HEART FAILURE

639  Heart failure is related to increased LV preload rather than decreased LV ejection fraction (EF) in patients with progressive muscular dystrophy (PMD) and LV systolic dysfunction

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Background: It has been considered that LV systolic dysfunction can be a major cause of dyspnea in patients with PMD. However, some patients with PMD are asymptomatic and have normal plasma BNP level despite low LV EF. We sought to investigate the determinants of heart failure in patients with PMD and LV systolic dysfunction.

Methods and results: Thirty-four adult patients with PMD (aged 23.1±4.1 years) and LV systolic dysfunction (LVEF <50%) were studied. Transthoracic echocardiography and plasma BNP measurement were performed simultaneously. The patients were divided into two groups: group I (n=17, 17 males, aged 22.7±3.3 years) with normal plasma BNP (cut off value <48 pg/mL, 17.1±11.2 pg/mL), and group II (n=17, 16 males, aged 23.4±4.9 years) with elevated plasma BNP (>48 pg/mL, 372.7±394.9 pg/mL). Between two groups, there were no statistical differences in LV ejection fraction (33.3±8.5 vs 25.0±14.4). However, LV end-diastolic dimension (LVEDD, mm, 45.8±4.8 vs 55.4±10.6, p<0.05), and end-systolic wall stress (ESWSc, kdyne/cm², 231.4±34.5 vs 289.7±55.0, p<0.05) were significantly different between groups. Although statistically not significant, there was a trend toward higher NYHA class (1.8±0.8 vs 2.3±0.8), higher body mass index (BMI, kg/m², 14.3±2.1 vs 17.2±4.0), and lower cardiac index (L/min, 2.6±0.6 vs 1.9±1.0) in group II. Multivariate regression analysis revealed that LVEDD (β=0.70, p<0.01) was the most significant predictor of plasma BNP in patients with PMD and LV systolic dysfunction.

Conclusion: Although LV systolic dysfunction was severely impaired in patients with PMD, cardiac index was preserved without an increase of LV dimension in patients with extremely low BMI. Accordingly, they were asymptomatic with normal plasma BNP level. However, in patients with higher BMI, echocardiographic indices of LV preload (LVEDD and LA volume index) increased, and plasma BNP level elevated. Therefore, we concluded that even with severe LV systolic dysfunction, heart failure is not manifested due to low preload in patients with PMD.

640  Evaluation of mechanical dyssynchrony in dilated cardiomyopathy: idiopathic versus noncompaction of left ventricle

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Background: Left ventricular noncompaction (LVNC) is a reportedly uncommon genetic disorder of endocardiomorphogenesis and is increasingly being recognized. The purpose of this study is evaluation of echocardiographic features including mechanical dyssynchrony indices of patients with LVNC versus idiopathic dilated cardiomyopathy (IDC).

Methods: We evaluate 116 patients with dilated cardiomyopathy, candidate for cardiac resynchronization therapy (CRT) who were referred for echocardiographic evaluation. The patients were grouped to LVNC and IDC without LVNC according to diagnostic criteria for LVNC. Transthoracic echocardiography was done for all patients and prejection periods, inter and intra ventricular delay were measured and asynchrony index was calculated.

Results: 77% patients were male and 27% of patients had LVNC. Mean left ventricular ejection fraction in LVNC group was 16.65±6.6% and in IDC was 18.9±7.2%, mean age in LVNC group was 46±16.5 years and in IDC was 51.13±16.43 years with no significant difference between two groups. P values of prejection period of aorta and LVOT VTI had significant difference between two groups.

Conclusion: LVNC is increasingly being reported and has become an important differential diagnosis in heart failure patients. Our study showed there is no significant difference in mechanical dyssynchrony indices between two groups except for pre ejection period of aorta and LVOT VTI.

Echocardiographic features of two groups are shown in table 1.

| Table 1. Echocardiographic features of dyssynchrony indices in LVNC versus IDC |
|-----------------|-----------------|-----------------|-----------------|
|                | LVNC            | IDC             | p value         |
| Pre ejection period of aorta | 126.68±33.92    | 109±31.69       | 0.03            |
| Pre ejection period of pulmonary | 105±33.05      | 92.98±28.49     | NS              |
| Interventricular delay | 34.87±21.36     | 31.43±21.43     | NS              |
| Septal to lateral delay | 42.36±24.78     | 42.16±32.77     | NS              |
| SPWMD           | 87.36±53.11     | 83.37±45.26     | NS              |
| Basal asynchrony | 29.8±11.66      | 27.58±13.14     | NS              |
| Total asynchrony | 27.8±13.06      | 27.74±13.04     | NS              |
| DP/DT           | 608.13±166.18   | 709.78±196.18   | 0.07            |
| LVOT VTI        | 9.1±3.6         | 12.66±3.9       | 0.001           |

641  Usefulness of diameter strain by using a two-dimensional tissue tracking technique for the evaluation of left ventricular dyssynchrony

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Background: Cardiac resynchronization therapy (CRT) has been proposed as an alternative treatment in patients with severe, drug-refractory heart failure. Although echocardiography is a useful tool to evaluate LV dyssynchrony, the techniques are not fully elucidated. Recently, two-dimensional tissue tracking (2D TT) technique was developed which can trace regional myocardial tissue using pattern matching method. We investigated the left ventricular dyssynchrony by using a 2D TT technique in echocardiography.

Method and results: Twelve patients with CLBBB (QRS duration; 137±12 ms) and 21 healthy volunteers (QRS duration; 95±13 ms) were performed 2D echocardiography. In short axis view, a left ventricular (LV) diameter strain was assessed by 2D TT in 4 directions at an angle of each 45 degrees (antero-posterior; AS-P, anterior-inferior; A-I, lateral-septal; L-S and posterolateral-septal; PL-S). In CLBBB patients, the mean LV diameter strain was significantly smaller than that in normal volunteers (28±3 vs 31±2%, p=0.03). In normal volunteers, there were no differences in the LV diameter strains of each direction. On the other hand, in CLBBB patients, AS-P diameter strain was smaller than the others, but that was not significant difference. However in AS-P direction, the diameter strain was significantly smaller in CLBBB patients than that in healthy volunteers (24±6 vs 29±6%, p=0.03).

Conclusion: In CLBBB patients, LV diameter strain in the direction of AS-P was reduced significantly. This procedure using 2D TT technique might be useful for the evaluation of left ventricular dyssynchrony.
The value of tissue Doppler echocardiography in heart failure with atrial fibrillation

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In heart failure left ventricular (LV) filling pressure is increased which cannot be assessed in atrial fibrillation by mitral Doppler pattern because of the lack of “A” wave. The purpose of this study was the evaluation of tissue Doppler imaging (TDI) in heart failure with atrial fibrillation. In 82 consecutive patients with nonvalvular atrial fibrillation (age 77 ± 9.4 yrs, 32 males) mitral anular early diastolic velocity (Ea) was measured by TDI, mitral E velocity, deceleration time (DT), the ratio of E/A, E/ejection fraction (EF) and E/Ea ratio were calculated. Pulmonary artery systolic pressure (PASP) was calculated from the tricuspid regurgitation velocity. Systolic heart failure was defined as clinical symptons and EF(<40%) and diastolic heart failure as clinical symptoms and EF(>40%). Pts were divided into 4 groups: I (no heart failure, EF(>50%): 42 pts; II (no heart failure, EF(<40%): 8 pts; III (diastolic heart failure): 20 pts; IV (systolic heart failure): 12 patients. There was no difference in age, heart rate and DT between the groups. In heart failure E and E/Ea were significantly higher (103±19 vs 88±17 cm/s, p<0.001 and 6.6±1.9 vs 5.3±1.3, p<0.001). PASP was significantly higher (41±12 vs 33±9 mm Hg, p<0.01) than without heart failure. In systolic dysfunction only E/Ea discriminated heart failure (group IV) from no heart failure (group II) patients (7±2 vs 5.4±1.3, p<0.05). There was no difference in any variable between systolic heart failure group (group IV) and diastolic heart failure (group III). Diastolic heart failure was different from no heart failure (group III vs group II) in E: 106±19 vs 88±17 cm/s, E/A: 6.4±1.7 vs 5.4±1.3 and PASP: 42±13 vs 32±8 mm Hg, all p<0.01. There was no correlation of E, Ea or EF with either age or heart rate.

Conclusions: 1. There is no age dependence of either mitral or myocardial early diastolic velocity in atrial fibrillation. 2. E/Ea is equally elevated in patients with systolic and diastolic heart failure in atrial fibrillation.

Tissue Doppler Imaging in heart failure: sinus rhythm vs atrial fibrillation

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Purpose: Hypertension (AH) is now second to ischaemic heart disease as a cause of heart failure (HF). The purpose of this research was to study the changes of left and right ventricular function, left ventricular structure and pulmonary pressures in patients with AH and AH complicated with HF.

Methods: 879 patients with AH without signs of myocardial infarction, were examined by EchocG. 278 patients, I group, had congestive HF (144 female, 134 male); 62 patients had I, 91 - II, 97 - III, 28 - IV class HFr according to the NYHA classification, 601 patients (II group) had unaccompanied AH (278 female and 323 male). All patients examined by standard EchoCG. Left ventricular (LV) diastolic function was studied by PW and Color M-mode flow Dopplergraphy and Pulsed Doppler Tissue imaging (TDI). Right ventricular (RV) diastolic function was studied by PW tricuspid flow Dopplergraphy and TDI. Mean pulmonary arterial pressure (PAP) was estimated by pulmonary arterial flow acceleration time. In I gr, 50 patients with atrial fibrillation were not included in analysis of diastolic function.

Results: LV systolic, mean arterial pressure and PAP, LV and RV wall and cavity dimensions in diastole, LV mass and mass index was significantly greater, LV E’Fs, S wave maximal velocity on LV TDI was significantly lower in patients with HF. Mitrail flow E wave velocity and E/A ratio, tricuspid flow E wave velocity and E/A ratio was significantly greater and tricuspid flow A wave velocity LV flow propagation velocity on color M-mode Dopplergraphy was significantly lower in patients with HF. The parameters of RV DT did not vary in any difference between groups. The overall prevalence of sex-adjusted LVH in I gr was 83.6% (49.9 - 3.11 yrs). The most frequent geometric pattern of LV in this group was eccentric hypertrophy (49.3%). 96% of patients with HF and 67.9% without HF (p<0.01) had LV diastolic dysfunction (DD). Restrictive filling pattern was found in 27.2% of HF patients with LV diastolic dysfunction and 0.83% of patients without HF. RV diastolic dysfunction was registered frequently in I gr than in II gr. (78% vs 31%).

Conclusions: The patients with AH complicated with HF have significant changes of EchocG parameters of heart structure and function. LV and RV hypertrophy, elevated PAP, restrictive pattern of LV dysfunction and RV diastolic dysfunction is frequently observed in patients with AH complicated with CHF than in patients without this complication.

Tissue Doppler imaging in heart failure: sinus rhythm vs atrial fibrillation

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In heart failure left ventricular filling pressure (LVFP) is increased. Tissue Doppler imaging (TDI) has been used to assess LVFP mostly in sinus rhythm. The purpose of this study was to compare the value of TDI in heart failure patients in sinus rhythm and in atrial fibrillation.

Methods: Left ventricular ejection fraction (EF) and mitral E velocity were measured by standard transthoracic echocardiography. Myocardial Ea velocity was obtained by TDI at the lateral mitral anulus and E/Ea ratio was calculated. Normal TDI values were determined in 70 healthy subjects (age 49±2.0 yrs, 22 males): E was 74.2±19.1 cm/s, Ea 16.8±4.6 cm/s, E/Ea 4.6±1.3. 74 consecutive heart failure patients were prospectively studied: age 76.9±10 years, 30 males. Patients were divided into 2 groups: sinus rhythm 35 pts, EF 50±18% (group 1) and atrial fibrillation 39 pts, EF 50±6.16±1% (group 2). There was no difference in age, EF and E velocity (99±25 and 103±18 cm/s resp), but heart rate was higher in group 2 (77.7±17.8 vs 96±26.8 bpm, resp., p<0.01). Ea was lower in group 1 (14.1±3 cm/s) than in group 2 (16.0±3.2 cm/s) and lower than in normals (16.8±4.6) both p<0.01. There was no difference in E/Ea between the 2 groups. But both were higher than in normals (7.4±2.6 vs 4.6±1.32<p<0.001 and 7.7±1.9 vs 4.6±1.32<p<0.001). In normals both Ea and E/Ea was significantly inversely related to age (r=-.76 and r=-.66 resp., both p<0.01). Mitral Ea velocity, anular velocity and E/Ea ratio did not correlate with either age or heart rate in the heart failure patients.

Conclusions: 1. Increased E/Ea indicating higher LVFP were equally present in heart failure patients with sinus rhythm or atrial fibrillation; 2. The age dependency of Ea, and E/Ea is lost in heart failure.

Systolic function in patients with heart failure. Tissue Doppler study

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Background: Ejection fraction (EF) is commonly used to estimate left ventricular systolic function (SF). According to the latest reports, normal EF does not mean normal SF.

Aim: to assess systolic function by tissue Doppler (TD) in patients (pts) with congestive heart failure (CHF) according to EF value.

Material and method: 96 pts (57 males; mean age 64.5±(11.4) with signs and symptoms of CHF and 200 healthy volunteers were enrolled into the study. CHF diagnosis was confirmed by Xray. Patients were divided in two groups according to EF value (group 1 with EF <45% and group 2 with EF ≥45%). S’ wave velocity in four points of mitral valve annulus and in four basal segments of left ventricle was measured by TDI. ROC for EF 45% was 4.9 cm/s with 90% sensitivity and 70% specificity. In each group the number of points with reduction of S’ wave velocity was evaluated.

Results: The results were presented in the table 1.

Conclusions: Systolic function is impaired in patients with congestive heart failure regardless of ejection fraction value, though it is more expressed in group with reduced ejection fraction. In group commonly called diastolic heart failure over 60% of patient have at least one point with abnormal systolic myocardiac velocity, assessed by tissue Doppler.

Assessment of longitudinal shortening of the left ventricle in patients with heart failure and preserved ejection fraction

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The presence of symptoms and signs of heart failure, abnormal diastolic function and preserved ejection fraction have been defined as diastolic heart failure. The systolic velocities measured at the mitral annulus by pulsed tissue Doppler imaging (TDI) and the displacement of the mitral annulus by M mode is likely to be indexes of global longitudinal function of the left ventricle. The aim of this study was to evaluate the longitudinal subendocardial systolic function in patients with heart failure and normal ejection fraction. We studied 43 patients with heart failure who had ejection fraction >50% calculated from B-mode images according to Simpson’s rule and with A/E ratio <1 calculated from transmitial Doppler flow. Systolic (s) and diastolic velocities (e, a) were measured by TDI at the level of the septal and lateral mitral annulus.Displacement of the mitral annulus was measured from A-mode view by M mode. The results were compared with a control group of 25 age-matched voluntary healthy persons.

Conclusion: Patients with heart failure and preserved ejection fraction, who seem to have diastolic dysfunction might have also systolic dysfunction, as
assessed by measuring mitral annulus velocities with TDI and mitral annulus displacement. These findings suggest that pure diastolic dysfunction is probably rare and that some systolic dysfunction is present in many patients with heart failure and normal ejection fraction.

Results:

<table>
<thead>
<tr>
<th></th>
<th>EF</th>
<th>E/A</th>
<th>E/e</th>
<th>a/e</th>
<th>Ts'</th>
<th>Mitral Displace (mm)</th>
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<tbody>
<tr>
<td>Control (25)</td>
<td>64±9</td>
<td>1.16</td>
<td>8.1</td>
<td>1.2</td>
<td>10.7</td>
<td>13.2</td>
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<tr>
<td>Heart Failure (43)</td>
<td>61±10</td>
<td>0.78</td>
<td>12.7</td>
<td>0.68</td>
<td>6.9</td>
<td>9.1</td>
</tr>
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</table>

### 647

**Does chronic kidney disease alter cardiac geometry and function in patients with chronic heart failure?**

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**Background/Aim:** In patients (pts) with chronic heart failure (CHF), chronic kidney disease (CKD) is associated with increased morbidity and mortality, but the impact of CKD on cardiac geometry and function has not been clearly elucidated.

**Methods:** This study evaluated 322 pts with stable CHF (mean age 59±13 years, 180 with ischemic, 142 with non-ischemic cardiomyopathy), who were under current heart failure medication and had stable creatinine values for at least three months. As a measure of renal function, the glomerular filtration rate (eGFR) was estimated using the abbreviated Modification of Diet in Renal Disease Study Equation. CKD was defined as eGFR <60 ml/min/1.73 m². Echo measurements included left ventricular (LV) dimensions/volumes, muscle mass (all indexed to body surface area), ejection fraction (EF), mitral E/A-ratio, deceleration time and tissue Doppler mitral annular velocities (S', E', A'). A restrictive mitral filling pattern was defined by an E/A-ratio >2 and a deceleration time <150 ms.

**Results:** CKD was present in 158 pts (49%, mean eGFR 44.5±11.9 ml/min/1.73 m²). 164 pts (51%) had no CKD (mean eGFR 75.6±11.9 ml/min/1.73 m²). Pts with CKD had larger LV diastolic/systolic diameters (3.6±0.5 cm/m² vs 2.9±0.5 cm/m²; p<0.01, respectively) and a restrictive mitral filling pattern was more frequent (34% vs 21%, p=0.03) and a higher muscle mass (184±56 g/m² vs 166±47 g/m², p=0.003) in comparison with pts without CKD, but LV volumes did not differ between groups.

**Conclusion:** In pts with CHF, CKD is associated with LV dilation, hyper trophy and progressive diastolic dysfunction. These mechanisms are likely to contribute to the increased morbidity and mortality of CHF pts with CKD.

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**Ultrasound lung comets for differential diagnosis of dyspnea: comparison with plasma cardiac peptides**

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**Background:** Differentiating cardiac from non-cardiac causes of dyspnea, in patients admitted to the hospital with acute shortness of breath, is still a clinical challenge. Ultrasound lung comets (ULCs) are a simple, low-tech method for quantitative assessment of extra-vascular lung water, originating from water-thickened subpleural pulmonary interlobar septa.

**Aim:** To assess whether ULCs could help in differentiating cardiac from non-cardiac causes of acute dyspnea.

**Methods:** We evaluated 98 patients (29 females; age 72±13 years) admitted with acute onset of dyspnea (NYHA class III or IV). Chest sonography and NT-proBNP assessment were performed on the same day (within 4 hours) in all patients and independently analyzed. ULCs were evaluated with transthoracic echocardiography (2.5 MHz cardiac probe) on anterior chest at 28 predefined scanning sites. Two independent physicians, blinded to ULCs findings, reviewed all the medical records to establish the etiologic diagnosis of dyspnea.

**Results:** Cardiogenic dyspnea was confirmed in 82 patients, and ruled-out in 16 patients. ULCs number was significantly correlated to NT-proBNP values (r=.49, p<.001). With receiver operating characteristic (ROC) analysis, NT-proBNP values >1098 pg/mL and ULCs number >15 had high, completely additive diagnostic accuracy to predict cardiogenic origin of dyspnea (see figure).

**Conclusion:** In patients admitted with acute dyspnea, ULCs are a simple, highly feasible, effective tool to identify the cardiac origin of dyspnea through indirect imaging of extra-vascular lung water with chest sonography. Its diagnostic value may integrate the one provided by cardiac peptides.

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**Echocardiographic findings correlate with the degree of BNP elevation: Is it always true?**

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**Background:** Severe heart failure (HF) is associated with worsening symptoms, and elevated brain natriuretic peptide (BNP). However, it is not completely understood why patients with HF present with different degrees of BNP elevation.

**Hypothesis:** Extremely high BNP does not necessarily reflect the severity of heart failure.

**Methods:** We selected patients admitted to the hospital from 12/2004 to 12/2005 with elevated BNP within three predominant ranges 1) Mild elevation: 500-1000 pg/mL; 2) Moderate elevation: 2000-3000; 3) Severely elevated group: >4000. The eligible patients are 200 and final study included 179 after excluding BNP fluctuations. Data was obtained retrospectively.

**Results:** Number of echocardiographic and clinical parameters demonstrated severe hemodynamic abnormalities in patients with moderately high BNP compared to mildly elevated BNP as shown in the table.

**Conclusion:** 1. BNP elevation to 3000 pg/mL reflects severity of structural and hemodynamic changes detected by echocardiogram. 2. Extremely high levels of BNP elevation (>4000 pg/mL) does not reflect the severity of hemodynamic and clinical changes. 3. Renal function determines BNP elevation between the moderate and high BNP groups.

<table>
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<tr>
<th></th>
<th>Variables</th>
<th>Low BNP</th>
<th>Moderate BNP</th>
<th>High BNP</th>
<th>Low/Mod</th>
<th>Mod/High</th>
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<tr>
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<td>48</td>
<td>49</td>
<td></td>
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<tr>
<td>BNP</td>
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<td>7271±7</td>
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<td>47.25±6</td>
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</table>

**650 Comparative analysis of three BNP assays in community assessment of LV systolic dysfunction: a cost-saving tool**

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**Objective:** Direct access echocardiography is increasingly demanded and frequently negative. Brain Natriuretic Peptide (BNP) has a widely developing role in predicting cardiac disease, particularly LV systolic dysfunction (LVSd). We compared the use of three simultaneous BNP assays with other demographic and clinical data to predict LVSd, in a cohort of patients with suspected heart failure.

**Design:** Prospective, single blinded cohort study of 95 patients referred by General Practitioners for open access Echocardiography. The echocardiographer was blinded to the serum BNP levels. Setting: A UK District General Hospital. Variables: Age, sex, British Society of Echocardiography (BSE) standard adult echocardiogram, routine, chest X-ray (CXR), ECG, cardiac vascular risk factors, symptoms and signs of cardiac failure, medication, simultaneous Roche® E170 NT proBNP (R-BNP), Bayer® Centaur BNP (BC-BNP) Biosite® Triage BNP (BT-BNP) levels.

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Results: A total of 93 echocardiograms were of diagnostic quality. Of these, 6 patients had LVSD. The R-NT-proBNP assay correctly identified all cases of LVSD with sensitivity 100%, specificity 49%, negative predictive value (NPV) 12%, and positive predictive value (PPV) 100%. Both BC-NPNT and BNP assays failed to predict one case of LVSD; sensitivity 83%; specificity 79%; PPV 22%; NPV 98.5% and sensitivity 63%; specificity 79%; PPV 22%; NPV 79.5% respectively. Direct inter-BNP assay correlation was good (R squared 0.735-0.887).

Conclusion: Use of serum BNP assay on patients referred for suspected heart failure allows for accurate predictive reduction in the echocardiographic workload by 45.3% (R-NT-proBNP) and 73.7% (BC-NPNT&BNP) respectively. This equated to a cost reduction per 100 referrals for echocardiography of $1320.50 for R-BNP and $3313.20 for BC-BNP and BT-BNP.

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Improvement of TDI Pulmonary Capillary Wedge Pressure and NT-proBNP in high heart failure patients

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Background: The use of N-Terminal Pro-Brain Natriuretic Peptide (NT-proBNP) has been found to be useful as an adjunct to standard clinical evaluation for the diagnosis and prognosis assessment in patients with Heart Failure (HF). Recently, several authors demonstrate the feasibility of non invasive Pulmonary Capillary Wedge Pressure (PCWP) assessment using Tissue Doppler Imaging (TDI). This study was aimed to investigate whether the improvement of PCWP value are able to predict prognostic and cardiac related mortality in patients with HF, as already demonstrated in previous studies for NT-proBNP.

Methods: We prospectively studied 28 patients (74±7 years; 17 M, 11 F) referred to Clinica Medica with diagnosis of acute destabilized HF. In all patients NT-proBNP and PCWP were measured during the first two hours of hospitalisation and in the day of discharge. NT-proBNP has been assessed using the ratio of transmural E velocity to the early diastolic mitral annulus velocity (Ea), according to the formula PCWP = 1.9±1.24 (E/Ea). All patients were in sinus rhythm and echocardiography evaluation was performed by the same ultrasonographer.

At 12 months follow-up patients were divided in two groups according to a combined endpoint based on cardiac death and hospital readmission for HF.

Results: After 12 months of follow-up 10 patients reached combined end point (4 cardiac death and 6 HF related hospitalisation) and were assigned to group A, while 18 patients resulted event free and were assigned to group B. Baseline concentration of NT-proBNP and PCWP values did not differ between the two groups. In group B NT-proBNP value decreased from 6793±10536 pg/mL to 3960±7473 pg/mL (p<0.01), while in group A no change was observed (3536±4713 pg/mL vs 4785±4273 pg/mL, p=NS). PCWP improved only in group B patients (23±10 mm Hg vs 17±9 mm Hg, p=0.01) while no significant reduction was observed in group A patients (22±7 mm Hg vs 20±7 mm Hg, p=NS).

Conclusions: Our results confirm the importance of NT-proBNP for the assessment of mid-term mortality likelihood in subjects with HF. This study suggests that also non invasive assessment of PCWP and its lack of variation on treatment is able to identify HF patients with higher risk of cardiac death and hospital readmission.

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Relationship of exercise capacity with left ventricular and atrial performance in heart failure

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Peak oxygen uptake (VO2) is a strong predictor of hospitalization and death in heart failure (HF). To assess the relation of exercise capacity to indexes of left ventricular (LV) and left atrial (LA) function in HF patients, 20 patients (17 male, aged 57±7 years) underwent maximal bicycle exercise testing with measurement of peak VO2 and were divided into 3 groups according to Weber’s classification: Group I, VO2 > 20 ml/Kg/min, Group II, VO2 from 10 to 15 ml/Kg/min and Group III, VO2 from 10 to 15 ml/Kg/min. All patients had LV ejection fraction (EF) < 0.45. M-mode and two-dimensional echocardiography was undertaken to obtain the ratio of transmural E velocity to left atrial (LA) annulus velocity (Ea), according to the formula PCWP = 1.9±1.24 (E/Ea). All patients were in sinus rhythm and echocardiography evaluation was performed by the same ultrasonographer.

At rest, in multiple regression analysis ejection fraction at maximal exercise was the best predictor of exercise tolerance.

Results: VO2 max for groups I, II and III was 21.2±6.6, 18.0±6.0 and 12.3±5.5 ml/Kg/min, respectively. Age, body surface area and etiology of HF did not differ among the groups. While LV diameters, mass, volumes, and EF were similar, peak (St) velocities were lower for group III. Doppler indices showed lower E waves and E/A ratio and a reduced DT, typical of restrictive filling for Group III. Additionally, this group exhibited evidence of LA failure, expressed by an increased LA min vol and lower LAEF, and a decreased late (Am) lateral velocity. There was a modest but significant correlation between peak VO2 and measurements of cardiac performance, including LVEF (r=0.49), LAEF (r=0.42), septal Sm (r=0.66) and lateral Am (r=0.44).

Conclusion: In patients with HF, impairment in exercise capacity may not be well related with LV dimensions or load dependent indexes of LV function, rather, it seems to be better predicted by diastolic indexes and LA performance.

Table 1. Echocardiographic variables

<table>
<thead>
<tr>
<th>LVEF (EF%)</th>
<th>LA max vol (ml)</th>
<th>E wave velocity (cm/s)</th>
<th>A wave velocity (cm/s)</th>
<th>E/A ratio</th>
<th>LA min vol (ml)</th>
<th>LAEF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>31±1</td>
<td>39±9</td>
<td>40±16</td>
<td>65±20</td>
<td>0.9±0.4</td>
<td>200±50</td>
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<td>(n=7)</td>
<td></td>
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<tr>
<td>Group II</td>
<td>32±1</td>
<td>47±9</td>
<td>35±16</td>
<td>58±17</td>
<td>0.8±0.3</td>
<td>240±66</td>
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<td>(n=7)</td>
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<td></td>
</tr>
<tr>
<td>Group III</td>
<td>32±1</td>
<td></td>
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<td>(n=6)</td>
<td></td>
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</table>

*- p<0.05

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Dobutamine stress echocardiography predicts exercise tolerance and BNP levels in patients with chronic congestive heart failure

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Background: Dobutamine stress echocardiography (DSE) is widely used for evaluation of myocardial contractile reserve and it provides prognostic information in patients with chronic congestive heart failure (CHF). Our aim was to evaluate the relationship among DSE response, BNP levels, and aerobic exercise capacity in CHF patients.

Methods: 33 CHF patients (age 66±8 years, 54% with an ischemic etiology), underwent high dose of DSE (up to 40 μg/kg/min): the response was evaluated by % of change in LV end-systolic volume. A blood sample was collected at baseline for measuring BNP levels. Next, CHF patients underwent cardipulmonary exercise test with expired gas measurement.

Results: On average, ejection fraction was 34±6% and NYHA class 2.3±0.6. Change in LV end-systolic volume was directly related to NYHA functional class (r=0.56, p=0.011) and BNP level (Figure), while inversely related to peak oxygen consumption (Figure). Ejection fraction at maximal dose of DSE was related to peak oxygen consumption (r=0.525, p=0.005) and O2 pulse (r=0.535, p=0.004), however no relationship was found with ejection fraction at rest. In multiple regression analysis ejection fraction at maximal dose of DSE (p=0.001) was the best predictor of exercise tolerance.

Conclusions: In patients with stable CHF, impaired myocardial contractile reserve relates to higher BNP levels and poorer exercise tolerance.

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Isovolumic systolic indices by Doppler tissue imaging are related to exercise capacity in dilated cardiomyopathy

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Introduction: Tissue Doppler indices (TDI) permit the evaluation of cardiac function, through filling pressure estimation and measurement of isovolumic events. This study explores the relation of TDI derived indices to an objective measure of functional status, such as peak O2 consumption during treadmill exercise (VO2P).

Material and methods: We studied 50 pts (aged 16-78 years) with previously diagnosed dilated cardiomyopathy (CCM), left ventricular ejection fraction <40%, and VO2P <40% (all had complete Echocardiographic and Tissue Doppler study for the evaluation of early (E) and late (A) mitral inflow velocity, deceleration time of E (DTE), early diastolic mitral annular velocity (Ea), systolic mitral annular velocity during isovolumic contraction (S1), systolic mitral annular velocity during isovolumic contraction (S2), systolic tricuspid annular velocity during isovolumic contraction (S1J) and systolic tricuspid annular velocity during isovolumic contraction (S2J). Subsequently all pts underwent maximal symptom-limited cardipulmonary exercise test for the evaluation of peak O2 consumption (VO2P) within a week.

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Results: E/A: 1.46±1.23, DTE: 175±81 ms, E/E': 12.4±4.6, S': 5.1±2.1, S': 5.1±1.8, S': 8.6±3.5, S': 12.4±4.6. Correlation coefficients of VO2P with flow and tissue velocity indices were: EF=0.477, p<0.001, E/A (r=0.42, p<0.03), DTE (r=0.156, p<0.31), E/E' (r=0.334, p=0.002) S' (r=0.658, p=0.0001), S' (r=0.376, p<0.009), S' (r=0.437, p<0.0012), S' (r=0.585, p=0.001). By multivariate analysis WMSI was the only independent predictor of VO2P. Conclusion: Significant relations exist between respiratory gas exchange and TDI derived indices of LV and RV longitudinal function in patients with DCM. Isotovolic contractility of LV as expressed by tissue velocity is the only independent determinant of exercise capacity.

655 Determinants of exercise-induced pulmonary hypertension in patients with heart failure and systolic left ventricular dysfunction

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Background: Pulmonary hypertension (PHT) and mitral regurgitation (MR) are frequently observed in heart failure patients. Although the role of MR in the genesis of PHT at rest has been described, the determinants of exercise induced PH have not been examined.

Methods: To evaluate the resting and exercise covariates associated with exercise induced PHT, 46 patients with left ventricular (LV) dysfunction (ejection fraction: 30±6%) underwent quantitative exercise echocardiographic assessment of the LV systolic and diastolic function (Early mitral inflow E' and early annulus velocity function), tricuspid pressure gradient (TTPG), LV volume and left atrial volume (LA).

Results: At rest, LV volumes, MR volume, E wave and LA volume correlated with TTPG, while MR volume was more likely to correlate with TTPG, S' and LAV (p=0.0001) and emerged as independent determinants of the TTPG. At exercise, LV volumes, MR volume, and the TTPG calculated in resting conditions correlated with the peak TTPG. The TTPG at rest was the sole predictor of the TTPG at exercise (r=0.5; p=0.005). However, the TTPG at peak exercise did not correlate with the magnitude of increase in the TTPG during the test (p=0.12, p=ns). The rate of exercise dyspnea was similar in patients with (40%) and without (44%) significant PHT at baseline (TTPG>40 mm Hg) (p=ns). At exercise, LV volumes and LA volume correlated with peak TTPG. In multivariate analysis, peak ejection fraction (p=0.006) and peak MR volume (p=0.00001) were independently associated with peak TTPG.

Conclusions: A larger exercise increase in MR and limited contractile reserve (weaker changes in ejection fraction) strongly affected the level of pulmonary pressure at exercise. The magnitude of changes in pulmonary pressure during exercise mainly depends on the dynamic behaviour of MR.

656 Functional capacity is related to contractile reserve in patients with left ventricular dysfunction

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In patients (pts) with heart failure the reduction of functional capacity is associated with poor long-term prognosis and the presence of contractile reserve is a favorable sign. In these pts, functional capacity is not strictly related to the baseline left ventricular ejection fraction (LVEF). Cardiopulmonary exercise testing (ET) is commonly utilized in this setting to evaluate functional capacity. We hypothesized that in pts with ischemic or nonischemic cardiomyopathy and left ventricular (LV) dysfunction, functional capacity measured by cardiopulmonary ET is related to the presence of contractile reserve assessed by low and tissue velocity indices: EF, E/A, LV mass index (LVMI).

Methods: Thirty-one clinically stable pts with LV dysfunction (age: 70±7 years, 27 men; 15 with ischemic and 16 with nonischemic cardiomyopathy) were examined. NYHA class was I in 10 pts, II in 19, and III II in 2. LVEF was 0.32±0.6. LV-DSE was performed with a standard protocol (5, 10, 20, 30, 40, and 50 mg/kg/min of dobutamine in 5-minute stages). Echocardiographic images were acquired at the end of each stage and recorded on a magnetico-optic disk for off-line analysis. A wall motion score index (WMSI) was calculated at baseline and at the end of the test. The presence of contractile reserve was defined as a decrease in WMSI of at least 0.2 during dobutamine infusion.

Cardiopulmonary ET was performed using a treadmill protocol (Naughton modification). Oxygen consumption (VO2peak) and functional capacity was defined as peak VO2 >75% of maximal predicted VO2.

Results: No patients in both ischemic and nonischemic cardiomyopathy group showed an increase in WMSI at LD-DSE. 18 pts showed contractile reserve at LD-DSE and 18 pts had a preserved functional capacity at cardiac pulmonary ET. 14 of the 18 pts with contractile reserve (77.8%) had preserved functional capacity. In contrast with 4 of the 13 pts without contractile reserve (30.8%). A significant correlation was found between contractile reserve at DSE and preserved functional capacity at cardiopulmonary ET (chi square =5.56, p=0.02). No relation was found between baseline echocardiographic LVEF and preserved functional capacity at cardiopulmonary ET (Wald Chi square =0.005, p=ns).

Conclusions: Our findings show that in pts with LV dysfunction, functional capacity is related to the presence of contractile reserve and not to baseline LV function.

657 Use of echocardiography in the management of congestive heart failure

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Objectives: We evaluated the use and the impact of echocardiography in patients receiving an initial diagnosis of congestive heart failure.

Background: An echocardiogram is recommended in all patients with suspected congestive heart failure. Few data are available on use and impact of echocardiography in management of congestive heart failure.

Methods: We prospectively included 799 consecutive patients (pts) admitted for a first CHF episode during the year 2000. 648 (81%) underwent echocardiography during their hospitalization (Echo group), and the other 151 pts constitute the No-Echo group. Baseline characteristics and 5 year survival of the Echo group and of the No-Echo group were compared.

Results: The No-Echo group pts were older (82.2 versus 73.8 yrs; p<0.001) and had a higher diastolic dysfunction (37% versus 47%; p=0.009), a higher prevalence of smoking (25% versus 38%; p=0.003) and dyslipidemia (14% versus 30%; p<0.001) but a higher comorbidity index (p<0.001) and more coronary artery disease (44% versus 34%; p=0.03). Pts who underwent echocardiography were more admitted in a cardiology department (76% versus 55%; p<0.001).The No-Echo group pts received at discharge less angiotensin-converting enzyme inhibitors (34% versus 58%; p<0.001), less beta-blockers (9% versus 25%; p<0.001), less spironolactone (17% versus 26%; p<0.05), less amiodarone (22% versus 34%; p<0.01), less warfarin (20% versus 31%; p=0.01), less statin (4% versus 15%; p<0.01) but more nitrates (40% versus 25%; p=0.01). Advanced age (RR=1.08; CI [1.06-1.1]; p<0.001), absence of cardiomegaly (RR=2.04 ; CI [1.4-3.1]; p<0.001) and more previous hospitalization in a general medicine department (RR=1.87; CI [1.84-1.8]; p<0.001) were independently related to the decision not to perform an echocardiogram. The 1 year (48% versus 76%; p<0.001), 3 year (32% versus 57%; p<0.001) and 5 year (21% versus 44%; p<0.001) survivals were lower in the No-Echo group. However, after adjustment for age, there was no significant difference (p=0.1).

Conclusion: The underuse of echocardiography after a first episode of CHF appears to be associated with advanced age and with the underuse of ACE inhibitors, beta-blockers and spironolactone.

658 Autologous monoclonal mono nuclear cell bone marrow in acute myocardial infarction

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1Tomsk, Russian Federation; 2Cardiology Institute Of Tomsk Research Center, Urgent Cardiology, Tomsk, Russian Federation

The aim of the study: To assess safety and efficacy autologous mono nuclear cell bone marrows (BMMCs) transplantation in patients with acute myocardial infarction (AMI).

Methods: The study was randomized, opened, controlled. 44 patients (age 55.2±8.6 years) with the first STEMI were enrolled. On admission patients were received therapy by 1,5 million U streptokinase. BMMCs (100 million) transplantation by balloon catheter placed into infarct-related artery (IRA) was performed at once after stent implantation in 22 patients (1st group) on the 7-21 day of AMI. Another 22 patients (2 nd group) undergo only stent implantation into IRA the same day of AMI. No differences in demographic and clinical characteristics were found at baseline. Autologous BMMCs were obtained from bone marrow aspirate by gradient centrifugation. Distribution of autologous BMMCs was studied by radionuclide indication of autologous BMMCs with 99 m Tc-HMPAO. Echocardiography, Holter monitoring, myocardial perfusion scintigraphy with 18F-FDG and plasma concentration of insulin-like growth factor-1 (IGF-1) and basic fibroblast growth factor (bFGF) were determined.

Results: All patients after discharge from hospitals were followed during up 6-month. All procedures connected with the autologous BMMCs transplantation were fulfilled without complications. 4 patients (2 patients in each group) suffered from recurring MI. Autologous BMMCs penetrating and fixed in myocardium after intracoronary injection. Stable myocardial perfusion defect decreased in both groups (29±24% in the 1st group vs 20±18% in the 2nd group, p=0.1), whereas transient myocardial perfusion defect appeared only cell therapy group. There were no differences in frequency and severity of chronic heart failure, severe arrhythmias, tolerance to exercise stress, qual-
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Safety of rapid carvedilol up titration in patients with left ventricular systolic dysfunction
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Background: In clinical trials, drug dosing is based on bodyweight, but in clinical practice dosing is based on bodyweight or body surface area. The aim of this study was to determine the safety of rapid up titration of carvedilol.

Methods: A total of 40 patients (21 males, 8 with diabetes, 6 with chronic obstructive lung disease, 4 with renal failure) were enrolled in the study, and received carvedilol in a rapid up titration, beginning with a loading dose of 6.25 mg. Patients were followed for a minimum of 6 months.

Results: There were no significant changes in the heart rate, systolic or diastolic blood pressure, or in ejection fraction during the up titration. Two patients developed nausea and one patient developed a transient bradycardia. There were no deaths or major adverse events.

Conclusion: Rapid up titration of carvedilol is safe and feasible in clinical practice.

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The effect of beta-blocker (Carvedilol) therapy on N-Terminal pro-brain natriuretic peptide levels and echocardiographic findings in patients with congestive heart failure
F. Gundogdu 1; E. Bozkurt 2; A. Kiziltunc 3; S. Sevimli 2; S. Arslan 2; M. Alhama 1; T. Datino 1; N. Barrueco 1; I. Castillo 1; M. Martinez-Selles 1
1Izmir, Turkey

Background: The role of beta-blockers in the treatment of heart failure is well established. However, the effect of beta-blockers on N-Terminal pro-brain natriuretic peptide (NT-proBNP) levels is not well understood.

Methods: A total of 25 patients (15 males, 10 females) with NYHA III or IV heart failure were enrolled in the study. Patients were randomized to carvedilol therapy or placebo. NT-proBNP levels were measured at baseline and after 12 weeks of therapy.

Results: There was a significant decrease in NT-proBNP levels in the carvedilol group compared to the placebo group (p<0.05).

Conclusion: Beta-blocker therapy is effective in reducing NT-proBNP levels in patients with heart failure.

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Levosimendan Improves Left Atrial Functions in Patients with Ischemic Heart Failure
H. Duygu 1; F. Ozkan 1; S. Nalbantgil 1; M. Zoghi 1; C. Gurgun 1
1Izmir, Turkey

Purpose: Levosimendan is a novel positive inotropic calcium sensitizer agent used in acute heart failure. Although its favorable effects on left ventricular systolic and diastolic functions are known, its effect on left atrial functions is not established. The purpose of this study was to investigate whether therapy with levosimendan improves left atrial active and passive functions compared to dobutamine.

Methods: A total of 15 patients (10 males, 5 females) with New York Heart Association class III or IV heart failure due to ischemic heart disease were randomized to receive either levosimendan or dobutamine. Left atrial function was assessed using echocardiography and the E/E' ratio was calculated.

Results: There was a significant increase in left atrial function in the levosimendan group compared to the dobutamine group (p<0.05).

Conclusion: Levosimendan improves left atrial functions in patients with ischemic heart failure.

Table 1

<table>
<thead>
<tr>
<th>Levosimendan</th>
<th>Dobutamine</th>
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</thead>
<tbody>
<tr>
<td>(before/after, p value)</td>
<td>(before/after, p value)</td>
</tr>
<tr>
<td>LA diameter (mm)</td>
<td>52±11/48.7±11.5</td>
</tr>
<tr>
<td>AEF</td>
<td>0.05±0.01/0.19±0.09</td>
</tr>
<tr>
<td>PEF</td>
<td>0.12±0.08/0.21±0.06</td>
</tr>
<tr>
<td>Stroke volume (ml/m²)</td>
<td>20.5±18.12/15.8±8.8</td>
</tr>
<tr>
<td>RF</td>
<td>0.23±0.04/0.38±0.03</td>
</tr>
</tbody>
</table>

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Effect of levosimendan on E/E' ratio in patients with ischemic heart failure
H. Duygu 1; F. Ozkan 1; S. Nalbantgil 1; M. Zoghi 1; A. Akilli 1; M. Akin 1; S. Payzin 1
1Izmir, Turkey

Purpose: Levosimendan is a novel positive inotropic calcium sensitiser agent used in acute heart failure. It improves hemodynamic parameters more favorably than the conventional positive inotropes. In this study, levosimendan’s effect on E/E’ ratio (a non-invasive indicator of LV filling pressure) was evaluated.

Methods: A total of 15 patients (10 males, 5 females) with New York Heart Association class III or IV heart failure due to ischemic heart disease were randomized to receive either levosimendan or dobutamine. E/E’ ratio was calculated.

Results: There was a significant decrease in E/E’ ratio in the levosimendan group compared to the dobutamine group (p<0.05).

Conclusion: Levosimendan improves E/E’ ratio in patients with ischemic heart failure.
Conclusions: Levosimendan caused a greater reduction of E/E′ ratio, a non-invasive indicator of LV pressure in acute systolic heart failure compared to dobutamine. This may explain the more favorable effects of levosimendan when compared to conventional positive inotropics.

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Single centre preliminary results of short-term effects of percutaneous left ventricular restoration in patients with chronic heart failure

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Background: Ventricular partitioning device (VDP) is an intraventricular implant that is delivered percutaneously, using femoral artery approach, in patients with chronic heart failure and extensive anteroapical wall motion abnormalities. First-in-man VDP implant was performed in our center, and we currently have world’s biggest single centre series of VDP implants.

Aim: To evaluate short-term effects of VDP on LV systolic and diastolic function in patients with chronic heart failure.

Methods: VDP was implanted in 4 consecutive patients (all males, mean age 53±9 years) with the history of anterior myocardial infarction and akinesia and/or dyskinesia of the LV anteroapical segments. LV ejection fraction (LVEF), as well as end-systolic (ESVI) and end-diastolic volumes (EDVi), were measured from the apical 4- and 2-chamber views using Simpson biplane formula, and expressed as indices. Transmitral flow was assessed from apical 4-chamber view, and deceleration time (DT) of the E wave and ratio of peak velocities of E and A waves were measured. E/E′ were measured prior to VDP implant, on hospital discharge (48 hours following VDP implant), and after 1 and 3 months. Patients were on stable maximal medical therapy for heart failure.

Results: As shown in Table, significant reduction in both ESVi and EDVi was noted at hospital discharge (48 hours following VDP implant) as compared to baseline values (p=0.02, and p=0.037, respectively), with no change in ESVi and EDVi during the following 3 months. There was no change in LVEF, but a trend toward improvement in LVEF was noted after 3 months as compared to baseline (36±3% vs 31±2%, p=0.08). VDP implant did not change DT and E/A ratio after 3 months as compared to baseline.

Conclusions: VDP significantly reduces LV volumes with a trend toward LVEF improvement, and no effect on LV diastolic function.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Discharge 1 month</th>
<th>Discharge 3 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDVi (mL/m²)</td>
<td>204±36</td>
<td>144±24</td>
<td>143±20</td>
</tr>
<tr>
<td>ESVi (mL/m²)</td>
<td>131±34</td>
<td>92±18</td>
<td>91±17</td>
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<tr>
<td>LVEF (%)</td>
<td>31±2</td>
<td>35±4</td>
<td>37±5</td>
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<tr>
<td>DT (ms)</td>
<td>176±53</td>
<td>162±25</td>
<td>159±19</td>
</tr>
<tr>
<td>E/A</td>
<td>1.84±0.92</td>
<td>1.53±0.84</td>
<td>1.55±0.74</td>
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</table>

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Treatment with erythropoietin improves left ventricular systolic performance and mitral regurgitation in patients with heart failure and chronic kidney disease

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Several studies have documented a benefit of erythropoietin treatment (EPO) in heart failure patients (HF) with anaemia and chronic kidney disease (CKD). Mitral regurgitation (MR) is a common finding in patients with left ventricular systolic dysfunction. The effect of EPO treatment on MR has not been studied. Therefore, we sought to determine the effect of EPO on MR and hemodynamics.

Methods: We have prospectively included 28 patients (mean age 68.11 ± 7 years) with severe HF due to systolic dysfunction, anaemia (Hb<12 g/dL) and CKD. Fourteen patients were treated with EPO and were matched with 14 control patients (C), for age, sex, haemoglobin(Hb), MR severity and left ventricular ejection fraction (LVEF) were enrolled. All patients underwent an echocardiography at baseline and after 2 months of treatment.

Results: Compared to controls, baseline, the mean NYHA class has decreased in the EPO group (2.2 vs 3.4) whereas no significant change were observed in the C group (3.2 vs 3.3). The mean Hb level increased (13.1 ± 10.0 g/dL) and did not change (10.2 ± 10.3 g/dL), in the EPO and C groups respectively. Hemodynamics - see table: * indicates p<0.05 vs baseline and 1vs controls. E/e′ decrease was well correlated with transtricuspid pressure gradient. A correlation was also observed between the decrease in MR severity and the increase in dP/dt.

Conclusions: As compared to controls, EPO improves left ventricular performance. EPO also decreases significantly the MR severity. This might partially explain the decrease of the filling pressure indices and the improvement of the clinical state in treated patients.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>EPO baseline</th>
<th>EPO 2 months</th>
<th>C baseline</th>
<th>C 2 months</th>
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<tr>
<td>LVEDV (mL)</td>
<td>161±17</td>
<td>163±17</td>
<td>179±21</td>
<td>185±21</td>
</tr>
<tr>
<td>LVESV (mL)</td>
<td>137±12</td>
<td>125±12</td>
<td>131±18</td>
<td>128±18</td>
</tr>
<tr>
<td>E/Em (%)</td>
<td>440±25</td>
<td>754±25</td>
<td>425±27</td>
<td>327±27</td>
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</tbody>
</table>

665

Baseline ejection fraction is a mainstay of early mortality prognostic score in acute pulmonary edema

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Background: We have recently developed a novel prognostic indicator in acute pulmonary oedema (PO) - pulmonary oedema prognostic score (POPS). This study is aimed to validate this score in a prospective cohort of PO patients (pts).

Methods: POPS was developed based on prognostic study of 276 pts and is a sum of 4 factors (each scored 1 point): infarction etiology, heart rate > 115/min, systolic blood pressure < 130 mm Hg and leucocytosis > 11500/mm³ on presentation. Validation group consisted of 100 consecutive, unselected pts (M-54%, F-46%; median age 68 years) referred to our department due to PO between 2001-2004. We reassessed the value of POPS and the prognostic factors for in-hospital mortality.

Results: The main difference between the previous and validation cohort was the introduction of primary angioplasty (pPCI) as a standard treatment of myocardial infarction; moreover, ejection fraction (EF) was assessed by echocardiography in nearly all pts. However, in-hospital mortality remained high - 24% and was predicted by 4 factors: leucocytosis > 11100/mm³ (p=0.0005; sensitivity; Se=71% and specificity Sp=87%); EF<26% (p=0.0005; Se=68%; Sp=80%); admission systolic blood pressure < 115 mm Hg (BP) (p=0.01; Se=54%; Sp=80%); diastolic BP<65 mm Hg (p=0.04; Se=42%; Sp=84%). However, POPS retained its high prognostic value: scores 3-4 carried 57% mortality risk as opposed to 19% in the remaining group, chi²p=0.0025. ROC analysis yielded AUC=0.68 (95% CI 0.58-0.70).

Conclusions: Mortality in cardiogenic PO remains high and main risk factors are related to unstable hemodynamics and leucocytosis. Ejection fraction <26% assessed by echocardiography remains a critical risk factor. Infection etiology is no longer a specific risk factor in pPCI era as opposed to baseline ejection fraction.

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The prognostic value of ultrasound lung comets in patients with dyspnea and/or chest pain

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Background: Ultrasound Lung Comets (ULCs) consist of multiple comet tails originating from water-thickened interlobular septa. They are a simple echographic sign correlated to extra-vascular lung water, whose increase is a possible harbinger of impending acute heart failure.

Aim: To assess the clinical and prognostic value of ULCs.

Methods: 205 in-hospital patients (68±13 years) admitted for dyspnea and/or chest pain syndrome were evaluated, upon admission, with a comprehensive 2D and Doppler echocardiographic examination and ULCs assessment. ULCs score was obtained by summing the number of comets from each of the scanning spaces in the anterior right and left hemithorax, from second to fifth intercostal spaces. All patients were followed-up for a median of 15 months.
Results: ULCs were present in 120 patients; 25 patients had mild (5 to 15), 37 moderate (16 to 30), and 58 severe (>30) ULCs. During the follow-up, 46 events occurred: 13 cardiac and 23 non-cardiac deaths, 1 non fatal myocardial infarction and 9 acute heart failure requiring hospitalization. Using a receiver-operating characteristics analysis, ULC >10 was the best predictor of future events (area under the curve =0.669). The 35-months event-free survival was highest in patients with no ULCs and lowest in patients with severe (>30) ULCs at entry (fig.). At multivariable analysis, ULCs provided additional prognostic information (Hazard Ratio = 1.44, Confidence Interval = 1.12-1.87, p<0.02) to clinical and echocardiographic variables.

Conclusion: ULCs provide useful information for prognostic stratification in patients admitted for dyspnoea and/or chest pain.

667 Global ventricular asynchrony and mortality in patients with stable heart failure
R. Crea1; A. D'Andrea1; V. Ducceschi1; M.M. Patella1; M. Santoro1; G. Provenza1; G. Gregorio1; R. Calabro2
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Aim of the study was to address if mechanical dyssynchroney measured by Tissue Doppler Echocardiography (TDE) has prognostic implications in patients with LBBB and stable HF.

Population and methods: 78 patients (mean age 68 ±13y; 42 male) with complete LBBB (QRS >120 msec) and stable HF (II NYHA class >3 months in optimal pharmacological therapy) underwent standard Doppler echo. Pulsed TDE was performed using four basal LV segments and one right lateral ventricular segment to assess the time to onset systolic contraction wave from R wave on ECG (Ts). The difference of Ts between the most delayed LV segment and RV lateral wall was considered as interventricular delay (IntraV-del). Intraventricular delay (IntraV-del) was the difference among Ts of the LV segments An index of global ventricular asynchrony (GVA) was obtained by the sum of IntraV-del and InterV-del. Patients were followed and cardiac events such as death, worsening of heart failure and need of cardiac resynchronization therapy were recorded.

Results: The mean value of EF was 36.4 ± 9.7 and of GVA was 154.5 ± 56.4 msec. GVA was inversely related to EF (r = -0.42 p<0.01). During the follow-up (34.3 months, range 21.2 to 48.2) cardiac events were recorded in 31 (39%) patients (death 11 pts, CHF 26 pts; CRT 7 pts). Cox's proportional hazard multivariate analysis showed that age, and GVA (HR = 1.02; 1.0364 vs 1.05; p<0.05) were independent predictors of mortality. ROC analysis (fig. 1) showed that a cut off value of GVA >160 msec (AUC = 0.88; p<0.0001) predicted mortality, with sensitivity, specificity, positive and negative predictive value respectively of 91%, 72%, 52% and 93%.

Conclusion: TDE derived global ventricular asynchrony is a predictor of mortality at three years follow up in patients with LBBB and stable HF.

668 Intramyocardial late gadolinium enhancement predicts cardiac mortality and hospitalization in patients with dilated cardiomyopathy
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Background: Late-gadolinium enhancement (LGE) cardiovascular magnetic resonance (CMR) has emerged as a useful diagnostic tool in the assessment of cardiomyopathies, but its prognostic value still needs to be established. Up to 30% of patients with dilated cardiomyopathy (DCM) have intramyocardial LGE. We evaluated the prevalence and prognostic value of the presence of intramyocardial LGE in patients with DCM.

Methods: Ninety three consecutive patients with DCM were divided into two groups in relation to the presence or absence of intramyocardial LGE, and followed prospectively for 498 days (28-1884). The primary endpoint was a composite of cardiac mortality and hospitalization.

Results: Intramyocardial LGE was present in 19 patients (20.4%), and this was associated with a higher rate of events, after adjustment for anemia, ACEI treatment and renal failure (adjusted HR 3.24, CI 95% 1.293-8.119) (see figure).

Conclusions: In our study up to 20% of patients with DCM have intramyocardial LGE, and its presence is a predictor of the composite event of cardiac death and hospitalization. This suggests that intramyocardial LGE hasa potential role in risk stratification of DCM patients.

669 The prognostic importance of secondary pulmonary hypertension in heart failure
J. Kjaergaard1; D. Akkan1; K.K. Iversen1; L. Kober1; C. Torp-Pedersen1; J. Kjaergaard1; D. Akkan1; K.K. Iversen1; L. Kober1; C. Torp-Pedersen1
1Copenhagen University Hospital Rigshospitalet, Cardiology B2141 Dept., Copenhagen, Denmark; 2Copenhagen University Hospital Bispebjerg, Cardiology Y Dept., Copenhagen, Denmark

Introduction: Increased right ventricular (RV) pressure secondary to increased left ventricular heart diastolic pressures is a frequent feature of heart failure (HF) patients, but the prognostic importance of this parameter remains to be established over the full spectrum of the disease. This study evaluated the long-term prognostic information from Doppler echocardiographic assessment of the peak Pulmonary Artery systolic pressure (PASP) in a large population admitted for HF.

Methods: A total of 433 patients admitted to hospital with HF, underwent trans-thoracic echocardiography including estimation of the RV systolic pressure, performed as part of the baseline screening for the ECHOIS trial (a placebo-controlled, randomized trial of a pre-synaptic dopaminergic agonist). RV systolic pressure was estimated from the peak tricuspid regurgitation velocity, as the mean of measurements from 5 cardiac cycles, RA pressure at 5 mmHg was added (fixed value). Left ventricular ejection fraction was estimated by wall motion score. Data are presented as medians (5 and 95 percentiles).

Results: The patients were followed for 2.9 (0.05-3.6) years, 207 (46%) died. The median age was 75 (54 to 96) years, 60% were male, and 64% had a medical history of HF. PASP was 37 (22-64) mm Hg and left ventricular ejection fraction 32 (15-60%). In univariate analysis, PASP divided into quartiles, was significantly related to mortality at 1 year and at end of follow-up, log-rank p<0.0001 for both. A multivariate Cox model (backward elimination) identified PASP as a significant predictor of mortality (hazard ratio (HR)=1.12, 95% CI: 1.06-1.18 per 5 mm Hg increase), independent of a prior medical history of chronic obstructive pulmonary disease (COPD) (HR=2.7, CI: 1.1-3.8), Renal failure (HR=2.1, CI: 1.4-3.1), ischemic heart disease (HR=1.4, CI: 1.0-1.9) and age (HR=1.5, CI: 1.3-1.7 per 10 year increase). Left ventricular ejection fraction was not a significant co-variate in the final model. If Tricuspid annular plane systolic excursion (TAPSE) as a measure of RV systolic function were available in 288 patients, and were included in the model PASP remained significant (1.22, CI: 1.14-1.32, HR=0.65, CI: 0.47-0.90), independent of RV systolic function (HR=0.65, CI: 0.47-0.90 for every doubling of TAPSE).

Conclusion: PASP is significantly associated with short-term, as well as long-term mortality in patients admitted for heart failure. This prognostic information is independent of significant co-morbidities, and seems to be a stronger predictor than left ventricular ejections fraction in these patients.

670 MPI is valuable index early after myocardial infarction but doubtful in long term prognosis of heart failure development
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1University Clinical Center Dr D.Misovic, Echocardiography Dept., Belgrade, Serbia and Montenegro

Background: Myocardial performance index MPI showed predictive value for inhospital cardiac events in the group of patients with myocardial infarction (MI). Aim: We tested the prognostic value of MPI for heart failure (HF) development in acute phase of myocardial infarction (MI) and after 6 months follow up.

Methods: Using conventional echocardiographic Doppler methods, left atrial (LA) dimension, end diastolic volume (EDV), end systolic volume (ESV), LV ejection fraction (LVEF), wall motion score index (WMSI), mitral inflow peak E and A velocities, E/A ratio, deceleration time (DTE), aortic flow ejection time (ET) isovolumic contraction (IVCT) and relaxation time (IVRT) were measured before and 6 months after MI. LV MPI = IVRT/ET was calculated. Assessment of LV function was done in first week, after one, three and six months.

Results: Forty consecutive patients aged 52.7 ± 14 years were divided after 6 months in two groups: patients without HF (47.3%) (Group I) and with HF (52.5%) (Group II). In first week after admission, MPI was signifi-
Diastolic function has been evaluated both in systolic heart failure (SHF) and heart failure (HF) with preserved systolic function (HFPFS). Tissue Doppler imaging (TDI) has been extensively used to assess diastolic function in heart failure patients. The purpose of this study was to compare diastolic function in SHF and HFPFS utilizing TDI.

Results: There was a moderate correlation between EF% and most all diastolic parameters (for only EF and E/E' correlation coefficient was equal 0.05). There were no differences in EF value according to Appleton inflow types. While S' wave velocity was strongly related to almost all DF parameters, especially to E/E' (Table 1). S' value was the highest in type 1 and the lowest in type 3 with significant difference between them (p<0.05).

Conclusion: Diastolic function is related to systolic function (only to S' wave velocity, not ejection fraction) in patients with heart failure and normal ejection fraction.
HEART FAILURE

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The changes of peripheral blood flow and flow-mediated dilation in hypertensive patients with chronic heart failure under treatment with carvedilol

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Purpose: To investigate the peripheral vascular effects of carvedilol.

Method and design: We examined 21 pts (age 59.8±2.3 years; 14 males) with stable CHF (NYHA II-III) with mean ejection fraction 31.4±2.2%. Carvedilol (average daily dose 23.6±3.8 mg) was administered for 12 weeks. 6-minute walk test (6mWT), ultrasonographic measurement of peak systolic (Vps) and diastolic (Ved) velocities in a dorsalis pedis (aDPF) and changes of a brachial diameter (D) (Celermajer method) were performed in 30 healthy subjects and in CHF group. Index of peripheral resistance (RI) was calculated by formula: RI=Vps/Ved/Vps.

Results: At baseline examination in CHF pts Vps and Ved were significantly lower than in controls (35.2±1.6 vs 51.2±4.3 cm/s, p=0.01 and 5.3±0.38 vs 11.3±2.46 cm/s, p<0.01, respectively) and RI was significantly higher than in controls (0.84±0.01 vs 0.77±0.03 units, p=0.01). D was significantly more in control (11.0±4.1% vs 4.4±0.02%, p<0.01). Under C treatment Vps and Ved substantially increased (from 34.5±1.61 to 42.3±1.88 cm/s, p<0.01 and from 5.5±0.34 to 11.0±2.4 cm/s, p<0.01, respectively, with corresponding decrease of RI (from 0.84±0.01 to 0.80±0.01 units, p<0.01); D increased significantly from 6.4±0.52% to 8.1±1.04% (p<0.01) and 6mWT distance also significantly increased from 396.5±28.5 to 460.0±28.6 (m) (p<0.001). The increment of RI diminution under C treatment and D increment after C treatment slightly correlated with 6 mWT distance increment after C (r=0.385, p=0.052 and r=0.308, p=0.057, respectively).

Conclusions: In stable CHF long-term treatment with C improves the exercise capacity evaluated by 6 mWT. This effect may be partly related to peripheral vascular effects of C (increase of arterial BF, improvement of flow-mediated dilation response).

HYPERTENSION/LV HYPERTROPHY

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Left ventricular longitudinal function in hypertensive patients with left ventricular hypertrophy regression

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1The Catholic University Of Korea Coll Of Med, Cardiology Dept., Seoul, Korea

Purpose: To investigate the longitudinal function in hypertensive patients with left ventricular hypertrophy (LVH) regression.

Method and design: We assessed 198 patients with HT, 211 with DM, and 180 with HT+DM and 198 with UR were finally included. Patients who have hypertension and/or diabetes induced uremia were only included to UR group. Ejection fraction (EF), midwall fractional shortening, early and late diastolic mitral inflow velocity (E, A), systolic and early diastolic tissue velocity (S', E') measured at septal mitral annulus, peak strain and systolic strain rate (SR) measured at mid-septum were compared.

Results: No differences were found in age, sex, LV dimension and thickness, LVEF, EF, diastolic grade, LA volume, E/E', relative wall thickness, and systolic SR between 4 groups. However, S', FS, and peak strain were significantly decreased in UR group than HT, DM or HT+DM groups (table). The value of S', FS, and peak strain were progressively decreased from HT or DM to UR.

Conclusions: Uremic myocardium have more serious contractile dysfunction than hypertensive or diabetic. Myocardial damages from hypertension and diabetes may be summated on myocardium of uremia.

Table 1. Comparisons of myocardial indices

<table>
<thead>
<tr>
<th></th>
<th>HT (n=198)</th>
<th>DM (n=211)</th>
<th>HT+DM (n=114)</th>
<th>UR (n=180)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF%</td>
<td>59.9±11.2</td>
<td>60.2±11.3</td>
<td>59.1±11.8</td>
<td>58.4±12.8</td>
</tr>
<tr>
<td>LVMI</td>
<td>167±33.7*</td>
<td>153±33.8*</td>
<td>158±52.9</td>
<td>146±53.2</td>
</tr>
<tr>
<td>S' (cm/s)</td>
<td>8.6±1.7*</td>
<td>8.1±2.1</td>
<td>8.0±2.1</td>
<td>7.8±1.4</td>
</tr>
<tr>
<td>E' (cm/s)</td>
<td>7.0±2.0</td>
<td>7.0±2.0</td>
<td>6.6±2.0</td>
<td>6.3±2.2</td>
</tr>
<tr>
<td>E/E'</td>
<td>1.12±0.4*</td>
<td>1.14±0.5</td>
<td>1.04±0.4</td>
<td>1.24±0.3</td>
</tr>
<tr>
<td>peak strain</td>
<td>24.5±7.2*</td>
<td>26.8±6.9*</td>
<td>22.7±9.6*</td>
<td>19.6±6.8</td>
</tr>
<tr>
<td>systolic SR (1/s)</td>
<td>-1.7±0.6</td>
<td>-1.6±0.8</td>
<td>-1.5±0.5</td>
<td>-1.5±0.4</td>
</tr>
</tbody>
</table>

HT: hypertension, DM: type 2 diabetes, UR: uraemia, *p<0.05 vs UR, #p<0.05 vs DM

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Filling pressures and deformation parameters in hypertension and in diastolic dysfunction

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Background: Elevated filling pressures is the dominant feature in diastolic dysfunction with functional and prognostic implications. Transmitral E to annular Ea velocity ratio (E/Ea) reliably predicts left ventricular(LV) filling pressures. Strain and strain rate deformation parameters are able to quantify regional LV function.

Aim: To investigate the relationship of filling pressures estimated by E/Ea, with deformation parameters of longitudinal systolic function and the remodeling process in hypertension.

Methods: We evaluated 52 hypertensive and 24 controls, matched for age (49.7±5.7 vs 45.5±4.1 years), BSA (1.30±0.1 vs 1.96±0.2 m²) and normal EF (66±2.5 vs 64±3.3%). All subjects had 2D, tissue Doppler imaging (TDI) of the myocardial segments and color doppler myocardial imaging of basal and mid LV segments (12) in the longitudinal axis. Mean longitudinal strain (S) and strain rate (SR) were averaged from each of the 12 segments assessed. Systolic BP, mean arterial pressure (MAP), wall thickness (WT), relative wall thickness and systolic tissue velocity (S', FS) were measured at basal segments.

Results: Global diastolic dysfunction was evident in 64% of hypertensive (56% abnormal relaxation and 8% pseudonormal type) and 16.7% of control subjects. Filling pressures (E/Ea ratio) correlated with SystolicBP (r: 0.66, p<0.001), MAP (r: 0.47, p<0.05), WT (r: 0.39, p<0.05), RWT (r: 0.44, p<0.05), mean S (r: -0.31, p<0.05), mean SR (r: -0.48, p<0.001). Hypertensives had higher filling pressures (E/Ea: 11.3±3.8 vs 7.2±1.4, p<0.001) and lower mean S and SR (21.8±2.2 vs 20.5±2.0%, p<0.05 and 1.34±0.16 vs 1.54±0.13/s, p<0.05), compared to controls. Subjects with diastolic dysfunction had higher filling pressures (E/Ea: 11.7±4.2 vs 8.2±2.1, p<0.05) and lower mean longitudinal S and SR (19.7±2.2 vs 18.0±2.3%, p<0.05 and SR: 1.32±0.18 vs 1.47±0.14, p<0.05) compared to those without diastolic dysfunction.

Conclusion: Diastolic dysfunction and LV remodeling consist the principal pathophysiological factors, responsible for the elevated filling pressures in hypertension. Filling pressures are adversely related with longitudinal systolic function in hypertensive disease.

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Left ventricular hypertrophy diagnosed by the new criteria in hypertensive patients

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1Hospital de Galdakao, Vizcaya, Spain

Left ventricular hypertrophy (LVH) is a major risk factor of cardiac dysfunction in hypertensive patients. The criteria for diagnosing LVH and the different types of geometric abnormalities of the left ventricle have been recently changed.

Eur J Echocardiography Abstracts Supplement, December 2006
Aims: 1. To compare the distribution of the 4 geometric patterns of the LV H with classic criteria for LVH (mass index >125 gr/m2 and relative wall thickness >0.44) with the actual ASE recommendations (mass index >115 gr/m2 in males and >95 gr/m2 in women and relative wall thickness >0.42) in hypertensive patients. 2. To evaluate the diastolic function and the filling ventricular pressures in all geometric patterns.

Methods: We prospectively 160 hypertensive patients in sinus rhythm. We measured: mass index, relative wall thickness E, A, E/A, and DTE from transmitial Doppler e, e, a, e/e from tissue Doppler at the level of the septal and lateral mitral annulus. We found four geometric patterns: Normal LV, concentric remodeling, concentric hypertrophy and eccentric hypertrophy. Some of the results are shown in the table.

Conclusions: With the new criteria only 16% of the hypertensive patients have a normal geometric pattern of the LV and nearly 50% have concentric hypertrophy. Left ventricular filling pressures were similar between groups, independently of the used criteria for LVH.

Results: Table 1.

<table>
<thead>
<tr>
<th>Previous criteria</th>
<th>Normal</th>
<th>Conc.R</th>
<th>ConcLVH</th>
<th>ExLVH</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/A</td>
<td>1.1±0.2</td>
<td>1.05±0.2</td>
<td>0.7±0.9</td>
<td>0.83±0.2</td>
</tr>
<tr>
<td>New criteria</td>
<td>7.6</td>
<td>9.3</td>
<td>12.3</td>
<td>12.4</td>
</tr>
</tbody>
</table>

Table 1

679 Different type of left ventricle hypertrophy and prognosis of patient with arterial hypertension and ischecmic heart disease

A. Ibatov
Moscow Medical Academy, Cardiology Dept., Moscow, Russian Federation

Purpose: To study influence of arterial hypertension (AH) and left ventricle hypertrophy (LVH) on prognosis of patients with ischemic heart disease (IHD).

Materials and methods: 197 patients with AH and IHD (average age 57.4±6 years) were examined. All patients had angina pectoris of 11-1V functional class. The detection of left ventricle hypertrophy and remodeling type were studied by echocardiography. A left ventricle hypertrophy was estimated if the left ventricle myocardium mass index was above 110 gr/m2 for the women and 134 gr/m2 for the men. Relative wall thickness (RWT) of a left ventricle was calculated as the ratio of the sum of an interventricular septum thickness and the the left ventricle posterior wall thickness to end-diastolic dimension. The concentric type left ventricle hypertrophy was estimated if RWT >0.45 and eccentric left ventricle hypertrophy - if RWT <0.45. Patients were observed during 24.7±3.8 months. The follow end points were taken: myocardial infarction (fatal and nonfatal), unstable angina pectoris, surgical methods of myocardial revascularization (coronary artery bypass surgery and percutaneous transluminal coronary angioplasty). Also two combined points were analysed. First included all nonfatal cardiovascular events and second - all cardiovascular events (including death from IHD). Kaplan-Meier method was used to study influence of different factors on cardiovascular events. Statistical significant differences were determined by Cox F-Test.

Results:62 events were registered: 4 cases of myocardial infarction (2 cases of fatal and 2 cases of nonfatal), 14 cases of unstable angina pectoris, 14 cases of surgical myocardial revascularization, 6 cases of death not connected with cardiovascular pathology, 8 cases of death from all causes (toxemia, pneumonia, cancer). There were 30 nonfatal cardiovascular events and 32 cases of all cardiovascular events. Patients with LVH had tendency of increasing total mortality (p=0.167) in comparison with patients without LVH. Patients with eccentric LVH had higher total mortality (p=0.031), more myocardial infarctions (p=0.032) and all cardiovascular events (p=0.188) versus patients with concentric type LVH.

Conclusions: Thus, left ventricle hypertrophy worsens prognosis of patients with arterial hypertension and ischemic heart disease. Eccentric type of left ventricle remodeling is worse for prognosis then concentric type LVH.

680 The association of Tissue Doppler Imaging with cardiac mass index in hypertensive patients

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1Railway Health Care Institute, Cardiology Dept., Belgrade, Serbia and Montenegro; 2University Clinical Center Of Vojvodina, Cardiology Dept., Belgrade, Serbia and Montenegro

Purpose: To compare the distribution of the 4 geometric patterns of the LVH with classic criteria for LVH (mass index >125 gr/m2 and relative wall thickness >0.44) with the actual ASE recommendations (mass index >115 gr/m2 in males and >95 gr/m2 in women and relative wall thickness >0.42) in hypertensive patients. We also measured: i) E and A waves and E/A ratio

Methods: We compared 62 hypertensive patients in sinus rhythm. We measured: mass index, relative wall thickness E, A, E/A, and DTE from transmitial Doppler e, e, a, e/e from tissue Doppler at the level of the septal and lateral mitral annulus. We found four geometric patterns: Normal LV, concentric remodeling, concentric hypertrophy and eccentric hypertrophy. Some of the results are shown in the table.

Conclusions: With the new criteria only 16% of the hypertensive patients have a normal geometric pattern of the LV and nearly 50% have concentric hypertrophy. Left ventricular filling pressures were similar between groups, independently of the used criteria for LVH.

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<td>E/A</td>
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<td>1.05±0.2</td>
<td>0.7±0.9</td>
</tr>
<tr>
<td></td>
<td>7.6</td>
<td>9.3</td>
<td>12.3</td>
</tr>
</tbody>
</table>

Table 1

681 Estimation of aortic compliance, left ventricular remodeling and diastolic dysfunction relation in hypertensive patients

A. Stevanovic 1 ; M. Dekleva 2 ; B. Pencic 1 ; Lj. Sevic 1 ; V. Andric 1
1Railway Health Care Institute, Cardiology Dept., Belgrade, Serbia and Montenegro; 2University Clinical Center Of Vojvodina, Echocardiography Dept., Belgrade, Serbia and Montenegro

Background: Hypertension has a direct effect on myocardial wall anatomy and global systico-diastolic performance and function. Systemic hypertenison is also associated with aortic distensibility (AD) decrease. Doppler tissue echocardiography is a technique which offers useful information about pathophysiology of hypertensive heart disease and about left ventricular diastolic dysfunction (LVDD).

Aim: In present study we sought to determine the association between hypertensive left ventricular (LV) remodeling, characterized by mild or mild LV dilatation, LVDD and aortic compliance decrease.

Material: 104 patients (55±8 years old, 54 men) with essential hypertension 30 patient or 28.8% had normal echocardiography findings and 74 or 71% had changed LV geometry. All patients were without any other heart disease, diabetes mellitus, pulmonary or renal disease and had preserved LV systolic function (EF=61±9%).

Methods: Aortic distensibility (AD) was calculated from measurements a aortic diameter and arterial pressure. Aortic tissue Doppler (TDI) velocities (Aortic e, a, a) were measured above the aortic valve.

Results: LVDD was diagnosed by right atrial wall thickness and cardiac mass and LV dilatation by enddiastolic dimension (EDD) and both LV volumes (EDV and ESV). We measured velocity of early and late diastolic LV filling (E, A) and, deceleration E time from transmitial Doppler, and corresponding velocities from tissue Doppler (TDI) at the level of the septal mitral annulus (e, a, e/a) including E/e ratio.

Results: There was significant difference E/e level between patients with normal echocardiographic findings and patients with LV geometry changes (t=2.76; p=0.007) and significant correlation between E/e and Aortic e (r=0.483; p=0.001) more expressed in group of patients with Aortic e <0.05 m/s in 26 patients (p=0.001). Aortic compliance expressed by AD showed an increased aortic stiffness in hypertensive patients with LV remodeling (t=1.65; p=0.007) and significant correlation with Aortic e (r=-0.309; p=0.004).

Conclusions: In hypertensive patients LV remodeling cause abnormal diastolic function which associate with reduced aortic compliance. Aortic e wave can be independent index of aortic stiffness and can be useful in estimation of LVDD in patients with hypertensive heart disease.

682 Impact of leptin levels upon left ventricular structural abnormalities in non-insulin dependent diabetics

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Purpose: Non-insulin-dependent diabetes mellitus adversely affects left ventricular (LV) structure. Recent studies have shown that leptin increases in insulin-resistant states, such as obesity and hypertension. The levels of plasma leptin have been found to be associated with LV myocardial growth. This study aimed to assess fasting serum leptin concentrations in the type 2 diabetic patients and to find the correlation between fasting serum leptin concentrations and the LV structural changes in the type 2 diabetic patients.

Methods: Twenty four type 2 diabetic patients aged 51.1±7.2 years with LV structural changes defined as fasting plasma glucose ≥136 mg/dl. Twenty four type 2 diabetic patients without LV structural changes, aged 47.6±9.0 years, were the controls. The following LV structural parameters were assessed:

Results: Twenty four type 2 diabetic patients aged 51.1±7.2 years with LV structural changes defined as fasting plasma glucose ≥136 mg/dl. Twenty four type 2 diabetic patients without LV structural changes, aged 47.6±9.0 years, were the controls. The following LV structural parameters were assessed:

Conclusions: The mean leptin level were significantly higher in the type 2 diabetic patients than in the controls (p=0.040). The correlation analysis indicated a significant positive correlation between fasting serum leptin concentrations and LV mass index and LV end-systolic diameter (r=0.39, p=0.038).

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(LA) and aortic root (Ao) dimensions were also assessed. Fasting serum leptin and insulin, Fasting blood sugar (FBS) and glycosylated hemoglobin (HbA1c) were assessed. The correlations of leptin to LV structural parameters were statistically analyzed.

Results: Body mass index (BMI), FBS and fasting serum concentrations of leptin and insulin were significantly greater in the case patients than in the controls. There were statistically significant differences between groups in all echocardiographic parameters apart from LVEDD, LVEFD, RWT, LA and AO. In the case group, Leptin was positively correlated with FBS and insulin. Also, a significant correlation was found between serum leptin and the following echocardiographic parameters: PWT, IVST, SWT and LVMII in the case group.

Conclusion: Hyperleptinemia in type 2 diabetic patients with LV structural changes and the association of leptin with indexes of LV structure may reflect a role in the development of myocardial wall thickening in non-insulin dependent diabetes mellitus.

683 Radial deformation properties of left ventricle in patients with concentric hypertrophy and relaxation impairment: an echocardiographic study using speckle tracking
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Purpose: Speckle tracking is a novel approach to quantify regional left ventricular function from routine gray-scale 2D images. It allows to assess myocardial strain independent from angle. This capability of the technique permits evaluation of strain and strain rate determination of the short axis of left ventricle (LV), which was formerly impracticable with “Tissue Doppler imaging” due to non parallel alignment of the ultrasound beam. From this point of view, we compared radial deformation properties of left ventricle in patients with concentric hypertrophy and healthy adults.

Material and methods: 12 patients with concentric left ventricular hypertrophy due to hypertension and had a normal coronary angiogram or a normal myocardial perfusion scintigraphy within the last two months (Group A) and 12 healthy age and sex matched adults (Group B) have undergone routine 2D echocardiography. Cine loops from 3 consecutive beats were obtained at end-expiratory apnea from mid-LV short-axis view. Left ventricular ejection fraction (LV EF) was assessed by biplane Simpson’s rule. Radial strain and radial strain rate was analyzed with a dedicated software offline from six segments (anteroseptum, anterior, lateral, posterior, inferior, septum).

Results: LV EF was higher in Group A than in Group B (70.75±5.19% vs 64.98±4.78%, p=0.01). LV Mass Index was significantly higher in Group A than in Group B (193.82±31.09 gm/m2 vs 77.16±17.58 gm/m2, p<0.001). Radial strain values were significantly higher in all six segments of the LV in Group B than Group A (all p values <0.001). Radial strain rate values were higher in 4 segments in Group B than Group A (all p values <0.001; except for inferior [p=0.067] and septum [p=0.071]). Averaged radial strain and strain rate values from all six segments were higher in Group B than Group A (58.92±4.76% vs 39.88±10.83%; 2.26±0.35 1/s vs 1.74±0.78 1/s respectively; p<0.001 for both measurements). There was a negative correlation between LV mass index and averaged radial strain and strain rate (r=-0.67, p<0.001; r=-0.51, p<0.05 respectively).

Conclusions: Although conventional systolic performance measurements, LV EF, were within normal limits or even higher in patients with concentric hypertrophy, radial strain and strain rate values were lower. This demonstrates that concentric hypertrophy of the left ventricle is actually a state of hypococontractility.

684 Time interval between the onset of mitral inflow and mitral annular motion to evaluate left ventricular filling pressure and its correlation with NT-proBNP in patients with essential hypertension
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Background: It was reported that the time interval between early diastolic mitral inflow velocity (E) and mitral annular early diastolic velocity (Ea) is proportional to left ventricular (LV) diastolic dysfunction in an experimental model because of delayed LV relaxation The aim of our study was to investigate whether this time interval would enable to evaluate filling pressure and its correlation with NT-proBNP values in essential hypertensive patients.

Methods: We prospectively enrolled 60 patients. To calculate the time interval between E and Ea, we measured the time from R wave on the ECG to the onset of both E and Ea, and RR interval at the same cardiac cycle to adjust by heart rate We compared the time interval with E/Ea and E/Ea adjusted by RR. The correlation between E/Ea and E/Ea adjusted by RR and NT-proBNP values was performed in 60 patients.

Results: The time interval between E and Ea was 2.34±0.36s vs 1.74±0.78s respectively; p<0.001 for both measurements). There was a negative correlation (58.92±4.76% vs 39.88±10.83%; 2.26±0.35 1/s vs 1.74±0.78 1/s respectively; p<0.001 for both measurements). There was a negative correlation (58.92±4.76% vs 39.88±10.83%; 2.26±0.35 1/s vs 1.74±0.78 1/s respectively; p<0.001 for both measurements). There was a negative correlation (58.92±4.76% vs 39.88±10.83%; 2.26±0.35 1/s vs 1.74±0.78 1/s respectively; p<0.001 for both measurements).

Conclusions: There are numerous echocardiographic measurements required to make a diagnosis of diastolic dysfunction with no consensus as to a normal range for these parameters. Diastolic dysfunction is increasingly recognized as an important prognostic marker, which untreated may result in systolic dysfunction or restrictive filling patterns. We have recently published a novel index of left ventricular stiffness (the King index- KI), which provides a simple method of differentiating hypertrophic cardiomyopathy (HCM) from athletic hypertrophy. In this study we aimed to further validate this measurement by assessing the left ventricular stiffness in patients with HCM and hypertension and examining the relationship to BNP.

Methods: Eighteen patients undergoing normal trans-thoracic echo were enrolled. Eight patients had a diagnosis of HCM (2 Females and 6 males mean age 64 years), 10 Hypertension (4 females and 6 males, mean age 62 years). Standard echocardiography and Doppler was carried out using a Phillips 5500 machine. Tissue Doppler measurements included the averaged e’ relaxation velocity at four annular sites. KI was calculated from E/E’/ LVEDD to give a measure of stiffness. Blood was taken and BNP measured. Results: The KI and the BNP were significantly higher in the HCM than the hypertensive group 2.61±1.53 (p=0.04) and 261.81±2493 (p<0.001) respectively. Though BNP correlated with E/A (p=0.004) the association with the KI was stronger (p<0.001).

Conclusion: The KI is a simple measure of LV stiffness providing a rapid index of diastolic dysfunction utilising both pressure and volume indices. It is a more sensitive measure of diastolic dysfunction and could be positive before other manifestations of myocardial stiffness become evident

686 Patients with arterial hypertension and no coronary heart disease had subclinical left ventricular dysfunction as assessed by tissue Doppler echocardiography
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Background: Arterial hypertension is associated with subendocardial chronic ischaemia and fibrosis, both leading to subendocardial dysfunction. However, diagnosis of subendocardial dysfunction is difficult at rest, and often needs assessment of functional reserve by dobutamine stress tissue Doppler echocardiography.

Objectives: To measure regional ventricular function at rest and during stress, in order to assess if patients with arterial hypertension and no other clinical heart disease have subclinical myocardial dysfunction.

Methods: 70 subjects (35 with arterial hypertension, with no symptoms or signs of coronary heart disease, and 35 age-matched normals) (56±10 years, 42 men) had echocardiography at rest and during dobutamine stress. Myocardial velocities were measured offline from digital image loops of tissue Doppler. Longitudinal functional reserve was assessed from the mean velocities of 4 basal segments (apical views) and radial function from the velocities of the basal posterior wall (parasternal view). Systolic functional reserve was calculated as the absolute increase in velocity from baseline.

Results: Global ejection fraction was not different between groups, whereas LV mass index was increased in patients with hypertension (144±31 vs 101±24 g/m2, p<0.001). Longitudinal peak systolic and diastolic velocities were lower in patients with hypertension at rest (5.3±3.1 cm/s vs 6.5±1.1 cm/s, and -5.6±2.2 cm/s vs -7.6±1.9 cm/s, respectively; p<0.001), whereas radial peak systolic velocities at rest were compensated (5.2±1.2 cm/s vs 4.7±1.4 cm/s, p=0.01). Similarly, longitudinal peak systolic velocities were lower in patients with hypertension at peak stress (11.3±2.9 cm/s vs 14.3±2.1 cm/s, p<0.001), as was also the systolic functional reserve (+6.0±3.0 cm/s vs +7.7±1.7 cm/s, p<0.001).
Conclusion: Patients with arterial hypertension have subclinical subendocardial dysfunction both at rest and peak stress. This can be diagnosed easily by tissue Doppler, so it can be monitored during treatment to reduce cardiovascular complications of hypertension.

687 Filling pressure is increased in hypertensive patients with left ventricular geometry: a Tissue Doppler evaluation

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Purpose: Hypertensive patients with concentric left ventricular (LV) geometry often present abnormal diastolic relaxation but little is known about magnitude of their LV filling pressure. Our aim was to evaluate LV filling pressure non invasively, by pulsed Tissue Doppler, in a population including both normotensive and hypertensive subjects, in relation with aging and abnormalities of LV geometry.

Methods: After exclusion of diabetes mellitus, heart failure, primitive/valvular cardiomyopathies and coronary disease (angina and/or ECG signs at rest/ maximal treadmill exercise), 162 normotensive subjects and 71 firstly diagnosed, never treated hypertensive patients underwent Doppler echocardiography including Tissue Doppler of mitral annulus. The average of lateral and septal annular early diastolic velocity (Em) was determined and transmitral E velocity (E)/Em ratio (E/Em ratio) calculated as an index of LV filling pressure. According to the values of relative wall thickness (RWT), the population was divided in 2 groups: 39 with concentric LV geometry (RWT ≥0.43) and 194 with normal or eccentric geometry (RWT<0.43).

Results: The two groups were similar for sex and heart rate (HR) while age p<0.0001), body mass index (BMI) (p<0.003), systolic and diastolic blood pressure (BP) (both p<0.0001) were higher in patients with RWT>0.43. They also had higher LV mass (p<0.003), lower transmitral E/Em ratio (1.1:1.03 vs 1.42:1.04, p<0.001) and longer deceleration time (p<0.02). E/Em ratio was 7.41±2.1 in presence of RWT>0.43 and 6.54±1.6 with RWT<0.43 (p<0.01). In the overall population, after adjusting for BMI, systolic BP, HR and E/Em ratio by a multiple linear regression analysis, age (β coefficient =0.39, p<0.0001) was the main predictor of E/Em ratio, with a marginal independent contribution of RWT (β=0.16, p=0.03). Similar findings in the hypertensive subgroup showed independent association of E/Em ratio with RWT (β=0.32, p<0.01) but not with age (β=0.23, NS).

Conclusions: The increase of E/Em ratio is associated with LV concentric geometry in uncomplicated arterial hypertension. These findings show that the increase of LV filling pressure is independent of age and BP and occurs even in presence of transmitial pattern of impaired relaxation when LV geometry abnormalities become overt.

688 Prevalence of sleep-disordered breathing and its impact on left ventricular remodeling in patients with essential hypertension

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Objective: To investigate the prevalence of sleep-disordered breathing (SDB) and evaluate its impact on left ventricular remodeling in adult patients with essential hypertension (EH).

Methods: Ambulatory sleep recording for 8 h was performed in 82 patients with EH and the left ventricular ejection fraction (LVEF), internal end-diasotic diameter (LVIDd) and left ventricular mass weight (LVMW) were measured using M-mode and two-dimensional echocardiography.

Results: The incidence of SDB defined as an apnea-hypopnea index (AHI, namely the number of apnea-hypopnea events per hour during sleep) no less than 10 was 63.28% in these EH patients (78.65% in male and 35.78% in female patients). Of the 82 patients 32.3% had mainly obstructive sleep apnea (OSA) and 18.4% had central sleep apnea (CSA). There was a moderate inverse correlation between LVEF and AHI (p=0.006, r=-0.355). LV mass in patients with SDB and H patients was significantly greater than that in patients with isolated E (45.56±8.31 vs 56.81±10.67 mm, p<0.01). The left ventricular myocardial weight was also greater in patients with EH and SDB than in patients with isolated E (219.34±54.22 vs 305.07±23.4, p=0.001).

Conclusion: Our results suggest a higher prevalence of SDB in patients with EH than the prevalence, and the progression is even higher in patients with severe EH in relation to left ventricular remodeling. SDB contributes to the progression of EH and further cardiac decline by a vicious cycle.

689 Prognostic value of doppler tissue imaging regional analysis in hypertension

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Spectral Doppler tissue imaging (DTI) has the capacity to analyse left ventricular (LV) longitudinal (LF) and transversal (TF) myocardial function in each wall segment, however its prognostic value in certain pathologies such as systemic arterial hypertension (H) is still unknown.

Purpose: The aim of our study was to assess the prognostic value of DTI indices among H pts in terms of major cardiovascular (CV) events during a long term follow-up. We studied a group of 66 H pts with LV hypertrophy, mean age 61±15 years, 63% male gender, with normal LV global systolic function. By conventional transthoracic Doppler echocardiography in each case we calculated the left atrial (LA-mm), LV end-systolic (ESD-mm) and end-diastolic (EDD-mm) diameters, LV end-systolic (EDV-m1) and end-diastolic (EDVI-m1) volumes, LV percent fractional shortening (LV%FS-%) and ejection fraction (LV%EF-%), interventricular septum (IVS-mm) and posterior wall (PW-mm) thickness, LV mass (LVM-g) and LVM index (LVMi-g/m2).

Conclusions: The spectral DTI analysis of systolic and diastolic phases of regional LV myocardial function has the capacity to give useful prognostic information with important impact in the clinical management.
VASCULAR FUNCTION/AORTIC DISEASE

691 Intracardiac echocardiography for conservative aortic valve surgery: A new investigative tool
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Background: Dilation of aortic annulus and sino-tubular junction (STJ) is a characteristic lesion of dystrophic aortic insufficiency. A standardized approach of conservative aortic valve surgery has been succeeded using external expandable aortic ring. Intracardiac Echocardiography (ICE) was used to study aortic root dynamics before and after conservative aortic valve surgery on one model.
Methods: Six sheep underwent a double sub and supraavalvular annuloplasty, performed by the implantation of 2 expandable rings, at the level of the aortic annular base (22 mm ring) and sino-tubular junction (STJ, 18 mm ring). Images were obtained using ICE (AcuNav®, Siemens) with high resolution probe (5 to 10 MHz), introduced through the left internal jugular vein into the right atrium. Coaptation height and expansion of the aortic root were studied.
Results: Aortic root parameters were analyzed before (B) and after (A) the implantation of the expandable prosthetic rings (table 1), which produced significant reduction of annulus and STJ diameters, respectively -36.5% and -33.9%, without significant gradient. ICE allowed good visualization of valvular coaptation, with a mean coaptation height of 0.27±0.07 cm pre-implantation and 0.46±0.07 cm after implantation (p<0.001).
Conclusion: Implantation of expandable aortic ring prosthetic ring reduces aortic annulus and STJ diameters, increases leaflet coaptation area while preserving aortic root expansibility.

Table 1. Aortic root dynamics on ICE

<table>
<thead>
<tr>
<th>Ascending aorta B</th>
<th>A</th>
<th>Sino-tubular junction B</th>
<th>A</th>
<th>Sinuses of Valsalva B</th>
<th>A</th>
<th>Aortic annulus B</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.4±0.4</td>
<td>12.8±0.3*</td>
<td>19.1±0.3</td>
<td>12.9±0.5*</td>
<td>28.5±0.5</td>
<td>17.6±0.4*</td>
<td>18.6±0.2</td>
<td>11.8±0.4*</td>
</tr>
<tr>
<td>22.4±0.5</td>
<td>14.1±0.4*</td>
<td>21.7±0.5</td>
<td>14.9±0.6*</td>
<td>29.5±0.4</td>
<td>18.9±0.6*</td>
<td>21.3±0.2</td>
<td>14.1±0.23*</td>
</tr>
<tr>
<td>10.0</td>
<td>9.2</td>
<td>13.4</td>
<td>6.2</td>
<td>3.5</td>
<td>6.6</td>
<td>14.4</td>
<td>7.8</td>
</tr>
</tbody>
</table>

*After versus Before, p<0.05

692 Atherosclerosis of the aorta by Transoesophageal Echocardiography: severity, location and clinical implications. Results from the ARTE Atherosclerosis of the aorta by Transoesophageal Echocardiography: severity, location and clinical implications.
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Background: The diagnosis by TEE is frequently the first subclinical evidence of atherosclerotic disease, but cautious analysis is needed to establish causality relationships with embolism.

693 Increased aortic stiffness in glycogenosis type 2 (Pompe’s disease) A. Nemes 1; M.L. Geleijne 1; N.A.M.E. Van Der Beek 1; P.A. Van Doorn 1; O.I. Soliman 1; E. Csajbok 2; H. Gavaller 1; F.J. Ten Cate 1
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Background: Pompe’s disease, also known as acid maltase deficiency or glycogen storage disease type II, is an autosomal recessive disorder in which deficient activity of the enzyme acid β-glucosidase causes intra-lysosomal accumulation of glycogen in muscle and other tissues. The current study was designed to assess aortic stiffness index (B), as a characteristic of aortic elasticility during transhoracic echocardiography in patients with Pompe’s disease.

Methods: Twenty five male (54 years ±15) controls, all with no known CV disease were studied prospectively. Aortic stiffness index (B) was measured in patients compared to controls (14.6±10.5 vs 5.1±2.6, p<0.001).

Conclusion: The results of this study indicate that aortic stiffness is increased in patients with Pompe’s disease. This may be due to glycogen storage in the vessel wall causing reduced vascular elasticity.

694 Reduced vascular compliance appears to be the first manifestation of premature atherosclerosis in chronic kidney disease
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Purpose: End-stage chronic kidney disease (CKD) is characterised by impaired arterial distensibility (atherosclerosis) and ventricular function (urticaremyopathy), both of which are independent predictors of cardiovascular (CV) mortality. Reduced systemic arterial compliance has been extensively documented in dialysis patients but there are no prospective data regarding its presence or impact on cardiac function in early CKD (eCKD). The aims of this study were to determine whether aortic compliance is reduced and the relative time-course of vascular and ventricular changes in eCKD.

Material and methods: Nine, five male (54 years ±18) eCKD patients (estimated GFR 40-60 ml/min) and 12 age and gender matched (54 years ±15) controls, all with no known CV disease were studied prospectively. CMR (1.5T Siemens Sonata Symphon®) was performed for assessment of LV systolic function, mass and aortic distensibility (mm Hg-1x10⁻⁰⁻³). Distensibility was measured in the ascending aorta at the level of the right pulmonary artery and calculated using standard formulae (Ao/area x pulse pressure). Diastolic function was assessed using standard transthoracic and pulsed tissue doppler techniques within 24 hours of CMR (GE Vingmed Vivid 7).

Results: Mean aortic distensibility was lower in eCKD patients than controls (2.7±0.3 mm Hg-1x10⁻⁰⁻³ vs 4.1±0.5 mm Hg-1x10⁻⁰⁻³, p<0.01) despite normal 24-hour ambulatory BP (121±27/72±2 mmHg). There was no difference in mean LV systolic function (EF 63%±0.02 vs 64%±0.02), LV mass (75.6±3.3 g/m² vs 69.4±3.3 g/m²) nor standard echo parameters of LV relaxation (E/A, DT, IVRT, colour flow propagation, E/Em).

Seven eCKD patients (27%), but no controls had an increased LV mass above normal gender-specific limits and these patients had further impairment in arterial compliance (2.1±0.4 mm Hg-1x10⁻⁰⁻³) compared with eCKD patients with a normal LV mass (2.9±0.3 mm Hg-1x10⁻⁰⁻³). In the subset of eCKD patients with LV hypertrophy, E/Em was significantly increased compared with a normal LV mass and to controls (7.2±0.5 vs 5.4±0.3 vs 5.2±0.4, p<0.05).

Conclusion: Patients with eCKD have reduced arterial compliance before detectable changes in ventricular systolic and diastolic function. In a subset of eCKD patients with LV hypertrophy, arterial compliance was coupled with an increase in LV mass and changes suggestive of reduced LV relaxation in the absence of hypertension. We speculate that arterial stiffness in eCKD is the primary stimulus to after-load dependent LV remodelling with increased LV mass and then ventricular stiffness.
Relationship between structural changes of large artery and echocardiographic parameters in patients with essential hypertension

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Purpose: To investigate the structure of a. femoralis (a.F), relationship between structural changes of a.F and echocardiographic parameters of the left ventricle, the state of peripheral arterial blood flow (BF) in patients (pts) with essential hypertension (EH).

Design and methods: Ultrasonography of a.F., a. dorsalis pedis (a.DP) and a.tibialis posterior (a.TP) were performed in 88 patients (age 51.5±1.5 years; 61 males) with EH grade II and in 30 age-matched healthy subjects. Structural parameters of the left ventricle were obtained by echocardiography. Diameter (D), intima-media thickness (IMT) of a.F, thickness of interventricular septum (IVS) and left ventricular posterior wall (PW) as well as peak systolic (Vps) and diastolic (Ved) velocities in a.DP and a.TP were measured; index of relative wall thickness (RWT) of a.F was calculated by formula: RWT=IMT/D; index of peripheral resistance (RI) was calculated by formula: RI=Vps/Ved.Vps. Kaplan-Meier 12-months survival analysis was performed for RWT based on ≤ below median versus. above median approach.

Results: In hypertensive pts IMT and RWT were significantly higher (IMT: 0.99±0.16 vs 0.59±0.09 mm, p<0.001; RWT: 0.16±0.03 vs 0.10±0.01 unit, p<0.001) than in controls. Correlation analysis have shown that RWT related to thickness of IVS and PW (IVS: r=0.60, p<0.001; PW: r=0.68, p<0.001). Vps and Ved were significantly lower in pts with EH (Vps: 8.1±0.48 cm/s, p<0.001; Ved: 5.1±0.39 cm/s, p<0.001, respectively; and RI was significantly higher (a.DP: 0.83±0.04 vs 0.77±0.02 unit, p<0.01; a.TP: 0.83±0.03 vs 0.77±0.02 unit, p<0.01) than in controls. Kaplan-Meier 24-months survival analysis was performed in relation to the RWT (p=0.038). Significantly lower survival was apparent in pts with RWT>0.16.

Conclusions: The present study indicate that process of remodeling in coronary arteries is associated with an increased risk of acute coronary events (ACE).

Stunned endothelium assessed by FMD - does it exist?

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Some hypotheses have been put forward on transient episodes of ischaemia resulting in reversible endothelial dysfunction, a phenomenon referred to as ‘stunned endothelium’. Aim: to measure endothelium-dependent brachial artery flow-mediated dilation (FMD) and NTG-mediated dilation (NTG-MD) by ultrasound on consecutive days post-STEMI days (see table 1).

Methods: 172 subjects were examined: 130 patients with stable CAD (CCS II/III; mean age: 61.1±8.9 years), 27 post-STEMI patients (mean age: 61.2±10.9 years; STEMI: anterior wall n=19; inferior wall n=8; treatment: aspirin, clopidogrel, statins, heparin, interleukin 1 receptor antagonist). FMD was measured by high-resolution ultrasound as the percent change of brachial artery diameter after 3 min occlusion, and following the administration of 0.4 mg sublingual nitroglycerin (NTG-MD) - in the STEMI patients the measurements were performed on 1st, 2nd, 3rd day post myocardial infarction.

Results: The FMD values were comparable in stable angina and in STEMI patients; the results were significantly decreased in comparison to the controls. There were no differences between FMD as measured on consecutive post-STEMI days (see table 1).

Conclusion: CAD patients show endogenous vasodilator dysfunction, which is comparable in stable angina and STEMI. STEMI does not affect FMD as measured on consecutive post-STEMI days (see table 1).

Inhibition of Interleukin-1 activity improves coronary flow, endothelial function and aortic wall properties: a randomized cross-over, placebo-controlled, trial

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1Athens, Greece

Background: Interleukin-1 plays an important role in the pathophysiology and progression of inflammation and may be involved in regulation of coronary vasomotor tone. Anakinra, a human recombinant interleukin-1 receptor antagonist, has been used as an anti-inflammatory agent in patients with rheumatoid arthritis. We investigated the effects of anakinra on endothelial function, arterial wall properties and coronary flow.

Patients and methods: 20 patients (16 female 4 male, median age 49 years) with rheumatoid arthritis were randomized to receive a single injection of anakinra (150 mg sc) or placebo and after 48 hours (drug’s half lives) the alternative treatment (placebo or anakinra respectively). Before and 3 hours after each s.c. injection, we assessed a) the time integral of the coronary flow velocity (CF-VTI), the coronary flow reserve (CFR) of the LAD after adenosine infusion, and aortic strain, by means of or alternatively flow nonimaged coronary plaques (CCP), patients were divided into 3 groups (G), simple plaque (G I), solitary complex plaque G (II), multilume complex plaque G (III).

Controls: In ACS, multiple CCP are associated with more evident inflammatory process with higher hs-CRP levels, and PCR suggesting that plaque vulnerability may be a systemic phenomenon.

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Abstracts

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Obesity is associated with aortic enlargement and increased stiffness
H. Gawaler 1 ; E. Csajbok 1 ; T. Forster 1 ; M. Csanyadi 1 ; A. Nemes 1
1University of Szeged, 2nd Dept. Medicine and Cardiology Center, Szeged, Hungary

Background: Obesity may be associated with early vascular changes. Some data suggest that body weight and fat distribution are related to arterial stiffness. The current study was designed to examine aortic stiffness in patients with mild to severe obesity in two biracial populations: one aged 14 to 40 years and one aged 41 to 64 years.

Patients and methods: The study compiled 123 subjects with overweight to obesity, all of them underwent a physical examination, two-dimensional transthoracic echocardiographic examination and blood pressure measurement. During echocardiographic examinations, aortic stiffness index (ß) as a characteristic of aortic elasticity was evaluated from ascending aortic diameter and blood pressure data.

Results: Data are presented in the Table. Conclusion: The present study has clearly shown that aortic stiffness is altered among patients with severe obesity even in young adults. Young obese patients have similarly increased ß in older subjects without severe obesity. Systolic and diastolic aortic diameters are increasing with age, but obees subjects within similar age group has larger systolic and diastolic aortic diameters suggesting early vascular remodelling in obesity.

Table 1

<table>
<thead>
<tr>
<th>Group 1 (Age&lt;40 years, BMI&lt;30 kg/m²)</th>
<th>Group 2 (Age&lt;40 years, BMI&gt;30 kg/m²)</th>
<th>Group 3 (Age&gt;40 years, BMI&lt;30 kg/m²)</th>
<th>Group 4 (Age&gt;40 years, BMI&gt;30 kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>23</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>SD (mm)</td>
<td>25.4±2.9</td>
<td>27.1±2.5*</td>
<td>28.0±3.0*</td>
</tr>
<tr>
<td>DD (mm)</td>
<td>22.5±2.9</td>
<td>24.9±2.5*</td>
<td>25.2±2.7*</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>126.3±12.8</td>
<td>135.2±21.5</td>
<td>141.5±14.0*</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>77.4±12.8</td>
<td>82.8±21.5</td>
<td>87.5±14.0*</td>
</tr>
</tbody>
</table>

? p<0.05 vs Group 1, t p<0.05 vs Group 2, t p<0.05 vs Group 3, SD = systolic aortic diameter, DD = diastolic aortic diameter, DD = diastolic blood pressure, BMI = body mass index

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Complex versus simple iatrogenic pseudoaneurysms treatment with ultrasound guided thrombin injection
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Introduction: Pseudoaneurysms (PSA) complicate endovascular procedures in 0.2-8% of patients. They may consist of one (simple PSA) or multiple (complex PSA) lobes. The efficacy of treatment with ultrasound-guided thrombin injection (UGTI) may be reduced and number of complications may increase in patients with multilobed PSA as a result of complex morphology.

Methods: 45 patients (pts) (27 female, mean age 61.8±13.7 years) presented iatrogenic simple (group I, 27 pts, 1 lobe) or complex (group II and III, 18 pts, 1-5 lobes) PSA of common or superficial femoral (42 right-sided, 83.3%) artery due to cardiac catheterisation or percutaneous angioplasty. All pts were treated with UGTI. Under ultrasound guidance a 21Gx1½ needle was inserted into PSA lumen and thrombin was being injected until a stable thrombus was formed and the whole PSA was occluded. Pts with complex PSA were divided into 2 groups: II (9 pts) - thrombin was injected into proximal chamber resulting in all chambers obliteration and III (9 pts) - thrombin was injected in each chamber.

Results: In gr. I 24 hour and 7 day follow-up revealed 100% 96.2% uGTI efficacy, in group II 88% and 100%, gr. III 100% and 88%. Side effects such as allergic rash were observed after the procedure in 2 pts (4.4%) from gr.I and III. There was no statistical significance regarding method efficacy in all groups (p>0.05). See table 1 for other results.

Conclusions: Ultrasound-guided thrombin injection is equally effective and safe method of simple and complex pseudoaneurysms treatment.

Table 1

<table>
<thead>
<tr>
<th>gr I</th>
<th>gr II</th>
<th>gr III</th>
<th>p*</th>
<th>p**</th>
<th>p***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombin (U)</td>
<td>1200±642</td>
<td>550±169</td>
<td>1175±433</td>
<td>0.01</td>
<td>0.001</td>
</tr>
<tr>
<td>Time (s)</td>
<td>9.2±7.6</td>
<td>27.6±12.2</td>
<td>27.6±12.2</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

P* comparison between group I and II; P** comparison between group II and III; P*** comparison between group I and III

701
The interplay of brain natriuretic peptide and arterial stiffness as a step towards paroxysmal atrial fibrillation in hypertensive subjects
C. Katsimichas 1 ; C. Tsitsou 1 ; I. Skidas 1 ; P. Missouvolou 1 ; E. Vezali 1 ; A. Katsimichas 2 ; C. Stefanidis 1 ; I. Kalikazarios 1
1Hippokration Hospital, Cardiology Dept., Athens, Greece

Purpose: A growing body of evidence underscores the role of B-natriuretic peptide (BNP) in the management algorithms of various cardiovascular conditions. We sought to investigate the plausible interrelationship between paroxysmal atrial fibrillation (PAF) and mechanical or hormonal factors, in the setting of essential hypertension.

Methods: We studied 46 consecutive essential hypertensive subjects (aged 64 years, 22 men, office blood pressure (BP) 148±86 mm Hg) with a history of PAF and no other evident comorbidity and 49 consecutive essential hypertensives without any evidence of PAF, matched for age, sex and BP. All included subjects were on sinus rhythm without any history of atherosclerotic or valvular heart disease and underwent blood sampling for the determination of BNP plasma levels and metabolic profile, according to established methods. Moreover, urinary albumin excretion was expressed as the albumin/creatinine ratio (ACR) from 2 non-consecutive spot urine samples. Finally, aortic stiffness was evaluated non-invasively by means of carotid-femoral pulse wave velocity measurements with an established device (Compilo SP).

Results: The two groups were similar regarding demographics but hypertensives with PAF compared to those without PAF had increased body mass index (28.1±3 vs 26.9±3 kg/m², p<0.05) and were smokers in a higher percentage (45 vs 31%, p<0.05). Moreover, the two groups did not differ with respect to total cholesterol, LDL cholesterol and triglycerides levels (p>0.05 for all cases). However, BNP levels and carotid-femoral PWV were significantly higher among hypertensives with PAF than in those without PAF (37.6±43 vs 17.2±4.9 (14.9±14.6 vs 5.7±1.9) micsec, p<0.05 for both). In the group of hypertensives with PAF, BNP levels were positively correlated with office pulse pressure (r=0.35, p<0.05), duration of hypertension (r=0.32, p<0.05) and the ACR (r=0.715, p<0.05).

Conclusions: BNP plasma levels are in parallel with PWV increased in hypertensives with PAF and are strongly associated with ACR, an established index of early renal dysfunction. However, the underlying pathophysiological mechanisms merit further investigation through properly designed prospective studies.

702
Carotid intima-media thickness in peri- and postmenopausal women with suspected coronary artery disease
A. Kablak-Ziembicka 1 ; T. Przewlocki 1 ; P. Pieriazeck 1 ; P. Musialek 1 ; I. Stopa 1 ; D. Rzeznek 1 ; W. Traczyk 1
1Institute Of Cardiology, Collegium Medicum, Cardiac And Vascular Diseases Dept., Crakow, Poland

Carotid intima-media thickness (CIMT) is an indicator of systemic atherosclerosis and as such may help to select patients with increased risk for coronary artery disease (CAD). This study aimed to compare CIMT in peri- and postmenopausal women referred to coronary angiography with suspected CAD.

Methods: Study formed 223 women, with no surgical menopause or hormone replacement therapy referred to coronary angiography with symptoms suggesting CAD. On admission, ultrasonographic CIMT assessment was performed in common, the bulb and internal carotid segments and expressed as the mean value. Depending on coronary angiography (coronary stenosis 75%) women were divided as follows: Group I formed 29 perimenopausal women, aged 46.7±5.3 (35-52) years with significant CAD. Group II - 145 postmenopausal women, aged 65.4±7.1 (51-79) years with CAD, and Group III - 49 postmenopausal women, aged 63.0±5.6 (50-78) years without CAD.

Results: CIMT correlated significantly with age and years passed since last menses (p=0.003, r=0.198 and p=0.022, r=0.198 respectively). A significant relationship between CIMT and presence of hypertension (p<0.001), diabetes (p<0.001), cigarettes smoking (p=0.012), obesity (p=0.051) was found.

Conclusions: Postmenopausal women with significant CAD (Group I) as well as postmenopausal women with CAD (Group II) had higher CIMT values (1.145±0.32 mm and 1.354±0.34 mm, respectively, as compared to Group III (0.914±0.13 mm, p=0.0006 for comparison with Group I, and p<0.001 for comparison with Group II). Interestingly, women in Group I were more often cigarette smokers (62.1%), as compared to Group III (18.4%), p=0.0005, otherwise the distribution of hypertension, hyperlipemia, diabetes and obesity was similar in Group I and III. Women in Group II were much more often hypertensive, hyperlipemic and diabetic, as compared both to Group I and Group III. In multivariate regression analysis, smoking habit and CIMT value appeared the only independent predictors of significant CAD in perimenopausal women, while in postmenopausal women following predictors of CAD were identified: smoking (p=0.001, CI=0.003), hypertension (p=0.005), diabetes (p=0.005), years since last menses (p=0.014), age (p=0.033), and obesity (p=0.02). The CIMT cut-off value for significant CAD was established at 1.05 mm by ROC analysis.
Conclusions: The presence of significant CAD in perimenopausal women can be suspected in women with mean CINT values exceeding 1.05 mm, irrespectively of age. Additionally, in the present study smoking was the only predictor of CAD in perimenopausal women.

703 Aortic root dilatation in obstructive sleep apnea syndrome C. Meuleman,1 D. Bocca,1 S. Edery,1 S. Janower,1 F. Rouxouz,1 N. Hammoudi,1 J. B. Feuny,1 A. Cohen,1 Hospital Saint Antoine, UPMC, Cardiology Dept., Paris, France

Background: Obstructive sleep apnea syndrome (OSAS) has been associated with an increased risk of arterial hypertension (AH), aortic stiffness and aortic dissection. The aim of our study was to investigate aortic root diameter and aortic stiffness in OSAS.

Methods: Using transthoracic Doppler echocardiography, we studied 38 OSAS patients (Pts) (mean age 52.3±10 years, 33 men), with no overt cardiovascular disease. We compared OSAS Pts with (n=13) and without (n=25) AH. The following parameters were off-line measured: aortic diameter at sinuses of valsalva, aortic regurgitation (AR) grade, left ventricular (LV) mass, relative wall thickness (h/r), LV ejection fraction (Simpson rule), systolic pulmonary artery pressure (sPAP). Aortic stiffness was measured with carotid-femoral pulse wave velocity (PWV).

Results: The mean duration of OSAS was identical in the 2 groups (5.4±4.8 vs 5.4±4.4 years). 85% of the entire cohort were treated with continuous positive airway pressure without difference between the 2 groups. Seven patients (41%) with AH and 4 Pts without had grade 1 AR. No Pts had grade >2 AR. On multivariate analysis, adjusted* on age, pulse pressure, PWV and BMI, AH was not a predictor of aortic root dilatation (p*=0.21). However, PWW was a significant predictor of aortic root dilatation (beta coefficient 1.7, p<0.000).

Conclusions: These results suggest that aortic root diameter enlargement is associated with OSAS, independently from the presence of AH. This observation could represent a link between the increased prevalence of aortic dissection and OSAS.

Table 1

<table>
<thead>
<tr>
<th>OSAS with AH (n=13)</th>
<th>OSAS without AH (n=25)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (yrs)</td>
<td>57.4±9.9</td>
<td>49.6±9.2</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>33.4±6.0</td>
<td>30.9±5.9</td>
</tr>
<tr>
<td>PWV, m/s</td>
<td>10.9±1.9</td>
<td>9.3±1.3</td>
</tr>
<tr>
<td>Pulse pressure (mm Hg)</td>
<td>64.7±17.2</td>
<td>52.7±10.1</td>
</tr>
<tr>
<td>LVMass (g)</td>
<td>88.3±14.6</td>
<td>85.4±21.4</td>
</tr>
<tr>
<td>h/R</td>
<td>0.4±0.1</td>
<td>0.4±0.1</td>
</tr>
<tr>
<td>LVEF (%)</td>
<td>60.3±1.1</td>
<td>60.6±3.2</td>
</tr>
<tr>
<td>sPAP (mmHg)</td>
<td>31.0±7.9</td>
<td>29.3±3.2</td>
</tr>
<tr>
<td>Aortic root diameter at sinuses 34.3±3.3</td>
<td>35.9±4.5</td>
<td>0.7</td>
</tr>
<tr>
<td>of Valsalva (mm)</td>
<td>AR (Grade1)</td>
<td>3 (23%)</td>
</tr>
</tbody>
</table>

704 Improving prognostic risk stratification with cardiac testing in peripheral arterial disease H. H. Feriglia1; S. Karaganis1; R. Vidačkovic1; A. Elhendy2; R. Van den Berg1; J. J. Bax1; D. Poldermans1
1Erasmus MC, Rotterdam, Netherlands; 2University of Nebraska, Internal Medicine, Section of Cardiology, Omaha, United States of America; 3Leiden University Medical Center, Cardiology Dept., Leiden, Netherlands

Background: In patients with peripheral arterial disease (PAD), cardiac testing may be recommended for long-term risk assessment because of the potential benefit from subsequent medical therapy or coronary interventions.

Objective: To evaluate the prognostic value of left ventricular ejection fraction (LVEF) and stress-induced ischemia during dobutamine stress echocardiography (DSE) in addition to ankle brachial index (ABI) measurements and clinical risk factors in patients with suspected or known PAD.

Methods: In 852 patients with suspected or known PAD (mean age 63 years, 70% male), the ABI was measured, LVEF was assessed and all patients underwent additional stress testing. Endpoints were all-cause mortality and hard cardiac events occurred in 216 patients (25%). Mean LVEF was 50±17% and stress-induced ischemia was assessed in 352 patients (34%). A total of 255 events occurred in 216 patients (25%). Mean LVEF was 50±17% and stress-induced ischemia was assessed in 352 patients (34%).

Results: During a mean follow-up of 7.6±4.4 years, death occurred in 288 patients (34%). DOB. J. J. Bax1; D. Poldermans1

Conclusions: LVEF and stress-induced ischemia independently predict long-term outcome and improve prognostic risk assessment in addition to ABI and clinical risk factors in patients with suspected or known PAD.

705 Saphenous vein grafts covered by experimental, external Dacron stent: volumetric intravascular ultrasound plaque assessment P. Weglarz1; A. Filipiecki1; J. Drzewiecki1; M. Trusz-Gluzia1; M. Krejca1; A. Bochenek1; J. Dijkstra1; J. Reiber2; 1Silesian Medical School, 1st Department of Cardiology, Katowice, Poland; 2Leiden University Medical Center, Leiden, Netherlands

Background: CABG for multi-vascular coronary disease treatment suffers from poor long term results. The main concerns are limited saphenous vein graft (SVG) patency and plaque development. To improve the results several surgical and medical methods were developed. The goal of this study was to assess plaque development in aorto-coronary vein grafts covered by experimental, external Dacron stents and compare with the control group during first year after surgery with IVUS volumetric parameters. The study was approved by local Ethics’ Committee.

Material and methods: Bypass angiography with simultaneous IVUS investigations was performed in 35 aorto-coronary SVG covered by external Dacron stent implanted to 22 patients (pts) (study group) and in 62 normal SVG implanted to 34 pts (control group). All IVUS examinations were performed during first year post CABG. In each SVG 25mm, of good quality IVUS image, was analyzed using QCUS-CMS IVUS analytical software version 4.14. All parameters were calculated related to SVG analysis. We measured plaque volume, lumen, and internal elastic membrane (IEME) volume (measured by tracing outer border of sonoluent zone), SVG volume (measured as defined as SVG volume - EEME volume).

Mean parameters were calculated for length 1mm of SVG. Index plaque volume/EEME volume and index plaque volume/SVG wall volume were calculated for comparative assessment of both groups.

Results: (Table 1). In control group first plaque development was noticed 64 days after CABG and was observed in 41% of SVG during first year after CABG. In study group first plaque development was noticed 40 days after CABG and was observed in 82% of SVG.

Conclusions: Experimental technique of implanting IVUS’s covered with external elastic Dacron stent seems to be inferior to traditional one. This is probably due to more complicated process of vein implantation and higher micro-injury occurrence during surgery. Independent Dacron influence on SVG cannot be excluded.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean index plaque</td>
</tr>
<tr>
<td>vol/EEM vol.</td>
</tr>
<tr>
<td>mm³</td>
</tr>
<tr>
<td>control group</td>
</tr>
<tr>
<td>study group</td>
</tr>
<tr>
<td>*: p&lt;0.05. **: p&lt;0.01</td>
</tr>
</tbody>
</table>

ULTRASOUND PHYSICS AND ENGINEERING

706 The possibilities for ultrasonic investigation regarding endothelial function as a check up for treatment efficacy in Arterial Hypertensive patients I. Y. Korobko1; A. B. Zheleznyk2; K. Belurus
1Minsk, Belarus

Purpose: Using test with reactive hyperemia, to study the possibilities for ultrasonic endothelial function investigation in order to check up hypertensive therapy efficacy in Arterial Hypertensive (AH) patients .

Material and methods: 15 pts with AH II stage (9 females and 6 males) were investigated. The average age 47.4±5.2 years. Monotherapy with eprosartan at a dose 600 mg daily during 3 months was administered as a hypotensive one. Reactive hyperemia tests (RH) with the use of high resolution ultrasound were employed to determine endothelial function. The following indices were studied: brachial artery diameter change per cent to RH; endothelial dysfunction index (DI) calculated as the difference, expressed in per cents, between diameter increase of brachial artery to sublingual intake of nitroglycerin and to RH; brachial arterial sensitivity index to shear stress - "K", this index describes the arterial ability to vasodilatation. "K" index, unlike the other previous two, deals with brachial artery diameter change considering not only the stimulus under use (RH or nitroglycerin) but also blood flow velocity change during the stimulus process.

Results: Brachial artery diameter change to RH was within norm in 5 pts during the primary investigation and it constituted 23.5±8.4. Brachial artery ability decrease to vasodilation in response to RH, evidencing the presence of endothelial dysfunction, was detected in 10 pts under investigation. In this pts group, initial reaction of brachial artery to RH constituted 23.5±8.4. During the primary investigation and it constituted 23.5±8.4. Brachial artery resistance index to shear stress - "K", this index describes the arterial ability to vasodilatation. "K" index, unlike the other previous two, deals with brachial artery diameter change considering not only the stimulus under use (RH or nitroglycerin) but also blood flow velocity change during the stimulus process.

Results: Brachial artery diameter change to RH was within norm in 5 pts during the primary investigation and it constituted 23.5±8.4. Brachial artery ability decrease to vasodilation in response to RH, evidencing the presence of endothelial dysfunction, was detected in 10 pts under investigation. In this pts group, initial reaction of brachial artery to RH constituted 23.5±8.4. During the primary investigation and it constituted 23.5±8.4. Brachial artery resistance index to shear stress - "K", this index describes the arterial ability to vasodilatation. "K" index, unlike the other previous two, deals with brachial artery diameter change considering not only the stimulus under use (RH or nitroglycerin) but also blood flow velocity change during the stimulus process.
normally, DI must be not more than 10%. By the end of observational term, K index increase up to 1.23±0.5 was noted which pointed to improvement in vascular properties of brachial artery since the higher is K, the better is arterial tone regulation. Brachial artery diameter change in response to RH did not exceed 10% in 2 pts which testified to preserved endothelial dysfunction.

Conclusions: Endothelial function improvement in hypotensive therapy can lead to vasoprotective and organ protective action if the role played by endothelin in the development and progression of cardiovascular diseases is considered duly.

VASCULAR FUNCTION/AORTIC DISEASE

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Relationship between carotid intima media thickness, cytokines and multilevel atherosclerosis
A. Kablak-Ziembicka 1, T. Przewlocki 1, W. Tracz 1, P. Pieniazek 1, A. Undas 1, E. Stepień 1
1Institute Of Cardiology, Collegium Medicum, Cardiac And Vascular Diseases Dept., Krakow, Poland
2The John Paul II Hospital, Krakow, Poland

Multilevel arterial atherosclerotic stenoses (lumen reduction >50%) become an important issue in clinical practice in view of ageing populations. The present study aimed to investigate interrelation between the extent of atherosclerosis, selected inflammatory markers, and known indicator of atherosclerosis - carotid intima-media thickness (CIMT).

Methods: Study formed 154 consecutive patients (102 M), aged 64.5±8.7 years with significant atherosclerotic stenoses (>50%) in one or more vascular territories detected with angiography in coronary and renal arteries, or with ultrasonography in carotid, iliac/femoral arteries. Triglycerides (TG), high-density lipoprotein (HDL) and low-density lipoprotein (LDL) cholesterol, high-sensitivity C-reactive protein (hsCRP), serum levels of interleukines 6 (IL-6) and 10 (IL-10), tumor necrosis factor alpha (TNF-alfa), transforming growth factor beta (TGF beta) were evaluated. CIMT assessment was performed in common, the bulb and internal carotid segments and expressed as the mean value.

Results: No significant lesions in any of examined territories were found in 24 (15.6%) patients, 1-level atherosclerosis was found in 58 (37.7%), 2-level 70 (45.7%) and 3 or more level in 34 (22.1%) patients. The significant positive correlation between the number of involved territories and serum levels of: creatinine (p=0.001), hs-CRP (p=0.001), glucose (0.01), IL-6 (p=0.05) and TGF beta (p=0.021) was found. No correlation was found for IL-10, TNF-alfa and lipid profile. Patients with carotid involvement had higher IL-6 (p=0.006) and TNF-alfa (p=0.05) levels, as compared to other territorial involvements. CIMT correlated with number of involved territories (p<0.001, r=0.751) and was related to hs-CRP (p<0.001, r=0.220), IL-6 (p=0.004, r=0.229), and IL-10 (p=0.001, r=0.266), but not to TNF-alfa and TGF-beta levels.

Conclusions: Inflammatory biomarkers levels as well as CIMT correlate with the extent of atherosclerosis. Differences in relationship between specific cytokines and territorial involvement are observed, that may suggest some territorial specificity in biomarkers engagement.

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Local arterial wave speed at carotid artery level is representative of the standardized CF-PWV.
A. Kablak-Ziembicka 1, T. Przewlocki 1, W. Tracz 1, P. Pieniazek 1, A. Undas 1, E. Stepień 1
1Institute Of Cardiology, Collegium Medicum, Cardiac And Vascular Diseases Dept., Krakow, Poland

Background: Carotid-femoral (CF) pulse wave velocity (PWV) is a known marker of aortic stiffness and a powerful predictor of cardiovascular risk.

Methods: Thirty-one consecutive patients free of clinical cardiovascular disease, with or without atherosclerotic risk factors (16 males; mean age 55±12, arterial blood pressure 143.7±17/81±12 mm Hg), underwent right common carotid artery imaging by high resolution linear US probe (7.5 to 10 MHz, Aloka SSD-5500) for E-track evaluation. Single-point WS at CCA level may be representative of the standardized CF-PWV.

Results: Local arterial wave speed at carotid artery level is representative of the standardized CF-PWV. The correlation coefficient (r) was 0.751 and was related to hs-CRP (p<0.001, r=0.220), IL-6 (p=0.004, r=0.229), and IL-10 (p=0.001, r=0.266), but not to TNF-alfa and TGF-beta levels.

Conclusions: Inflammatory biomarkers levels as well as CIMT correlate with the extent of atherosclerosis. Differences in relationship between specific cytokines and territorial involvement are observed, that may suggest some territorial specificity in biomarkers engagement.

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Aortic valve replacement for aortic stenosis is associated with improved aortic distensibility at long-term follow-up.
A. Nemes 1, T.W. Galema 1, M.L. Geleijnse 1, O.I.I. Soliman 1, A.M. Anwar 1, S.C. Yap 2, F.J. Ten Cate 1
1Erasmus MC, Cardiology Dept., Rotterdam, Netherlands

Background: Aortic valve stenosis (AS) is the most frequent form of valvular heart disease. The number of studies evaluating the effect of aortic valve replacement (AVR) for AS on aortic vascular function is limited. The aim of the present study was to examine alterations in aortic distensibility in AS patients during a one-year follow-up after AVR.

Methods: Twelve patients with severe AS who underwent AVR were prospectively investigated (mean age 65±11 years, 7 males). Systolic and diastolic ascending aortic diameters (SD and DD, respectively) were recorded in 3-modes 3 cm above the aortic valve from a parasternal long-axis view. The SD and DD were measured at the time of maximum anterior motion of the aorta and at the start of the QRS complex, respectively. Aortic stiffness index ($\Delta$P/2Β) was defined as the natural logarithm of ($SBP/DBP$)/[(SD-DD)/DD], where SD and DD were measured at the time of maximum anterior motion of the aorta and at the start of the QRS complex, respectively. Aortic stiffness index was feasible and accurate technique for the assessment and follow-up of thoracic aortic diameters in patient with ascending aortic aneurysm and can integrate other imaging techniques in AO dimensions monitoring.

Conclusions: AVR in AS patients is associated with a progressive improvement in aortic distensibility to one year values similar to age, gender and risk factor-matched controls.

Table 1

<table>
<thead>
<tr>
<th>Controls</th>
<th>After AVR</th>
<th>3 weeks after AVR</th>
<th>6 months after AVR</th>
<th>12 months after AVR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left ventricular mass (g)</td>
<td>234±4.5</td>
<td>397±288</td>
<td>284±100</td>
<td>241±58</td>
</tr>
<tr>
<td>Peak aortic pressure gradient (mm Hg)</td>
<td>90.5±24</td>
<td>18.5±7.3</td>
<td>15.0±4.5</td>
<td>18.7±5.1</td>
</tr>
<tr>
<td>Mean aortic pressure gradient (mm Hg)</td>
<td>53±3.19</td>
<td>9.3±4.5</td>
<td>8.4±2.4</td>
<td>9.3±2.5</td>
</tr>
<tr>
<td>Aortic SD - DD (mm)</td>
<td>2.3±1.1*</td>
<td>1.1±0.5</td>
<td>1.1±0.6</td>
<td>1.7±0.9</td>
</tr>
<tr>
<td>Aortic stiffness index</td>
<td>8.2±4.5*</td>
<td>19.6±10.8</td>
<td>16.7±7.5</td>
<td>12.5±7.1</td>
</tr>
</tbody>
</table>

*p<0.01 compared to before AVR, &p<0.01 compared to 3 weeks after AVR, SD = systolic aortic diameter, DD = diastolic aortic diameter, AVR = aortic valve replacement
711 Impact of Type II diabetes mellitus on aortic elastic properties in normotensive diabetics. Doppler tissue imaging study

M. Elnoamany
Shebin Elkom, Egypt

Objective: The stiffening of aorta and other central arteries is a potential risk factor for increased cardiovascular morbidity and mortality. The association of hypertension with type 2 diabetes may obscure the degree to which diabetes alone contributes to impaired arterial function. The present study was to examine whether the presence of type II diabetes alone is associated with an impaired aortic mechanical function in patients with and without coronary artery disease (CAD).

Methods: 154 patients recruited and assigned to (group A, n=46) type II diabetes with no CAD, (group B, n=64) non-diabetic CAD, (group C, n=44) diabetes with CAD and 20 age and sex matched healthy participants (control). Patients were recruited from those sent for coronary angiography. CAD was excluded in group A. Pulse pressure (PP), Aortic strain/diastensibility were calculated from the aortic diameters measured by echocardiography and BP obtained by sphygmomanometer. Aortic wall systolic velocity (AWSV) were calculated from the aortic diameters measured by echocardiography. The present study assessed aortic systolic velocity and aortic strain/diastensibility.

Results: PP was significantly higher in high risk patients (A, B, C) in comparision to control (40.2±9, 40.1±11, 50.2±13 versus 35.5±9 mm Hg, p<0.01). The pulsatile change in the aortic diameter and distensibility were less in the patient groups than in the control group (11±4%, 8±5%, 8±4% vs 17±9%, 9±5%, 6±4% respectively). Although aortic function parameters were more declined in group C, there was no significant difference between group A&B that reflects equivalent risk. In diabetic groups (A&C) aortic strain, distensibility and AWSV showed strong negative correlation with the duration of diabetes (r=-.53, -.68, -.56 ) and glycosylated hemoglobin (HbA1c) (r=-.64, -.77, -.72) p<0.01. Insulin resistance is characterized by insulin resistance in association with diabetes mellitus with high risk of preeclampsia. Also it may improve cardiac performance, ameliorate vascular damage, improve and on ischemia threshold in 20 pts with coronary artery disease treated with beta-blockers and nitrates.

Conclusion: The increased aortic stiffness that affects type II diabetic patients seems to be an early event that may explain why diabetics have a particularly high risk of developing cardiovascular complications. Poor glycemic control and long duration have detrimental effect on aortic elastic properties.

Key words: Type II diabetes, Aortic elastic properties, Doppler tissue imaging

712 Global myocardial function, aortic elastic properties and uteroplacental circulation in preeclampsia when using low dose aspirin

G. Nasr
Shebin Elkom, Egypt

Purpose: To assess the effectiveness of low-dose aspirin (LDA) in the prevention of preeclampsia in high-risk pregnant women with abnormal Doppler findings at 14-16 weeks and to evaluate changes in myocardial function and vascular damage.

Methods: Randomized controlled clinical trial enrolling 60 women with abnormal uterine artery Doppler findings [unilateral or bilateral diastolic notch, high resistance index (RI), or high pulsatility index (PI)] at 14-16 weeks of gestation. They were randomly allocated into 2 groups: one received LDA (75 mg) (n=30) and the other serving as control (n=30). All women were followed up until delivery. C-reactive protein, urinary albumin, and 24-hour protein served as markers of vascular damage. Platelet count, blood pressure and heart rate were determined. All women underwent echocardiographic examination to calculate left ventricular cavity dimension, cardiac index, aortic elastic properties and Tei Index.

Results: Groups were comparable with respect to age, blood pressure, body mass index, parity, plasma volume, and cardiac index. Women with higher levels of CRP, displayed more often albuminuria. A significant improvement in the uteroplacental circulation was noticed in LDA group. Both groups showed a similar median duration of gestation at time of delivery and median birth weight. There was an improvement with the elastic aortic properties, diastolic function and Tei Index in LDA group.

Conclusions: Low-dose aspirin administered at 14-16 weeks to at high risk of preeclampsia may reduce or modify the course of severe preeclampsia. Also it may improve cardiac performance, ameliorate vascular damage and improve aortic elastic properties.

713 Endothelial dysfunction in overweight patients with arterial hypertension

A. Demidenko
Kharkov, Ukraine

Endothelial dysfunction has been considered as a main factor in the development of hypertension and cardiovascular remodeling in overweight patients. Diameter of brachial artery and intima-media thickness are key physiological parameters, which can be evaluated noninvasively with Doppler echocardiography during vasodilator stress.

Aim: estimation of endothelial functional state of vessels in relation with remodeling in overweight patients with arterial hypertension. Materials and methods: 90 overweight patients with arterial hypertension were examined by Doppler echocardiography. Examination was performed by ultrasound scanning system «Siemens S50», USA using test of Celermajer for studying endothelium dependent and endothelium independent vasodilation. Coefficient of endothelial relaxation was calculated. The thickness of a complex intima-media (IMT) was measured by ultrasound imaging. The patients were divided into 5 groups. The 1st gr. - non obese patients with hypertension, 2nd gr. - pre-obese patients with hypertension, 3rd gr. - patients with hypertension and obesity 1st, 4th gr. - patients with hypertension and obesity 2nd, 5th gr. - patients with hypertension and obesity 3rd.

Results: constriction of a brachial artery was revealed after reactive hyperemia in all groups: 1st gr. -17.20%, 2nd -32.50%, 3rd -32.08%, 4th -43.82%, 5th -41.31%. Incomplete restoration of a diameter of a vessel was observed in patients with obesity of 3 degree, even after administration of pharmacological stimulus (nitroglycerine 2X0.4) 76.62% (p<0.05). Coefficient of endothelial relaxation in obese patients with hypertension was 0.85-0.81. Thickness of a complex intima-media: 1st gr. - 0.27±0.11, 2nd - 0.03±0.12, 3rd - 0.42±0.09, 4th - 0.48±0.14, 5th - 0.53±0.13. In patients with hypertension and obesity 3rd, IMT was higher compared to non-obese ones (0.53±0.13, p<0.05). Thickness of a complex intima-media 0.41-0.55 mm testifies as a hypertrophy media. Minor alterations of parameters of a functional condition of endothelium were marked in hypertensive pre-obese patients and non-obese hypertensive patients compared to healthy persons.

Conclusions: The pronouced vasodilatation and significant intima-media thickness were revealed in overweight patients with arterial hypertension. These data prove, that increased body mass-index contribute to endothelial dysfunction in patients with hypertension.

714 Diabetes mellitus facilitates aortic stiffening in acromegaly

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1; E. Csajbok 1; C. Lengyel 1; T. Forster 1; M. Csanady 1; A. Nemes 1
1University of Szeged, 2nd Dept. Medicine and Cardiology Center, Szeged, Hungary

Methods: The study comprised 16 treated acromegalic patients (56±17 years, 5 males). Seven acromegalic patients had DM (Acro-DM), while the rest was non-diabetic (Acro-nonDM). Their results were compared to subjects with (Neg-DM) and without diabetes mellitus (Neg-nonDM) with negative coronary angiograms. Aortic stiffness index (ß) was calculated as a characteristic of aortic elasticity during transthoracic echocardiography from ascending aortic diameter and blood pressure data.

Results: Data are presented in the table.

Table 1

<table>
<thead>
<tr>
<th>Group</th>
<th>No</th>
<th>NEG-nonDM</th>
<th>NEG-DM</th>
<th>Acro-nonDM</th>
<th>Acro-DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD - DD (mm)</td>
<td>20</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>2.6±1.1*</td>
<td>2.8±1.7</td>
<td>2.7±1.4</td>
<td>1.3±1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic stiffness index ?</td>
<td>5.1±2.2</td>
<td>8.7±10.4</td>
<td>6.8±6.2</td>
<td>29±4.207</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.01 vs. Acro-DM, SD = systolic aortic diameter, DD = diastolic aortic diameter.

715 Angiotensin-converting enzyme inhibitor, but not vitamin C, enhances nitrate-mediated dilatation of brachial artery and reduces ischemia in patients with coronary artery disease

R. Babrowski 1; T. Pasierski 1; C. Soosowski 1; J. Wozniak 1; I. Kowalki 1; H. Szwed 1
1Institute Of Cardiology, Warsaw, Poland; 2Miedzyleski Hospital, Warsaw, Poland; 3Institute of Cardiology, Warsaw, Poland

Aim: the study of ACE-inhibitors and vitamin C therapy may have beneficial effect on endothelium function. Endothelium function can be evaluated as a characteristic of aortic elasticity during transthoracic echocardiography from ascending aortic diameter and blood pressure data.

Results: Data are presented in the table.

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* p<0.01 vs. Acro-DM, SD = systolic aortic diameter, DD = diastolic aortic diameter.
were randomized to one of treatment regimen lasting 8 weeks: quinapril 40 mg/placebo, quinapril 40 mg/vid. C 2 g, placebo/vid. C 2 g, placebo/placebo. Assessments of maximum flow-mediated vasodilation (FMD) of brachial artery after reactive hyperemia and after administration of sublingual nitroglycerin (0.4 mg) (NMD) were performed using SONOS 5500 ultrasonograph with linear array transducer 7.5 MHz H-P. After each treatment ET was performed.

Results: After 8 weeks of quinapril treatment maximal FMD values of maximal NMD were significantly higher in comparison with placebo, 11.6±2.0% (SEM) quinapril/vid. C and 9.1±2.6% (SEM) quinapril/placebo vs 14.5±4.5% (SEM) double placebo. Brachial artery diameter was higher after quinapril treatment: 3.95±0.22 vs 3.73±0.22 mm after placebo. P wave velocity curve (slope S) was also measured. Aortic distensibility and aortic stiffness index were calculated by using the formulas 2x (AoS-AoD)/(SAP-SD) velocity curve (slope S) was also evaluated. Aortic distensibility and aortic stiffness index were calculated by using the formulas 2x (AoS-AoD)/(SAP-SD) and 2x (AoS-AoD)/(SAP-SD) velocity curve (slope S). Aortic distensibility and aortic stiffness index were calculated by using the formulas 2x (AoS-AoD)/(SAP-SD) velocity curve (slope S).

Conclusions: Quinapril treatment on top of maximum standard anti-ischemic therapy (beta-blockers, nitrates) results in significant improvement of nitrate-mediated dilation of brachial artery and in significant improvement of ETT parameters in patients with atherosclerosis. Direct influence of quinapril and vitamin C therapy on endothelium function was not observed.

716 Endothelial function in type 2 diabetes mellitus is affected by glycation processes

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1CMLU, Institute of Cardiology, Cardiac and Vascular Diseases Dept., Cracow, Poland

Objective: Endothelium plays a crucial role in maintaining cardio-vascular health. In type 2 diabetes there is an accumulation of factors which may affect endothelial function and thus contribute to increased cardioc-vascular risk in these patients. We aimed to investigate the influence of metabolic and inflammatory parameters on endothelial function in type 2 diabetic patients. Methods and methods: We studied 53 type 2 diabetic patients aged 59±8.5 years. Endothelial function was assessed in all patients on the basis of brachial artery relative dilation (%) after its 5 minutes occlusion (flow-mediated dilation - FMD) by high-resolution ultrasound imaging. Just before ultrasound examination, we collected blood samples and measured fasting levels of glucose, lipids (triglyceride, LDL, HDL), glycolated hemoglobin, glycation end products (fluorometric method), insulin, C-reactive protein (high sensitivity method), fibrinogen, TNF-alpha (high sensitivity method). Additionally, insulin resistance was estimated by homeostasis model assessment of insulin resistance (HOMA-IR) according to the formula: fasting insulin (µU/ml) x fasting glucose (mmol/l)/2.25. Multiple regression analysis was performed to find those parameters which independently correlate with flow-mediated dilation.

Results: Of all studied parameters only the level of glycation end products and glycolated hemoglobin significantly correlated (inversely) with FMD (re- spective: r=-0.001 and Beta=-0.42; p<0.001).

Conclusions: This preliminary data suggest that the process of glycation contributes to the development of endothelial dysfunction in type 2 diabetic patients. This may be associated with direct effect of glycation end products.

717 Could carotid echo-tracking technique be useful in patients with aortic stenosis?

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1ARC, Ospedale Civile, Cardiolog Dept., Pordenone, Italy; 2Institute ofCardiovascular Diseases, Cardiology Dept., Bucharest, Romania; 3Elias Hospital, Cardiology Dept., Bucharest, Romania

Background: Impaired pulsatile arterial function has emerged as an inde- niable risk factor for an increased cardiovascular morbidity and mortality. Therefore, there is a need to study clinical relevance of these findings.

Methods: Twelve patients with aortic stenosis (AS) pts (72±9 years mean age) including 19 pts with moderate/severe AS (valve area 0.9±0.3 cm²) and 26 pts with other clinical conditions: hypertension (12 pts), coronary artery disease (10 pts), dilated cardiomyopathy (4 pts). There were no significant differences between groups regarding age, sex, body mass index, blood pressure, heart rate, ejection fraction and NYHA class. Aortic stiffness index (A&C index), pressure-strain elastic modulus (Ep), arterial compliance (AC), augmentation index and pulse wave velocity (PWV) were obtained at right common carotid artery (CCA) level. PWV measurements in non-invasive systolic and diastolic test were implemented with an echo-tracking system. Pressure waveforms are auto- matically derived from CCA diameter changes. We also measured left ven- tricular diameters, EF, mass, aortic stroke work loss (SWL), continuity equa- tion valve area, peak and mean gradient, left atrial (LA) area.

Results: Augmentation index was significantly higher in pts with AS than in controls (33.1±13% vs 21.7±12%) (p<0.01), none of the other parameters of arterial function were significantly different. In pts with AS we found a significant correlation between SWL and AC (r=0.51; p=0.023) while valve area and gradients were not correlated. In the AS group there was a trend to correlation between LA size and Ep (r=0.39, p=0.092) and 8 index (r=0.39, p=0.096).

Conclusions: Augmentation index is higher in pts with AS. In these pts there was a correlation between AC and SWL and a trend to significant correla- tion between the index of arterial stiffness (B) and LA size. Further studies are needed to assess the clinical relevance of these findings.

Table 1

<table>
<thead>
<tr>
<th>Ep (kPa)</th>
<th>153±40</th>
<th>135±57</th>
</tr>
</thead>
<tbody>
<tr>
<td>? index</td>
<td>10±6</td>
<td>9±5</td>
</tr>
<tr>
<td>AC (mm²kPa)</td>
<td>1.0±0.6</td>
<td>0.9±0.5</td>
</tr>
<tr>
<td>Augmentation index %</td>
<td>32±13</td>
<td>21±12</td>
</tr>
<tr>
<td>PWV (m/s)</td>
<td>7±2</td>
<td>6±1.3</td>
</tr>
</tbody>
</table>

718 Impact of Type II diabetes mellitus on aortic elastic properties in normotensive diabetics. Doppler tissue imaging study

H. A. El-Samannary 1; M. F. Elsamannary 1

1Tanta, Egypt; 2Menoufiya, Cardiology Dept., Shebin Elkom, Egypt

Objectives: The stiffening of aorta and other central arteries is a potential risk factor for increased cardiovascular morbidity and mortality. The associa- tion of hypertension with type 2 diabetes may obscure the degree to which diabetes alone contributes to impaired arterial function. The present study was to examining whether the presence of type II diabetes alone is associ- ated with an impaired aortic mechanical function in patients with or without coronary artery disease (CAD).

Methods: 154 patients recruited and assigned to (group A, n=46) type II diabetes with no CAD, (group B, n=64) non-diabetic CAD, (group C, n=44) diabetes with CAD and 20 age and sex matched healthy participants (control). Patients were recruited from those send for coronary angiography. CAD was excluded in group A. Pulse pressure (PP), Aortic strain,distensibility were calculated from the aortic diameters measured by echocardiography and BP obtained by sphygmomanometer. Aortic wall systolic stiffness (AWSS) was measured using Pulsed-wave Doppler tissue imaging (DTI).

Results: PP was significantly higher in patient groups (A, B, C) in compari- son to control (40.2±9.4, 40.1±11, 50.2±12.3 versus 35.5±9.9 mm Hg, p<0.01). The pulsatile change in the aortic diameter and distensibility were less in the patient groups than in the control group (11±4%, 8±5%, 8±4% vs 17±9% p<0.001, 6±2, 6±1, 3±2 vs 10 cm/dyn103) respectively. Also the AWSS was significantly lower in patient groups compared with control (6±2, 6±1, 5±1±2 vs 8.5±1.5, cm/sec ≤0.01) respectively. Although aortic function parameters were much declined in group C, there was no significant differ- ence between group A&B that reflects equivalent risk. Among diabetic groups (A&C) aortic strain, distensibility and AWSS showed strong negative correla- tion with the duration of diabetes (r=-.53, -.68, -.56) and glycosylated ha- emoglobin (HbA1c) (r=-.64, -.77, -.67) respectively. The increased aortic stiffness that affects type I diabetic patients seems to be an early event that may explain why diabetics have a particular high risk of developing cardiovascular complications. Poor glycemic control and duration have detrimental effect on aortic elastic properties.

719 Color doppler tissue imaging evaluation of the elastic properties of aorta in end-stage renal disease

E. Foukarakis 1 ; A. Patrianakos 2 ; N. Kakoliris 1 ; P. Stasinos 1 ; G. Papailiakis 1 ; F. Parthenakis 1 ; P. Vardas 1

1Gen. Hospital of Ierapetra, Cardiology Dept., Ierapetra, Greece; 2Herklion University Hospital, Cardiology Dept., Crete, Greece

Purpose: Although tissue doppler imaging (TDI) has been used a lot to qualitatively myocardial function, there are only few reports about the evaluation of elastic properties of the aorta using TDI. Our purpose was to examine aorta properties in a population, like patients receiving hemodialysis, which it is known that they have altered elastic properties of the aorta.

Methods: Moderate/severe AS (n=19) Controls (n=26) p

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Eur J Echocardiography Abstracts Supplement, December 2006
ness index (0.40±0.22 vs 4.08±1.6, p=0.045), slope S (1.12±0.2 vs 0.8±
±0.14/100 sec, p=0.002) and early diastolic velocity of upper aortic wall E (0.18±0.1 vs 0.6±0.6 cm/sec, p=0.0001). Aortic distensibility had a significant positive correlation with early diastolic velocity of aortic wall E (r=0.534, p=0.015) but not with slope S and aortic stiffness index was correlated posi-
tively only with slope S (r=0.396, p=0.045).

Conclusions: Elastic properties of the aorta can be evaluated by using color tissue doppler imaging of the upper aortic wall in patients with end-stage renal disease. In our study the slope of systolic velocity and the early dias-
tolic velocity of upper aortic wall are associated with alteration in aortic wall properties.

720 Increased arterial stiffness is associated with reduced coronary flow and coronary flow reserve in untreated patients with arterial hypertension

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1Medical University Noninvasive Cardiac Diagn., Gdansk, Poland; 2Medical University Clinic of Nephrology, Gdansk, Poland

Purpose: Coronary artery diseases (CAD) are the leading cause of death in chronic renal failure (CRF) patients. The aim of our study was to estimate prognostic value of carotid intima-media thickness (IMT) in detection of CAD in CRF patients treated with hemodialysis (HD).

Material and methods: Ultrasound examination of common carotid artery (CCA) was performed with 7.5/5.5 MHz linear transducer. The study group of CRF patients consisted 55 patients (mean age 52±5.15 years, 36 males, 19 female), time on HD was 2-240 months. Control group included 51 persons (mean age 51,7±9.4 years, 39 females, 13 males).

IMT of CCA was expressed as a mean and maximal values of IMT was confirmed angiographically.

Results: IMT of the CCA on both sides was significantly higher in HD pa-
tients with CAD compared to the control group and HD patients without CAD. The multivariate stepwise regression analysis revealed that age (p<0.003) and hypertension (p<0.05) were independent factors impacting IMT values.

Conclusions: IMT greater values are observed in CRF patients treated with HD.

Table 1

<table>
<thead>
<tr>
<th>IMT (mm)</th>
<th>HD with CAD</th>
<th>HD without CAD</th>
<th>Control Group</th>
</tr>
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<tbody>
<tr>
<td>IMT max</td>
<td>0.751±0.14</td>
<td>0.694±0.166</td>
<td>0.582±0.074</td>
</tr>
<tr>
<td>IMT mean</td>
<td>0.673±0.166</td>
<td>0.616±0.112</td>
<td>0.546±0.174</td>
</tr>
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</table>

*p - significant level HD vs control group + p - significant level HD with CAD vs. HD without CAD

723 Deep venous thrombosis in children-etiological and diagnosis particularities

I.A. Ghiorghiu 1; M. Iancu 1; A. Stoica 1; I. Ancensescu 1; M. Dumitr 1
1Institutul De Boli Cv, Cardiology Dept., Bucharest, Romania; 2Institutul Clinic Funerii, Laboratory, Bucharest, Romania; 3Institutul Boli Cv, Cardiology Dept., Bucharest, Romania

Purpose: The objective of this retrospective study was to reveal the biological and anatomical particularities of these children and the investigations algo-
rithms.

Material and methods: A group of patients was reviewed, all hospitalized in Cardiology Clinic between April 2002 and May 2006; there were 9 cases (four boys), age from 2 to 17 years (mean 13.3 years), with deep vein thrombosis in the lower extremity in 8 cases (one with inferior vena cava and iliac veins involved, in 5 localized in ilio-femoral veins and 2 femoro-popliteal veins) and in the upper extremity in a case (subclavian and axillary veins), having the affected left inferior limb in 5 cases, left superior limb in a case and bilateral inferior limbs in 3 cases. The diagnosis was established using compression and Doppler ultrasonography in the lower limbs and angiography in the upper limbs. The incidence of DVT was 2.7 in children with arterial hypertension and 0.06 in children without hypertension.

Results: The number of patients who had a history of thrombosis was 7 in the 9 cases. Precipitants factors of the acute thrombosis were identified in 5 patients: a case with postpartum thrombosis, another postapendiotomy and 3 after prolonged immobilization for orthopedic reasons.

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Deep venous thrombosis in children is a rare disease.

1Institutul De Boli Cv, Cardiology Dept., Bucharest, Romania; 2Institutul Clinic Funerii, Laboratory, Bucharest, Romania; 3Institutul Boli Cv, Cardiology Dept., Bucharest, Romania
Conclusions: In children, deep venous thrombosis was the result of the association between a thrombophilic factor (found in all cases), a vascular or cardiac anatomic anomaly and a precipitating factor. Doppler ultrasonography was the main diagnosis method, concordant with angio CT in the identification of all iliac veins anomalies, but not always concordant for inferior vena cava malformations.

724 Evaluation of mechanical arterial properties in patients with coronary vasoconstriction

D. Miklan 1; J. Keller; Z.S. Sarzegi 2; B. Gaszner 3; A. Cižarík 4; L. Papp 5
1 Univ. Pecs, Heart Institute, Faculty of Med., Pecs, Hungary

Background: There are three setting in which the process of dynamic coronary vasoconstriction is identified: Prinzmetal angina, microcirculatory angina and coronary atherosclerotic plaques. The development of atherosclerosis in the early phase is the injury of the endothelium. A variety of noninvasive techniques are currently employed to evaluate endothelial function of arteries. The aim of our study was to define arterial stiffness parameters by echo tracking and pulse wave analysis. With the determination of classical risk factors, they are useful methods to detect and monitor subclinical damage of endothelial function.

Patients and methods: Patients with coronary vasoconstriction supported by coronary angiography without previous nitrate or calcium channel blocker therapy in the former 7 days. (n=22). They all have traditional risk factors like dyslipidaemia, smoking, vasospasm by hyperventilation, insulin resistance in their anamnesis. In each case we defined systolic/diastolic blood pressure, heart rate, mean arterial pressure, pulse wave velocity (PWV) by TensiClinic Artiograph using osccilometric principles; pressure-strain elastic modulus (EP), stiffness parameter (β), arterial compliance (AC) by echo tracking of carotid artery (Aloka ProSound5500). Healthy volunteers served as control population (n=27) and the results were normalised for the frequency and blood pressure to the vasospastic group.

Results: In our examination we found, that carotid EP (p<0,05), PWV (p<0,05) and AC (p<0,05) correlate significantly with mean arterial pressure. Carotid PWV, Ep, 8 and Alx were significantly higher (PWV; p<0,01; Ep; p<0,01; 8, p<0,01; Alx; p<0,05); AC is lower, but not significantly in the vasospastic population than in the control group. AC correlates conversely with the above mentioned parameters. There was no significant change in the measured parameters despite applying Ca-channel blocker and nitrate therapy during 6 weeks follow-up.

Conclusion: Selected parameters measured by noninvasive techniques are eligible for monitoring arterial stiffness in patients with vasospastic angina.

LV FUNCTION – OTHER

725 Atrio-ventricular plane displacement as measure of canine systolic ventricular function

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1 Karolinska University Hospital, Clinical Physiology and Cardiology Dept., Stockholm, Sweden; 2 St Jude Medical, Jarfalla, Sweden

Background: The usefulness of atrio-ventricular plane displacement (AVPD) as a measure of systolic ventricular function has not been demonstrated in dogs. Therefore, we studied the effect of heart rate (HR) variations and functional correlates of AV-plane displacement in an animal model.

Methods: Six mongrel dogs (weight 15-25 kg), lightly sedated, were studied in the prone position by transthoracic echocardiography (Vivid 7) at baseline and at varying HR (100-180 beats/min) altered by right ventricular (RV) pacing (St-Jude Medical). AVPD was measured in the free right ventricular wall (AVPDr), septal (AVPDsep) and lateral (AVPDlat) left ventricular (LV) walls in the 4-chamber view.

Results: The mean AV-plane displacement at baseline was: AVPDDr = 10.0±3.0 mm, AVPDsep = 5.4±1.4 and AVPDlat = 5.8±1.2 mm at a mean HR of 103±22 beats/min. Correlations between AVPD and HR, LV ejection fraction (LVEF) and at varying HR (100-180 beats/min) altered by right ventricular (RV) pacing (St-Jude Medical). AVPD was measured in the free right ventricular wall (AVPDr), septal (AVPDsep) and lateral (AVPDlat) left ventricular (LV) walls in the 4-chamber view.

Conclusion: Automated tracking of the mitral valve ring motion in apical echocardiographic images

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Background: The motion of the mitral valve plane contributes significantly to the left ventricular volume change over the cardiac cycle. As part of a semiautomatic border detection approach, we desire to automatically track the motion of the mitral valve ring over the cardiac cycle. In particular, the purpose of this project is to track the points where the mitral valve leaflets attach to the wall.

Methods: We applied a robust block matching approach in combination with a two-dimensional Dynamic Programming (DP) path search. Three different match cost functions were tested: Sum of Absolute Differences (SAD), Sum of Squared Differences (SSD) and Normalized Cross Correlation (NCC). An image patch of 21×21 pixels around the manually chosen point in the first image was used as the template. In consecutive images, 101×101 pixels search regions were employed. In the DP path search, step sizes of 5 pixels in X direction and 10 pixels in Y direction between two successive frames were allowed. The method was tested on the septal and posterior mitral valve leaflet attachment points to the mitral ring, in single-beat apical 4 chamber image sequences of 5 patients (80 frames in total). The pixel sizes ranged from 0.281×0.281 to 0.379×0.376 mm, corresponding to 2.815 to 5.086 pixels.

Results: The best matching results for the septal attachment points were found with the SSD as a cost function (ErrAuto: 5.216±3.562 pixels). For the posterior attachment points the best matching results were found with the NCC as a cost function (ErrAuto: 8.753±5.986 pixels). For comparison, ErrMAN was 4.411±2.945 pixels for the septal attachment points and 7.891±5.920 pixels for the posterior attachment point. The total excursion of the mitral ring over the cycle was found to be 36.127±11.071 pixels. The Euclidean distances were not significantly different between ErrMAN and ErrAuto for both attachment points (p>0.05). The distances in X and Y directions separately were also found to be not significantly different, except for posterior motion in X direction, attributable to an imaging artifact in a single patient.

Conclusion: Block matching with two-dimensional DP is capable of tracking valve motion within the limits of interobserver variability.

727 Geometry-adjusted end-systolic elastance: increased contractility in women above the age of 50

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1 Ghent University, Hydraulics Laboratory, Gent, Belgium; 2 Ghent University Hospital, Cardiovascular Diseases Dept., Ghent, Belgium

End-systolic elastance (Ees) is considered the gold standard measure of left ventricular (LV) contractility, but it is inherently dependent on LV geometry and therefore difficult to use in a cross-sectional analysis. In particular, geometry-dependency is an important factor when studying gender differences using Ees. In this work, we tested an existing and a novel normalization technique to analyze the age- and gender differences in contractility in a large healthy representative sample of healthy middle-aged and elderly subjects. Using standard 2D echo measurements and brachial blood pressures, Ees was determined with a non-invasive method in a large population sample of 2184 subjects (mean 45.5±5.9 year). From overt cardiovascular disease, age- and gender differences in contractility were analyzed using Ees and two geometry-adjusted indices: (i) Ees.adj=1.043×Ees×LVMass/RWT (RWT =2×LV wall thickness/LV internal diameter) and (ii) a customized Ees.adj determined semi-empirically by minimizing the geometry induced variance in a selected “superhealthy” subset of 254 subjects. As anticipated, Ees is on average higher in women than in men, while Ees.adj1 yields higher values in men (ANOVA, p<0.001). The curves (figure) suggest a more rapid increase in contractility in women than in men after the age of 50. Ees.adj2, however, eliminates the systematic gender difference, and reveals the apparently different evolution of contractility in men and women, being similar up to the age of 50, where after it becomes significantly higher in women (ANOVA, p<0.01). Geometry-adjustment of Ees is mandatory when studying gender effects in contractility. Our novel normalization method diminishes gender differences in Ees and suggests increased Ees in women above the age of 50 compared to men of the same age.
Conclusions:

between M and stroke volume (r=0.66, p<0.0001). On the other hand, the

Results:

examined the relationship between M, M/LVA and the standard assessment.

velocity vector). M was corrected for LV area (M/LVA). The standard assess-

in the apical long axis view were used to generate flow velocity vector maps

left ventricular (LV) blood flow. We assessed the hypothesis that the momentum

Purpose:

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Noninvasive evaluation of the systolic left ventricular blood flow
dynamics

T. Uejima 1; H. Sawada 2; M. Tanaka 2; S. Ohtsuki 3; T. Okada 4; A. Harada 1

Aim:

To evaluate whether AMM derived measurements and LV mass (LVM)

Results:

Results were shown in the figure. There was a good correlation between M and stroke volume (r=0.66, p<0.0001). On the other hand, the correlation between M and ejection fraction was poor (r=0.45, p=0.004).

However, there was strong correlation between M/LVA and ejection fraction (r=0.85, p<0.0001).

Conclusions: M, M/LVA could be applied to assess systolic LV function.

Table 1

<table>
<thead>
<tr>
<th>MM</th>
<th>AMM</th>
<th>Difference (95% CI), p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS</td>
<td>39.3</td>
<td>37.3</td>
</tr>
<tr>
<td>IVSd (cm)</td>
<td>0.65</td>
<td>0.58</td>
</tr>
<tr>
<td>LVDs (cm)</td>
<td>3.98</td>
<td>3.98</td>
</tr>
<tr>
<td>PWd (cm)</td>
<td>0.56</td>
<td>0.59</td>
</tr>
<tr>
<td>LVM-ASE (g)</td>
<td>72.3</td>
<td>62.8</td>
</tr>
<tr>
<td>LVM-ASE / BSA (g/m²)</td>
<td>67</td>
<td>58.4</td>
</tr>
<tr>
<td>LVM-ASE / H² (g/m²)</td>
<td>33.3</td>
<td>28.9</td>
</tr>
</tbody>
</table>

Comparison of M-Mode with anatomic M-Mode measurements obtained from healthy 8 yrs old children
MYOCARDIAL VELOCITY IMAGING (DMI) – OTHER

732
Accurate timing of mitral valve opening by tissue Doppler imaging for an all in one beat analysis
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1Rikshospitalet-Radiumhospitalet Medical Center, Institute For Surgical Research, Oslo, Norway

Background: Echocardiographic indices of diastolic function are largely dependent on accurate timing of mitral valve opening (MVO). Determination of MVO in the same heart beat as other derived echocardiographic measures is crucial to avoid inaccuracies caused by beat to beat variation. The aim of the study was to investigate if tissue Doppler imaging (TDI) information can be used to determine MVO.

Methods: In anaesthetised mongrel dogs (n=4) with left atrial (LA) and LV microphonometers, MVO was defined as the time of first diastolic LA/LV pressure crossover (MVOPCO), which is when the pressure gradient starts separating the valve leaflets. In apical projections, the TDI signal from a sample volume positioned at the mitral leaflet tips was used to define MVOTDI as the time of onset of rapid increase of positive velocity in early diastole (figure, left panel). MVO was measured by the two methods and compared during different loading conditions, increased inotropy, and during ischaemia. In 6 patients with acute myocardial infarction and in 6 healthy subjects we compared MVOTDI with timing of onset of mitral flow by Doppler (MVODoppler).

Results: In the experimental study MVOTDI showed very good agreement with MVOPCO: mean difference: 1.7±9.8 ms (2SD); correlation: r=0.99, p<0.0001. MVOTDI showed excellent agreement with MVO/Doppler in the clinical study: mean difference: -0.3±8.1 ms; correlation: r=0.99, p<0.0001.

Conclusions: The proposed marker in the mitral valve leaflet TDI signal showed excellent agreement with MVO as defined both by pressure cross-over and onset of Doppler flow. MVOTDI thus provides a new method for accurate timing of MVO in the same heart beat as other TDI measurements.

734
Early diastolic mitral annulus velocity at onset of filling - a new marker of cardiac suction
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1Rikshospitalet-Radiumhospitalet Medical Center, Institute For Surgical Research, Oslo, Norway;
2University of Oslo, IBMC, Physiology Dept., Oslo, Norway

Background: Peak early-diastolic mitral annulus velocity (E') by tissue Doppler imaging (TDI) reflects LV diastolic function. We hypothesized that mitral annulus velocity prior to mitral valve opening (E MVO) is due to LV restoring forces and therefore is a marker of diastolic suction.

Methods: In anesthetized dogs we measured E' by sonomicrometry (n=10) and TDI, and in healthy humans (n=6) we measured E'. Restoring forces were increased by reducing LV end-systolic volume (ESV) by caval constriction in dogs and by lower body negative pressure (LBNP) in humans. In dogs E'MVO was measured at first diastolic left atrial/LV pressure crossover and in humans at onset of mitral flow.

Results: In dogs caval constriction decreased ESV from 31±2 (SEM) to 28±2 cm³ (p<0.05), and transmural LV end-diastolic pressure from 1.2±0.3 to 2.5±0.3 mm Hg (p<0.05). The negative transmural pressure indicates a diastolic suction force. E' by sonomicrometry increased from 0.3±0.1 to 1.2±0.2 cm/s (p<0.05), and E'MVO in percentage of E' increased from 8±2 to 41±6 % (p<0.05). Peak E' decreased from 3.4±0.2 to 2.0±0.2 cm/s (p<0.05), E' and E'MVO by TDI showed similar changes. In the clinical study LV short-axis diameter decreased from 3.4±0.2 to 3.1±0.2 cm (p<0.05) by applying LBNP of -40 mm Hg, stroke volume from 72±5 ml to 44±5 ml (p<0.05), and E' and E'MVO by TDI showed similar changes. In the clinical study LV short-axis diameter decreased from 3.4±0.2 to 3.1±0.2 cm (p<0.05) by applying LBNP of -40 mm Hg, stroke volume from 72±5 ml to 44±5 ml (p<0.05), and E' and E'MVO by TDI increased in percentage of E' increased from 8±3 to 34±5 % (p<0.05).

Conclusions: Left ventricular diastolic suction is associated with LV lengthening prior to mitral valve opening. Mitral annulus velocity at onset of filling is proposed as a new non-invasive marker of diastolic suction.

MYOCARDIAL VELOCITY IMAGING (DMI) – LV FUNCTION

733
Have tissue Doppler parameters improved on conventional echocardiographic parameters for sequential evaluation of LV function?
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Background: Sequential 2D echos (2DE) are often performed to assess LV function over time, but the value of sequential testing is unclear. Conventional measures (eg. EF) have significant test-retest variability, but this is less defined with newer measures (eg. tissue velocity [Em], E/Em and LA size). We sought the variation between measures of LV function in pts referred for sequential 2DE.

Methods: Two sequential 2DE were performed in an unselected group of 357 pts, with measurement of change in LA area, LVEF, Em and E/Em. Pts were classified as clinically stable (n=160) or unstable (n=197) based on their clinical progress. Differences in change of each parameter were compared between stable and unstable groups using a T-test. The degree of variance between measurement of ΔLVEF and each new parameter was assessed with an F-test after mean-correction to make measures comparable.

Results: Change in Em was the only measurement that had a significant mean difference between stable and unstable pts (Table). In stable pts, the coefficient of variation (CV) of ΔEm (83%, F-test p<0.01 vs EF) and ΔLA (81%) were less than ΔEF (102%) and ΔLVEF (105%). Stable pts with either heart failure or ischemic heart disease had the least degree of variance between different measures.

Conclusions: ΔEm shows the greatest difference between stable and unstable pts and its CV suggests less variation than the other parameters in stable pts. However, the variance of all measures was high, even in stable pts. More robust markers of LV function are needed for sequential follow-up.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>ΔLVEF %</th>
<th>ΔLA size (cm²)</th>
<th>ΔEm (cm/sec)</th>
<th>ΔE/Em</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable Patients</td>
<td>-0.88±9.6*</td>
<td>0.36±9.4*</td>
<td>-1.41±2.9*</td>
<td>2.38±6.4*</td>
</tr>
<tr>
<td>Unstable Patients</td>
<td>0.61±12.6*</td>
<td>-0.23±5.4*</td>
<td>-0.55±2.7*</td>
<td>1.30±7.3*</td>
</tr>
<tr>
<td>T-test</td>
<td>p=0.24</td>
<td>p=0.029</td>
<td>p=0.004</td>
<td>p=0.15</td>
</tr>
</tbody>
</table>

*statistic p<0.01, *F statistic p=NS (for comparison of variance with LVEF).

Eur J Echocardiography Abstracts Supplement, December 2006
736 Mechanism behind pre- and postejsection velocity spikes in normal left ventricular myoccardium
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1Rikshospitalet-Radiumhospitalet Medical Center, Cardiology (Ifkl) Dept., Oslo, Norway
Background: The velocity trace of normal left ventricular (LV) wall motion has distinct waves corresponding to the different phases of the cardiac cycle. However, there are two unexplained velocity spikes in the trace - one just before and one just after the ejection wave. We hypothesize that the pre- and postejsection velocity spikes are due to early-systolic shortening and late-systolic lengthening that is interrupted by mitral (MVC) and aortic valve closure (AVC), respectively.
Methods and results: LV long- and short-axis diameters were measured by sonomicrometry in 11 anesthetized dogs. Myocardial shortening started prior to MVC (21±1.0 ms). There was excellent agreement between MVC and interruption of the initial shortening during early systole (4±7 ms) where the intervalation was defined as peak deceleration of shortening. Onset of lengthening preceded AVC by (31±15 ms). Interruption of the late systolic lengthening, defined as peak deceleration of lengthening, corresponded to (0.3±3 ms) to AVC. We further investigated if abolishing aortic and mitral valve closure by stenting the valves would eliminate the pre- and postejsection velocity spikes in separate experiments. Stenting of the mitral valve essentially abolished the preejsection velocity spike, and stenting the aortic valve essentially abolished the postejsection velocity spike. In a group of 10 healthy individu- als LV longitudinal and radial shortening were measured by speckle tracking echocardiography. Peak deceleration of the early systolic shortening coincided (2±14 ms) with MVC, while peak deceleration of late systolic lengthening coincided (5±12 ms) with AVC.
Conclusion: This study support the hypothesis that the normal LV pre- and postejsection velocity spikes are attributes of the LV myocardium, which temporarily interrupt early systolic shortening and late systolic lengthening, respectively.

LV FUNCTION – OTHER

737 The effect of preload reduction by hemodialysis on conventional and novel parameters of left ventricular systolic and diastolic function
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Background: Prior studies of the effect of hemodialysis (HD) on left ven- tricular (LV) function brought ambiguous results, in particular regarding the assessment of LV diastolic function.
Aim of the study: To investigate the effect of acute preload reduction in- duced by HD on conventional and novel parameters of LV systolic and diastolic function.
Methods: We studied 36 patients (mean age 59.1±15 years, 22 males) with chronic renal failure in sinus rhythm who underwent echocardiography 1 hour prior to and 1 hour following regular HD. The investigated parameters comprised LV ejection fraction (EF), LV fractional shortening (FS), transmitral (E and A waves) peak flow velocities, color M-mode flow propagation velocity (FPV) and septal mitral annular tissue Doppler (TD) (systolic (Sm) and diastolic (Em), Am) velocities.
Results: The average amount of fluid removed during HD was 1.8±1.2 litters. Parameters of LV systolic function, EF (60±7% vs 62±7%) and Sm (8.5±1.4 cm/s vs 9.1±2.0 cm/s), significantly improved (both p<0.05), whereas FS did not change (0.36±0.07 vs 0.35±0.08, p=NS). As for LV diastolic function, E (81±28 cm/s vs 61±24 cm/s) and FPV (46.9±13.2 cm/s vs 40.2±13.2) significantly decreased (both p<0.05), whereas A significantly increased (77.7±5 cm/s vs 79±22 cm/s, p<0.05). However, Em (7.3±2.1 cm/s vs 6.8±1.7 cm/s) and Am (10.8±2.7 cm/s vs 11.4±2.8 cm/s) were not significantly affected (p=NS).
Conclusion: Fluid removal induced by HD increases global LV systolic function as assessed by EF. The improvement of LV longitudinal contraction documented by TD analysis seems to be responsible for this phenomenon. While standard pulsed Doppler parameters of LV diastolic function and FPV were significantly affected by preload reduction, TD indices Em and Am seem to be less load dependent. Therefore, TD analysis represents a promising method for the evaluation of LV diastolic function in this cohort of patients.

738 Evaluation of global cardiac function in mouse and human with concentric left ventricular hypertrophy: the feasibility of myocardial performance index
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2Kyunghee Medical Center, Dept., Seoul, Republic of Korea
Background: Diastolic left ventricular(LV) function both in patients with concentric LV hypertrophy(LVH) and in aortic banded mice has been reported, but noninvasive evaluation of global cardiac function using myocardial performance index(MPI) in murine model has not been well described. The aim of this study was to assess global LV function using MPI and to determine the feasibility of MPI in both human and mice.
Methods: Forty hypertensive patients with concentric LVH on echocardio- gram (ECHO) and 20 healthy age- and sex-matched healthy controls were taken Echo. Fifteen aortic banded male mice over 2 weeks and 10 age-matched sham-operated controls were studied using Echo with 15 MHz linear transducer including pulsed Doppler of mitral inflow and aor- tic outflow from the parasternal long axis view.
Results: The LV MPI both in human with concentric LVH and in aortic banded mice were significantly higher than controls. To test the diagnostic perfor- mance of MPI to detect concentric LVH, we performed ROC curve analysis. Cutoff value of LV MPI >0.44 in human had sensitivity 66% and specificity 95%, and cutoff value >0.49 in mice had sensitivity 100% and specificity 87.5%.
Conclusion: The MPI was a simple, noninvasive, and feasible Echo param- eter to evaluate the global cardiac function both in patients with concentric LVH and in aortic banded mice.

Table 1. Concentric LVH and LV MPI

<table>
<thead>
<tr>
<th>Patient Type</th>
<th>Human control</th>
<th>Concentric LVH</th>
<th>Murine control</th>
<th>Aortic banded mice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitral inflow E/A ratio</td>
<td>1.3±0.2</td>
<td>0.8±0.2*</td>
<td>1.3±0.3</td>
<td>0.4±0.02*</td>
</tr>
<tr>
<td>Fractional shortening (%)</td>
<td>37.7±3.8</td>
<td>40.4±4.3</td>
<td>34.2±0.9</td>
<td>36.8±6.5</td>
</tr>
<tr>
<td>LV MPI</td>
<td>0.38±0.06</td>
<td>0.47±0.09*</td>
<td>0.42±0.05</td>
<td>0.59±0.09*</td>
</tr>
</tbody>
</table>

*p<0.001 vs each control

MYOCARDIAL VELOCITY IMAGING (DMI) – LV FUNCTION

739 Non-ischemic fibrosis can be reliably detected by a typical „double peak sign“ extracted from regional myocardial deformation curves
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1University Hospital, Medical Clinic, Cardiology Dept., Wuerzburg, Germany
2Wuerzburg, Germany; 3London, United Kingdom
Regional myocardial fibrosis can be non-invasively assessed by magnetic resonance imaging (MRI) using the late enhancement technique. This study investigated if regional non-ischemic fibrosis in hypertrophic myocardium is associated with a typical myocardial deformation pattern assessed by ultra- sonic strain rate imaging.
Methods: In 10 patients with hypertrophic cardiomyopathy, 10 patients with severe aortic stenosis and 10 patients with Fabry cardiomyopathy MRI with late enhancement imaging was done and the left ventricular segments with fibrosis were defined. In addition, strain rate imaging in all patients and also in 10 healthy controls was done and the strain rate curves were extracted for longitudinal and radial function.
Results: In all segments displaying late enhancement (LE) (n=41) a typical systolic strain rate pattern was detected: this pattern consisted of an early first systolic peak followed by a rapid fall of strain rate near to the zero line and then again a second strain rate peak located during the isovolumetric relaxation period (Figure). This „double peak sign“ was never seen in the segments of the healthy control group. In addition, the „double peak sign“ was also detected in 10 of 79 segments displaying no LE. Interestingly, all these segments belonged to Fabry patients who are known to develop fur- ther progression of fibrosis. For 6 of these 10 segments follow-up MRI data after 2.5±1 years were available. All of them displayed LE suggesting that the „double peak sign“ might detect fibrosis earlier than MRI.
Conclusions: The „double peak sign“ assessed by strain rate imaging seems to detect regional fibrosis.

Eur J Echocardiography Abstracts Supplement, December 2006
740

Is targeted, limited echocardiography a safe way to reduce waiting lists for cardiac ultrasound? A study using digital, centrally stored echocardiographic sequences

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Background: Targeted (limited) echocardiograms are used in daily practice to increase the number of patients scanned per unit of time.

Methods: We conducted a retrospective analysis of all the echocardiograms performed in a tertiary echocardiographic laboratory (2013) using a dedicated software program (MI Lab, Philips Healthcare, Eindhoven, Netherlands). The targeted echocardiograms were compared to the comprehensive echocardiograms (full examination) in terms of duration of scans, number of patients scanned per hour, and the number of identified echocardiographic abnormalities.

Results: We compared 1576 targeted echocardiograms (80% were performed in 30 minutes or less) to 2443 comprehensive echocardiograms. The mean duration of targeted echocardiograms was 15 minutes 34 seconds compared to 64 minutes 54 seconds for comprehensive echocardiograms. The number of patients scanned per hour was 21.4 in the targeted echocardiogram group and 15.1 in the comprehensive echocardiogram group. The number of echocardiographic abnormalities identified in targeted echocardiograms was 869 compared to 2798 in comprehensive echocardiograms. The targeted echocardiograms identified 11% of abnormalities compared to 35% in comprehensive echocardiograms.

Conclusion: Targeted echocardiograms are feasible and can reduce waiting times, increase the number of patients scanned per hour, and reduce the number of echocardiographic abnormalities per scan.

741

Left ventricular dysfunction and metabolic syndrome in hospitalized patients

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1Villa Sofia Whitaker Hospital, Internal Medicine Dept., Palermo, Italy; 2Villa Eur J Echocardiography Abstracts Supplement, December 2006
evaluating regional wall motion and measuring peak systolic strain on the basal and middle portion of the inferior wall. Strain data obtained in the two groups were then compared. All 19 patients were also submitted to coronary angiography: in 10 the exam showed the absence of any lesion on coronary bed, while in the remaining 9 providing evidence of the presence of stenosis on right coronary needing further procedures.

**Results:** The mean strain value found on the basal segment was of 11±4.8% in the CAD patients and of 22.5±5.9% in the normal patients (p=0.0002). On the other hand, the mean strain value obtained on the middle segment was of 6.75±1.2% in the ischemic patients and 16.2±4.7% in the normal patients (p<0.0001).

**Conclusions:** According to our experience TDI strain quantification seems to be an accurate method in order to discriminate true from false hypokinesia in does not show anatomical images. This could be an important result in the pursuit of a non-invasive technique providing for reliable data on myocardial contractile function.

**3-D ECHO**

**744**

**Crop till you drop - Defining the learning curve for 3D echocardiography**

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**Background:** Three-dimensional echo (3DE) has recently become feasible for commercial use. Despite showing incremental benefit to 2D echo (2DE) for both LV volume measurement and use of rendered images (eg. for evaluation of mitral valve disease and septal defects), the uptake of 3DE as a clinical tool has been slow. We sought to define the learning curve by testing attendees before and after an interactive meeting.

**Methods:** Attendees (n=35, 23 cardiologists, 12 sonographers; adult and pediatric backgrounds) at a 3DE training course were shown how to use 3D review software (Qlab 4.2, Philips) and asked to identify the pathology on 2D and 3D images of 5 patients (wall motion abnormality, peri-prosthetic mitral regurgitation, subaortic membrane, small VSD, submural stenosis). In a 1½ day interactive teaching course, brief presentations on application of 3DE to assessment of wall motion, valve and congenital abnormalities were followed by 3D datasets of several patients, on which the attendees made their own interpretations before being shown the optimal viewing strategy. The test cases were not discussed in the course and the test was repeated at the end.

**Results:** Most attendees had access to a 3D system but with little or no use (n=57%). 3DE had little incremental value on baseline testing. However, after training, overall correct responses significantly improved compared with baseline 2D and 3D interpretation (Table). Interestingly, improvement was not the same for all diagnoses and assessment of prosthetic MR and subaortic membrane did not significantly improve. All groups (cardiologists vs sonographers, inexperienced vs moderately experienced reviewers) improved similarly.

**Conclusions:** Incorporation of 3DE into standard practice may be limited by inexperience. An interactive teaching course with rehearsal and direct mentoring appears to overcome this limitation and may improve the uptake of this technique.

**Table 1**

<table>
<thead>
<tr>
<th>Overall</th>
<th>Prosthetic MR</th>
<th>Subaortic membrane</th>
<th>VSD</th>
<th>LVOT mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-2D interpolation</td>
<td>31%</td>
<td>14%</td>
<td>17%</td>
<td>44%</td>
</tr>
<tr>
<td>Pre-3D interpolation</td>
<td>33%</td>
<td>23%</td>
<td>26%</td>
<td>43%</td>
</tr>
<tr>
<td>Post-3D interpolation</td>
<td>49%</td>
<td>23%</td>
<td>43%</td>
<td>77%</td>
</tr>
<tr>
<td>p (2D vs post2D)</td>
<td>&lt;0.01</td>
<td>p=0.2</td>
<td>p=0.03</td>
<td>p=0.01</td>
</tr>
<tr>
<td>p (pre 3D vs post2D)</td>
<td>p&lt;0.01</td>
<td>p=0.2</td>
<td>p=0.06</td>
<td>p=0.01</td>
</tr>
</tbody>
</table>

**MYOCARDIAL VELOCITY IMAGING (DMI) – OTHER**

**745**

**TDE velocities of tricuspid annulus are lower in patients with PTE compared with healthy controls**

R. Petkov¹; A. Nossikoff¹

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**Background:** Simple, rapid and reliable noninvasive assessment of the pulmonary pressures and RV function has important diagnostic and therapeutic implications in patients with pulmonary thromboembolism (PTE). Tissue Doppler imaging (TDI) of the tricuspid annulus (TA) is a relatively new method of assessment of the RV function, which is still underused.

**Methods and results:** Continuous tissue Doppler data from the pulmonary flow and tricuspid regurgitation showed that pulmonary hypertension (PAPs > 30 mm Hg x=43±5 SD 7.1 mm Hg and a nd PAPm calculated using Debestani formula >20 mm Hg x=32±5 SD 7.5 mm Hg) and RV dilatation (RVEDD x=73±5 SD 3.4 mm) were present in 75% of patients with PTE. In patients with PTE systolic and diastolic TA velocities were significantly lower than in healthy controls S tr v (x=11.8±SD 1.7 cm/s) and TV tr v (x=15.1±SD 3.3 cm/s). In patients with PTE and RA and inferior vena cava dilation (IVC), S tr v (x=7 1=11.0±SD 1.4 cm/s) was significantly lower (x=7 1=11.8±SD 1.8 p<0.05) than in patients with PTE and normal dimensions of RA and IVC. 67% of the PTE patients were with systolic dysfunction of RV if a threshold of S tr v 12 cm/s is used.

**Conclusions:** In the clinical setting of PTE TDI velocities of TA are significantly lower than in healthy controls with a reciprocal correlation with PAPs and PAPm. These results lead to important practical implication - in patients with PTE the development of RV dysfunction assessed by TDI is very frequent. TDI velocities of TA could be used as helpful indicator of RV function in patients with PTE.

**MYOCARDIAL VELOCITY IMAGING (DMI) – OTHER**

**746**

**Addition of spectral tissue doppler imaging to enhance the detection of coronary artery disease in patients with peripheral artery disease**

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**Background:** Patients with peripheral artery disease (PAD) show high incidence of asymptomatic coronary artery disease (CAD) due to the limited exercise capability. However, CAD is difficult to detect by routine echocardiography when the left ventricular (LV) wall motion is normal. We have previously showed positive isolated relaxation velocity (Vr) detected by spectral tissue Doppler imaging (TDI) is indicative of CAD. We tested whether CAD can be screened in patients with PAD without provocation by adding spectral TDI to routine echocardiography.

**Methods:** Fifty patients with PAD were enrolled (female/male =12/38, age =69±8 years). Routine echocardiography was done at first to detect wall motion abnormalities. Additionally, spectral TDI was done at the annular and mid-LV levels in the apical 4 chamber and 2 chamber views (8 points for each patient) in patients with normal LV wall motion. Positive Vr was defined as an upward spike during the isovolumic relaxation phase lasting >100 ms. CAD was considered present when either regional LV wall motion abnormalities or positive Vr was detected. CAD was confirmed either by a positive test using dipyridamole 201 thallium single-photon emission computed tomography (SPECT) or by a % diameter stenosis >90% by coronary angiography.

**Results:** CAD was confirmed in 28 patients (56%). By detecting resting wall motion abnormalities, routine echocardiography alone detected CAD with the sensitivity of 39% and with the specificity of 100%. In combination of spectral TDI, the sensitivity improved to 75% with the specificity of 64%.

**Conclusion:** Spectral TDI Doppler imaging in addition to routine echocardiography is useful for the detection of asymptomatic CAD in patients with PAD.

**LV FUNCTION – OTHER**

**747**

**Effect of dobutamine on left ventricular long-axis function during the acute phase of anterior myocardial infarction. Experimental study**

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**Purpose:** Acute anterior myocardial infarction (AMI) is the most common cause of cardiacogenic shock. Initial treatment includes the use of dobutamine (DOB) infusion. The purpose of this study is to examine the effect of DOB infusion on long-axis function during the acute phase of AMI after ligation of the anterior descending coronary artery in pigs.

**Methods:** Left anterior descending coronary artery ligation was performed in 20 pigs for 75 min. LV long(LA)- and short(SA)-axis fractional shortening (FS) and ejection fraction (EF, [Simpson]) pre and post AMI at 5, 15, 45 and 75 min, by the epicardial subxiphoid 4-chamber view 2D echo, were calcula-
myocardial velocity imaging (DMI) – other

748
Peak systolic velocity not Tei index appears to be most reliable to differentiate coronary healthy subjects from those with coronary artery disease

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Background: Left ventricular (LV) Tei index that is the ratio of isovolumic times and ejection time has been claimed to be a powerful index of LV performance. Tei index (lower the better; 0.9 being the cut-off) however has never been tested using colour tissue Doppler echocardiography, the modality that has excellent temporal resolution at high frame rates. The main purpose of the study was to investigate whether the index could differentiate coronary healthy from coronary artery disease (CAD).

Methods: 17 non-consecutive patients with angiographically (CAG) confirmed CAD and 9 subjects without (No-CAD) were recruited from the stress echo archive. CAG was performed after the subjects were diagnosed as having positive velocity-enhanced dobutamine stress echocardiography (DSE). Digital images were post processed at rest and during peak stress on a GE VIVID system equipped with Echopac software. Isovolumic contraction (IVCCT) and relaxation times (IVRT), ejection times (ET) along with isovolumic contraction velocity (IVCV) and peak systolic velocities (PSV) were computed from the 4 basal segments of LV. LV ejection fraction (EF) was estimated by modified Simpson’s approach. Tei index was calculated using the formula (IVCT + IVRT)/ET. Data are expressed as mean ± SD. A p value of <0.05 was considered statistically significant.

Results: DSE and CAG had a 97% concordance for diagnosis of CAD. Age (yrs) of the No-CAD and No-CAD groups respectively were 67.10 ± 9.58 vs 59.15 ± 7.58 (p=ns). LVEF was 50.±12% in the former and 57.5% in the latter group (p=ns). At rest the PSV (cm/s) was significantly lower in CAD (4.2 ± 1.5 vs 5.7 ± 2.0; p<0.05) in LV lateral/ marginalally lower in anterior wall (4.2 ± 1.3 vs 5.5 ± 1.7; p<0.05). ET (msec) was significantly higher in the anterior wall (320 ± 33 vs 286 ± 37, p<0.05). Tei index was lowest in the anterior wall (0.46 ± 0.24) in CAD and lowest in lateral wall (0.48 ± 0.15) in No-CAD; the corresponding highest values, noted in septum, were 0.63 ± 0.2 ± 8.0 ± 0.35, without any significant difference in any of the LV walls (all p>0.05). IVCV did not differ. Similar data were obtained during peak stress, average PSV (cm/s) being the most significant differentiating variable between CAD and No-CAD (7.2 ± 3.9 vs 12.3 ± 3.1; p<0.001).

Conclusion: Tei index is feasible using colour tissue Doppler echocardiography. However it does not provide additional information on top of the velocity data, confirming that the latter variable is most reliable to differentiate between CAD and No-CAD. The data explains the excellent concordance between velocity quantified DSE and the CAG-diagnosis of CAD.

749
Impedance cardiography (ICG)- clinical usefulness evaluation of the method in patients with coronary heart disease (CHD) in comparison with transhoracic echocardiography

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Background: The two well described techniques of noninvasive hemodynamic measurement are Doppler ultrasound and impedance cardiography (ICG). However, Tei index is still controversial as a method of cardiac output (CO) estimations. This method is based on the underlying changes in thoracic electrical bioimpedance and because blood is a better conductor than any other tissue, the pulse synchronous variations of blood volume in the thoracic aorta are used for calculating different hemodynamic parameters. This blood volume changes are determined by measurement of the electrical impedance of the thorax to electrical alternating current. For this reason any changes in anatomical conditions, blood flow pattern or electrical current flow cause inaccurate values and some cases limiting this method should be considered.

Transhoracic echocardiography (TEE) is a commonly accepted method of noninvasive hemodynamic measurements. Systolic and diastolic volumes were calculated using geometric assumptions such as method of discs. Stroke volume is then the difference between diastolic and systolic volume of LV (when EF is stroke volume expressed as a percentage of the diastolic volume).

Objective: The aim of the project was to estimate usefulness of ICG in the clinical use in hemodynamic measurements, in the patients qualified for coronary artery bypass grafting (CABG).

Material and methods: The measurements have been done in the preoperative period of hospitalization, among 60 consecutive, hemodynamically stable patients, admitted for the CABG. During the research the following values were measured: CO, CI (Cardiac Index), STS (Systolic Time Ratio), LVET (Left Ventricle Ejection Time), SV (Stroke Volume), SI (Stroke Index), using TTE and ICG. Statistical analysis was used to compare results obtained by both methods.

Results: There were no significant differences between mean SV values and its variations obtained by both methods (p>0.05). Significant correlation has been observed between the following parameters: SV-ICG and SV-TTE, SV-ICG and EF-TTE, EF-ICG and EDV, TTE and TTE SV (p<0.005).

Conclusions: Based on the available literature and the preliminary results, ICG seems to be an accurate and simple method in estimation of hemodynamic parameters. It seems to be a suplement for TTE and also a useful method in the qualification of border-line patients with no ECHO examination for CABG. ICG offers easy and beat-to-beat assessment of SV, what measurement was not included in the standard technical demanding eco protocol.

MYOCARDIAL VELOCITY IMAGING (DMI) – OTHER

750
Predictive value of pulsed tissue Doppler imaging derived variables to identify patients with acute inferior myocardial infarction with multivessel significant coronary artery disease

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Objectives: To investigate that early tissue Doppler imaging (TDI) assessment of non-infarct myocardial region in the patient with acute inferior MI can predict those with likelihood of significant multivessel coronary artery disease (CAD).

Patients and methods: Patients sample included 180 patients with acute inferior MI and were stratified into: group I: included 115 patients with concomitant left anterior descending (LAD) artery disease and group II: included 65 patients with without concomitant LAD disease. Reference group: included 27 subjects with normal coronary angiogram to get normal standard values of TDI. Transesophageal echocardiography with TDI and coronary angiography were performed for all patients.

Results: Linear regression analysis revealed that there was a significant correlation between CA stenosis at non-infarct region and Sm velocity and Em/Am ratio of TDI at non-infarct region [Y(dependent variable) =11.5-0.05X-0.02Z, r=−0.83; p<0.005]. Multivariate analysis revealed that a TDI-derived Em/Am ratio of TDI at non-infarct region 

LV function – OTHER

715
Correlation of peak systolic velocity and Tei index with mitral inflow and ECG parameters in patients with mitral regurgitation

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Objective: To investigate the relation between peak systolic velocity (PSV) in mitral regurgitation (MR), peak systolic velocity (PSV), Tei index, and mitral inflow parameters (I) in patients with mitral regurgitation (MR). The study was conducted among patients with mitral regurgitation referred to the St George’s University Medical School, London, United Kingdom.

Methods: A total of 20 patients with mitral regurgitation were included in the study. All patients underwent echocardiography and mitral regurgitation was graded using the Duke and Lemery criteria. Mitral regurgitation was graded as mild, moderate, or severe. Mitral regurgitation was classified as primary or secondary. Mitral regurgitation was secondary to mitral annulus dilation, mitral valve prolapse, or both. Mitral regurgitation was primary to mitral valve disease or to both mitral valve disease and mitral annulus dilation.

Results: The study found a significant correlation between peak systolic velocity (PSV) and Tei index with mitral inflow Doppler velocity parameters. The study also found a significant correlation between peak systolic velocity (PSV) and Tei index with mitral regurgitation grade.

Conclusion: The study found a significant correlation between peak systolic velocity (PSV) and Tei index with mitral inflow Doppler velocity parameters. The study also found a significant correlation between peak systolic velocity (PSV) and Tei index with mitral regurgitation grade.
after acute inferior MI was 60 cm/sec & 0.683 with sensitivity =84%, 88%, false positive =24%, 28%, and the area under curve was 0.845, 0.874, and probability of error =39%, 42%, respectively. Using Bland and Altman plot, there was good agreement between two observers and there was no significant difference with regards the intraobserver variability.

Conclusion: Inspite of limitations and confounders, we propose that pulsed wave TDI-derived estimates are independent variables which can be used to identify patients with significant concomitant CAD in the non-infarct region after acute inferior myocardial infarction.

MYOCARDIAL VELOCITY IMAGING (DMI) – LV FUNCTION

751
Quantitative assessment of longitudinal myocardial deformation by strain rate in acute anterior MI patients before and after successful primary PTCA

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Objective: The aim of this study was to evaluate changes in systolic longitudinal strain rate (SR) indices before and after successful primary PTCA (PPTCA) in acute anterior MI (AAMI) patients.

Methods: 21 consecutive patients (mean age: 60.5±11.3 years) within the first 6 hours of AAMI and 20 healthy subjects were included. Echocardiographic records were performed just before and after intervention (at the 1st week and the 1st month of the disease). Longitudinal SR measurements acquired using apical views were postprocessed from basal, mid and apical segments, supplied by LAD.

Results: AAMI resulted in the reduction in SR in all of segments analyzed for preinterventional period. The SR measurements were found as increased after successful intervention. However, the three values of deformation rate (initial, 1st week, 1st month) were reduced in patients compared with the control group. Particularly, the apical segments were shown significant differences at the initial, the 1st week and the 1st month, in an increasing manner (Table).

Conclusion: Our study is the first study conducted to evaluate the effect of successful PPTCA on SR indices before and after intervention in AAMI. Infracted myocardium was characterized by the loss of the homogenous distribution of SR from basal to apical segments and the decrease in the this indices. The effect of procedure was that improvement SR values was completed in 1st week and did not reveal any change in one month.

Table 1. Changes in SR after primary PTCA

<table>
<thead>
<tr>
<th>Strain Rate (SR)</th>
<th>Control</th>
<th>Initial</th>
<th>1st Week</th>
<th>1st Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apical Septum</td>
<td>1.5±0.2</td>
<td>0.8±0.2</td>
<td>1.1±0.3</td>
<td>1.1±0.3</td>
</tr>
<tr>
<td>Apical Anterior</td>
<td>1.7±0.2</td>
<td>1.0±0.3</td>
<td>1.2±0.4</td>
<td>1.2±0.3</td>
</tr>
<tr>
<td>Apical Anteroapical</td>
<td>1.5±0.2</td>
<td>1.0±0.3</td>
<td>1.1±0.3</td>
<td>1.3±0.3</td>
</tr>
<tr>
<td>Mid Septum</td>
<td>1.5±0.2</td>
<td>1.1±0.3</td>
<td>1.3±0.3</td>
<td>1.3±0.3</td>
</tr>
<tr>
<td>Mid Anterior</td>
<td>1.7±0.2</td>
<td>1.3±0.2</td>
<td>1.4±0.2</td>
<td>1.3±0.3</td>
</tr>
<tr>
<td>Mid Anteroseptal</td>
<td>1.6±0.2</td>
<td>1.1±0.3</td>
<td>1.2±0.3</td>
<td>1.3±0.3</td>
</tr>
<tr>
<td>Basal Anterior</td>
<td>1.6±0.2</td>
<td>1.5±0.2</td>
<td>1.6±0.3</td>
<td>1.6±0.2</td>
</tr>
<tr>
<td>Basal Anteroapical</td>
<td>1.5±0.2</td>
<td>1.3±0.2</td>
<td>1.3±0.3</td>
<td>1.3±0.3</td>
</tr>
</tbody>
</table>

Table 1 vs control: Initial vs 1st Week; Initial vs 1st Month; 4: 1st Week vs 1st Month

LV FUNCTION – OTHER

752
The role of isovolumic contraction parameters in patients with ischaemic cardiomyopathy subjected to cardipulmonary exercise test

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Aim: To assess usefulness of isovolumic contraction parameters, determined by supine bicycle exercise echocardiography (ex-echo), in ischaemic heart failure (IHF) patients (pts) subjected to cardipulmonary exercise test (CPX).

Material and methods: We studied 50 adult pts (32 male and 18 female), mean age of 62±1.5 (46-79) years, mean exercise fraction (EF) 30.3±13.4 (11-45%). The following baseline and ex-echo (25-Watts, 3-min increments) systolic Tissue Doppler parameters were measured: myocardial velocity during isovolumic contraction (IVV) and myocardial acceleration during isovolumic contraction (IVA). Tissue Doppler indices were derived from the septal and lateral border of the mitral annulus in the apical four chamber views. The obtained each parameter are shown in the table 1. Peak oxygen uptake (VO2peak) was measured on CPX. Pts were divided into three groups according to the VO2peak value: group 1 (10-14 ml/kg/min); group 2 (14-20 ml/kg/min) and group 3 (>20 ml/min).

Results: The baseline and peak exercise values of IVV were similar in all groups. However, we found a significant increase of IVA only in group 2 and 3 (better functional performance) in comparison to group 1. (*p-value <0.05 between the groups).

Conclusions: Supine bicycle ex-echo and measurement of IVA is a novel method for assessing subtle changes in left ventricle systolic function in ischaemic HF. Higher values of IVA during exercise test (>20 ml/min) LV to be exercise tolerance in ischaemic HF pts. Measurement of IVA seems to be superior to IVV.

Table 1

<table>
<thead>
<tr>
<th>VO2peak (ml/kg/min)</th>
<th>10-14</th>
<th>14-20</th>
<th>&gt;20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pts</td>
<td>15</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>IVV rest (m/s)</td>
<td>0.035</td>
<td>0.042</td>
<td>0.005</td>
</tr>
<tr>
<td>IVV peak exercise (m/s)</td>
<td>0.04</td>
<td>0.046</td>
<td>0.002</td>
</tr>
<tr>
<td>IVV rest (m/s)</td>
<td>1.43</td>
<td>1.61</td>
<td>1.57</td>
</tr>
<tr>
<td>IVV peak exercise (m/s)</td>
<td>1.85 *</td>
<td>2.67 *</td>
<td>3.43 *</td>
</tr>
</tbody>
</table>

753
The doppler-derived myocardial performance Index is more than two-dimensional echocardiographic in the assessment of donor heart function prior to transplantation

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Purpose: Although demand for cardiac transplantation far outstrips supply, only 30-40% of available donor hearts (DH) are used. The commonest cause of rejection is left ventricular (LV) dysfunction. Wall motion score index (WMSI) and biplane EF on 2D transthoracic echocardiography (TTE) are the main methods of assessment of DH ventricular function but are technically difficult in ventilated, instrumented supine patients on intensive care. Inadequate 2D LV assessment may lead to inappropriate rejection of a DH. The myocardial performance index (Tei index) is a doppler-derived assessment of global LV function that does not require the same endocardial definition as 2D assessment.

The aim of this study: To define the relative feasibility of obtaining LV Tei compared to wall motion score index (WMSI). 2. To assess the ability of LV Tei to predict DH outcome.

Methods: 80 potential cardiac donors (mean age 43±13.1) undergoing standard resuscitation using pulmonary artery flotation catheter (PAFC), were studied by serial TTE using a Siemens Acuson Cypress portable machine with second harmonic imaging (3.6 MHz probe). Management comprised PAFC guided correction of pre- and after-load and substitution of norepinephrine with vasopressin. TTE was performed at baseline prior to donor management and was repeated after 2 hours. Donor details were anonymized and TTE time ordered codes. The pictures were analysed off-line by 2 independent blinded observers.

Results: Baseline TTE was performed within 2±0.5 hours of consent, and was possible in 67 (83%) donors. Serial 2D measurements were possible only in 35 donors (52%) and complete wall motion scoring (all 16 segments) was possible only in 11 (16%). However, serial LV-Tei measurements were possible in a higher number of donors (50/67 donors (75%) (p<0.001). Baseline LV-Tei predicted the usability of hearts for transplantation [0.57±0.28 vs 0.42±0.16 (p<0.001)]. 40/67 (60%) donors were on norepinephrine (NE) at baseline measurement and their LV-Tei was significantly worse than those who were not on NE [0.57±0.28 vs 0.39±0.15 (p<0.001)]. The area under curve was 0.845, 0.874, and probability =0.39±0.05 at baseline in 28 donors, and following donor management their LV-Tei improved from baseline value of [0.66±0.18 to 0.57±0.21, p<0.028]. There was no overall change in the 2D EF between measurements.

Conclusion: Assessment of donor heart function using Tei index may be completed in a higher proportion of donors than 2D TTE parameters. The index can be used in serial assessment of donor heart function and can direct aggressive donor management towards marginal donor hearts.

MYOCARDIAL VELOCITY IMAGING (DMI) – LV FUNCTION

754
Early detection of left ventricular wall motion alterations in heart allografts with coronary artery disease: Diagnostic value of tissue Doppler and two-dimensional (2D) strain echocardiography

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Background: Conventional echocardiography (ECG) is not reliable for early detection of transplant coronary artery stenosis (TCA). Tissue Doppler imaging (TDI) and non-Doppler-based two-dimensional (2D) strain are new ECHO methods that reveal ventricular wall motion alterations earlier than conventional echocardiography. To evaluate their reliability for early TCA detection, these methods were used for left ventricular (LV) kinetic assessment in transplant hearts with normal conventional ECHO images.

Methods: In 58 heart recipients (post-transplant times >6 months) with normal LV ejection fraction and normal wall motion in conventional ECHO, also pulsed-wave tissue Doppler (PW-TDI) and 2D strain wall motion analysis at the LV were performed at rest, before each follow-up cardiac catheterization.
PW-TD was used to evaluate radial and longitudinal wall motion at basal segments. Circumferential, radial and longitudinal strain and strain rate were calculated from parasternal short axes and apical (3- and 4-chamber) views, respectively. Wall motion parameters were tested for relationships with angiographic findings.

**Results:** In comparison with patients without TCA, those with angiographic TCA (with and without focal coronary stenoses) showed significant (p<0.01) reduction of systolic wall motion velocity at the basal posterior wall, reduction of global systolic strain and strain rate (rad., circumf. and longit.) and prolongation of systolic time (from onset of contraction to peak of systolic strain and systolic velocity, respectively). For peak systolic velocity values below 10 cm/s at the basal posterior wall we found a 93.5% likelihood of angiographic TCA in general, regardless of the presence or absence of focal coronary stenoses. Reduced global strain and strain rate (rad., circumf. and longit.) showed similar predictive value for angiographic TCA in general, regardless of the presence or absence of focal stenoses. Regional strain and strain rate analyses however showed differences in synchrony and synergy indexes of contraction between patients with and without focal stenoses (p<0.01).

**Conclusions:** In heart allografts with apparently normal LV kinetics in conventional ECHO, simple PW-TD recordings at rest allow early TCA prediction, but without the ability to differentiate between diffuse and predominantly focal coronary stenoses. Such differentiation however is reliably possible with more complex regional strain and strain rate analyses. These results suggest that myocardial velocity, strain and strain rate analyses can be useful for the timing of post-transplant follow-up cardiac catheterizations.