HEART FAILURE

835 Transmitial flow patterns and the presence of kidney disease provide independent and incremental prognostic information in patients with chronic heart failure

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Background/Aim: In patients (pts) with chronic heart failure (CHF), the transmitial flow pattern carries important prognostic information. In such pts, chronic kidney disease (CKD) is frequently observed but its prognostic impact relative to that of transmitial flow patterns is unknown.

Methods: This prospective study enrolled 292 pts with stable CHF (mean age 59±13 years, mean NYHA functional class 2.7±0.5, mean ejection fraction 30±10%). As a measure of kidney function, the glomerular filtration rate (eGFR) was estimated using the abbreviated Modification of Diet in Renal Disease Study Equation. CKD defined as eGFR <60 ml/min/1.73 m² was present in 148 pts (mean eGFR 43.6±13.5 ml/min/1.73 m²), 144 pts had no CKD (mean eGFR 74.0±10.5 ml/min/1.73 m²). Echo measurements comprised left ventricular dimensions/volumes, ejection fraction, mitral E/A-ratio, deceleration time and tissue Doppler mitral annular velocities (S', E', A'). The mitral filling pattern was classified as restrictive (RFP), pseudonormal (PNFP) or abnormal relaxation (ARFP). A cardiac event (cardiac death or urgent cardiac transplantation) was defined as combined study end point.

Results: During a follow-up of 497±373 days, 45 pts suffered a cardiac event (cardiac death, n=42; urgent cardiac transplantation, n=3). By multivariate Cox analysis including clinical and echocardiographic variables, independent prognostic predictors were a RFP (hazard ratio: 2.77, 95% CI 1.28-6.09), CKD (hazard ratio: 2.79, 95% CI 1.24-6.28), and left atrial diameter (hazard ratio: 2.21, 95% CI 1.47-3.44). In pts with RFP (n=62), the prognostic value for CKD was more evident in patients with low Goldman score. In higher Goldman activity 42%, specificity 91%, positive predictivity 74% and negative predictivity 73% for predicting cardiac endpoints. The value of left atrial enlargement was more evident in patients with low Goldman score. In higher Goldman scores, although left atrial diameter also predicted cardiac events, its additional benefit was not significant.

Conclusion: Left atrial enlargement can be a valuable parameter in cardiac risk assessment in elderly patients undergoing noncardiac surgery.

837 Right ventricular function is an independent predictor of mortality in heart failure

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Introduction: Right ventricular (RV) dysfunction has been associated with increased mortality in small studies of advanced heart failure (HF) and myocardial infarction. We evaluated the long-term prognostic information from Tricuspid annular plane systolic excursion (TAPSE), a simple measure of RV ejection fraction, in a large consecutive population admitted for HF.

Methods: A total of 911 patients admitted to hospital with HF, underwent trans-thoracic echocardiography including TAPSE performed as part of the baseline screening for the ECHOS trial (a placebo-controlled, randomized trial of a pre-synaptic dopaminergic agonist). TAPSE was measured by M-mode echocardiography of the lateral tricuspid annulus as the mean of measurements from 5 cardiac cycles. Left ventricular ejection fraction was estimated by wall motion score. Data are presented as medians (9 and 95 percentiles).

Results: The 911 patients were followed for 3.0 (0.1-3.7) years. The median age was 74 (52 to 89) years, 40% were male, and 64% had a medical history of HF. TAPSE was 17.2 (9.2-27.4) mm and left ventricular ejection fraction 30 (15-60)%). TAPSE was divided into quartiles (inter-quartile range 13.2-21) and lower values was associated with increased mortality at 1 year and at end of follow-up, log-rank p=0.003 and p=0.01, respectively. A multivariate Cox model (backward elimination) identified TAPSE as a significant predictor of mortality (hazard ratio (HR)=0.74, 95% CI 0.59-0.93 per doubling of TAPSE), independent of a prior medical history of HF (HR=1.39, CI 1.08-1.79), chronic obstructive pulmonary disease (HR=2.40, CI 1.13-4.86), or age (HR=1.62, CI 1.45-1.82 per 10 year increase). Other significant parameters were BMI, sex, or presence of valvular disease, renal failure, or diabetes. Left ventricular ejection fraction was not a significant co-variate in the final model.

PERIOPERATIVE/INTENSIVE CARE

836 Left atrial diameter as a predictor of cardiac events in elderly patients undergoing noncardiac surgery

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Objective: In patients undergoing noncardiac surgery, transthoracic echocardiography (TTE) is only recommended individuals with a history of heart failure in order to evaluate resting left ventricular function. However echocardiography can be valuable in elderly patients who may have clinical overt or undetected heart diseases. The aim of this study was to investigate the value of preoperative echocardiographic examination for assessing cardiac risk in elderly patients.

Methods: Consecutive patients aged older than 65 years (45 male, 50 female, 72±8 years) underwent TTE before noncardiac surgery. Cardiac endpoints were in-hospital death, nonfatal acute coronary syndromes, congestive heart failure and arrhythmic events that cause hemodynamic deterioration.

Results: Cardiac endpoints occurred in 34 patients (36%, 10 death, 3 acute coronary syndrome, 17 congestive heart failure and 4 arrhythmic events). In univariate analysis, patients with cardiac events had larger left atrial and left ventricular diameters, lower ejection fraction and more frequent moderate-severe mitral regurgitation. In multivariate analysis, adjusted for Goldman risk score, history of coronary artery disease or heart failure, ejection fraction and type of diastolic dysfunction, Goldman risk score and left atrial diameter were the two significantly related factors to cardiac events (p<0.001 and p<0.03). In ROC curve analysis, AUC for left atrial diameter was 0.73 (p<0.001, 95% CI 0.62-0.84) and a left atrial diameter ≥74 mm had a sensitivity 42%, specificity 91%, positive predictivity 74% and negative predictivity 73% for predicting cardiac endpoints. The value of left atrial enlargement was more evident in patients with low Goldman scores. In higher Goldman scores, although left atrial diameter also predicted cardiac events, its additional benefit was not significant.

Conclusion: Left atrial enlargement can be a valuable parameter in cardiac risk assessment in elderly patients undergoing noncardiac surgery.
CORONARY FLOW

838
The additional prognostic value of coronary flow reserve on anterior descending artery in patients with positive stress echo by wall motion criteria. A transthoracic vasodilator stress echo study
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Background: It has been demonstrated that vasodilator stress echocardiography imaging of left anterior descending (LAD) coronary flow reserve (CFR), provides additional prognostic information over regional wall motion in patients with a negative stress echo result. The aim of the present study was to assess the prognostic value of CFR in patients with known or suspected coronary artery disease (CAD) and positive stress echo.

Methods: We studied 254 patients (186 men, age 67±9 years) with positive stress echo by standard wall motion criteria. All patients underwent dipyridamole (up to 0.84 mg/kg in 10 minutes) stress echo with CFR evaluation of LAD by Doppler, of these 225 had angiographically assessed CAD.

Results: During a median follow-up of 27 months, 34 events occurred: 3 cardiac deaths, 6 nonfatal myocardial infarctions, 25 re-hospitalizations for unstable angina. Mean CFR was 1.8±0.5. At individual patient analysis 97 patients had normal CFR (≥2.0) and 157 had abnormal CFR on LAD. The 24-month spontaneous event-free survival was better in patients with higher CFR (see figure). At Cox analysis, a CFR of LAD<2 (hazard ratio [HR] 2.5, 95% CI 1.2-5.1, p=0.013), was the only independent prognostic predictor of outcome.

Conclusions: In patients with a positive stress echocardiography by wall motion criteria, CFR provides independent information for prognostic stratification, and a reduced CFR is associated with a worse outcome.

STRESS ECHO

839
The additive prognostic value of wall motion abnormalities and coronary flow reserve during dipyridamole stress echo
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Objectives: The aim of the study was to evaluate the prognostic value of Doppler echocardiographic derived coronary flow reserve (CFR) over regional wall motion in patients with known or suspected coronary artery disease undergoing Dipyridamole Echocardiography test (DET).

Methods: In a prospective, multicenter, observational study. We evaluated 1145 patients (702 males; 64±11 years) who underwent high dose dipyridamole (0.84 mg/Kg over 10’) stress echo with CFR evaluation of LAD by Doppler. During a median follow-up of 27 months 33 events occurred: 3 cardiac deaths, 6 nonfatal myocardial infarctions, 25 re-hospitalizations for unstable angina.

Results: CFR on LAD. During a mean follow-up of 36 months 33 events occurred: 3 cardiac deaths, 6 nonfatal myocardial infarctions, 25 re-hospitalizations for unstable angina. Mean CFR was 2.2±0.5. At individual patient analysis 225 had angiographically assessed CAD.

Conclusions: In patients with known or suspected coronary artery disease DET result by wall motion criteria and CFR are additive and complementary for the identification of patients at higher risk of experiencing hard events.

HEART FAILURE

840
The combination of neurohormonal, ventilatory and echocardiographic parameters is useful in risk stratification of patients with Chronic Heart Failure
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Background: Whether brain natriuretic peptide (BNP) combined to the enhanced ventilatory response (EVR) during cardiopulmonary exercise test or echocardiographic indexes of diastolic dysfunction, improves prognostic stratification in systolic heart failure (HF) is currently unknown.

Methods and results: Median BNP plasma levels, measured in 134 consecutive stable outpatients with mild to moderate HF and LV ejection fraction (LVEF) <40%, who performed a maximal exercise test, were 214 [96, 508] pg/ml. EVR, assessed as slope of the relation between minute ventilation and carbon dioxide production (VE/VCO2 slope) >35, was found in 60/134 patients (45%). A restrictive filling pattern (RFP), defined as presence of E/A ratio >2.0 cm/sec and E deceleration time <140 ms, was present in 25/126 patients with Doppler data available (19.5%).

During 717±244 follow-up days, 50 patients died or were admitted for worsening HF. By multivariate analysis, independent predictors of outcome were RFP (HR 2.867, 95% CI 1.459 to 5.633, p=0.002) and EVR (HR 2.80, 95% CI 1.414 to 5.546, p=0.003). The addition of RFP or EVR to BNP levels > 215 pg/ml determined a three-fold increase in risk (HR 2.987, 95% CI 1.376 to 6.483, p=0.006), while the combination of the three predictors identified the patient population with the worst outcome (HR 9.631, 95% CI 4.375 to 21.69, p<0.0001). E vent-free survival rates were 75% in patients without predictors (n=52), 73% in those with one (n=31), 48% in those with two (n=33), and 11% in those with 3 subjects of prognostic factors.

Conclusions: In systolic HF, EVR and RFP are the strongest predictors of outcome, while plasma BNP levels > 215 pg/ml have an additive prognostic value. The present study highlights the importance of a multiparametric approach for an optimal risk stratification in CHF patients. Patients at high or very high risk should undergo closer follow-up and be carefully evaluated for different therapeutic options, including non pharmacological treatment.

CONTRAST ECHO

841
Discharge NT-proBNP and myocardial perfusion echocardiography predicts major adverse cardiac events after acute anterior myocardial infarction and early PCI
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Long term prognosis inpatients with acute MI and early PCI is under investigation. This study was undertaken to assess NT-proBNP at discharge and real-time myocardial contrast echocardiography (rt-MCE) as a combined index for prediction of major adverse cardiac event (MACE) defined as death, reinfarction or rehospitalisation for CHF.

Methods: Study group consisted of 115 consecutive patients (aged 57±11.75% males) with first myocardial infarction, only anterior wall treated with PCI <12 hours from symptom onset. On the second day of infarction rt-MCE was performed with 0.3-0.5 ml bolus of Optison. Initially global left ventricular function was assessed from apical views (4-ch, 2-ch, 3-ch), then myocardial perfusion in dysfunctional segments was analyzed (PSI: 2=homogenic, 1=partial 0=absent). Perfusion index (RPSI) was the mean of dysfunctional segments PSI. Integrity of microvascularite was present (MCE+) if at least 50% of dysfunctional segments present homogenic contrast.
Results: The mean study population LVEF was 40.8±6.0%, WMSI 1.41±0.2 and RPSI 1.29±0.69. During 500 day follow-up 28 MACE were registered (8 deaths, 7 MI's, 13 rehospitalizations for CHF). Minimal NT-proBNP was 56.0, and maximal 8337.0 pg/ml. The ROC curve was constructed to assess cut-off point for MACE prediction during long-term follow-up. The best value to predict MACE was NT-proBNP over 1895 pg/ml (AUC 0.79). Based on NT-proBNP<1895 pg/ml and NT-proBNP≥1895 pg/ml and NT-proBNP< in 52 pts the study population was divided into 4groups: group A (NTproBNP< and MCE-), group B (NTproBNP< and MCE+), group C (NTproBNP+ and MCE-) and group D (NTproBNP+ and MCE+). According to survival analysis with Kaplan Meier analysis the cumulative probability of MACE-free survival during 1.5 year follow-up was 35%, 78%, 91% and 98%, respectively.

Conclusions: Combined use of discharge NT-proBNP and nMCE examination in patients with acute cardiac infarction treated with early PCI is simple and accurate predictor of major adverse cardiac events in long-term follow-up.

CARDIOMYOPATHY/PERICARDIAL DISEASE

842 Incremental prognostic value of restrictive filling pattern in hypertrophic cardiomyopathy: a Doppler echocardiographic study

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Objectives: To study frequency and incremental prognostic value of restrictive filling pattern (RFP) in hypertrophic cardiomyopathy (HCM).

Background: HCM is usually characterized by left ventricular diastolic dysfunction and preserved systolic function. Main diastolic abnormality at Doppler echocardiography in HCM is abnormal relaxation pattern; however RFP has never been extensively evaluated before.

Methods: 87 consecutive HCM patients (64% men, mean age 45±19 years) underwent physical and Doppler-echocardiographic evaluation at our centre from March 1993 to February 2001. Mean length of follow-up was 96±54 months.

Results: RFP was found in 14 patients (16%) at index evaluation. Patients with RFP had higher NYHA class, more frequently signs of heart failure and lower left ventricular ejection fraction (p=0.018, p=0.002 and p=0.001, respectively). During follow-up, mortality plus heart transplantation was significantly higher in HCM patients with RFP than in those without RFP (p=0.0001) (figure 1). NYHA class (HR=5.95, 95% CI: 1.34-26.38, p=0.019), indexed left atrial diameter (HR=1.68, 95% CI: 1.01-2.82, p=0.047) and RFP (HR=2.94, 95% CI: 1.25-6.88, p=0.01) were selected as predictors of death or transplant in a multivariate proportional hazard model. The AUC of ROC curve from multivariate regression models for predicting adverse outcome significantly improved from 0.76 considering only NYHA class to 0.84 after inclusion of RFP and indexed left atrial diameter (p=0.01).

Conclusions: RFP is rare but not exceptional in HCM. Echo-Doppler evaluation of filling pattern congers additional prognostic power to clinical stratification.
Importance of echocardiography in early assessment and follow up in surgically treated patients with ventricular septal defect after acute myocardial infarction

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Objective: Rupture of the left ventricle wall (VDI) in patients with acute myocardial infarction (MI) is severe and often life threatening complication. The aim of the study was to assess the risk of early surgical treatment in this group of patients, outcome and long term prognosis using echocardiography and clinical methods.

Material and methods: Clinical and echocardiographic parameters were assessed in 14/17 patients operated due to VDI which was confirmed by echocardiography and angiography before the operation (11 men, 3 women, mean age 63.2±7.9). The following clinical parameters were analyzed: NYHA class, heart rate (HR), blood pressure (BP), cardiac rhythm, ECG. The following echocardiographic parameters were measured: left atrium diameter (LA), end-diastolic (EDD), and end-systolic (ESD), left ventricle diameter, ejection fraction (EF), severity of mitral (MR) and tricuspid (TR) regurgitation. The pressure gradient on the site of VDI and systolic pressure of the right ventricle (RVSP) were also measured.

Results: All patients were in NYHA III class, in sinus rhythm with average heart rate 86±18/min. LA and LV diameters were normal and average EF assessed by Simpson was decreased (32.9±7.5%). In 6 patients with inferior MI, VDI was localized in the basal segment of the inferior LV wall, in 4 patients with anteroseptal MI at the site of interventricular septum and in 4 patients at the posterior wall of the LV. All patients had significant left-to-right shunt whereas in 2 patients small right-to-left shunt also existed. Pressure gradient at the site of VDI was 72.8±57 mm Hg. All patients had mild MR and TR, RVSP was moderately increased (48.8±22.1 mm Hg). Dacron patch was placed on the VDI site in the majority of patients (12/14) with additional coronary artery by-pass grafting in 7 patients. In two patients direct suture was done. Haemodynamically insignificant residual shunt was detected immediately after operation in only two patients. One patient died immediately after operation and one 42 months after the operation.

Conclusion: Patients with VDI after acute MI could be successfully surgically treated with good early as well as long term prognosis. Although these are high risk patients, in our study group surgical intervention was found to be justified and efficient treatment with good results. Echocardiography as non-invasive technique is a method of choice for early assessment for precise localization of the ruptured site and haemodynamic parameters as well as for early and late postoperative follow up.

NT-proBNP in differentiation of normal and pseudonormal mitral flow in ischemic heart disease

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Background: Echocardiographic assessment of LV diastolic function is important in settings of objective signs of heart failure in patients with preserved LV systolic function. Diagnosis of moderate diastolic dysfunction (DD) with pseudonormalization feature is difficult.

The aim of the study was to assess NT-proBNP diagnostic value for diagnosis of DD and differentiation of normal and pseudonormal mitral flow.

Methods: Among 83 consecutive patients/pts with angiographically documented coronary artery disease and LVEF >45% the normal mitral flow (E/A >1) was found in 40 pts (age 56±10 years, 33% males). In 32 of them the inflow from right superior pulmonary vein (RSPV) was normal (S/D >1, Aa <35 cm/s) and in 8 pts it was found to be pseudonormalized.

Results: NT-proBNP levels were significantly higher (734±586 mg/ml vs 167±100; p<0.001) than in group A. Based on the ROC curve the best discriminative value was >32 pg/ml (AUC 0.83, sensitivity 63%, specificity 97%, accuracy 85%, PPV 85%, NPV 63%)

Conclusions: In ischemic heart disease with preserved LV systolic function and normal mitral flow NT-proBNP may be helpful in selection of patients with isolated diastolic dysfunction and pseudonormal pattern of mitral flow.
after acute myocardial infarction (AMI) determine LV function deterioration and modify clinical and therapeutic course of the disease.

**Aim:** Evaluation of the predictive value of MPI in dynamic and progression of subsequent and late post infarction LV remodeling.

**Methods:** Using conventional echocardiographic Doppler methods, LV ejection fraction (LVEF), end diastolic volume (EDV), end systolic volume (ESV), with 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) intervals were measured and MPI (IVRT+IVCT/ET) was calculated. Assessment of LV function was done in first week after AMI, three and six months.

**Results:** Forty patients with first AMI were divided in two groups according cut off value of MPI: group I - MPI 0.56-0.62, group II, MPI >0.62. There was significant difference between group I and II in EDV values in first week (164 vs 187 ml; p=0.022). Continuing increase of EDV in group II (from 187 to 199 ml; p=0.011) and significant decrease in group I (from 164 to 146 ml, p=0.01), was in result significant in EDV between groups after six months (146 vs 199, p=0.024). In group II there was significantly higher values of ESV in first week after AMI (115 vs 137 ml; p=0.02). Between third and sixth month in group I ESV significantly decreased (from 123 to 76 ml; p=0.029), but in group II there was slightly, but not significantly change (from 123 to 118 ml, p=ns), so after six month there was significant difference between two groups in ESV values (76 vs 118 ml; p=0.043). There was no significant correlation between MPI level and WMSI changes in first week after AMI and during six months follow up. Close correlation was found between DTE and MPI value in first week in group II comparing to group I (p=0.03; p=0.07) in patients with mitral inflow restrictive pattern (E/A ≥ DTE<140 ms).

**Conclusions:** Assessment of MPI in very early phase of AMI could predict the dynamic of long term LV remodeling. Increased values of MPI (>0.62) could be used as invaluable screening method for patients with high and progressive degree of postinfarction LV remodeling in early phase and after 6 months.

**851**

**Left ventricle postinfarction remodeling and character of fibronectin degradation in Q wave myocardial infarction patients**

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Character of fibronectin (FN) degradation may have significant influence on processes of left ventricle (LV) remodeling, connected with matrix destruction and high matrix metalloproteinase (MMP) activity, however, more needs to be learned about this problem. The aim was to investigate the influence of character of FN degradation on frequency of LV dilatation remodeling (DR) developing in Q wave myocardial infarction (Q-MI) patients.

**Material and methods:** 64 patients with Q-MI (male - 80%, all patients are younger 75 y.o.) were admitted within the first 6 hours after Q-MI symptoms onset and received standard treatment that included thrombolysis (100%), aspirin (96%), beta-blockers (92%), ACE inhibitors (84%), statins (52%). The purpose of this study is to examine whether early changes in functional remodeling of the left ventricle (LV) are related tofatal MI arrhythmias.

**Methods:** Left anterior descending coronary artery ligation, for 120 min was performed in 11 pigs. LV long- and short-axis fractional shortening (FS) pre and post MI every 10 min during the initial 30 min and every 15 min thereafter by the epiradicial subxiphoid 4 chamber view 2D echo were calculated. Aortic flow as well as LV systolic and diastolic pressure was also measured. Intractable ventricular fibrillation (VF) occurred in 5 out of the 11 pigs used within the initial 30 min post MI. Short-axis FS in all animals with VF reduced post MI significantly (mean FS change -41.83±12.04%, p<0.05) while an increase of the short-axis FS in all animals without VF was observed (mean FS change +29.68±11.09%, p<0.05). Long-axis FS reduced significantly post MI in both groups (mean FS change -38.72±12.97%, p<0.05 with and mean FS change -38.53±6.41%, p<0.001 without VF).

**Conclusions:** Short-axis FS reduction precedes the appearance of VF in the initial 30 min post MI. It is postulated that the loss of the compensating short-axis FS increase to the long-axis FS reduction may act through the mechano-electrical phenomenon to VF propensity during the acute phase of MI.

**852**

**Types of postinfarction remodeling of left ventricle in patients with Q-wave myocardial infarction**

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The purpose of our investigation was to estimate the course of postinfarction remodeling in patients with Q-wave myocardial infarction (QWMI). We studied 115 pts with QWMI. Depending on the clinical status at admission they were divided into 3 groups: with clinical signs of heart failure (30 pts), without heart failure but with systolic dysfunction (19 pts), without heart failure and with preserved systolic function (66 pts). We performed ECHO- and doppler-ECHO- cardiography initially (first 24 hours of QWMI), in 3.7, 14, days, 1 and 3 months and 6-minute walk test to determine functional class of heart failure (NYHA).

**Results:** In group 1 end-diastolic volume (EDV) increased from 179.0±9.4 ml to 209.2±14.7 ml, p<0.05, end-systolic volume (ESV) from 91.9±8.8 ml to 109.1±14.7 ml, p<0.05. Ejection fraction (EF) did not changed significantly (48.7±2.5% initially, 47.9±4.4% in 3 months). Sphericity index grew from 0.59±0.02 to 0.63±0.02, myocardial mass (MM) of left ventricle increased from 282.0±19.5 g to 331.7±20.9 g (excipient hypertrophy) Diastolic function severely impaired (LV end-diastolic volume index increased in 6.6% of pts, pseudonormal - in 23.3% ) got worse (30% of pts with restrictive filling in 3 months). At the end of investigation heart failure class was 2.61±0.11. In group 2 EDV increased from 169.0±6.9 ml to 175.3±10.1 ml, ESV decreased (-6.3±6.3 ml initially, 83.8±14.1 in 3 months), EF improved from 43.0±2.3% to 52.12±3.2%, sphericity index and MM of left ventricle changed insignificantly. Heart failure class was 1.9±0.14. In group 3 EDV (155.0±6.6 ml 157.7±9.7 ml) and ESV (63.0±4.9 ml - 63.94 ml) did not change, EF stayed in normal ranges (60.4±2.2% - 59.7±1.0% at admission and at the 1year visit). Echocardiographic examination (LOGIC Q, Daco, USA) as well as transmitral filling, 50% type I of diastolic dysfunction. At the end of investigation heart failure class was 1.59±0.09 (diastolic heart failure).

**Conclusions:** Pronounced dilation of left ventricle (>10% and/or over 160.0 ml) is compensatory and is accompanied with significant increment of ESV, MM, sphericification of left ventricle cavity, does not lead to the improvement of global contractility and predisposes to the development of the severe heart failure. Moderate dilation (<10%, less than 160.0 ml) is compensative, leads to the increment of ejection fraction (Frank-Starling mechanism), prevents progression of diastolic abnormalities and courses heart failure of lesser functional class. In patients without LV dilation with preserved EF diastolic dysfunction can cause heart failure in 56.4% of cases.

**853**

**Ventricular fibrillation in the acute phase of myocardial infarction**

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**Purpose:** Fatal ventricular arrhythmias during the acute phase of myocardial infarction (MI) are multifactorial in their origin. The purpose of this study is to examine whether early changes in functional remodeling of the left ventricle (LV) are related to fatal MI arrhythmias.

**Methods:** Left anterior descending coronary artery ligation, for 120 min was performed in 11 pigs. LV long- and short-axis fractional shortening (FS) pre and post MI every 10 min during the initial 30 min and every 15 min thereafter by the epicardial subxiphoid 4 chamber view 2D echo were calculated. Aortic flow as well as LV systolic and diastolic pressure was also measured. Intractable ventricular fibrillation (VF) occurred in 5 out of the 11 pigs used within the initial 30 min post MI. Short-axis FS in all animals with VF reduced post MI significantly (mean FS change -41.83±12.04%, p<0.05) while an increase of the short-axis FS in all animals without VF was observed (mean FS change +29.68±11.09%, p<0.05). Long-axis FS reduced significantly post MI in both groups (mean FS change -38.72±12.97%, p<0.05 with and mean FS change -38.53±6.41%, p<0.001 without VF).

**Conclusions:** Short-axis FS reduction precedes the appearance of VF in the initial 30 min post MI. It is postulated that the loss of the compensating short-axis FS increase to the long-axis FS reduction may act through the mechano-electrical phenomenon to VF propensity during the acute phase of MI.
Different recovery (rate) of longitudinal and radial function after an episode of acute ischemia

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Background: Previous studies have shown that the cyclic variation of integrated backscatter returns prior to wall thickening (i.e. radial strain) after acute ischemia. This might be due to a different rate in recovery of radial (R) and longitudinal (L) deformation. In our laboratory, a new ultrasound methodology for the estimation of all in-plane myocardial strain components has been developed. The aim of this study was to measure the amount and the rate of recovery of both R and L deformation after acute ischemia.

Material and methods: In 9 closed-chest pigs, a 5 min PTCA circumflex occlusion was used to induce myocardial ischemia. This was followed by 130 min of reperfusion. Radio-frequency (RF) ultrasound data with high spatial and temporal resolution (>160 fps) were acquired in a parasternal long-axis view (Toshiba Aplio) at baseline (BL), after occlusion and at selected points during the following reperfusion. Data were transferred to a personal computer for off-line analysis using dedicated software (SPEQLE-2D). End-systolic R and L strain were extracted from the “at risk” posterior wall segment and the remote non-ischemic septal segment. For each animal, strain data were normalized to its BL value and a logarithmic fit was made. Finally, an average fit over all animals was determined.

Results: During reperfusion of the ischemic segment, L strain showed faster recovery than R strain. However, after 130 min of reperfusion R strain had almost completely recovered while L strain remained reduced. No changes were found in the septal segment during the reperfusion period.

Conclusions: The amount of rate of recovery after an episode of acute ischemia is different for radial and longitudinal function. This might be related to an epi- to endocardial recovery of function in combination with fiber orientation.