514 Left ventricular hypertrophy regression is persistent on antihypertensive therapy for 3 years.

M. Lengyel, 1 S. Borbas, C.S. Fengang, A. Zorandi, O. Gottschall, G. Hung.I Inst of Cardiology, Budapest, Hungary; 2St. Irene Hospital, Budapest, Hungary

Background: The regression of left ventricular hypertrophy (LVH) has been shown following antihypertensive treatment, however the longterm persistance of such effect may be questionable.

The objective of this study was to assess the 3 year effect of rilmenidine (R) monotherapy on LVH in mild-moderate hypertension.

Methods: 45 consecutive patients were included into this prospective phase IV open echocardiography (echo) study who had baseline LVH defined as left ventricular mass index (LVMi)=>/110 and >/=130 g/m² in females and males resp., in whom blood pressure was well controlled by 1-2 mg/day R monotherapy and who had measurements at baseline, at 1 year, at 2 years and 3 years. There were 20 males, 25 females, mean age 50.4±14.7 yrs. Echo measurements were performed by one "blinded" observer in a central laboratory. LV posterior wall (PW), septum (IVS) thickness, LV dimensions, E, A velocities, deceleration time (DT) were measured. LVMI, relative wall thickness, LV dimensions, E, A velocities, deceleration time (DT) were compared with normal values from a control group. Changes in LVMI, relative wall thickness, LV dimensions, E, A velocities, deceleration time (DT) were measured. LVMI, relative wall thickness, LV dimensions, E, A velocities, deceleration time (DT) were measured. LVMI, relative wall thickness, LV dimensions, E, A velocities, deceleration time (DT) were measured. LVMI, relative wall thickness, LV dimensions, E, A velocities, deceleration time (DT) were measured. LVMI, relative wall thickness, LV dimensions, E, A velocities, deceleration time (DT) were measured. LVMI, relative wall thickness, LV dimensions, E, A velocities, deceleration time (DT) were measured.

Results: Baseline systolic function was normal (EF=56.8±7.4%). 59.1% had concentric hypertrophy and 59.5% had impaired relaxation (E/A<1 with DT<200 ms). There was no change in LV dimensions, E, A, PW, DT, IVS, LVMi and RWT decreased significantly at 1 year and these changes persisted after 3 years (Table). The frequency of concentric hypertrophy decreased from 59.1 to 24.4, 25.6 and 31%, the rate of abnormal RWT from 59.1 to 34, 42 and 36%.

Conclusions: There was a significant regression of LVH after 1 year R monotherapy due to decrease in wall thickness with an improvement of LV remodelling and these changes persisted after 3 year monotherapy.

515 Peripheral endothelial dysfunction and left ventricular diastolic dysfunction in patients with essential hypertension.

W. Kosmala, W. Kuliczkowski, J. Orzeszko, M. Przewlocka-Kosmala. Medical University, Cardiology, Wroclaw, Poland

Similar neurohumoral factors are involved in myocardial and peripheral vascular endothelial abnormalities. However, it is not clear whether endothelial abnormalities are associated with left ventricular (LV) diastolic dysfunction.

The aim of the study was to investigate the relation of LV diastolic function parameters and plasma levels of soluble intercellular (s-ICAM) and vascular (s-VCAM) cell adhesion molecules and endothelium-dependent flow-mediated dilatation in brachial artery (FMD) in hypertensive pts.

Material and methods: Studied group consisted of 57 pts mean age 53.5±11.7 with essential hypertension and without coronary artery disease. 18 age-matched healthy persons served as controls. Echocardiographic assessment of LV diastolic function comprised velocity of early (E) and late (A) transmission, time of E wave (DT), isovolumic relaxation time (IVRT), total ejection isovolumic index (TEI), propagation velocity of E wave (EP), velocity of systolic (S), diastolic (D) and atrial reversal (AR) pulmonary venous flow. Exercise capacity was assessed by exercise time and total workload expressed in MET.

Results: FMD increased significantly in 25 pts (61%). Groups of pts with normal and impaired exercise tolerance did not differ with respect to age, LVMi, LVEF and ANP. Significantly higher values of A, S/D and BNP and lower values of BNP were noted in pts in diminished exercise capacity. Moreover, in this group of pts trends toward lower values of E/A and higher values of AR were observed. Significant correlations were found out for MET and: age (r=0.49, p<0.001), A (r=0.62, p<0.001), E/A ratio (r=0.55, p<0.004), D (r=0.55, p<0.004), AR (r=0.38, p<0.01), BNP (r=0.53, p=0.01). Exercise time correlated with A (r=0.61, p<0.001), E/A ratio (r=0.41, p<0.04), D (r=0.51, p<0.009), AR (r=0.35, p=0.02), S/D ratio (r=0.47, p=0.01), BNP (r=0.45, p=0.01). Other investigated parameters did not correlate with both MET and exercise time. By stepwise multiple linear regression analysis D and AR were the only determinants of MET whereas D and A turn out to be the only independent predictors of exercise time.

In conclusion: In hypertensive pts: (1) diastolic function of LV is a principle determinant of exercise capacity, (2) BNP is superior to ANP in predicting exercise tolerance.

516 Determinants of exercise capacity in hypertensive patients.

W. Kosmala, J. Orzeszko, M. Przewlocka-Kosmala, W. Kuliczkowski. Medical University, Cardiology, Wroclaw, Poland

An impaired exercise capacity is common in hypertensive patients (pts). Not all determinants of this pathology remained exactly recognized.

The aim of the study was to investigate factors related to exercise tolerance in hypertensive pts.

Material and methods: Studied group consisted of 41 pts (18 males, 23 females) mean age 54.2±11.9 with essential hypertension and without coronary artery disease. In each patient echocardiographic study, estimation of plasma levels of ANP and BNP and treadmill exercise test were performed. Echocardiographic assessment comprised evaluation of left ventricular mass index (LVMi), ejection fraction (LVEF), velocity of early (E) and late (A) transmission, deceleration time of E wave (DT), isovolumic relaxation time (IVRT), total ejection isovolumic index (TEI), propagation velocity of E wave (EP), velocity of systolic (S), diastolic (D) and atrial reversal (AR) pulmonary venous flow. Exercise capacity was assessed by exercise time and total workload expressed in MET.

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In conclusion: In hypertensive pts: (1) diastolic function of LV is a principle determinant of exercise capacity, (2) BNP is superior to ANP in predicting exercise tolerance.

HYPERTROPHIC CMP

518 The localization of the septal ablation lesion is predicted by the septal contrast depot during echo-guided septal ablation.

D. Hering, D. Welge, D. Fassbender, D. Horstkotte, L. Faber. Heart Center North Rhine-Westphalia, Department of Cardiology, Bad Oeynhausen, Germany

Background and Introduction: Percutaneous septal ablation (PTSSMA) for symptomatic hypertrophic obstructive cardiomyopathy (HOCM) requires the exact definition of the septal myocardium to be attacked. We tested whether the clinical and haemodynamic effect is correlated with morphologic measures of the intraprocedural contrast study (p-MCE) in 33 patients (pts) who had their echo video loops archived digitally and who had a complete follow-up after 3 months.

Results: The mean area of the contrast depot (CD) was 8.5±2.5 cm², its length along the left ventricular (LV) endocardial border 1.9±0.6 cm, the proximal edge of the CD from the mitral-septal contact (SAM-C), with the SAM-C covered in all cases. Septal thickness at this point as measured by 2D echo was 2.8±0.4 cm (vs. 2.0±0.4 cm by standard m-mode, p<0.01). A mean ethanol dose of 1.9±0.3 ml was followed by a CK rise up to 529±197 UI. 2 pts (6%) needed a pacemaker. After 3 months, all but 1 pt were in NYHA class I or II (from 2.9±0.4 to 1±0.6), and all but 1 had significant reduction or elimination of the outflow gradient (LVOTG: from 61±26 to 8±16 mm Hg; p<0.001). LA size was reduced from 50±7 to 45±7 mm (p<0.01). The proximal edge of the ablation lesion correlated with the proximal edge of the CD (r=0.5±0.005); septal thickness at SAM-C was 1.8±0.4 cm (p<0.01 vs. baseline). No other correlations were found between the efficacy of PTSSMA and measures of the CD during p-MCE.

Conclusion: The localization of the ablation lesion 3 months after PTSSMA is predicted by the localization of the contrast depot with respect to the mitral-septal contact. Standard m-mode measurement underestimate the thickness of the ablation region. The final shape of the ablation lesion and its hemodynamic effect, however, are not correlated with measures of the contrast depot but seem to follow an individual remodelling process.

In conclusion: In hypertensive pts there is no relation of LV diastolic function indices and peripheral endothelial function assessed by plasma level of s-ICAM and s-VCAM and endothelium-dependent flow-mediated dilatation in brachial artery. These results may indicate various degree of impairment of endothelial function in coronary and peripheral circulation.
Echocardiographic analysis of patients with hypertrophic obstructive cardiomyopathy and persisting NYHA class III symptoms during long-term follow-up after septal ablation. L. Faber 1, D. Welge 1, H. Seggewiss 2, D. Fassbender 1, D. Horstkotte 1, 1Heart Center North Rheine-Westphalia, Cardiology Dept., Bad Oeynhausen, Germany; 2Leopoldina Hospital, Department of Internal Medicine, Schweinfurt, Germany

Background and Introduction: In about 90% of the patients (pts), with symptomatic hypertrophic obstructive cardiomyopathy (HOCM), symptoms and outflow gradient (LVOTG) can significantly be reduced by septal ablation (PTBSMA). Pts. with heart failure symptoms during long-term follow-up after PTBSMA are not characterized sufficiently. We analyzed our long-term cohort of pts. treated between 1996 and 1998 with respect to persisting or recurrent NYHA functional class III symptoms after PTBSMA.

Results: Hospital mortality was 1.7% (VF, pulmonary embolism, and pericardial tamponade: 1 pt. each). Mean CK rise was 599±300 Ul. A DDD-pacemaker (DDD-PM) had to be implanted in 13 pts. (7%). Mean follow-up time is now 54±15 months, 8 pts. (5%) were lost to follow-up. Out of the 167 cases analyzed, 12 pts. (7%) underwent a repeat-PTBSMA and 4 (2%) a myectomy. These cases included, 156 pts. (88%) had complete elimination of obstruction, and 151 pts. (85%) reported sustained symptomatic improvement at their last follow-up.

Persisting or recurrent class III symptoms, however, were reported by 16 pts. (10%). LVOTG recurrence or persistence was the suspected reason in only 2 of these cases, 8 pts. were free from LVOT obstruction, and 6 had provachable gradients <60 mm Hg considered hemodynamically irrelevant. The leading reason for persisting class III symptoms despite satisfactory LVOTG reduction were marked obesity (BMI >30/m²) in 5, severe diastolic LV dysfunction in 5, and coexistent pulmonary disease in 4 pts. 8 pts. (5%) died during long-term follow-up: due to stroke (n=2), extracardiac disease (n=3), or suspected sudden cardiac death (n=3).

Conclusions: PTBSMA results in a persistent LVOTG reduction and symptomatic improvement during long-term follow-up. Peri-interventional and long-term mortality seem to be at least comparable to surgical myectomy. Pts. with marked obesity, coexistent pulmonary disease, and advanced diastolic LV dysfunction are less likely to have symptomatic benefit from LVOTG reduction, and need additional treatment of these abnormalities.


Purpose: From previous studies it has been documented that plasma brain natriuretic peptide (BNP) levels were associated with the clinical severity of hypertrophic cardiomyopathy (HCM). On the other side filling pressures of left ventricle (LV) can be noninvasively estimated with the ratio E/Ea (E: peak velocity of early mitral flow, Ea: early diastolic velocity of the lateral side of mitral annulus by means of PW TDI).

The purpose of this study was to investigate the possible relation of BNP plasma levels with LVEDP and ratio E/Ea in patients with HCM (mean age 55.9±15 yrs) and to compare them with healthy control subjects (mean age 55.9±15 yrs). BNP plasma levels were measured by an immunoradiometric assay (Shionoria BNP by Cis-Diagnostics). A DDD-pacemaker (DDD-PM) had to be implanted in 13 pts. (7%). Mean follow-up time is now 54±15 months, 8 pts. (5%) were lost to follow-up. Out of the 167 cases analyzed, 12 pts. (7%) underwent a repeat-PTBSMA and 4 (2%) a myectomy. These cases included, 156 pts. (88%) had complete elimination of obstruction, and 151 pts. (85%) reported sustained symptomatic improvement at their last follow-up.

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Mitrval regurgitation decrease after alcohol septal ablation in hypertrophic obstructive cardiomyopathy. A. Wojtarowicz, Z. Kornacewicz-Jach, J. Kazmierczak. Department of Cardiology, Szczecin, Poland

Mitrval valve regurgitation (MVR) is frequent in hypertrophic cardiomyopathy, especially in its obstructive form (HOCM) and influence on clinical course. Alcohol septal ablation (ASA) is an efficient therapeutic method in HOCM.

Material and methods: ASA was made in 23 pts (4 women, 19 men) with HOCM in age 21 to 63 years. (mean 43±12). Follow-up time was 6 months to 5 years, mean 2.5 year. We assessed by echocardiography: peak LVOT gradient, diastolic IVS thickness, LA dimension and area (LAA), and diastolic LV dimension. Degree of MVR we estimated from 0 (absent) to 4+ (very large) and as maximal regurgitant flow area of in colour Doppler (MRA) and its ratio to LA area (MRA/LAA) in apical 4-chamber view. We estimated followed LV diastolic function parameters: E an A waves velocity, E/A ratio and IRV as well. Comparison between values before ASA and any time after ASA was made.

Results: peak LVOT gradient decreased from 73±40 mmHg to 17±3±16.4 mmHg; P=0.0001. Only in two pts reduction was less that 50%. IVS thickness reduction we observed in all pts, mean from 2.4±0.6 cm to 1.4±0.6 cm, P=0.0001. LV dimension was larger in follow-up (4.7±0.6 cm) than at baseline (4.2±0.5 cm); P<0.01. LA dimension and area not changed significantly (LA 4.3±0.6 cm before ASA, and 4.4±0.7 cm after ASA, LAa 19.2±4.6 cm² before and 18.6±3.8 cm² in follow-up). From among diastolic function parameters only IRV changed significantly: shortening from 96±2±18.7 ms to 83±1±20 ms; P=0.02. Before ASA MVR was absent in 2 pts, and degree 3+ has one patient. After ASA in 1 patients without MVR before ASA we noted 1+. In 5 pts with degree 1+ was no changes in MVR in follow-up, and in other pts decreased as 1+ to 2+. Mean MVR degree decreased from 1.5±0.7 before ASA to 0.9±0.6 in follow-up (p=0.01). Mean MRA decreased from 3.1±3.1 cm² before 10.4±1.3 after ASA (P=0.01), and MRs/LAas decreased from 0.15±0.11 to 0.07±0.06 in follow-up (p=0.001).

Conclusion: Alcohol septal ablation in HOCM caused decrease of mitral valve regurgitation without influence on LA dimension.

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523 Improvement of left ventricular diastolic function after septal surgical myectomy or percutaneous septal alcohol ablation in patients with hypertrophic obstructive cardiomyopathy. A. Klotecekoglu, R.S. Sharma, P.M. Elliott, W.J. McKenna, D. Pellerin. The Heart Hospital, London, United Kingdom

Left ventricular outflow tract (LVOT) obstruction and diastolic dysfunction are responsible for dyspnoea in patients with hypertrophic obstructive cardiomyopathy (HOCM). Surgical myectomy and percutaneous septal alcohol ablation are effective treatments to relieve obstruction in these patients. To assess the effect of (surgical and percutaneous) septal reduction therapy (SRT) on LV diastolic function, 59 HOCM patients were studied at baseline and 3±4 months after septal myectomy (n=37) or alcohol ablation (n=22). There was a significant improvement in NYHA class and in peak oxygen consumption after SRT. LVOT pressure gradient was markedly reduced to a similar extend by both procedures. The ratio of early to late peak diastolic LV inflow velocities (E/A) and the ratio of early diastolic LV inflow velocity to lateral mitral annular velocity (E/Ea) significantly decreased after SRT (1.5±1.6 versus 0.9±0.8 and 17±9 versus 10±5 respectively). At baseline, 54% of patients had delayed relaxation and 35% showed a pseudonormal pattern on transthoracic inflow recording. After SRT, 89% of patients showed delayed relaxation. 80% of patients with a restrictive LV filling pattern before SRT had pseudonormal or delayed relaxation after SRT. Left atrial area at end systole decreased from 33±8 cm² to 26±6 cm², p<0.05. Total area of mitral regurgitant jet also significantly decreased. There was no correlation between the change in diastolic pattern, E/A and E/Ea ratios and the change in mitral regurgitation. There were no significant differences in the changes of LV diastolic function indices between septal myectomy and alcohol ablation patients. Conclusion: Echocardiographic diastolic function parameters improved after SRT in HOCM patients with similar changes after septal myectomy and septal alcohol ablation. These changes in diastolic parameters were not related to the decrease in mitral regurgitation. Improvement in LV relaxation and decrease in LA pressure after SRT may contribute to the clinical amelioration of the patients.

524 Right ventricular function in hypertrophic cardiomyopathy. S. Mörner1, P. Lindqvist1, E. Kazzam2, A. Waldenstrom1. 1Umea University Hospital, Dept of Pub. Health & Clin. Medicine, Umea, Sweden; 2Mälar Hospital, Department of Medicine, Eskilstuna, Sweden

Background: Hypertrophic cardiomyopathy (HCM) is characterised by hypertrophy of the left ventricle (LV), but may also involve the right ventricle (RV). While much is known about the left ventricular function, little has been documented about the RV. Therefore, the aim of the present study was to evaluate RV systolic and diastolic function in patients with HCM.

Material and methods: Twenty-five patients (11 females) with HCM and 26 healthy individuals (10 females) with mean age 53±18 and 53±17 years respectively were studied by echocardiography. LV fractional shortening (FS) and LV inflow filling pattern (E- and A-wave velocities) were determined. RV function was assessed by tricuspid annular plane systolic excursion (TAPSE) and Doppler tissue imaging (DTI).

Results: HCM patients had increased thickness of the interventricular septum and RV wall. The RV systolic long axis motion (TAPSE) was reduced and isolauricular contraction time (ICT) was prolonged, compared to controls. There was also a reduced early diastolic (E) velocity and prolonged isolauricular relaxation time (IRT) in the patients. Systolic (S) and late diastolic (A) velocities did not differ between the groups.

Table 1

<table>
<thead>
<tr>
<th>HCM</th>
<th>Controls</th>
<th>P-value</th>
</tr>
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<tbody>
<tr>
<td>TAPSE, mm</td>
<td>19.8±5.2</td>
<td>24.1±3.8</td>
</tr>
<tr>
<td>RV thickness, mm</td>
<td>5.9±1.8</td>
<td>3.4±1.2</td>
</tr>
<tr>
<td>DTI-S, systolic, cm/s</td>
<td>13.0±5.2</td>
<td>15.1±3.2</td>
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<tr>
<td>DTI-E, early diastole, cm/s</td>
<td>9.5±3.7</td>
<td>14.3±4.1</td>
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<tr>
<td>DTI-A, late diastole, cm/s</td>
<td>15.2±5.6</td>
<td>15.4±4.1</td>
</tr>
<tr>
<td>DTT, ms</td>
<td>112±32</td>
<td>91±17</td>
</tr>
<tr>
<td>DTT, ms</td>
<td>95±42</td>
<td>52±25</td>
</tr>
<tr>
<td>LV E/A ratio</td>
<td>1.5±0.9</td>
<td>1.2±0.5</td>
</tr>
<tr>
<td>FS %</td>
<td>45±13</td>
<td>41±6</td>
</tr>
</tbody>
</table>

Conclusion: Cardiac hypertrophy was shown to be present in both the left and right ventricles in patients with hypertrophic cardiomyopathy. Disturbances in right ventricular function was detected in the systolic as well as the diastolic phase of the cardiac cycle. The data provide new information on right ventricular function in hypertrophic cardiomyopathy.

525 Echocardiographic prediction of hemodynamic effect of alcohol septal ablation for hypertrophic obstructive cardiomyopathy. J. Veselka1, S. Prochazkova2, R. Duchonova2, I. Bolomova2. 1University Hospital Motol, Dept. of Cardiac Surgery, Prague 5, Czech Republic; 2University Hospital Motol, Opt. of Cardiac Surg., Div. Cardiology, Prague, Czech Republic

Purpose: Alcohol septal ablation (PTLSMA) is an effective method in the treatment of symptomatic patients with hypertrophic obstructive cardiomyopathy (HOCM). In this study we studied the capability of echocardiographic parameters in predicting of left ventricular outflow tract (LVOT) pressure gradient decrease six months after PTLSMA.

Methods: The group of patients comprised 29 consecutive patients with symptomatic HOCM (17 women, mean age 64 ± 14 years) enrolled for echocardiography-guided PTLSMA procedure. Clinical and echocardiographic data were collected at baseline and six months after PTLSMA.

Results: At six-month follow-up, both the maximal resting pressure gradient and the isosorbide dinitrate provoked gradient decreased significantly (69 ± 44 to 19 ± 17 mmHg and 111 ± 53 to 25 ± 22 mmHg, p < 0.01). Left ventricular remodelling was associated with a significant diminution of left ventricle (LVd) (p < 0.05), decrease of left ventricular ejection fraction (LVEF) (p < 0.01) and basal septum thickness (IVSD) (p < 0.01). All patients reported an improvement of dyspnoe and angina pectoris at follow-up (p < 0.01). There were statistically significant correlations between LVOT pressure gradient at follow-up and baseline LVd (r = 0.62, p = 0.002), IVSD (r = 0.50; p < 0.01) and LVEF (r = 0.44; p < 0.05). The stepwise regression analysis showed statistical dependence of LVOT pressure gradient at follow-up on LVd, IVSD and LVEF (r = 0.62, p = 0.002). Conclusions: PTLSMA is effective method in the treatment of symptomatic patients with HCM resulting in symptomatic improvement and left ventricular remodelling. Results of our study suggest that hemodynamic effect of PTLSMA could be predicted by baseline echocardiographic evaluation of IVSD and LVEF.

526 Comparative study of left ventricular diastolic function using pulsed tissue Doppler and cardiac MR in patients with hypertrophic cardiomyopathy. R. Faludi1, L. Toth1, A. Cziraki1, I. Repa2, L. Papo1, T. Simon1. 1University of Pécs, Heart Institute, Pécs, Hungary; 2Institute of Diagnostics, University of Kaposvar, Kaposvar, Hungary

Background: Abnormalities in left ventricular (LV) diastolic function (df) are common in hypertrophic cardiomyopathy (HCM). Traditional pulsed Doppler-derived diastolic function (Df) parameters are routinely used to evaluate left ventricular diastolic properties, but two sensitive and preload-independent techniques are available to assess LV-df: pulsed tissue Doppler echocardiography (PTDI) and cardiac magnetic resonance imaging (CMR). Our study aims to compare the results of these two different methods in patients with HCM.

Methods: PTDI was performed by ATL HDI 5000 ultrasound system. Myocardial early diastolic (Ea) and late diastolic (Aa) velocities were measured at the septal (S) and the lateral (L) mitral annulus (MA). L and S Ea/Aa ratios were calculated. 1.5 T Siemens Vision Plus (Siemens, AG Germany) with a cardiac software package at the Institute of Diagnostics and Oncoradiology (University of Kaposvar) was used for cardiac imaging. ECG gated long axis and consecutive, multiple, no slice, 8 mm thick short axis plane MR images covering the entire left ventricle (LV) were acquired to study cardiac function. Gradient-echo, segmented K-space cine imaging was acquired and MASS 5.0 (Medis, NL) was used for editing of the MR images. Time-volume-curve of the global LV was routinely obtained, evaluated, peak filling rate (PFR) and PFR/end diastolic volume (EDV) 1/s were calculated.

Results: 13 patients (6 male, 7 female, mean age 46±11 years) - 7 pts with septal, 3 pts with apical, 3 pts with concentric hypertrophy - were studied. Decreased df (Ddf), was accepted if Ea in the lateral and septal region was less then 11 and 8 cm/s, respectively. Ea/Aa equal or less than 1 for both regions was considered to show Ddf. MRI derived Ddf was accepted in cases of PFR < 250 ml/s or PFR/EDV < 4,0 EDV/s. Ea at the L-MA and S-MA showed of 9,1±3,1 (Ddf in 10 pts), and 6,7±2,1 cm/s (Ddf in 9 pts), and simultaneously Ea at the lateral and septal walls were 1,03±0,53 (Ddf in 9 pts) and 0,93±0,35 (Ddf in 9 pts) respectively. PFR of 395±1,148 ml/s (Ddf in 3 pts) and PFR/EDV of 2,99±0,16,1 ml/s (Ddf in 11 pts) were determined using MRI. Conflicting results from PTDI and CMR were found in 2 pts.

Conclusion: Both methods show Ddf in HCM patients. The differences, however, indicate that further studies are necessary to define pathognomic values for both methods, while to characterise diastolic function in HCM patients.
527 Left atrial size is an important predictor of morbidity in patients with latent obstructive hypertrophic cardiomyopathy.

M. Eriksson1, A. Wlos2, C. Stoggelet2, E.D. Wigle2, H. Rakowski2. 1Department of Clinical Physiology, Stockholm, Sweden; 2Toronto General Hospital, Cardiology, Toronto, Canada

Background: Subaortic obstruction in HCM may be classified as obstruction at rest or latent (provable). Although echo characteristics of hypertrophic cardiomyopa-thy (HCM) and systolic LV outflow obstruction (LO) have been studied, there is limited information on long-term morbidity in patients presenting with LO.

The aim of this study was to analyze predictors of morbidity in patients with LOHCM followed in a tertiary referral center.

Methods: A retrospective study of 125 patients (73% men) diagnosed from 1975 to 2002 was performed. Inclusion criteria were: unexplained left ventric-ular hypertrophy with no significant outflow gradient (LVOTGR) at rest, increasing to >30 mmHg by pharmacological provocation, documented by echo (n=65) or cardiac catherization (n=60). Symptoms, clinical findings, mortality and cardiovascu-lar morbidity were analyzed.

Results: The mean age at presentation was 45.2 ± 16.1 years. At baseline the mean LVOTGR at rest was 7 ± 8 mmHg and 65 ± 25 mmHg after provocation, the mean left atrial diameter was 40 ± 6 mm, the mean septal thickness 18.6 ± 4.2 with hypertrophy limited to the basal 1/3 of septum in 71 patients (57%), and to the proximal 2/3 in 30%. Morbid events occurred in 59 of 127 patients consistent with cardiovascular morbidity of 46.5%. The probability of event-free survival for pa-tients with LOHCM was 51.6% at 15 years of follow-up. Sixteen patients (13%) had one or more morbid events at the initial presentation, most frequent event being AF (n=13), CHF (n=3), MI (n=2) and/or cerebrovascular event (n=2). Two independent predictors of all cardiovascular morbidity were identified by a multivariate Cox re-gression analysis: left atrial enlargement at baseline HR 2.2 (95% CI 1.3 – 4.0) and a higher age at diagnosis HR 1.03 (95% CI 1.001 – 1.044).

Conclusion: The majority of patients with LO have less extensive hypertrophy and a more favorable prognosis than other types of HCM. However, in the presence or left atrial enlargement and older age at presentation LO does have significant cardiovascular morbidity and mortality.

528 Evaluation of subendocardial ischaemia by strain Doppler echocardiography in patients with left ventricular outflow tract obstruction.

A. Villarelli, Y. Conde, E. Cimino, R. Costantini, I. D’Angelo, S. Stellato, La Sapienza University, Cardiology, Rome, Italy

Background: The purpose of the present study was to assess the subendocardial wall function using tissue Doppler imaging (TDI) and strain rate imaging (SR) in patients with congenital left ventricular outflow (LVOT) obstruction.

Methods: We studied TDI and SR in 19 pts aged 11-31 years with congenital aortic stenosis (valvular, 12 pts; subvalvular, 6pts; supravalvular, 1pt). 13 age-and obstructive gradient and to determine whether it might be used to discriminate the LV function between those groups.

PURPOSES - we sought to compare the systolic and diastolic tissue Doppler (TD) longitudinal strain rate (SR) and strain velocity (SV) in patients (pts) with hypertrophic car-diomyopathy (HCM) according to the presence or absence of a significant outflow obstructive gradient and to determine whether it might be used to discriminate the LV function between those groups.

Background - Pts with obstructive hypertrophic cardiomyopathy (OHCM) are more symptomatic and have a worse long term outcome than pts with the non-obstructive form (NOHCM).

529 Tissue Doppler imaging in hypertrophic cardiomyopathy: differences between obstructive and non-obstructive forms.

A. Araujo, E. Arteaga, A. Matsumoto, B. Ianni, C. Mady. Heart Institute - Sao Paulo University, Cardiopatias Gerais, Sao Paulo, Brazil

PURPOSES - we sought to compare the systolic and diastolic tissue Doppler (TD) longitudinal strain rate (SR) and strain velocity (SV) in patients (pts) with hypertrophic car-diomyopathy (HCM) according to the presence or absence of a significant outflow obstructive gradient and to determine whether it might be used to discriminate the LV function between those groups.

Methods - 87 HCM pts with a septal thickness >15mm, non-dilated LV and normal ejection fractions were selected: 52 without gradient (NOHCM) and 35 with a resting gradient >30 mmHg (OHCM). 40 healthy volunteers served as the control group.

The following pulsed TD parameters were obtained sampling the mitral annulus on lateral and septal borders: peak systolic velocities (SaL and SaS), peak early diastolic velocities (EaL and EaS) and late diastolic velocities (AaL and AaS). The mean Ea/Aa ratio was calculated.Pulsed Doppler mitral inflow peak E wave velocity was measured to determine the E/Ea ratio. Statistical analysis by ANOVA and Turkey test; values of p <0.05 were considered significant.

Results - the early longitudinal annular diastolic velocity is significantly slower in OHCM than NOHCM. The Ea/Aa ratio is lower and the E/Ea ratio higher in OHCM as compared to NOHCM. TD systolic velocities are significantly slower in HCM than in normals and data are more pronounced in OHCM (table).

Results

<table>
<thead>
<tr>
<th></th>
<th>OHCM 35</th>
<th>NOHCM 52</th>
<th>Control 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>EaL(cm/s)</td>
<td>7.8</td>
<td>6.2</td>
<td>11.3</td>
</tr>
<tr>
<td>EaS(cm/s)</td>
<td>12.6</td>
<td>8.1</td>
<td>7.9</td>
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<tr>
<td>E/EaL</td>
<td>1.0</td>
<td>1.9</td>
<td>3.8</td>
</tr>
<tr>
<td>SaL(cm/s)</td>
<td>9.8</td>
<td>8.8</td>
<td>9.3</td>
</tr>
<tr>
<td>SaS(cm/s)</td>
<td>7.9</td>
<td>8.0</td>
<td>9.3</td>
</tr>
<tr>
<td>EaM/AaM</td>
<td>0.3</td>
<td>0.2</td>
<td>0.001</td>
</tr>
<tr>
<td>SaM(cm/s)</td>
<td>0.3</td>
<td>0.2</td>
<td>0.001</td>
</tr>
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</table>

Conclusions - in obstructive hypertrophic cardiomyopathy, the left ventricular diastolic and systolic functions are more impaired than in the non-obstructive form, and it can be an early indication of adverse long term outcome.

530 Mid-systolic septal deceleration - a new sign of left ventricular outflow tract obstruction obtained by colour-coded tissue Doppler echocardiography.

O.A. Breithardt1, B. Stottle2, A. Franke1, U. Janssens1, P. Hanrath1, H. Kuhn2. 1Universitätsklinik Aachen, Dept. of Cardiology, Aachen, Germany; 2Klinikum Baden-Baden, Dept. of Cardiology, Baden-Baden, Germany

Diagnosis of hypertrophic obstructive cardiomyopathy (HOCM) is based on the identification of asymmetric septal hypertrophy, mitral leaflet systolic anterior motion (SAM) and a systolic LVOT gradient. Many patients present with no significant resting gradient, but develop significant obstruction after provocation manoeuvres or induced extrasystoles. Doppler evaluation of the LVOT gradient during such manoeuvres remains technically challenging, in particular in difficult cases with sub-optimal Doppler angles and concomitant mitral regurgitation. We describe a new non-invasive sign for LVOT obstruction obtained by colour-coded tissue Doppler echocardiography (TDI).

Clinical Case: Septal longitudinal motion was studied by TDI in a 69-year old HOCM patient during transcoronary alcohol ablation of septal hypertrophy (TASH). Invasive hemodynamics showed only a small LVOT gradient at rest (Figure,left), but a significant post-extrasystolic LVOT gradient, which was associated with a abrupt mid-systolic deceleration (MSSD) pattern in the simultaneously acquired basal septal TDI velocity trace (Figure,middle). Immediately after TASH, both the LVOT gradient and the simultaneously recorded MSSD pattern were significantly reduced (Fig-ure,right). A similar MSSD pattern was observed in 5 additional consecutive HOCM patients with severe LVOT obstruction, but in none of 10 patients with pure aortic valve stenosis.
531 Diagnosis of left ventricular outflow tract obstruction in hypertrophic cardiomyopathy by tissue Doppler imaging.

B. Stolle 1, O.A. Breithardt 2, A. Frank 2, H.P. Küh 2, P. Hamm 2, H. Kuhn 1

1Klinikum Bielefeld-Mitte, Dept. of Cardiology, Bielefeld, Germany; 2Universitätsklinikum Aachen, Dept. of Cardiology, Aachen, Germany

The presence of left ventricular outflow tract (LVOT) obstruction in hypertrophic obstructive cardiomyopathy (HOCM) has important therapeutic implications (surgical or catheter based treatment). LVOT obstruction in HOCM is diagnosed by asymmetric septal hypertrophy, mitral leaflet systolic anterior motion and a systolic LVOT gradient. We describe a new sign for LVOT obstruction obtained by colour-coded tissue Doppler imaging (TDI), which may help to identify affected patients (pts) and to monitor therapy.

Methods: Septal longitudinal motion was studied by TDI (100 frames/s) in 26 pts with suspected HOCM (septal wall thickness >15mm). We identified in 15/26 pts a characteristic biphasic systolic velocity pattern with an early (S1) and a late (S2) positive systolic peak velocity, interrupted by an abrupt mid-systolic septal deceleration (MSSD) notch (defined as >25% relative and >1 cm/s absolute decrease from S1). Isovolumic events were excluded from the analysis by identification of on-set and end of ejection by aortic valve Doppler. The presence of an MSSD pattern identified severe LVOT obstruction (>30mmHg peak gradient at rest) with 92% sensitivity and 91% specificity. Doppler derived LVOT gradient was significantly higher in pts with MSSD compared to those without MSSD (71±27 vs. 17±10 mmHg, p<0.001). There was a close temporal relationship between invasive LVOT gradient development and the MSSD in the septal TDI trace as demonstrated by simultaneous recordings (Figure, post-extrasystolic beat).

Conclusions: The presence of an MSSD pattern in the TDI velocity trace is strongly associated with severe LVOT obstruction and may constitute a new diagnostic tool for gradient characterisation, in particular in difficult cases with suboptimal Doppler angles.

532 MRI study for the measurement of regional left ventricular function in hypertrophic cardiomyopathy.

T. Simor 1, L. Thö 1, R. Sepp 1, A. Palinkás 2, M. Csanydy 2, T. Forster 1, L. Papp 1

1University Of Pecs, Heart Institute, Pecs, Hungary; 2University of Szeged, Department of Medicine, Szeged, Hungary

Hypertrophic cardiomyopathy (HCM) is adequately investigated by echocardiography (ECHO). MRI, as a gold standard, is capable for the direct measurement of global left ventricular (LV) function. Furthermore MRI is able to measure regional/segmental wall thickness/thickening for the entire heart. The aim of our study was to correlate wall thickness (WT) and thickening (WT%) in HCM patients and thus decide whether WT may specify WT%.

Method: 1.5 T Siemens Vision plus (Siemens, AG Germany) with a cardiac software package at the Institute of Diagnostics and Oncoradiology (University of Kapovszár) was used for cardiac imaging. ECG gated long axis (4, 3 and 2 chamber view) and consecutive, multiplex, no slice gap, apex to base, 8 mm thick short axis plane MR images covering the entire left ventricle (LV) were acquired to study morphology and cardiac function. Gradient-echo, segmented K-space cine imaging with an FOV of 450 mm, TR/TE/Flip 10 ms/7 ms/25° and 256x256 image resolution was set for the measurement of global cardiac function. MASS 5.0 (Medis, NL) was used for the analysis of MR images. LV muscle regions were determined based on the 16 segment model. WT and WT% parameters were determined in each of the 16 segments.

Results: Our study included 14 men and 4 women. Ages ranged from 12 to 64 years (mean, 38±16 years) and HCM was already diagnosed by ECHO. A total of 288 segments (18 x 16) were analyzed. WT was less than 10, 10 to 15, 15 to 20, 20-25 and larger than 25 mm in 114, 97, 53, 19 and 5 segments, respectively. WT and WT% was correlated for all segments and the following formula was calculated: WT\% = 0.0808 x WT + 167.5, R² = 0.4845.

Conclusion: A significant negative correlation was found between WT and WT%. WT larger then 25 mm was akinetic, WT between 20 to 25 mm indicated severely reduced WT% (<30%), WT between 17 to 20 mm showed moderately reduced WT% (30-50%), while WT less then 17 mm showed normal WT%. It is our conclusion that WT indicates well the regional systolic function in HCM patients.

533 Intramyocardial coronary flow velocity in patients with various types of cardiac hypertrophy.

C. De Gregorio 1, A. Micari 4, A. Repucero 1, P. Grimaldi 1, M.C. Morgesi 2, F. Rizzo 2, O. Centi 2, S. Carezzi 2, S. Cogliore 1, 1Cardiology & Cardiac Rehabilitation Unit, Internal Medicine & Pharmacology, Messina, Italy; 2Graduate School of Cardiology, Messina, Italy; 3Cardiology Unit, Messina, Italy

Aims: Ultrasound devices allow investigating the flow velocity in the intramural small coronary arteries (IMCA) as well as in the left descending coronary artery (LDA), especially in patients (pts) with hypertrophic cardiomyopathy (HCM). In the present study we sought to evaluate the coronary flow velocity pattern in 29 adults, aged 69 ± 10, with LV mass > 220 gr and interventricular septum thickness of 14 mm at least were studied by transhoracic Doppler-echocardiography (TTE). All patients were divided into three groups: obstructive HCM (group A = 9), nonobstructive HCM (group B = 12) and left ventricular hypertrophy (LHV) subsequent to aortic valve stenosis (group C = 8).

Methods: Standard echo measurements were taken. In addition, at baseline, the flow velocities both in apical IMCA and distal LDA were assessed by using high-frequency transducers in harmonic imaging and without contrast enhancement.

Results: No significant between-group differences resulted in LV diastolic diameters, absolute mass and ejection fraction. Coronary artery flow velocities and LV gradients are displayed in the table below. In all the study population the IMCA diastolic flow was directed from the epicardium to the endocardium edge.

Conclusions: Despite no differences in the LDA flow, the IMCA diastolic velocity was significantly higher in pts with obstructive than non-obstructive HCM. Patients from group C showed same velocity pattern as those from the group A. These findings likely suggest a relationship between IMCA diastolic flow behaviour and presence of LV systolic gradient in severe cardiac hypertrophy. Various can the mechanisms be leading to this occurrence, first of all the "milking-like" phenomenon subsequent to the higher wall stress.