Correlation (r=0.78) between PASP measured by ECHO and obtained during HEMO were found. Correlation between MPAP evaluated by HEMO and calculated by Chemla formula and by Talano formula were respectively (r=0.7 and r=0.6). Differences between HEMO and ECHO flow parameters are shown in table.

Conclusion: In patients with pulmonary embolism, MPAP can be more reliably predicted from Doppler-derived PASP by using new formula (MPAP=0.61 PASP +2 mm Hg) than by old formula using acceleration time.

Table 1  
<table>
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<th>ECHO</th>
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<tr>
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<td>43.4±11.4</td>
<td>32.7±16.4</td>
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<tr>
<td>P</td>
<td>50.2±26.7</td>
<td>56.8±24.8</td>
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1136  
Exercise echocardiography with contrast for the evaluation of right ventricular systolic pressure. New method  
L. Rocha Lopes 1; M.J. Loureiro 1; C. Cotrim 1; O. Simoes 1; P. Cordeiro 1; A. Cortico 1; M.J. Santos 1; M. Carraga 1
Hospital Garcia de Orta, Cardiology Dept., Almada, Portugal; 2Almada, Portugal

Introduction: The utilization of contrast has been implemented for improve-ment of the Doppler signal in multiple clinical contexts.

Objective: To evaluate the value of contrast echocardiography, with agi-tated saline with blood, in the improvement of the Doppler signal used to quantify the pulmonary artery systolic pressure during exercise.

Material and methods: We studied 13 women, aged 54±11 years, with the diagnosis of Scleroderma, who were referred to the unity of heart failure and pulmonary hypertension for screening of pulmonary hypertension. According to the unity protocol, a transfemoral echocardiogram was made, in left decubitus (LD), with evaluation of right ventricle-right atria gradient (gRV/RA); a peripheral venous access was obtained, with a 3-way stopcock and the patients were placed in orthostatism (O), with a new evaluation of gRV/RA. Exercise echocardiography (EE) was begun, with evaluation of gRV/RA at peak exercise (P) and Afterwards, if the gRV/RA (8cc with 1cc of agitated saline with 1cc of blood) was injected, followed by a new evaluation of gRV/RA (PC) and the interruption of the EE. Pulmonary hypertension was diagnosed when gRV/RA at the end of the exercise was superior to 40 mm Hg.

Results: The quality of Doppler signal was deteriorated in two patients, maintained in one and improved in ten, with the use of contrast. In one patient a Doppler signal was only obtained with the use of contrast. In four patients a gRV/RA superior to 40 mm Hg was only obtained with the use of contrast. Of these, three have already been submitted to right heart catheterization, that confirmed the diagnosis of pulmonary hypertension. gRV/RA P was 51±10 mmHg and gRV/RA PC was 59±10 mm Hg, p=0.001.

Conclusions: 1. RV/RA gradients obtained at peak exercise are higher with the use of contrast. 2. This method seems to have relevant clinical value in the diagnosis of pulmonary arterial hypertension.

1137  
The value of Tei-index for the complex echocardiographic diagnosis of right ventricular dysfunction in patients with chronic obstructive pulmonary disease  
V. Pyankov 1; Y. Chuyasova 1; I. Pyankova 1
1Kirov State Medical Academy, Internal Diseases Dept., Kirov, Russian Federation; 2Kirov Hospital Administration, Kirov, Russian Federation

Purpose: Right ventricular (RV) dysfunction in patients with chronic obstruc-tive pulmonary disease (COPD) associated with poor outcomes and increased mortality. The aim of this study was to evaluate the diagnosis role of Tei-index in patients with COPD complicated by RV dysfunction.

Material and methods: 46 males with severe COPD (mean age 59±8 years) were studied. All patients underwent clinical and laboratory examinations. RV wall thickness, RV end-diastolic diameter, area and volume were evaluated with two-dimensional echocardiography. The tricuspid inflow profile (E, A, E/A, DT) and hepatic vein flow velocity (S, D, A) were measured with pulsed Doppler. Peak velocities of the tricuspid annular motion (Sa, Ea, Aa/Aa) were derived from pulsed wave Doppler tissue imaging (DTI). Tei-index (myocardial performance index) calculated as the quotient (isovolumic relaxation time + isovolumic contraction time)/ejection time.

Results: RV systolic dysfunction (RV ejection fraction <45% and Sa<11.5 sm/s) was detected in 15.5% of cases. RV diastolic dysfunction was detected in 100% of cases. Impaired relaxation pattern of tricuspid inflow (E/A<1.0 and Ea/Aa<1.0) was detected in 69.6%, pseudonormal pattern in 17.4% (2.00<E/A>1.0 and Ea/Aa>1.0), restrictive pattern in 13% (E/A>2.0). There were significant correlations between Tei-index and Sa/Aa (r=0.86, p=0.002), S (r=0.80; p=0.004), VA (r=0.89, p=0.001).

Conclusions: Our study confirmed high prevalence of RV systolic and dias-tolic dysfunction in patients with COPD. Physicians should detect RV dys-function in patients with COPD. Tei-index is a useful parameter to evaluate COPD patients with RV dysfunction.

1138  
Assessment of right ventricular function during exercise by strain or strain rate imaging and ventilatory response in patients with severe pulmonary arterial hypertension  
A.F. Flusch 1; P.S. Schoene 1; A.H. Hansen 1; S.B. Buss 1; E.G. Greunig 1; F.J. Meyer 1; H.F. Kuecherer 1
1University Of Heidelberg, Cardiology Dept., Heidelberg, Germany

Background: The increased regression slope relating minute ventilation to carbon dioxide output (VE/VECO2 slope) during exercise reflects the abnor-mal ventilatory response to exercise due to inefficient ventilation in patients with pulmonary arterial hypertension (PAH). VE/VECO2 slope has been char-acterized a prognostic marker in PAH. However, the non-invasive assess-ment of hemodynamics during exercise is still insufficient in PAH. Therefore, this prospective study evaluated right ventricular performance by echocardiographic technique during exercise in PAH.

Methods: 15 patients with severe pulmonary arterial hypertension (8 diastolic, 7 thromboembolic) confirmed by right heart catheterization (WHO class 3, mean pulmonary artery pressure 43±8 mm Hg; mean±SD) were evaluated by echocardiography during symptom-limited maximal cardiopulmonary ex-ercise testing (ramp protocol, semi-recumbent); VE/VECO2 slope, systolic pul-monary artery pressure (sPAP), tricuspid annular plane systolic excursion (TAPSE), Tei index, strain and strain rate were measured during exercise.

Results: In all patients, oxygen consumption at peak exercise was reduced (13.2±4 mL/min/Kg body weight), and VE/VECO2 slope was increased (48.6±8.4). There was a significant inverse correlation between peak regional longitudinal right ventricular systolic strain and VE/VECO2 slope (r=0.62, p<0.001). Moreover, an inverse correlation between strain rate and VE/VECO2 was found (r=0.71, p<0.001). In contrast, VE/VECO2 was independent from other echocardiographic parameters including sPAP, TAPSE, and Tei Index (r=-0.31, r=-0.24, r<0.08). Further investigations are needed.

Conclusions: This first observation indicates that strain and strain rate imaging might be useful for the evaluation of right ventricular performance during exercise in patients with PAH. The potential role of strain and strain rate imaging as a new non-invasive prognostic marker in patients with PAH needs further investigation.
Pulmonary vascular resistance estimated by echocardiography is elevated in patients with obstructive sleep apnea during daytime.

Mayo Clinic College of Medicine, Cardiovascular Dept., Rochester, United States of America

Background: Obstructive sleep apnea (OSA) has been related to an increased pulmonary vascular resistance (PVR) measured invasively. Objective: To determine if daytime Doppler derived pulmonary systolic pressure (PSP) and PVR estimated by echocardiography is associated with severity of OSA.

Methods: A cross-sectional design of 85 subjects with suspected OSA who had their first overnight polysomnography (PSG) and a complete echocardiographic study performed within 2 months of the PSG without primary pulmonary hypertension, severe left ventricular dysfunction (EF<40%) or use of continuous positive airway pressure. Subjects were divided according to the apnea hypopnea index (AHI) and by the mean oxyhemoglobin saturation during PSG. PVR was calculated using the formula: -0.556x1.154*(pre-ejection period/acceleration time)/Pre-ejection period + pulmonary artery ejection time. Parameters were obtained by calibrating the Doppler signal of the systolic pulmonary with the tricuspid regurgitation flow. All analyses were performed by the same observer, blinded to the PSG results.

Results: We excluded 38 patients due to inability to calibrate Doppler signals to estimate PVR, and 3 with severe left ventricular dysfunction. The mean age of the patients was 66±12 years and 19% were men. Main results are presented in the table. When excluding seven patients with diagnostic criteria of chronic pulmonary obstructive disease, adjusted p values for trend between PVR and AHI and between PSP and AHI remained similar (0.01 and 0.11, respectively).

Conclusions: PSP showed no differences across OSA severity. PVR estimation by echocardiography was significantly increased across severity of OSA, and it was highly significant in patients with AHI>15 even after adjusting for PSP measured during daytime.

Table 1. Pulmonary vascular resistance in OSA

<table>
<thead>
<tr>
<th>AHI</th>
<th>Mean nocturnal PVR (Wood units) ±0.71</th>
<th>Mean AHI Adjusted PVR (Wood units) ±0.71</th>
</tr>
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<tbody>
<tr>
<td>&lt; 5</td>
<td>5-14</td>
<td>15 Crude Adjusted ±0.40</td>
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<tr>
<td>n=14</td>
<td>n=8</td>
<td>n=22 P value For trend p value</td>
</tr>
<tr>
<td>PVR (Wood units)</td>
<td>0.71</td>
<td>0.89</td>
</tr>
<tr>
<td>PSP (mm Hg)</td>
<td>1.21</td>
<td>0.41</td>
</tr>
<tr>
<td>Sa (cm/s)</td>
<td>0.83</td>
<td>0.83</td>
</tr>
</tbody>
</table>
| p values adjusted for age, gender, body mass index, hypertension, coronary artery disease, smoking and chronic obstructive pulmonary disease; tensive adjustments ± PSP; p value <0.01 when compared to AHI=5.

Accuracy of indices of longitudinal right ventricular function in severe pulmonary hypertension

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1140

Background: Assessment of right ventricular (RV) function is difficult in patients with severe pulmonary hypertension (PHT) because of the afterload dependence of the indices of RV longitudinal function. Tricuspid annular plane systolic excursion (TAPSE) and peak systolic velocity of the tricuspid annulus (Sa, obtained by tissue Doppler imaging) have been recently proposed as accurate and reproducible indices of longitudinal RV function. Aim: To compare TAPSE and Sa with RV ejection fraction (RVEF) assessed by isotopic angiography in patients with severe PHT.

Methods: Ninety patients with a primary PHT and a normal left ventricular function were included. Systolic pulmonary artery pressure (sPAP) was assessed by tricuspid regurgitation peak velocity. TAPSE and Sa were obtained from an apical 4-chamber view using the M-mode and the pulsed wave Doppler trace of the tricuspid annulus, respectively. Isotopic RVEF and echocardiography were performed within one week in all patients.

Results: sPAP ranged from 45 to 133 mm Hg. RVEF was severely impaired in 79 patients (Group 1: 35%) and normal in 11 (Group 2: 22%). TAPSE was similar in the 2 groups. TAPSE and Sa were significantly lower in group 1 than in group 2. TAPSE and Sa were significantly correlated to each other (r=0.63, p<0.001). However, TAPSE and Sa were poorly correlated with RVEF (TAPSE: r=0.43, Sa: r=0.40; p<0.05) and with sPAP (TAPSE: r=0.36, Sa: r=0.34; p<0.05).

Conclusion: In patients with severe PHT, the new echographic indices of longitudinal RV function (TAPSE and Sa) are also influenced by increased afterload, but they add an incremental value in differentiating preserved from altered RV function.

1141
The effect of septum and right ventricular free-wall on right ventricular diastolic function in mild hypertension - a colour tissue doppler echocardiographic study

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Aim: In this study, we aimed to investigate effect of septum and right ventricular free-wall on right ventricular diastolic function measured by conventional and colour tissue Doppler echocardiographic methods in patients with mild hypertension.

Material and methods: The study group was consisted of 31 mild hypertensive patients (systolic blood pressure/diastolic blood pressure = 144±11/91±9 mm Hg, mean age 52±7 years, 10 men, 21 women) and 30 age-matched normotensive control subjects (systolic blood pressure/diastolic blood pressure = 113±9/62±6 mm Hg, mean age 47±7 years, 14 men, 16 women). All the parameters were measured with conventional and colour tissue Doppler echocardiography.

Results: Left ventricular diastolic dysfunction in 17 of 31 patients (54%) and right ventricular diastolic dysfunction in 16 of 31 patients (52%) were found. Septal wall thickening (<0.05), posterior wall thickening (<0.05), left ventricular mass (<0.05), left ventricular mass index (<0.05), and right ventricular free-wall thickness (p<0.001) were statistically increased in hypertensive group than control group. Significant correlations were observed between parameters of right and left ventricular filling in hypertensive patients (Mitral E wave - Tricuspid E wave r=0.31 p=0.015, Mitral A wave - Tricuspid A wave r=0.371 p=0.003, Mitral E/A ratio - Tricuspid E/A ratio r=0.537, p=0.001). Although, no correlation was found between parameters of right ventricular diastolic function measured by conventional and diastolic parameters of right ventricular free-wall measured by tissue Doppler echocardiography, significant correlation was found between tricuspid E/A ratio and diastolic parameters of septum measured by colour tissue Doppler echocardiography.

Conclusion: Right ventricular diastolic function is significantly impaired in mild systemic hypertension. Septum is more effective than right ventricular free-wall on right ventricular diastolic function.
1143

Is exercise echocardiography useful in the evaluation of pulmonary artery pressure in patients with systemic sclerosis?

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Background: Pulmonary HyperTension (PHT) dramatically impairs quality of life and survival of patients suffering systemic sclerosis. Although early recognition is required, it is so far based on pulmonary artery pressures measurement using rest echocardiography. However, resting PHT is a sign of an already advanced stage of the disease.

The aim of our study was to assess the profile of pulmonary pressure during exercise echocardiography (EE) in order to detect abnormal pressure response.

Methods: We studied a group of 12 patients with systemic sclerosis and normal pulmonary pressure at rest. Ten were symptomatic. All patients under-went rest echocardiography. Systolic pulmonary artery pressure was estimated by systolic gradient between right ventricle and aortic valve (VA Gr), obtained from tricuspid regurgitation maximal velocity (Vtr) (VA Gr=4 Vtr²).

Patients underwent symptom limited semi-supine EE VA Gr was evaluated at each step and at peak workload. Electrocardiogram and blood pressure were also recorded during exercise.

Results: mean age was 56±2.5 years; there were 10 women and 2 men. The number of patients in NYHA class 1, 2 and 3 were respectively 2, 5 and 5 (mean NYHA class: 2.2±0.2). The VA Gr at rest was 24±1 mm Hg (17 to 32 mm Hg). The mean VA Gr in each NYHA group was respectively 24±2, 23±3 and 26±2 mm Hg for NYHA class 1, 2 and 3. Maximal workload during exercise was 83±6 Watts. No adverse effect was observed. The VA Gr at peak exercise was significantly increased, compared to rest, at 44±4 mm Hg (25 to 70 mm Hg) (p<0.0001). The peak VA Gr in each NYHA group was respectively 35±0, 43±6 and 49±6 mm Hg for NYHA class 1, 2 and 3. No patient had developed VA Gr>40 mm Hg. Among symptomatic patients (class 2 or 3), 8/10 (80 %) developed VA Gr>40 mm Hg.

Conclusion: exercise echocardiography in patients with systemic sclerosis is safe and useful to evaluate exercise pulmonary pressure. Symptomatic patients without pulmonary hypertension at rest seem to have more elevated pressures at exercise. They might benefit of a closer follow-up to detect pulmonary hypertension earlier and begin treatments.

1144

Estimation of pulmonary artery pressure by pulsed wave tissue Doppler imaging of the tricuspid and mitral annulus

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Detecting the presence of pulmonary artery hypertension (PAH) is important in patients suffering from progressive systemic sclerosis (SSc), especially in those who have unexplained dyspnoea. Non-invasive assessment of pulmonary artery pressure (PAP) is conventionally based on the Doppler examination of the tricuspid regurgitation. Recent studies have made an attempt to find a tissue Doppler (TDI) parameter characteristic of PAH, with diverse results. The relation between PAP and left ventricular function has been poorly understood, too. The aim of our study was to investigate the correlation between the TDI parameters of right and left ventricular function and the PAP measured by right heart catheterization.

Material: 20 patients with SSc (mean age 55±10, 17 female), suspicious for PAH were studied.

Methods: In addition to the conventional Doppler parameters of the transmural flow, myocardial systolic (S), early (Ea) and late (Aa) diastolic velocities were measured at the lateral border of the mitral and tricuspid annulus by TDI using Aloka ProSound 5500 ultrasound system. Mitral E/Ea ratio was calculated. During right heart catheterization, resting mean, systolic, and diastolic PAP were measured. In patients with resting mean PAP<30 mm Hg the same parameters were also measured during exercise test.

Results: We found a significant correlation between S(39.1±10.5 vs. 30.1±30.1, p<0.001), E(26±7 vs. 15±5, p<0.001), and A(16±6 vs. 7±4, p<0.001) with the resting systolic PAP measured by the catheter. Also the diastolic PAP was significantly correlated with the systolic S(40±14 vs. 29±10, p<0.001), E(29±7 vs. 19±5, p<0.001) and A(16±8 vs. 8±6, p<0.001) PAP measurements. The mean (r=0.593, p<0.01), systolic (r=-0.574, p<0.05), and diastolic PAP (r=0.673, p<0.01) measured during exercise test showed significant positive correlations with the E/Ea ratio.

Conclusion: In patients with SSc the systolic (and late diastolic) tricuspid annular velocity determined by TDI can be used to assess the resting PAP. Furthermore, the E/Ea ratio - which parameter characterizes the left ventricular diastolic pressure - is able to predict PAP during exercise. This study suggests that left ventricular diastolic function is an important factor influencing the PAP in patients with SSc.

1145

Prognostic value of right ventricular involvement in patients with systemic lupus erythematosus and subclinical myocardial dysfunction

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Systemic lupus erythematosus (SLE) is an autoimmune disease frequently associated with cardiac involvement. The right ventricle (RV) systolic and diastolic abnormalities, mainly in the SLE patients (pts) without cardiac symp- toms, are not well defined and their prognostic significance is insufficiently known.

The aim of the study was to evaluate RV function and its prognostic value in pts at early stages of SLE, with no previously known cardiac involvement.

Methods: We studied 48 pts with SLE (mean age 28±6.7 ±4 years), 95.6% women, without previous diagnosis of cardiac disease. The exclusion criteria were the presence of an ejection fraction less than 55%, calculated from B-mode images according to Simpson’s rule, pulmonary systolic arterial pressure higher than 30 mm Hg, significant valvular diseases and the presence of pericardial effusion. Six minutes walk test and an echocardiographic study, including pulsed tissue Doppler imaging (TDI) were performed in all pts. Systolic (Sm) and diastolic velocities (Em, Am) of the left ventricle (LV) and RV were measured by TDI at the tips respectively at the tricuspid annulus. Myocardial performance index (MPI) was calculated for LV and RV by using TDI derived isovolumic contraction time, isovolumic relaxation time and ejection time.

Results: We found a significant correlation between SmLV and SmRV (7.94±1.34 vs 10.2±2.11, p<0.0001), Emlv and EmRV (7.86±1.76 vs 9.61±1±1, p<0.0001) but not between AmLV and AmRV. Simple linear re- gression analysis demonstrated significant correlation between MPlv and MPiRV (0.40±0.044 vs 0.35±0.063, p<0.01). During two years follow up, 14 pts (29%) developed heart failure, as assessed clinically and by reduction of the 6 min walk distance. MPlrv best predicted the occurrence of heart fail- ure, with a sensitivity of 87% and a specificity of 93% for a cut-off value of 0.335.

Conclusions: Patients at early stages of systemic lupus erythematosus could have subclinical left and right ventricular dysfunction. Right ventricular myocar- dial performance index seems to be particularly useful to assess prognosis in these patients, by predicting the development of heart failure.

1146

The effect of pulmonary endarterectomy on the severity of functional tricuspid regurgitation in patients with chronic thromboembolic pulmonary hypertension

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Background: In selected patients with chronic thromboembolic pulmonary hypertension (CTEPH), significant decreases of pulmonary artery pressure and pulmonary vascular resistance can be achieved by pulmonary endar- terectomy (PEA). The reduction of pressure overload results in an early de- crease of right ventricular (RV) dimensions and RV functional improvement. The changes in RV morphology have an impact on severity of functional tricuspid regurgitation (TR).

Aim of the study: We evaluated the effect of PEA on the magnitude of change in TR.

Methods: 15 patients with severe CTEPH (48±14 years, 11 males) underwent complete echocardiographic examination prior to and 2 weeks after PEA. Pulmonary artery systolic pressure (PASP) as a peak TR gradient, RV end-diastolic diameter (RVEDD) and RV fractional area change (RVFAC) were measured. The changes in RV morphology have an impact on severity of functional tricuspid regurgitation (TR).

Results: We found a significant decrease from 47±6 mm to 31±5 mm and RVFAC improved from 0.22±0.08 to 0.28±0.04 (p<0.001). The significant reduction of EOA (0.38±0.12 to 0.29±0.08 cm²) and RV area (15±4 to 11±2 cm²) was also noted (both p<0.001).

Conclusions: In patients with severe CTEPH, PEA results in a significant Decrease in RV pressure overload with concurrent improvement of RV func- tion and morphology. These changes lead to a significant reduction in TR severity. Therefore, tricuspid annuloplasty is not necessary in patients with CTEPH undergoing PEA.

Eur J Echocardiography Abstracts Supplement, December 2006
1147
Prognostic importance of quantitative echocardiography in patients suspected of pulmonary embolism
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Background: Echocardiography (TTE) is an essential adjunct to the diagnostic work-up of the patients admitted with acute dyspnea with acute onset suspected of possible Pulmonary Embolism (PE). TTE has been shown to be helpful in identifying RV dysfunction and thereby choosing the appropriate treatment strategy, as well as identifying differential diagnoses. The present study evaluated the prognostic information from quantitative echocardiographic parameters in patients with dyspnea suspected of non-massive PE.

Methods: Of 296 patients included, 13 had V/Q scans of insufficient quality for interpretation, 2 patients were lost to follow-up, leaving 281 (94%) patients for analysis, of whom 58 (20%) had high probability of PE. Echocardiographic covariates previously evaluated for their diagnostic value were entered in a multiple, backward-elimination Cox proportional hazard model: pulmonary acceleration time (a previously established measure of RV pressure), peak strain and systolic velocity of the right ventricular free wall, as well as age and sex, and left ventricular function as potential confounding factors.

Results: Patients were followed for a median of 2.3 years (max. 3.0 years); 74 patients (26%) died during this period. Survival rate in patients diagnosed with PE and patients without no different (log-rank test p=0.86). The results of the multivariate model showed that age, left ventricular ejection fraction and pulmonary acceleration time were independent prognostic factors, see Table.

Conclusion: The present study identifies pulmonary acceleration time among quantitative echocardiographic markers of RV pressure and function as significant, independent prognostic marker in patients admitted for acute dyspnea, suspected of non-massive PE. These findings support the use of TTE in the initial assessment of patients with acute onset dyspnea suspected of pulmonary embolism.

Table 1

| Parameter                  | HR per 10 unit increase | 95% CI          | p value *
|----------------------------|-------------------------|-----------------|---------------
| Pulmonary acceleration time| 0.86                    | 0.72-0.95       | p=0.004       |
| Age (years)                | 1.44                    | 1.13-1.85       | p=0.004       |
| LV ejection fraction (%)   | 0.50                    | 0.39-0.67       | p=0.02        |

1148
Subclinical pulmonary vascular changes occur without pulmonary hypertension or right ventricular dysfunction in moderate to severe chronic obstructive pulmonary disease
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Introduction: Raised pulmonary artery pressure (PAP), pulmonary vascular resistance (PVR) and right ventricular dysfunction (RVD) are common in end stage chronic obstructive pulmonary disease (COPD), but their prevalence in pts with less severe COPD remains unclear.

Methods: Sequential respiratory function tests (RFT) and transthoracic echocardiograms (TTE) were performed in 137 pts with COPD and 30 age-matched controls. COPD was defined according to GOLD guidelines. TTE were analysed for 2D parameters (chamber size, left ventricular EF) and Doppler parameters (TR grade and maximum velocity, RVOT time velocity integral and maximum velocity), and PVR was calculated from the TR maximum velocity and RVOT TVI. RVD was assessed by tissue Doppler imaging. Pts with more than mild valvular regurgitation or stenosis were excluded. Comparison of means was made by independent-samples t-test.

Results: There were no differences in left and right atrial size, left ventricular filling pressures or left ventricular ejection fraction between groups. Table 1 compares RV parameters for both groups; despite the lack of difference in RFT, PAP and RV free wall systolic motion (RVOT TVI), the COPD group displayed increased PVR. The incidence of increased PVR in the COPD group was 60%, with no differences between tertiles of COPD severity. RV systolic function was similar between COPD and normal controls.

Conclusion: In ambulatory patients with moderate to severe COPD and normal pulmonary pressures, increased PVR is seen in the absence of RVD. Subclinical increases in PVR are common and do not correlate with air flow limitation severity in this group. Increased PVR may be a potential therapeutic target before the development of pulmonary hypertension and RV dysfunction.
Non-invasive diagnostic and functional evaluation of cardiac involvement in patients with systemic sclerosis

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Abstracts

Background: Heart involvement can be a serious complication of systemic sclerosis (SSc) with increased mortality. SSc may be associated with right ventricular overload, secondary to pulmonary hypertension (PH). The reported rates of PH in SSc patients is 10-50% and represents a leading cause of mortality. The aim of this study was to characterize the prevalence of PH in SSc patients and to establish whether that population presents limitation in exercise capacity.

Methods: We prospectively studied 45 consecutive patients (41 F, 4 M, age 54±15.4 yrs) with SSc (mean disease duration 9±4 yrs) and the group of 15 age-matched healthy subjects (13 F, 2 M, age 48±10.6 yrs). In addition to conventional evaluations, transthoracic echocardiography (TTE) for assessment of RV overload, 6-minute walking test (6-MWT) and NT-proBNP were performed.

Results: Patients with SSc presented echocardiographic signs of RV overload. Tricuspid regurgitation pressure gradient (TRPG) could be measured in 38 SSc patients (84%) and in 5 controls (33%). The mean value of TRPG in SSc group was higher than in controls (27.6±5 vs 19.2±2 mm Hg, p=0.04). PH (TRPG>30 mm Hg) was found in 13 (29%) SSc patients while in none of the controls. Also RV/LV ratio was increased in SSc patients (0.54±0.07 vs 0.48±0.05, p=0.001). The mean value of Tei index for the right ventricle was higher in SSc patients than in controls (0.34±0.07 vs 0.29±0.03, p=0.02). The mean 6-MWT distance was shorter in SSc groups when compared with controls (520±105 vs 617±47 m, p=0.001) and the mean saturation of capillary blood after the 6-MWT was lower in SSc patients (91.8±4 vs 96.7±1%, p=0.001). Interestingly plasma NT-proBNP was elevated in 28 SSc patients (84%) and in 5 controls (33%).

Conclusions: Pulmonary hypertension and limitation of exercise capacity is common in SSc patients. Noninvasive investigation of PH among SSc patients may provide an opportunity to intervene prior to development of irreversible pulmonary vascular disease.

1152 Echocardiographic determinants of functional capacity in pulmonary arterial hypertension

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In pulmonary arterial hypertension (PAH), the relation between echocardiographic parameters and functional capacity is not well defined.

Objectives: To analyse the relation between functional capacity and certain echocardiographic (Echo) parameters in patients with severe PAH.

Methods: From 2000 to 2005, 78 patients with severe PAH (mean age 44±12 years, disease duration 9±4 years, 25% Collagen disease, 14% other etiologies) were evaluated with transthoracic Echo, measuring: 1) right ventricular (RV) geometry and function (RV diastolic diameter, systolic and diastolic areas, %shortening area, Tei index); 2) left ventricular geometry and diastolic function (eccentricity index, systolic and diastolic areas, mitral inflow velocities); and 3) Echo measured cardiac output and RV-right atrial gradient. All patients underwent six minute walk test (6MWT) and NYHA functional class (I-IV) classification. All test were performed within the same day.

Results: The mean 6MWT distance walked was 411±92 m, without correlation (Pearson) with any right or left ventricular echocardiographic parameter. With the increased time of survival as a result of improved treatment of AIDS, pulmonary artery systolic pressure (PASP) estimated in 71 mm Hg (63-84). Severe right ventricular enlargement was detected in all cases and severe tricuspid valve regurgitation was found in two of them. All patients refused to undergo cardiac catheterization. After 3 months of gradually increasing doses of sildenafil (maintenance doses of 50 mg four times a day), the patients improved dramatically and the functional class was reduced from IV to II. Right ventricular dilation and tricuspid regurgitation declined significantly, and pressure decreased to a mean PASP of 45 mm Hg (41-50). The mean six minute walk distance increased 269 m. The clinical improvement and the decrease in the PASP persists after 2 years of follow-up.

The adverse effects were transient headache and facial flushing in one woman, and transient rhinorrhea in the other one without any adverse effect in the man.

Conclusions: Our data demonstrate a beneficial effect of sildenafil in patients with HIV-related pulmonary hypertension, without significant side-effects. This initial results in HIV-related hypertension treatment are very promising.
1156 Evidence based, MRI strengthened risk stratification strategy for hypertrophic cardiomyopathy patients - A follow up study

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Background: The occurrence of hypertrophic cardiomyopathy (HCM) among clinical studies shows large variations. The predictive power of risk factors to indicate proper clinical outcome also varies among clinical studies. The aim of our study was to determine whether evidence based risk stratification, strengthened by MRI techniques, improved the prediction of clinical outcome.

Material and methods: 51 HCM (mean age 49±16, 33 male, HOCM 20) patients (pts) were studied between 2002 and 2005. Detailed anamnestic data, physical examination, ECG, HOLTER, Stress test, echocardiography and cardiac MRI (function and late enhancement) were performed to determine evidence based minor and major risk factors of SCD. Coronary angiography was only performed in cases of clinical indications of IHD. High risk patient group was defined having two or more major risk factors (Group I). The rest of the patients were grouped into the low risk patient group (Group II). The diagnostic powers of risk factors were analyzed while comparing their occurrences. The outcome indicators during follow up were: occurrences of heart failure (HF), cardiac death (CD), necessity of ICD implantation and surgical myectomy.

Results: 16 (45±12y, 5/11 f/m) and 35 (32±15y, 14/21 f/m) pts were classified into Groups I and II, respectively. The number of high risk pts examined in our heart center was higher than then expected based on the literature. In Groups I vs II the occurrences of SCD, NSVT, aborted empty BP, LVWT >30 mm, and late enhancement were 2 vs 0, 4 vs 1, 3 vs 0, 9 vs 3 and 14 vs 9, respectively. The latter data indicate significantly higher number of risk factors in Group I. Simultaneously in Group I vs II the occurrences of HF, CD and ICD implantation were 2 vs 0, 4 vs 1, 3 vs 0, 9 vs 3 and 14 vs 9, respectively. There was no significant difference in the number of HOCM (8 vs 12) pts between Groups I and II. Interestingly, the number of major advanced cardiac events, the necessity of ICD implantation and surgical myectomy in Group I vs II were respectively 16 (31±13y, 5/11 f/m) and 25 (36±15y, 14/21 f/m). The latter data indicate significantly higher number of risk factors in Group I.

Conclusion: The number of major advanced cardiac events, the necessity of ICD implantations and surgical myectomy were indicated well using our evidence based MRI strengthened risk stratification strategy.

1157 Left or right diastolic function - which is the first to be affected in HIV patients? A Tissue Doppler imaging study

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The micocardiac anomalies prevalence in HIV patients (p) goes from 25% to 75%. The early diagnosis is extremely important in order to prevent cardiac disfunction progression to irreversible stages. It is accepted that the diastolic disfunction precedes the systolic dysfunction in dilated cardiomyopathy. However, and particularly in HIV p, we don't know if the diastolic dysfunction begins early on the left or right side of the heart. The Tissue Doppler Imaging (TDI) allows the evaluation of the longitudinal functional using the mitral and the tricuspid annulus motion.

Objectives: To characterize the longitudinal diastolic function by TDI in HIV p with normal systolic function by conventional echocardiography in the left and right ventricles and to determine the most sensitive one, that is, the first being affected.

Methods: We analyzed the mitral annulus motion by TDI in 4 places using the apical view and the tricuspid annulus motion in 25 HIV p with no cardiac pathology and in 22 healthy volunteers. Both groups were set by age, gender, body surface, blood pressure and heart rate. These data were compared between the 2 groups. In order to increase the study specificity, p older than 45 were excluded.

For the statistics: Two sample t-test, Chi-square test or Fisher’s exact test, as adequate, in the discrete variables.

Results: 25 HIV p were evaluated, 13 men, age average of 34±4±6 years and 25 healthy volunteer, age average of 34±4±6 years. Both groups were not statistically significant versus normal high risk p with normal systolic function frequently have diastolic disfunction by TDI both on the left (28%), and on the right (56%). According to these results, the right ventricle’s diastolic function is affected faster in HIV patients with normal global systolic function. This difference was very significant when compared mitral with tricuspid e/a (p<0.001).

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<th>Table 1</th>
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<tr>
<td>Mitral Annulus</td>
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<td>e/a</td>
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<td>p with e/a &lt; 1 (number and %)</td>
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<td>NS = No statistical significance</td>
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1158 Noninvasive diagnosis of biopsy-proven cardiac amyloidosis

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Cardiac amyloidosis is associated with characteristic ECG and echocardiographic changes, yet each finding alone is relatively nonspecific. A combination of noninvasive prognostic parameters would be desirable for this tissue-based diagnosis.

Objective: This study analyzed the utility of electrocardiographic (ECG) and echocardiographic findings in the diagnosis of amyloidosis proven by histological exam.

Methods: 17 consecutive patients with cardiac amyloidosis were included in the study in a 5-years observing period (12 men, 5 women, mean age 57.3±12.7 years). All patients were evaluated by clinical exam, electrocardiography, echocardiography and by cardiac catheterization. The diagnosis of cardiac amyloidosis was confirmed by histological exam. All patients had sign of ‘dip and plateau’ on cardiac catheterization.

Results: On initial evaluation, all patients had signs and symptoms of heart failure: 9 patients had left ventricular insufficiency and right sided finding dominate the clinical presentation in 8 patients. 10 patients were in IV or NYHA functional classes. On the ECG, only 7 patients had low-voltage and pseudo-infarction patterns, and 5 patients had ECG signs of left ventricular hypertrophy. All patients presented increased thickness of left ventricular walls on 2D echo- cardioographic exam (8 of them with granular sparkling texture). Left ventricular hypertrophy was found as mild or moderate. Atrial enlargement was identified in 12 patients. 7 patients had biventricular hypertrophy (free wall - RV >10 mm). All patients had different degrees of diastolic dysfunction. There were 5 cases of isolated mild ventricular hypertrophy and impaired relaxation, without any ECG signs, atrial enlargement or right ventricular hypertrophy. In this minority of patients there were only signs of mild heart failure and left ventricular hypertrophy, in the absence of aortic stenosis or history of systemic hypertension.

Conclusion: The diagnostic of cardiac amyloidosis may be very challenging in isolated left ventricular hypertrophy. Non-invasive cardiac investigations are sometimes not sufficiently conclusive for distinguishing between hypertrophic cardiomyopathy and cardiac amyloidosis. In the absence of hyper- tension or aortic stenosis, cardiac amyloidosis should be considered as a differential diagnosis, despite the lack of ECG or echo signs, taking into account the prognostic and therapeutic consequences.
1159 Systolic and diastolic functions, qt interval and myocardial perfusion imaging in post-viral cirrhosis with and without ascites

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Purpose: The term “Cirrhotic cardiomyopathy” has been given to describe the cardiac structural and functional abnormalities found in cirrhotic patients. As ascites develops, the quality of life usually becomes worse. Some patients develop dyspnea, palpitation, dizziness and hemodynamic instability. Therefore, this study aimed to explore some cardiac functions in post-viral cirrhosis; namely the systolic and diastolic functions by Doppler echocardiography, the prevalence of prolonged QT interval by conventional electrocardiogram and evidence of myocardial ischemia by single-photon emission computed tomographic (SPECT) stress imaging.

Methods: The study was conducted in Suez University Hospital. The cohorts with cirrhotic patients (27 M and 13 F, mean age of 59.7±6.10), 20 of them had ascites. Cirrhosis was due to HCV in 37.92.5% and HBV in 3 (7.5%). No evidence of schistosomal liver disease was found by ultrasonography. The controls were 10 healthy volunteers (5 M and 5 F, mean age = 57.8±5.0).

Results: Compared to controls, cirrhotics had lower mean arterial blood pressure (p=0.0421), lower cholesterol, LDL and triglycerides (p=0.0001 for each) and HDL (p=0.05). Cirrhotics had normal left ventricular dimensions and significantly enlarged right ventricular dimensions (p0.440 seconds) was found in 18/40 patients (45%) vs 1/10 controls (10%) (p=0.041) with no relation to the severity of liver disease. A mild perfusion defect was found in only 1/40 cirrhotic (2.5%) vs 2/10 controls (20%) (p=0.097).

Conclusion: Cirrhotic patients showed right ventricular enlargement, normal left ventricular dimensions and normal systolic function. However, patients with ascites were more likely to have diastolic dysfunction. Although prolonged QT interval is common in cirrhotic patients, myocardial ischemia seems to be uncommon.

1160 Predictors of large volume paracentesis induced circulatory dysfunction in patients with massive hepatic ascites

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Purpose: In patients with massive ascites, large volume paracentesis may be associated with complications as circulatory dysfunction. Selection of appropriate patients might reduce such side effects.

Methods: Forty-five patients known to have liver cirrhosis and presenting with massive ascites were included. There were 27 males and 18 females, whose mean age (mean 51.2±10.64). All patients were subjected to full history, clinical examination, complete blood picture, prothrombin time, serum albumin, total plasma protein, serum bilirubin, serum creatinine, serum electrolytes and plasma renin activity measured by radioimmunoassay. Echocardiographic evaluation for cardiac output, pulmonary artery pressure, diastolic and systolic and diastolic function was performed before and after paracentesis.

Paracentesis induced circulatory dysfunction is defined as increase in plasma renin activity of more than 50% of pretreatment value at a level greater than 7.5 μg/litre/hour on the 6th day after paracentesis.

Results: The incidence of paracentesis induced circulatory dysfunction in patients with massive hepatic ascites was 73.3% and increased with the severity of the disease. Younger patients were at higher risk while diabetics and hypertensives were at lower risk. Gender had no influence. Lower limb edema was a good indicator of circulatory dysfunction. Ascitic patients showed higher heart rate. Neither electrolytes levels nor hematocrit value had an influence (p=0.998) and (p=0.506) respectively. In cirrhotic patients with tense ascites the A wave velocity and deceleration time of the E wave were markedly increased and the E/A ratio was markedly reduced. Ejection fraction had similar values of the normal patients with a tendency to increase after paracentesis (ejection fraction mean 58.6±6.9 and 61.1±11.6 before and after paracentesis respectively p=0.028).

Conclusion: Left ventricular diastolic function is altered in cirrhosis which is more marked in the presence of ascites. This may represent the early stage of hepatic cardiomyopathy. The incidence of paracentesis-induced circulatory dysfunction in the presence of a tense ascites increased with the severity of the chronic liver disease. Younger patients were at higher risk while diabetics and hypertensives were at lower risk.

1161 Left ventricular pump function and myocardial contractility in patients with type-1 myotonic dystrophy: a case study on beta-blocker therapy

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Purpose: In patients with dilated cardiomyopathy (DCM), the evaluation of the systolic function has an important role for prognosis and therapy. Ejecction fraction, normally used to assess systolic function, is influenced by preload and afterload. Intrinsic myocardial contractility, instead, is the capacity of cardiac myocytes to generate force and to shorten, independently from hemodynamic conditions. Echocardiographic assessment of myocardial contractility is made using the relationship between end-systolic wall stress (ESS) and left ventricular fractional shortening (FS) or between ESS and heart rate-corrected velocity of circumferential fiber shortening (VCFc). Circumferential wall stress is more appropriated when left ventricular shape ill altered. ESS is inversely correlated to both FS and VCFc.

Methods: 27 patients with DCM, not still treated with beta-blockers, were included in the study. ESS - FS and ESS - VCFc relationship was assessed at baseline and six months after up-litration phase with carvedilol was ended.

Results: All patients, at baseline, had depressed intrinsic myocardial contractility (red squares in fig. 1. Carvedilol therapy significantly reduced ESS and increased FS (green circles in fig. 1). In 20 of 27 patients (74%) myocardial contractility increased until reentering in the normality range, while in the other 7 patients (26%) there was an increase in FS without normalization of the contractility.

Conclusion: The improvement of left ventricular pump function with Carvedilol, is usually associated to a normalization in myocardial contractility, assessed at endocardial level. Such mechanism could be mediated from the modifications to the neurohormonal network that occurs during therapy with beta-blockers.

1162 Chloroquine cardiotoxicity: a case of reversible cardiomyopathy

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Background: Chloroquine (CQ) is an antimalarial agent used in the treatment of rheumatological disease. Severe adverse effects have been described during long-term treatment; respect to cardiac toxicity, this drug may induce restrictive or diastolic cardiomyopathy and conduction disturbances.

Case report: We report the case of 54 year-old man with rheumatoid arthritis in treatment with CQ (250 mg/d) for 6 years. We was admitted to our hospital with congestive right heart failure. The ECG showed synus bradycardia, first degree AV block and right bundle branch block. The chest radiograph showed mild cardiac enlargement with mild signs of pulmonary congestion. The echocardiogram showed increased wall thickness of both ventricles, LV preserved systolic function and right ventricular dysfunction, with signs of biventricular restrictive physiology (E/A ratio = 3 in mitral inflow, IVC diameter = 25 mm). The coronary angiography and haemodynamic study revealed no significant coronary artery stenosis, equalization of right and left diastolic pressures and dip-plateau configuration in the ventricular diastolic pressure tracing. An endomyocardial biopsy of the RV was obtained and the ultrastructural examination demonstrated the presence of curvilinear bodies, myeloid bodies and large secondary lysosomes diagnostic of chloroquine toxicity.

Follow up: Once stopped CQ treatment, a definitive marker was implanted and the patient has been followed-up for 18 months. He has improved his functional situation (now, he is in NYHA class II), signs of heart failure have disappeared with lower dosage of furosemide (currently 40 mg/d). Echocardiography parameters have also improved (E/A ratio = 1.4, IVC diameter = 18 mm).

Conclusion: CQ cardiotoxicity is an unusual complication with a few cases reported. The poor prognosis and its potential reversibility make essential an early diagnosis confirmed by biopsy. We have not found any other case in literature with cardiomyopathy and conduction disturbances, with histopathological study and proved reversibility in the follow-up.

1163 Contribution of myocardial performance index to assessment of left ventricular function in patients with type-1 myotonic dystrophy

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Purpose: The myocardial performance index (MPI) is a fairly new measurement of myocardial function and may abnormal in a variety of cardiac conditions when standard measurements of ventricular function are normal.

Methods: This study was undertaken to determine if the MPI could provide additional information on myocardial function in patients with type 1 myotonic dystrophy (DM1) and normal myocardial systolic function.

Results: 30 patients with DM1 (male 15, mean age 44.4±12 years) and 30 comparable healthy subjects were studied. All subjects performed conventional two-dimensional Doppler echocardiography.
but not the basal segments were affected.

Mesoapical AHCM was defined if also the mesoventricular LVFP were abnormal in 73% of patients in presence of normal fractional fractioning (E)/tissue E (E’). The MPI, defined as the sum of isovolumic contraction and relaxation time divided by ejection time, resulted significantly higher than controls (0.72±0.15 vs 0.48±0.1 cm/sec, p<0.0001). The MPI was abnormal in 73% of patients in presence of normal fractional fractioning and ejection fraction.

Conclusion: We found significant alterations of myocardial contractility detected by MPI in patients with DM1. MPI could be important addition to the echocardiographic evaluation of patients with DM1.

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Left ventricle diastolic and systolic function in hypertrophic cardiomyopathy after exercise

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Objectives: In our research we aimed to study influence of exercise on diastolic and systolic functions of left ventricle (LV) in patients with hypertrophic cardiomyopathy (HCM).

Methods: We studied 39 patients with HCM (25 male and 14 female, aged 16 to 75 years, mean age - 54.2±2.7 years). 19 patients (48.7%) showed obstruction of LV outflow tract (LVOT). We used M-mode, two-dimensional and Doppler echocardiography before and in 1-1.5 minutes after erect ergometer exercise test (EET).

Results: On the basis of EET data the patients were divided into 2 groups: group I had low tolerance to exercise (limit of power 25-50 W), Group II included patients with medium tolerance to exercise (limit of power 75-100 W). Echocardiography at rest found out higher factor of asymmetry of LV and higher mass of LV in patients of the group I than in group II. But the difference was not statistically significant. Velocity of E-peak was higher in the group II with comparison to the group I (0.5±0.02 m/s vs 0.4±0.03 m/s, p=0.04). End-diastolic volume (EDV) in patients of the group I after EET decreased significantly (from 100.1±4.3 ml to 76.0±8.2 ml, p<0.05). End-systolic volume (ESV) also decreased (from 65.6±3.8 cm to 47.8±4.4 cm, p<0.05), while in patients of the group II these parameters stayed almost unchanged (EDV 4.6±4.14 cm and 4.6±0.12 cm, p=0.9; EDV 98.9±8.7 ml and 94.9±10.2 ml, p=0.7). Stroke volume (SV) in patients of the group I decreased after EET from 65.8±3.8 ml to 50.7±4.4 ml (p<0.05), while in patients of the group II SV stayed almost unchanged (66.4±6.1 ml and 66.6±3.9 ml, p=0.9). We have found out direct correlation between SV of LV and duration of EET, r=0.6, p=0.04). Ejection fraction (EF) of LV in patients of group II reduced significantly (from 76.0±3.4% to 62.5±4.1%, p<0.05), while EF remained unchanged in the group I (77.5±16.7 %, p<0.0001). The MPI, defined as the sum of isovolumic contraction and relaxation time divided by ejection time, resulted significantly higher than controls (0.72±0.15 vs 0.48±0.1 cm/sec, p<0.0001). The MPI was abnormal in 73% of patients in presence of normal fractional fractioning and ejection fraction.

Conclusion: We found significant alterations of myocardial contractility detected by MPI in patients with DM1. MPI could be important addition to the echocardiographic evaluation of patients with DM1.

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Morphologic variables and diastolic function in hypertrophic cardiomyopathy

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Introduction: Hypertrophic cardiomyopathy (HCM) has great phenotypic, clinical and prognosis heterogeneity. Several characteristics such as obstruction, severe hypertrophy, elevated filling pressures and severe interstitial fibrosis have been related to poor prognosis. The study aimed to determine the relationship between morphologic and dynamic variables of HCM assessed by echo-Doppler and magnetic resonance (MR).

Methods: Forty HCM, 21 men, mean age 58±19 years, 43% obstructive, were studied. NYHA = 40%, II: 22% and III: 8%. Left ventricular mass (LVM), maximum wall thickness and presence of late gadolinium enhancement (LGE) were assessed by cardiac MR, taking into account their severity, extension and location. Maximum dyssynchronous gradient, degree of mitral regurgitation (MR) and LV filling pressures (LVFP) estimated by the mitral E/E′ ratio were assessed by echo-Doppler.

Results: LVM and maximum myocardial thickness determined by MR correlated with LVFP (r=0.5; p=0.08). Maximum dyssynchronous gradient, grade of mitral regurgitation (MR) and LV filling pressures (LVFP) estimated by the mitral E/E′ ratio were assessed by echo-Doppler. LGE and maximum myocardial thickness determined by MR correlated with NYHA (r=0.45; p<0.001). Maximum dyssynchronous gradient, degree of mitral regurgitation (MR) and LV filling pressures (LVFP) estimated by the mitral E/E′ ratio were assessed by echo-Doppler.

Conclusion: LVNC most frequently diagnosed primarily by echocardiography and its prevalence seems to be increased with the improvement of cardiac imaging so echocardiographers should be aware and trained to recognize this abnormality.

Table 1. Clinical presentations of patients with LVNC

| Number of Patients |
| Low cardiac output | 12 |
| Coroartery Disease | 3 |
| Source of Emboli | 2 |
| Aortic Insufficiency | 2 |
| Mitral Insufficiency | 1 |
| Infective Endocarditis | 1 |
| Routine Echocardiography | 1 |
Conclusion: LVM, maximum wall thickness, severity and diffuse late enhancement pattern were associated with greater deterioration in diastolic function and increase in filling pressures.

1168 Echocardiographic assessment in patients with hypertrophic obstructive cardiomyopathy after alcohol ablation in 5 to 9 years after ablation

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Alcohol percutaneous septal ablation (PTMSA) is an effective method of treatment in hypertrophic obstructive cardiomyopathy (HOCM), but its long term results are not well recognized.

Methods: 32 patients had results of alcohol ablation in 18 pts to 9 years post PTMSA in comparison with early, 1 and 3 years results. Assessed parameters: peak outflow gradient (LVOTG), left ventricular dimension in systole (LVd), diastole (Lvd), interventricular septum (IVS) and posterior wall (PW) thickness in diastole, left atrium dimension (LA), mitral E and A waves, E/A ratio, isovolumetric relaxation time (IVRT) and deceleration time. We estimated changes in LV anatomy and contractility, valves function and other new findings.

Results: In all patients we observed significant reduction of LVOTG (from 74±40 mm Hg to 13±12 mm Hg). At the end of observation 2 pts had LVOTG >40 mm Hg and 2 pts >20 mm Hg. LVs increased after 6 months from 2.2±0.6 cm to 2.9±0.6 cm (p<0.001). Lvd from 4.2±0.6 cm to 4.6±0.6 cm (p<0.05) and IVS diminished from 2.4±0.6 cm to 1.5±0.4 cm (p<0.001). PW and LV didn’t change significantly. Results after 6 months and in follow-up were similar. Among diastolic function parameters IVRT was shorter after 6 months and 1 year than before procedure and in follow-up. Mitral insufficiency diminished in most of pts. In 3 pts definite reduction of LVOTG and IVS remodeling ended after 1-3 years.

In 1 pt we observed worsening of LV systolic function (progression toward congestive cardiomyopathy?) from 5 years after PTMSA, in other 1 after 7 years - mitral annulus calcification and in 1 significant mitral regurgitation. In 4 pts pacemaker or cardioverter implantation 1 or more years after PTMSA was necessary. In 5 oldest patients we observed new arteriosclerotic plaques in aorta.

Conclusion: PTMSA is an effective method in treatment of HOCM in long-term observation. Results in 6 months follow-up are permanent in most of patients.

Rhythm and conduction disturbances are still significant problem after successful PTMSA.

1169 Characterization of left and right ventricular diastolic function by conventional and tissue doppler imaging and clinical outcome in patients with hypertrophic cardiomyopathy

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Purpose: This study sought to investigate whether conventional and tissue Doppler velocities are predictive of adverse clinical outcomes in patients with hypertrophic cardiomyopathy (HCM).

Methods: Echocardiograms were prospectively obtained in 96 patients with HCM (median age 53). (Inclusion criteria were considered: normal sinus rhythm; heart rate <90 beats/min and absence of moderate to severe mitral regurgitation. The end point was sudden cardiac death, ventricular fibillation/ventricular tachycardia or ICD discharge. Median follow-up was 14.2 months.)

Results: By univariate analysis, a statistical significant correlation was documented between the end point and tricuspid E velocity (r=0.20, p=0.04), tricuspid A velocity (r=-0.20, p=0.04), tricuspid E/A ratio (r=0.27, p=0.006), septal mitral Ea (r=-0.28, p=0.006), septal E/Ea ratio (r=-0.32, p=0.001) and lateral mitral Aa (r=-0.20, p=0.04). By forward stepwise regression analysis, septal E/Ea ratio (R²=0.34, p<0.001) and tricuspid E/A ratio (R²=0.36, p<0.001) predicted sudden cardiac death, ventricular fibillation/ventricular tachycardia or ICD discharge.

Conclusion: Septal E/Ea and tricuspid E/A ratios are strongly associated with adverse clinical events in patients with HCM. Measurement of these indexes may assist in the risk stratification of patients in this setting.

1170 Echocardiographic data, characteristics and long-term follow-up in Tako-Tsubo Cardiomyopathy

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Methods: We reviewed echocardiographic studies of 15 patients with the diagnosis of Tako-Tsubo Cardiomyopathy. Diagnosis was established by left ventricular angioiography describing apical ballooning without evidence of relevant coronary artery stenoses. All patients were admitted with the clinical signs of an acute myocardial infarction between July 2001 and January 2006.

In these patients baseline transthoracic echocardiography (TTE) was obtained in a median time-interval of 1.7 days (minimum 0/maximum 6) after coronary angiography. Follow-up TTE was performed in varying time intervals after hospital admission and the patients were followed over a long-term period (2 months to 4 years).

Results: Fourteen (93%) of the patients were female. The median age was 69 (range 48-98) years. All but one patient were in sinus rhythm. One patient documented atrial fibrillation on ECG. Angiography demonstrated LV systolic dysfunction with substantially reduced ejection fraction (EF) (30±10%; range 28% to 45%). In the acute-phase (day 0 to day 2 after admission), TTE showed typical midapical left ventricular dysfunction with a median ejection fraction (EF) of 37±7.3% (range 25% to 56%). The segmental distribution was focussed on the apical segments and in only few patients also medial segmental wall motion abnormalities were seen. Basal segments were normo- or hypercontractile at end-systole and the resultant fractional shortening was 32±11.5 (range 19 to 46.3). Short-term follow-up was performed in 7 patients at a median time interval of 20.8±15.4 days and showed an increase in left ventricular function with a median EF of 64.8±13.2%. Resolution of left ventricular dysfunction was proved in 6 patients after a median follow-up of 23.8 (4/74) days. Mitral valvul insufficiency was recognized as mild in 6 cases and as moderate in 2. Tricuspid valvul insufficiency was recognized in 6 patients. Right heart failure was present in 4 patients. In all patients right heart failure was resolved at day 6, 7 and 24 of the follow-up TTE of each patient. In three patients an intraventricular systolic flow acceleration with a late-peaking systolic velocity curve, was detectable. Median intraventricular flow velocity in these three patients was 4 m/s, appropriate to an intraventricular pressure gradient of 50 mm Hg (35/60). Striking was a moderate left ventricular hypertrophy in these three cases. Outflow tract gradient rapidly resolved in the controlled two cases. All of the controlled patients had a normal EF at long-term follow-up, which was performed after a median time of 19 month after the initial clinical event.

1171 Relation between BNP, exercise capacity and left ventricular outflow tract obstruction in patients with hypertrophic cardiomyopathy

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The aim of this study was to evaluate possible correlation between BNP levels, exercise capacity and left ventricular outflow tract obstruction in patients with hypertrophic cardiomyopathy.

Methods: In 19 patients (age 51.1±14.2 years; 11 female) a complete echocardiographic study (with assessment of left ventricular outflow tract obstruction) and cardiopulmonary exercise test (CPX) with assessment of peak VO2 and VE/VCO2 slope (index of excessive exercise ventilation) were performed. In all patients venous blood for BNP analysis was collected after 30 min rest and immediately after exercise.

Results: In 10 patients left ventricular outflow tract obstruction was diagnosed. There weren’t any significant differences between groups with (HOCM) and without obstruction (HCM) concerning age (44.1±7 vs 55±6 years), BNP levels at rest and after exercise, and peak VO2 (21.4±6 vs 21.5±6 ml/kg/min). There was a trend toward higher VE/VCO2 slope (index of ventilatory response to exercise) in HOCM. BNP level increased significantly with exercise in both groups; HOCM - rest vs exercise - 351±395 vs 505±532 pg/ml; peak VO2 - 0.008 and HCM - rest vs exercise - 391±395 vs 467±450 pg/ml; p<0.005. In the whole investigated group there were significant correlations between BNP level at rest and peak VO2 (r =-0.6; p=0.004) and VE/VCO2 slope (r=0.6; p<0.009) and BNP peak exercise level and peak VO2 (r =-0.6; p=0.01) and VE/VCO2 slope (r=0.5; p=0.02).

Conclusion: These preliminary observations indicate that BNP level and exercise capacity are not related to left ventricular outflow tract obstruction in HCM. The significant correlations between BNP levels and exercise capacity in patients with HCM, which are similar to that found in heart failure, require further investigation.

1172 Prevalence of pericardial effusion in an HIV-infected population

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Introduction: Several cardiac diseases have been reported in HIV infected (HIV+) patients (pts), both with and without clinical evidence of Acquired Immunodeficiency Syndrome (AIDS). According to the Literature, both symptomatic and asymptomatic moderate to large pericardial effusions (PE) have been reported in up to 42% of HIV+ patients. Aim of our study is to assess the prevalence and incidence of pericardial effusion in an unselected population of HIV+ subjects.

Methods: We prospectively studied 286 consecutive HIV+ patients referring to the outpatient clinic of our hospital for routine check-up, during chemotherapy or whenever a cardiac disease was suspected. All patients had electrocardiogram (EKG), clinical, 2-D and Doppler cardiac evaluation.
performed. Fourteen pts had a follow-up echocardiogram; totally we collected data of 300 echocardiograms. The PE was classified as very mild (mean distance between the pericardial layers <5 mm), mild (5 to <10 mm), moderate (1 to 2 cm) or large (≥ 2 cm).

Results: The pts were 528 males, 57 females, 1 transsexual (male to female), aged 22 to 68 yrs (mean=40). Among the 286, 122 had AIDS (55 non-Hodgkin lymphoma, 16 Kaposi sarcoma, 10 carcinomas, 41 systemic infections). PE was detected in 31 pts (10.8%) at first examination and in two more pts at follow-up: totally 33 pts (11.5%) had PE, that was very mild in 20, mild in 11, large (requiring pericardial drainage) in 2 pts. PE was more frequent in pts with AIDS than in those without it (17.2% vs 7.3%, p=0.05). Among AIDS pts, it was more frequent in those with lymphoma than in those without it (27.2% vs 8.9%, p=0.05). Two pts with myocarditis had mild PE. Conclusions: Pericardial effusion is rare in our HIV+ population, and seldom requires therapeutic interventions. It is more frequent in AIDS pts and, among them, in pts with lymphoma. Routine echocardiographic screening is not recommended in HIV+ pts, unless there is a clinical suspicion of heart disease.

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Determinants of left atrial dilation in patients with hypertrophic cardiomyopathy
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In patients with hypertrophic cardiomyopathy (HCM) left atrial (LA) enlargement is a powerful predictor of poor outcome; determinants of LA dilation, however, have been poorly investigated.

Purpose: We assessed the hypothesis that echocardiographic findings may predict the development of LA dilation.

Methods: We retrospectively analyzed echocardiograms of 137 consecutive patients with HCM (mean age 40+15 years, range 18-79) who had no history of atrial fibrillation and at least 1 year of clinical and echocardiographic follow-up. By echocardiography, we measured LA fractional shortening, an estimate of left ventricular (LV) passive diastolic dysfunction, and maximal LV wall thickness, an estimate of the degree of hypertrophy. A LA diameter <45 mm was considered to be normal. The end of echocardiographic follow-up and adverse outcome were defined as either death, heart transplantation, myotomy-myectomy or atrial fibrillation during follow-up.

Results: At baseline, LA diameter was normal in 79 patients. During follow-up, 25 patients with normal LA diameter at baseline developed LA dilation, whereas in the remaining 54 LA diameter remained stable. By logistic regression analysis, determinants of LA dilation during follow-up were found to be LA fractional shortening and maximal LV wall thickness (p<0.001). Kaplan-Meier analysis showed that a dilated left atrium, either at baseline or during follow-up, was a strong predictor of adverse outcome (p<0.05) (figure).

Conclusions: In patients with HCM diastolic dysfunction and the degree of hypertrophy induce LA dilation; patients with LA dilation have an increased risk for adverse outcome.

1174
What duration and level of alcoholic consumption is associated with alcoholic cardiomyopathy?
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Eighty two patients’ histories and the data of their blood pressures, physical examination, and ECG’s examinations as well as their full echocardiographic parameters were reviewed at a big detoxification center between 2000-2003. In 57 pts the examinations 2-3 days after abstinence, while in 25 pts others were carried out.

Aim of the study: One hand was to assess the effect of the increasing alcoholic consumption on the severity of alcoholic disease and on the other hand to assess the worsening of the myocardial parameters during the worsening of alcoholic disease. On the basis of a score system - in which the tuberculosis in the patient’s history meant 2, the perforation of the stomach, unsuccessful medical care and recurrent ebriety meant 3-3.3 points, one accident meant 1 point while the hand tremor, polyneuropathy, muscle atrophy meant 1-4 points depending on their severity - the patients were divided into two groups, mild one with 45 patients (4.8±2.36 point) and a serious one with 37 patients (11.9±2.67 point) p=0.001. It was presented, that during the worsening of the alcoholic disease the day- to-day alcohol intake increased significantly from 134.7±125.39 to 171.6±106.21 gram (p<0.005) per day, 77±13.8 to 89±12.0 mg/dl of blood pressure as well as the left ventricular ejection fraction (65.7±9.19 to 60.6±11.07 percentage p<0.05) decreased while the deceleration time of the “E” mitral inflow increased (from 178.1±49.39 to 213.0±60.36 millisecundum p<0.01) significantly. On the basis of these facts, one can say with our patients’ alcohol consumption with 134-207 gram alcohol per day even if carried on for 15-21 yrs did not cause significant cardiac and circulatory injury, while the harmful effect of such a huge quantity of alcohol to other organs and to the social circumstances was already considerable.

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Prognostic significance of contractile reserve assessed by Tei index in patients with idiopathic dilated cardiomyopathy
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Introduction: Prognostic value of contractile reserve assessed by changes of left ventricular (LV) systolic function indices, such as ejection fraction (EF) and wall motion score index (WMSI), in patients with idiopathic dilated cardiomyopathy has been well documented. Since these patients usually have both systolic and diastolic LV dysfunction, it could be expected that dobutamine induced changes of Tei index (ΔTei), as a parameter of global myocardial performance, could give more valuable prognostic information.

Aim and methods: To assess the prognostic value of ΔTei, 38 patients in sinus rhythm with idiopathic dilated cardiomyopathy underwent dobutamine stress echocardiography test. Maximum dose of 40 mcg/kg/min of dobutamine was infused, with incremental doses of 5, 10, 20, 30 and 40 mcg/kg/min at 5 minutes intervals. For the measurement of Tei index, transmural inflow and the ejection time of LV outflow tract were recorded at baseline and at peak dose of dobutamine. Tei index was calculated as the sum of isovolumetric contraction and relaxation time, divided by ejection time. For each patient three consecutive beats were measured and averaged.

Results: There was a significant decrease of value of Tei index from 1.11±0.42 at baseline, to 0.85±0.29 at peak dose of dobutamine, p<0.001. Cut-off value for ΔTei that identified patients with preserved contractile reserve was < -0.35, as calculated by receiver-operating characteristic curves. Kaplan-Meier survival analysis revealed that patients with contractile reserve had better five-year survival as compared to those without contractile reserve (log rank 6.01; p=0.014). In univariate regression model, ΔTei, along with other indices of contractile reserve, such as WMSI and ΔEF was shown to be significant predictor of cardiac mortality over five-year period (p=0.022, p<0.001, and p=0.012, respectively). However, multivariate Cox’s regression analysis identified ΔWMSI as the only independent predictor of five-year mortality. Correspondingly, when area under curve was calculated for each these three parameters, ΔWMSI emerged again as the most potent prognostic variable (0.810 vs 0.785 for ΔEF, p=0.526 and 0.810 vs 0.605 for ΔTei, p=0.044).

Conclusions: Our data indicate that in patients with idiopathic dilated cardiomyopathy ΔTei, as an index of contractile reserve, appears to be good predictor of five-year mortality, albeit less strong than ΔWMSI.
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**Regional peak systolic strain in symptomatic patients with obstructive hypertrophic cardiomyopathy (HOCM) assessed by speckle tracking echocardiography (STE)**

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**Introduction:** STE or 2D strain imaging has been introduced as an alternative to tissue Doppler based myocardial deformation (e.g., strain imaging). In a cohort of 88 patients (pts) with HOCM (mean age: 53±12 years, NYHA functional class: 2.8±0.4) we considered candidates for a septal ablation procedure (PTSMA) method has emerged and refractory to maximum medical management. The echo-guided percutaneous transluminal septal myocardial ablation (PTSMA) method has emerged.

**Aim:** To assess the effects of PTSMA procedure on changes of global and regional left ventricular function by conventional 2D and tissue Doppler echocardiography (TDI).

**Material and methods:** We studied our first 6 consecutive patients (age 38.5±8.6 years, 3 females) before and 3 months after PTSMA for refractory HOCM (LV outflow gradient >50 mm Hg at rest or after provocation). We assessed standard 2D (V2V diameter, Doppler-derived LV-outflow gradient (LVOT), transmural flow patterns (peak E- and A-velocities and ratio, deceleration time of E-velocity, isovolumic relaxation time), pulmonary venous flow data (systolic filling difference, fraction of atrial reversal and transmural A-wave duration) and septal and lateral myocardial velocities measured by pulsed tissue Doppler (PW-TDI) examination in the apical 4-chamber view (systolic: Sm, early diastolic: Em, late diastolic: Am peak velocities and their ratio, the mitral E/Em index as an estimate of LV filling pressure).

**Results:** The PTSMA, the LVOT gradient decreased from 58.7±23.3 to 30.5±14.6 mmHg (p<0.03) with an increase of E-velocity (69±12 vs 53±15 cm/s) and A/E ratio (1.2±0.2 vs 0.7±0.3). A shortening of IVRT from 102±17 to 67±8 ms (p<0.05, respectively). The TDI measurements showed reduced myocardial velocities and signs of elevated filling pressures at baseline, which improved after alcohol ablation (11.6±2 vs 5.9±0.8 cm/s for septal Em, 16.4±2.9 vs 6.8±1.8 cm/s for lateral Em, 6.1±1.4 vs 11.5±2.1 for septal E/Em, and 4.3±1.2 vs 9.8±2.7 for lateral E/Em, p<0.05, respectively).

**Conclusions:** The functional improvement following PTSMA could be partially detected by conventional 2D and transmural inflow velocities (except E-velocity and IVRT). However, the relatively load-independent parameters of all at the septal or lateral sites could reveal a stable improvement of diastolic myocardial properties and signs of elevated left ventricular filling pressure independently from outflow tract gradient.

1179

**Tissue doppler imaging detects subclinical left ventricular dysfunction in patients with type-1 myotonic dystrophy**

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**Background:** Myotonic dystrophy type 1 (DM1) is a neurological disorder including congenital hypertrophy of the ventricles, cardiac conduction abnormalities, atrial fibrillation, and ventricular dysfunction. The aim of the study was to assess the value of Pulsed-wave Doppler tissue imaging (PW-DTI) in assessing diastolic and systolic dysfunction in patients with DM1 and normal 2D-echocardiographic systolic and diastolic indexes.

**Methods:** 30 patients with DM1 (male 15, mean age 44.4±12 years) and 30 comparable healthy subjects were studied. All subjects performed conventional two-dimensional Doppler echocardiography and pulsed-wave DTI at mitral annulus level.

**Results:** PW-DTI was able to detect the following abnormalities of systolic and diastolic function in DM1: a significantly lower peak S velocity in DM1 than in controls, both at septum (7.2±1.3 vs 8.4±1.4 cm/sec, p<0.001) and lateral wall level (9.5±1.7 vs 11.2±2.3 cm/sec, p<0.005) in presence of a normal ejection fraction; a significantly lower PW TDI E1/A1 ratio both at septum (0.9±0.6 vs 1.4±0.4 cm/sec, p<0.01) and lateral wall level (1.5±0.8 vs 1.9±0.7 cm/sec, p<0.03) in presence of a normal mitral inflow E/A ratio; an higher E/E1 ratio in DM1 than in controls both at septum (9±2.3 vs 7.2±1.7 cm/sec, p<0.001) and lateral wall level (6.6±2.3 vs 5.3±1.8 cm/sec, p<0.05).

**Conclusion:** We found significant alterations of systolic and diastolic PW-DTI parameters in patients with DM1. According to the results, DTI parameters might have an important role in the knowledge of the early myocardial dysfunction in patients with DM1.

1180

**Integrated Backscatter Analysis detects early systolic functional and structural left ventricular alterations in patients with type-1 myotonic dystrophy**

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**Background:** Type 1 myotonic dystrophy (DM1) is a multisystem inherited neuromuscular disease with major cardiac involvement and various degrees of non-specific myocardial changes, such as interstitial fibrosis, fatty infiltration, hypertrophy of myocardiocytes, and focal myocarditis.

**Aim of the study:** Using ultrasonic cardiac tissue characterization analysis, we evaluated the possibility to detect early changes in cardiac ultrastructure, by myocardial echoreflectivity (IBS), and intrinsic myocardial contractility, by cyclic variation index (CVI). In patients with DM1 and apparently normal heart at conventional echocardiography.

**Patients and methods:** 30 patients with DM1 (male 15, mean age 44.4±12 years) and 30 comparable healthy subjects underwent conventional Doppler echocardiography and integrated backscattering analysis.

**Results:** The main results of our study in the DM1 patients were: a significant higher septal wall thickness at end-diastole (10.2±1.9 vs 8.7±1.4 mm, p<0.001), posterior wall thickness at end-diastole (9.2±1.5 vs 8.2±1.2 mm, p<0.001) and left ventricular mass index (101.3±21.6 vs 87±21.2 g/m², p<0.001).
LVEF after CT as compared to pre-CT echocardiogram in the group with a comparable baseline evaluation was -13% to +12%, mean 0%.

Conclusions: Anthracyclines to CT seems to be quite safe even in elderly people, using less cardiotoxic analogues (i.e. epirubicin or idiubucin) and limited dosage. Late appearance of LF dysfunction is possible even if, in this particular group of pts, it could be due to aging.

1183 Early post-surgical constrictive pericarditis: an underdiagnosed but benign entity

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Incidence of post-cardiac surgery constrictive pericarditis is known to be 2-3%, with wide presentation time (14 days to 25 years) and significant operative mortality (8-12%). We tested the hypothesis that constractive physiology (a) may occur early after open chest cardiac surgery as a specific subtype of the recently described transient constrictive pericarditis.

Conversely, retrospectively analyzed echocardiograms registered early (within 7 days) after open heart surgery in 135 consecutive patients over a 3-month period for occurrence of CP, diagnosed as a prominent inspiratory interventricular septal bounce and/or in early expiratory peak E wave at Doppler left ventricular (LV) inflow. We related CP to a number of patient and in-hospital-related variables. Follow-up analysis was performed at 6 months (echocardiography) and 3 years (clinical and echocardiographic data).

Early postoperative CP was found in 27/135 patients (20%). Of these, only 7 (45%) were originally diagnosed by the reporting cardiologist. Further, diagnosis of CP was associated with use of a respiratory tracing (p<.001) and Doppler transmitral flow velocity monitoring (p<.05) during echocardiography. In patients with haemodynamically significant CP (16/7=12.8±2.0 cm²/p<0.05) and there was a trend towards increased left atrial area.

No association was found between CP and open pericardium, left bundle branch block, chronic pulmonary obstructive disease, redo surgery, intraoperative bleeding or pleural effusion. At logistic regression analysis, CP was predicted by larger LV end-diastolic volume (p=.02) and younger age (p=.02). At 6 months, CP persisted in 11/27 (41%) and regressed in 5 (45.5%) patients. At 3 years follow-up, echocardiographic data were available in 30 (91%) and clinical data in 92 (76%) patients: CP physiology was not related to occurrence of dyspnea, readmission or cardiac death (4 pts), did not change in 1 (8.0%), disappeared in 9 (7.4%) due to the end of the follow-up. As new finding in 3 (25%) patients.

Conclusions: Our study suggests that incidence of early post-operative CP is much higher than previously described, mostly unrecognized at routine echocardiography, with benign prognosis, and that etiology may be inflammatory leading to transient CP in more than half of the cases.

1184 Constrictive pericarditis: early and late outcome

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Purpose: Patients with constrictive pericarditis (CP) are thought to be cured by pericardiectomy. Because of the low incidence of cp only limited data on outcome is available. Therefore, we determined the short- and long-term survival of pericardiectomy.

Methods: All patients who underwent pericardiectomy for constrictive pericarditis at the Academic Medical Center (AMC) between 1983 and 2004 were reviewed. Baseline characteristics and operative data were reviewed retrospectively. Follow-up was done with a questionnaire send to the general practitioner and by reviewing the hospital records.

Results: A total of 34 patients were identified: 29 male, age 57±16 years, mean symptom duration 11±12 months). Heart failure was present in 82% of the patients. Most patients who developed CP had a history of cardiac surgery or no identifiable cause could be found. A concomitant procedure was performed in 9% of the cases. Perioperative mortality was 12% (4/34), all due to heart failure. The follow up was 100% complete and lasted almost 4 years. The one- and five-year survival was 89% and 60%. Age was the only independent predictor of late mortality. Late mortality was due to a cardiac cause in 62% of the cases. At the end of follow up 87% (14/16) of the patients were in NYHA class I or II.

Conclusions: Cardiac surgery is an important cause of constrictive pericarditis. The operative mortality of pericardiectomy is considerably low and long-term survival is limited, but the functional outcome of survivors is good.

1185 Left ventricular remodeling reduces papillary muscle contractility in patients with dilated cardiomyopathy: quantitative analysis by 2-dimensional tissue tracking technique

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Background: Quantification of papillary muscle (PM) function has become feasible with newly developed two-dimensional echocardiographic tissue track-

References:

- Z. Huobucha 1; T. Palecek 1; Z. Marecek 1; P. Marсалek 1; E. Kejova 1; M. Ascherman 1; A. Linhart 1
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Background: Wilson’s disease is an inherited autosomal recessive disorder of copper metabolism resulting in pathological accumulation of copper in the liver, brain and other tissues. One of the reported manifestations is cardiac involvement.

Purpose: The aim of the study was to retrospectively evaluate the incidence of cardiac involvement in Wilson’s disease patients. Furthermore we assessed left ventricular (LV) contractility function using both traditional parameters and midwall fractional shortening (MFS).

Methods: We studied 42 patients with Wilson’s disease (19 men and 23 women, mean age 34±10 years) and 42 age and sex-matched healthy volunteers. All subjects underwent complete echocardiographic examination. We included only subjects with good quality echocardiograms allowing M-mode measurements. We assessed LV wall thickness, LV mass index (LVMi), relative wall thickness (RWT), ejection fraction (EF), endocardial fractional shortening (FS), MFS and MFS adjusted by circumferential end-systolic wall stress (ESS).

Results: In comparison to healthy volunteers, Wilson’s disease patients had increased thickness of the interventricular septum (9.5±1.4 vs 8.6±1.1 mm, p<0.01) and LV posterior wall (9.1±1.3 vs 8.2±1.0 mm, p<0.01). While the two groups did not differ in LVMi, RWT was significantly increased in Wilson’s disease patients compared to control subjects (0.38±0.06 vs 0.34±0.04, p<0.001). Concentric LV remodelling was present in nine patients (21%) and LV hypertrophy in one patient. Ejection fraction and FS showed a non-significant trend toward lower values (EF 62±5 vs 64±5%, p=0.06; FS 53±6 vs 50±7.5%, p=0.05), while MFS was significantly decreased in Wilson’s disease patients compared to control subjects (0.17±0.03 vs 0.19±0.02, p=0.001). When corrected by ESS decreased MFS compared to predicted was found in 54% (n=22) of Wilson’s disease patients and in 17% (n=7) of control subjects (p<0.001). The established echocardiographic abnormalities did not correlate with the type of Wilson’s disease manifestation, presence of Hie1069Gln mutation, laboratory parameters or duration and type of therapy.

Conclusions: Cardiac involvement in Wilson’s disease patients is characterised by LV parietal thickening, increased prevalence of concentric LV remodelling and decreased myocardial contractility measured by MFS. Assessment of MFS may reveal significant contractility impairment masked by abnormal LV geometrical remodelling.

Supported by the research project MZO-64165.

1182 Anthraccline chemotherapy in the elderly: an echocardiographic study

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Introduction: The clinical use of chemotherapy (CT) with anthracline drugs is limited by cardiac side effects; the most clinically relevant toxicity is chronic hypokinetic-dilated cardiomyopathy. The risk of cardiotoxicity is believed to be higher in children and elderly patients.

The aim of this study was to retrospectively evaluate the incidence of cardiac toxicity in a group of patients (pts) aged 65 years or more at the time of treatment with anthracyclines.

Methods: We performed a clinical and echocardiographic evaluation of 83 consecutive patients (pts) treated with anthracyclines, and who were aged 65 to 80 years (mean and median 68) when the treatment had started. A complete M-Mode, 2-Dimensional and Doppler evaluation was done. The measurement of left ventricular ejection fraction (LVEF) with the area length method was calculated as a mean of at least 3 beats in pts in sinus rhythm and at least 6 beats in pts with atrial fibrillation. All the pts were one or more echocardiograms 4 to 191 months (mean 56) after completion of CT. A baseline clinical and echocardiographic examination before CT was available in 33 of them.

Results: Eighty pts had received Epirubicin (to a cumulative dosage of 165 to 180 mg/m²), 20 Adriamycin (mean 664 mg/m²), 2 Adriamycin and 1 Idrabucin. At the follow-up after CT the EF ranged from 49% to 76% (mean 64%). The only pt with EF <50% was asymptomatic. Two more pts had normal EF one year after CT and developed dilated cardiomyopathy 5 and 10 years later, respectively. Thus, among the 63 pts, only 3 (4.8%) had left ventricular dysfunction after CT. The change in LV diameter was not significant, and the EF remained within the normal range in all the pts. The change in EF <50% was asymptomatic. Two more pts had normal EF one year after CT and followed up after CT the EF ranged from 49% to 76% (mean 64%). The only pt with EF <50% was asymptomatic. Two more pts had normal EF one year after CT and developed dilated cardiomyopathy 5 and 10 years later, respectively. Thus, among the 63 pts, only 3 (4.8%) had left ventricular dysfunction after CT.
1186
Phenotypic diversity in the extent and distribution of hypertrophy caused by a troponin T mutation in a family with hypertrophic cardiomyopathy

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Background: The genotype/phenotype link in hypertrophic cardiomyopathy (HCM) is weak. Aim: We report the echocardiographic findings in a family with HCM and a troponin T mutation.

Methods: 3 generations of the maternal relatives of an index patient with HCM were screened by echocardiography. Genetic testing involved linkage analysis followed by sequencing of the troponin T gene.

Results: Of the 38 family members screened, 9 had HCM of the non obstructive variety. There were also 2 sudden deaths in the family. The patients’ ages were 11-55 years. All the HCM patients had the same mutation, involving the substitution of arginine with glutamine at codon 92 (R92Q) in the troponin T gene. The echocardiographic features of HCM patients were diverse. The distribution of LHV was heterogeneous. The hypertrophy limited to anterior interventricular septum (IVS) in 4 patients to gross, almost concentric LVH in another 4. In patient 11, the hypertrophy spared the anterior IVS. The RV free wall was hypertrophied in 4 patients with more severe degrees of hypertrophy. IVS thickness ranged from 0.8-3.6 cm. The maximum LV thickness encountered was 3.8 cm.

Conclusion: The R92Q troponin T mutation is known to cause mild hypertrophy and is associated with a significant risk of sudden cardiac death. In this family the degree of hypertrophy ranges from mild to very severe. The distribution of the hypertrophy is also varied. Despite the similar genetic basis in all 8 patients, the expression is diverse. This highlights the lack of genotype phenotype correlation in HCM.

Table 1. Echo features of the HCM patients

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (yr)</th>
<th>Rhythm</th>
<th>LA (cm)</th>
<th>AS (cm)</th>
<th>PW (cm)</th>
<th>Max LV thickness (cm)</th>
<th>LVEDD (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>55</td>
<td>AF/VR</td>
<td>2.5</td>
<td>2.0</td>
<td>1.2</td>
<td>3.0</td>
<td>3.8</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>SR</td>
<td>3.5</td>
<td>2.6</td>
<td>1.0</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>3</td>
<td>49</td>
<td>SR</td>
<td>2.5</td>
<td>2.6</td>
<td>1.1</td>
<td>3.0</td>
<td>3.6</td>
</tr>
<tr>
<td>4</td>
<td>38</td>
<td>SR</td>
<td>2.6</td>
<td>2.5</td>
<td>1.1</td>
<td>3.0</td>
<td>3.6</td>
</tr>
<tr>
<td>5</td>
<td>32</td>
<td>SR</td>
<td>2.6</td>
<td>2.6</td>
<td>1.0</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>6</td>
<td>38</td>
<td>SR</td>
<td>2.6</td>
<td>2.5</td>
<td>1.0</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>SR</td>
<td>2.6</td>
<td>2.5</td>
<td>1.0</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>8</td>
<td>26</td>
<td>SR</td>
<td>2.6</td>
<td>2.5</td>
<td>1.0</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>9</td>
<td>22</td>
<td>SR</td>
<td>2.6</td>
<td>2.5</td>
<td>1.0</td>
<td>2.8</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Ad: anterior septum; PS: posterior septum; AW: anterior wall; PW: posterior wall; LW: lateral wall; IV: inferior wall.

1187
Usefulness of tissue Doppler imaging in risk stratification of sudden cardiac death in hypertrophic cardiomyopathy

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Background: Hypertrophic cardiomyopathy (HCM), an autosomal dominant disorder affects 1:500 persons according to genetic data. Sudden cardiac death (SCD) and serious arrhythmic events (SAE) are the most important problems among patients with HCM, especially in young persons. Intraventricular septum thickness >30 mm is a known risk factor for SCD. Tissue Doppler imaging (TDI) can be useful in evaluation of both global and regional abnormality of systolic and diastolic LV function.

Methods: A total of 57 patients with HCM (age 46.21±14.84 years, 51% men) were divided into two groups according LVEDP: group I (LVEDP <17.5 mm Hg); group II (LVEDP >17.5 mm Hg) evaluated by echocardiography using formula: 1.47xE/Ea+1.55. Echocardiographic data were analysed: wall thickness, left and right ventricular diameters, left ventricular mass index (LVM), hypertrophic expression index (Hep - evaluated by incidence of hypertrophy ≥15 mm in 15 segments of LV) = number of nonhypertrophic segments + number of hypertrophic segments x 1.5 accordingly of segmental thickness (15-19 mm; 20-24 mm; 25-29 mm; >30 mm; 515), local atrial area (LAA), ejection fraction (EF), diastolic function (E, A, DT, E/A, IVRT) and using TDE annular velocities from septum (S), lateral (L), anterior (A) and inferior (I) walls with evaluation of heterogeneity index (Het) [Het = (M - Mean+ L - Mean + I - Mean + A - Mean)/4] and global function index (GFI = E/Ea/Sa). Serious arrhythmic events (SAE) were obtained after clinical and Holter monitoring data: VT, VF and msVT, SVT, ICD implantation.

Results: Both groups were similar in terms of age sex, NYHA class and incidence of LVO obstruction. In group I a higher LVM and Hep were observed (189.79±65.15 cm3 and 2.21±0.57 respectively) than in group II (147.35±35.16 cm3 and 1.84±0.48) (p<0.0007; p=0.05). In both groups enlargement of LAA was observed but the differences were NS (20.8±7.42 cm2 vs 22.12±9.06 cm2), Mean LVEDP in group I was 14.07±2.45 mm Hg vs 24.92±5.6 mm Hg in group II (p<0.0001), higher GFI and smaller Het were observed in group II (2.93±0.99 vs 1.68±0.84 cm/s; p=0.0001 and 0.95±0.55 vs 1.4±0.73 cm/s; p=0.05 respectively). Patients in group II had higher incidence of SAE (76%) vs 33% in group I (p=0.05). GFI >1.97 was a risk factor for SCD with 80% sensitivity and 73.3% specificity. Coincidence of GFI >2.0 + Hep >2.0 and Het <1.0 cm/s had a poor prognostic value (p<0.05).

Conclusions: Patients with HCM and elevated LVEDP demonstrate greater LV hypertrophy and more incidence of serious arrhythmic events. TDI is useful in risk stratification of sudden cardiac death.

1188
Cardiomyopathy in sarcoglycanopathies. A retrospective study

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Background: Sarcoglycanopathies (SG) are autosomal recessive muscle diseases (myopathies), secondary to mutations of the sarcoglycan complex. This complex consists of four transmembrane proteins: α-, β-, γ-, δ-sarcoglycan. It contributes to the stability of the plasma membrane cytoskeleton. Depending on which protein is abnormal, four SG are described referred as α-, β-, γ-, or δ-SG. Each sarcoglycan is expressed both in skeletal (skeletal) and cardiac muscle. Muscular disorder in SG is similar in the four types resulting in proximal muscle weakness (referred as Limb Girdle Muscular Dystrophy: LGMD). The link between SG subtype and heart disease is not well known. We conducted a review of every case of SG followed in our unit to assess heart involvement in adult patients with SG and to describe the link between heart involvement and molecular profile.

Material and methods: Adults patients with genetically proven SG, referred in our unit for the follow up of mechanical ventilation whether it is invasive or
non invasive (n=27). Left ventricular ejection fraction was measured using Simpson or Teicholz method in 23 patients, 4 patients had only visual evaluation. Patients with LVEF < 50 % or rated as low were considered to have systolic heart failure (SHF).

**Results:** Ten patients had a-SG and 17 a-SG (table). All subjects were discharged and confided to wheeling chair. Respiratory failure was constant with restrictive syndrome. Overall prevalence of systolic heart failure was high (30%). Mean EF was lower in patients with a-SG (53%) than in patients with a-SG (67%) (p < 0.01). No patients with a-SG had SHF whereas 47% of patients with a-SG had SHF (p < 0.01).

**Conclusion:** We found a high prevalence of SHF in patients with SG and a strong association between the type of SG and a low LVEF. Only patients affected with a-SG had SHF.

### Table 1. Characteristics

<table>
<thead>
<tr>
<th>a-SG (n=10)</th>
<th>a-SG (n=17)</th>
<th>Overall (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>37 (9)</td>
<td>32 (7)</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>17 (4)</td>
<td>19 (5)</td>
</tr>
<tr>
<td>LVEDD, mm</td>
<td>25.5 (3)</td>
<td>27.4 (5)</td>
</tr>
<tr>
<td>IVS/PW ratio</td>
<td>1.1 (0.2)</td>
<td>1.1 (0.2)</td>
</tr>
<tr>
<td>LVEF, %</td>
<td>67 (7)</td>
<td>53 (17)</td>
</tr>
<tr>
<td>SHF, %</td>
<td>0 (0)</td>
<td>8 (47)</td>
</tr>
</tbody>
</table>

Data are given as mean (SD) except where noted.

### 1189 Safety of pericardiocentesis: echocardiography guidance is obligatory and blind procedures are not justified even in the emergency settings

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**Background:** Since the introduction of echocardiography blind approach to pericardiocentesis is not justified any more, due to its significant contribu-
tion to the feasibility and safety of the procedure. However, in the emergency setting, echocardiography guidance is occasionally skipped and the procedure is performed only based on the report of the referring physician, without guidance by any imaging modality.

**Aim of the study:** In order to elucidate importance of echocardiography guidance in the emergency setting, we compared incidence of major com-
lications in patients undergoing pericardiocentesis due to the imminent cardiac tamponade.

**Methods:** Pericardiocentesis was performed in 50 patients (mean age 57±10 years; 58% males) with large pericardial effusion and imminent cardiac tam-
ponade. Malignancy was the most common etiology (48%), followed by infec-
tions (20%), idiopathic (14%), tuberculosis (10%), connective tissue dis-
esases (5%), and renal failure (3%). Pericardial puncture without any guid-
ance was performed by subxiphoid approach in 22 patients (44%) and 11 patients (76%) underwent echocardiography-guided pericardiocentesis and drainage of the pericardial effusion (69 procedures, intercostal approach in 95.7%, subxiphoid approach in 4.3%).

**Results:** Major complications were infrequent in the group of patients that underwent echocardiography-guided pericardiocentesis (one pneumotho-
rax, 1.4%) in contrast to six patients (50%) undergoing blind emergency pericardiocentesis (two patients with liver injury, two patients with pneumotho-
rax, and two patients with perforation/laceration of the right ventricle, 17% each). Unfortunately, since cardiac surgery was not available on site, fatal outcome occurred in both patients with perforation/laceration of the right ventricle and blind pericardiocentesis.

**Conclusions:** Echocardiography guidance has significantly reduced inci-
dence of major complications associated with pericardiocentesis and should never be skipped even in the emergency setting and patients with end-
stage cardiac tamponade.

### 1190 Basal and midventricular ballooning: new patterns of transient left ventricular ballooning

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**Background:** Transient left ventricular apical ballooning is a novel, recently de-
scribed syndrome that mimics acute myocardial infarction. It is characterized by acute chest pain, ECG changes and limited release of cardiac markers in the ab-
ences of coronary artery disease. In left ventricular apical ballooning the ventricle shows regional wall motion abnormalities with normal basal contractions and an akinesic apex, but there may be different patterns of left ventricular involvement.

**Methods and results:** We examined 15 consecutive patients who were ad-
mitted to our clinic with acute coronary syndrome from 01.07.2002-31.01.2006. 14 patients were females, one patient was male. The mean age was 62.3±12.4 years. In 13 of them coronary angiography was performed which showed normal epicardial coronary arteries. In eight patients laevography or echocardiography revealed typical apical ballooning with preserved basal con-
tractions. In 6 patients an atypical pattern with regular apical contractions, but with midventricular ballooning was detected. The male patient presented with-
out basal and midventricular contractions, but with regular apical contrac-
tions. There was no difference between the patients in terms of presenting symptoms, ECG changes or triggering events (emotional or physical stress).

**Conclusion:** In all patients laevography or echocardiography revealed new patterns of transient left ventricular ballooning. However, more data are needed to further characterize these variants.
9±4%: post: 12±5%; p<0.0001). PSLS correlated significantly with wall thickness at follow-up (fig 1) and NYHA class improvement.

**Conclusions:** Reduction of LV afterload by elimination of the outflow gradient following a successful PTGSM in symptomatic HOCM results in improvement of systolic lateral shortening, while the septal ablation region remains unchanged.

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**Frequency of isolated noncompaction as a cause of heart failure and heart transplantation: a single center experience**

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**Background:** Isolated left ventricular noncompaction (IVNC) seems to be a rare cause of heart failure. The true incidence of IVNC as a cause of heart failure and heart transplantation is unknown.

**Methods:** Among 1,356 patients (pt) in the database of our heart failure clinic since 1987, 971 pt (72%, study population) had echocardiography performed at our hospital. Among these 971 pt, the following data were collected: definite diagnosis of heart disease, age at echocardiography, gender, incidence and age at heart transplantation. Echocardiographic diagnosis of IVNC was based on the following criteria: absence of coexisting cardiac abnormalities, segmental thickening of the left ventricular myocardial wall consisting of two layers: a thin compacted epicardial layer and a thickened endocardial layer with prominent trabeculations and deep recesses with a ratio of noncompacted to compacted myocardium ≥1:1 at end-systole, and Color Doppler evidence of flow within deep perfused intertrabecular recesses.

**Results:** There were 793 men (82%). Average age at echocardiography was 52±14 years. The main etiology of heart failure was: coronary artery disease (CAD) in 370 pt (38%), dilated cardiomyopathy (IDC) in 332 pt (34%), valvular heart disease in 112 (12%), congenital heart disease in 47 pt (4.8%), IVNC in 25 pt (2.6%), hypertensive heart disease in 22 pt (2.3%), hypertrrophic cardiomyopathy in 14 pt (1.4%), idiopathic restrictive cardiomyopathy in 12 pt (1.2%), amyloid heart disease in 9 pt (0.9%), arrhythmogenic right ventricular cardiomyopathy in 9 pt (0.9%), myocarditis in 8 pt (0.8%), cardiomyopathy due to neuromuscular disease in 5 pt (0.5%), postpartum cardiomyopathy in 3 pt (0.3%), cardiomyopathy of unknown etiology in 2 pt (0.2%), and 1 pt (0.1%) with anthracycline induced cardiomyopathy. Heart transplantation was performed in 253 (26%) in pt with the following diagnoses: IDC in 45%, CAD in 39%, valvular heart disease in 6%, congenital heart disease 4 %, IVNC in 2%, amyloid heart disease 1%, idiopathic restrictive cardiomyopathy in 1%, neuromuscular disease in 0.8%, myocarditis in 0.6% and arrhythmogenic right ventricular cardiomyopathy in 0.4%. Mean age at heart transplantation overall was 48±12 years and in pt with IVNC 47±14 years (p=ns).

**Conclusions:** Among patients followed in a heart failure clinic, IVNC is a rare underlying cardiomyopathy for both heart failure (2.6%) and heart transplantation (in only 2% of patients) using the published diagnostic criteria.

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**Diagnostical implications of right ventricular systolic dysfunction in patients with dilated cardiomyopathy**

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**Background:** Unlike left ventricular (LV) function, right ventricular (RV) function has not been widely studied in ischemic patients. Evidence for the role of RV function is emerging in patients with heart failure of different etiologies.

**Objectives:** To investigate the diagnostic role of RV systolic dysfunction (RVSOD) in idiopathic dilated cardiomyopathy (IDC) & ischemic cardiomyopathy (ICM).

**Methods:** A series of 102 patients with dilated cardiomyopathy, either non ischemic (n=49, IDC group) or ischemic (n=53, ICM group) & 20 healthy volunteers as a control group were included in this study. RVS function was assessed by pulsed - wave Doppler tissue imaging (PWDTI) of tricuspid valve in 0.8% and arrythmogenic right ventricular cardiomyopathy in 0.4%. Mean age at echocardiography was 47±14 years (p=ns).

**Results:** Patients with IDC and ICM had comparable LV EF (36.7%±7.2% vs 39%±6.6%, p<0.1) and pulmonary artery systolic pressures (38.1±5.7 mm Hg vs 35.8±7.5 mm Hg, p<0.08). TASV & RV EF were significantly lower in IDC compared to ICM (10.6±1.2 cm/s vs 12.7±1.4 cm/s, p<0.001) & (34.1%±4.1% vs 47.6%±7.5%, p<0.001) respectively. The prevalence of RVD & VC was significantly higher in the IDC compared with ICM (67.4% vs 17%, p<0.001) & (85.7% vs 15.1%, p<0.001 respectively. Reduced RV EF, low TASV & RV EF were powerful independent predictors of ICM compared with IDC (OR for each =0.78, 0.21, 0.63 respectively & 95% CI [0.72-0.85], [0.12-0.38] & [0.54-0.73] respectively, p<0.001 for each). Reduced TASV had a positive predictive value (P) of 48% & a negative PV of 90% to diagnose IDC, for reduced RV EF these values were 79% & 73%, and for VC 85% & 87% respectively. The correlation between TASV & RV EF was stronger in IDC compared with ICM (r=0.87, p<0.001 in IDC while r=0.69, p<0.001 in ICM) respectively.

**Conclusions:** PWDTI has a high predictive power for RVSOD & in the presence of LVD, the combination of low TASV, VC & reduced RV EF is a power- ful marker for IDC compared with ICM, independent of pulmonary hypertension & LV EF. These findings support the concept that IDC is frequently characterized by a biventricular affection & that the presence of RVD repre- sents a distinguishing feature of this disease.

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**Differential diagnosis between pathological and physiological left ventricular hypertrophy by tissue Doppler assessment of right ventricular function**

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**Background:** In some athletes who have a substantially increased left ventricular (LV) wall thickness, it may be difficult to distinguish with certainty between physiological hypertrophy due to athletic training and pathological hypertrophy due to hypertrophic cardiomyopathy or associated arterial hypertension. Echocardiographic criteria for this differential diagnosis are still controversial, and despite the diagnostic potential of current ultrasound tech- niques, there is still cases of ambiguous myocardial hypertrophy. How- ever, these criteria are based on the evaluation of the LV function, whereas right ventricular (RV) function is almost always affected in pathological hyper- trophy, and normal or even „supranormal” in athletes. Moreover, it was postulated that RV myocardial velocities might discriminate between patho- logical and physiological hypertrophy, but no definite cut-off values have been published.

**Aims:** To identify new echocardiographic indices that might differentiate between pathological and physiological hypertrophy by measuring right ventricular function, using tissue Doppler. Methods. We compared 60 sub- jects with different types of left ventricular hypertrophy (Group I - 15 patients with hypertrophic cardiomyopathy, Group II - 15 patients with arterial hyper- tension, and Group III - 30 athletes) with 20 normal subjects (Group IV). The peak velocities of tricuspid annular motion at the RV free wall site were mea- sured from the apex in the 4-chamber view by on-line tissue Doppler echocardiography.

**Results:** There were no differences in mean age and global ejection fraction between groups. Groups I and II had significantly lower right ventricular early diastolic velocities than the athletes (9.7±3.5 cm/s and 10.9±3.1 cm/s, re- spectively, versus 14.2±3.7 cm/s, p<0.01; 12.3±3.0 in controls), whereas early diastolic velocities were not different. The best differentiation of pathological hypertrophy from physiological hypertrophy was provided by an early diastolic tricuspid annular velocity <12.00 cm/s (sensitivity 77%, specificity 77%, AUC=0.80, p<0.001), whereas the best differentiation of hypertrophic cardiomyopathy from physiological hypertrophy was provided by an early diastolic tricuspid annular velocity <10.75 cm/s (sensitivity 90%, specificity 74%, AUC=0.82, p<0.001).

**Conclusion:** Right ventricular early diastolic velocities are decreased in pa- tients with pathological hypertrophy, but preserved in athletes. This simple echo parameter might be included, together with the assessment of LV func- tion, in special algorithms to differentiate between pathological and physi- ological hypertrophy.

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**Myocardial fibrosis assessed by integrated back scatter is related to diastolic function and major cardiac arrhythmias in hypertrophic cardiomyopathy**

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**Background:** Interstitial fibrosis is increased in patients with hypotrophic cardiomyopathy (HCM). It affects left ventricular (LV) myocardial compliance and it is par- ticularly high in patients who died suddenly. Ultrasonic integrated backscatter in diastole (IBS) correlates with myocardial collagen content in various pathological and clinical settings.
Purpose: Septal IBS in patients with HCM is a determinant of LV passive diastolic function and is higher in patients with ventricular arrhythmias.

Methods: We evaluated by echocardiography 46 patients with HCM (mean age 34±12 years). Septal IBS was calculated by both applying an appropriate regression correction (IBSc) and by relating it to pericardial reflectivity (IBSp). Difference in duration between transmitral forward (A) and pulmonary venous backward (Ar) velocities (A-Ar) was measured as an estimate of passive diastolic function. Thirty eight patients underwent Holter monitoring for 48 hours.

Results: IBS inversely correlated to A-Ar: IBSc: r=-.522; p<0.001; IBSp r=-.302; p=0.041; (figure, left panel). Moreover, IBS was greater in the 10 patients with sustained (VT) or non sustained ventricular tachycardia (NSVT): IBSc: 28.5±3.8 vs 25.4±3.8 dB, p=0.034; (figure, right panel).

Conclusions: IBS signal in patients with HCM is related to passive diastolic dysfunction, as assessed by late diastolic filling dynamics, and is related to major ventricular arrhythmias in these patients. Interstitial fibrosis is likely to affect IBS, diastolic dysfunction and the genesis of ventricular arrhythmias in HCM.