P8.7: VASCULAR ENDOTHELIAL SENESCENCE AND METABOLIC SYNDROME

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ARTERIAL WAVE REFLECTIONS: LOOKING BEYOND THE FIRST HARMONIC AND PRESSURE INFLECTION POINTS TO ASSESS LATE-SYSTOLIC VENTRICULAR LOADING

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Background: Late-systolic ventricular loading is associated with impaired relaxation and adverse remodeling. Standard indices of relative wave reflections such as augmentation index (AIX) and reflection magnitude (RM) from wave separation analysis blend different times within the cardiac cycle and are unspecific to their loading in late-systole. We introduce an index of late-systolic load (QfQrep), derived from wave transmission theory that integrates increased and earlier reflections specifically during late-systole while inherently normalized to the associated flow wave.

Methods: Central pressure and flow were measured in 226 subjects using carotid tonometry and phase-contrast MRI, respectively. AIX and RM were determined using standard methods. Reflected wave transit time (RWTTTrans) was determined using tube-load modeling.

Results: Decreased RWTTTrans (standardized β = -0.525; P < 0.001) and increased RM (β = -0.629; P < 0.001) were significantly associated with QfQrep (R² = 0.791).

Conclusion: QfQrep is strongly predicted by wave reflection timing and two standard wave reflection indices. RM is defined by the amplitude of the composite backward wave normalized by that of the composite forward wave, both of which occur at different times. AIX, also blending two different times, combines an early-systolic inflection point with a generally late-systolic tonic peak. The advantage of QfQrep is that it focuses on the reduced-ejection period to integrate effects of increased and earlier effects of reflections in late-systole. QfQrep can be obtained readily from standard wave separation analysis.

RELATIONSHIP BETWEEN PULSE WAVE VELOCITY AND BIOPSY PROVEN RENAL MICROVASCULAR LESIONS

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Aortic stiffness is associated with chronic kidney disease. Although it is well established that patients with chronic kidney disease have classical and non-classical risk factors correlated to a high pulse wave velocity, there is no data on the deleterious effect of high pulse wave velocity on intra renal microvasculature.

The aim of this study was to explore the relationship between arterial stiffness, assessed by cfPWV and renal microvascular lesions assessed by renal biopsy. In 25 patients who went through a renal biopsy we analysed renal vascular lesions, and obtained cfPWV using a Complior device. cfPWV and age were positively correlated to the severity of vascular lesions. This results support the hypothesis that an elevated pulsatility in target organ microcirculation such as kidneys leads to vessel damage and contributes to worsen glomerular filtration rate.

MORNING CENTRAL BLOOD PRESSURE SURGE IS RELATED TO AGE

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Objective: Morning surge of peripheral blood pressure (BP) is considered to be an independent risk factor for cardiovascular diseases. However, morning central blood pressure surge (MCBPS) has not been analyzed so far. Therefore, the aim of this study was to evaluate the variables independently associated with MCBPS.

Methods: Fifty patients with never treated hypertension (age 40.4±11.5 years, 35 men) and 50 normotensive subjects (age 38.3±12.0 years, 35 men) were included into the study. Applanation tonometry of the radial artery and “n-point forward moving average” method have been used to derive 24-h CSP (BPro, HeatllStats). The sleep-through MS was calculated as the difference between the morning pressure (the average BP during the 2 hours after awakening) and the lowest nighttime BP (the average of the lowest pressure and the 2 readings immediately preceding and after the lowest value). To assess the independent variables related to MCBPS multiple regression was used.

Results: Mean MCBPS was 17.3±7.8 mmHg in whole group, 18.6±7.3 mmHg in hypertensives, and 16.0±8.2 mmHg in normotensives (p=N.S). Sex, smoking, BMI, 24-h heart rate, glucose level, and kidney function were not related to MCBPS. Independent variables correlated with MCBPS are presented in the table.

Conclusion: Morning central blood pressure surge may be related to age in normotensive, but not in hypertensive subjects. Beta coefficient standard error p

whole group
age -0.33 0.10 0.001
24-h mean central BP 0.24 0.09 0.013
Normotensives
Age -0.43 0.13 0.001

P8.6 PULSATILE COMPONENT OF CENTRAL BLOOD PRESSURE AND THE RISK OF STROKE IN CORONARY PATIENTS. RESULTS FROM THE AORTIC BLOOD PRESSURE AND SURVIVAL STUDY

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Background: There is ongoing debate concerning the best blood pressure (BP) parameter predicting cardiovascular risk. The aim of the analysis was to investigate the relationship between central BP and stroke in patients undergoing coronary angiography.

Methods: The study group consisted of 954 patients (691 men and 263 women; mean age: 57.3±10.0 years) undergoing coronary angiography with left ventricular EF≥40%. A vast majority of participants was prescribed BP-lowering drugs. Invasive ascending aortic BP during catheterization was taken at baseline. The duration of follow-up was 33.4±18.8 months. We defined pulsatility as the ratio of pulse pressure to mean BP. The Cox proportional hazard regression analysis was used to assess the relationship between BP-derived indices and the risk of stroke.

Results: During the follow-up 19 (2.0%) patients suffered from stroke and 57 (6.0%) from stroke or CV death. The multivariate hazard ratios related to BP-derived indices according to the presence of HT are given in the table.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stroke</th>
<th>CV death or stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP derived variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>1.32(0.85-2.04)</td>
<td>1.05(0.79-1.38)</td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>0.88(0.57-1.36)</td>
<td>0.80(0.61-1.05)</td>
</tr>
<tr>
<td>Mean blood pressure</td>
<td>1.08(0.71-1.64)</td>
<td>0.91(0.70-1.19)</td>
</tr>
<tr>
<td>Pulse pressure</td>
<td>1.65(1.03-2.66)</td>
<td>1.25(0.93-1.67)</td>
</tr>
<tr>
<td>Pulsatility</td>
<td>2.07(1.25-3.42)</td>
<td>1.50(1.11-2.03)</td>
</tr>
</tbody>
</table>

Conclusion: Pulsatile, but not steady component of central blood pressure predicts the risk of stroke in coronary patients.

VASCULAR ENDOTHELIAL SENEENCE AND METABOLIC SYNDROME

Dimitrios Terentes-Printzios 1, Charalambos Vachopoulos, Nikolaos Ioakeimidis, Athanasios Agelis, Panagiotis Xaplanteris, Panagioti Pietri, Dimitrios Tsoulos
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Objectives: Vascular aging and metabolic syndrome (MS) are both independent predictors of cardiovascular events. We examined whether MS accelerates the progression of vascular aging.

Methods: 142 subjects (mean age 51.9±10.8 years, 94 men) with no established cardiovascular disease were investigated in 2 examinations over a 2-year period (mean follow-up visit 1.84 years). MS was defined by the ATP III criteria. Subjects had at the beginning and end of the study...
determinations of carotid-femoral pulse wave velocity (PWV), aortic augmentation index corrected for heart rate (Alx75), brachial flow-mediated dilatation (FMD) and carotid intima-media thickness (cIMT). Based on these measurements, the annual absolute changes were calculated.

**Results:** At baseline patients with MS compared with patients without MS had lower values of FMD (6.0% vs. 7.0%, \( P = 0.025 \)), but there were no statistically significant differences for PWV (7.04 m/s vs. 7.26 m/s, \( P = 0.242 \)), Alx75 (19.9% vs. 20.3%, \( P = 0.846 \)) and cIMT (0.68 mm vs. 0.68 mm, \( P = 0.957 \)). For the overall population, there were no statistically significant differences in the annual absolute changes of PWV, FMD, Alx75 and cIMT.

Presence of MS is associated with endothelial dysfunction as well as accelerated progression of endothelial dysfunction, especially in the younger subjects.

**P8.9 EFFECT OF CARDIAC RESYNCHRONISATION THERAPY ON THE AUTONOMIC NERVOUS SYSTEM FUNCTION**

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Development of cardiac resynchronisation therapy (CRT) in recent years became a breakthrough in treatment of severe heart failure. The aim of this study was evaluation of CRT effect on the autonomous nervous system function.

**Methods:** The study covered a group of 55 patients (45 men, 10 women; mean age 67.04 ± 9.13 years) with chronic heart failure stable for at least 3 months, in the NYHA functional class III or IV despite optimal pharmacotherapy, with a reduced left ventricular ejection fraction (LVEF) < 35%, wide QRS complexes > 120 ms. Before the resynchronisation system was implanted and after three months of observation arterial stiffness was evaluated with the carotid-femoral pulse wave velocity (PWV).

**Results:** Statistically significant changes weren’t demonstrated for carotid-femoral pulse wave velocity value, only a tendency for its reduction (11.73 ± 2.37 m/s vs 11.32 ± 2.78 m/s, \( p = 0.08 \)).

After the resynchronisation system implantation, no statistically significant change in arterial stiffness was observed, only a trend towards its reduction.

**P8.10 EFFECTS OF BARIATRIC SURGERY ON ENDOTHELIAL FUNCTION IN EXTREMELY OBESE PATIENTS**

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**Introduction:** Bariatric surgery in extremely obese patients has influence on metabolic variables and body weight however data about influence on flow-mediated dilatation (FMD) of brachial artery are inconsistent. The aim of the study was to assess the effect of bariatric surgery on endothelial function measured by flow-mediated dilatation.

**Material and methods:** We examined 35 patients with extreme obesity who met the eligibility criteria and underwent bariatric surgery (sleeve gastrectomy or Roux-en-Y Bypass).

**Results:** Data from 35 patients (34 men; age: 45±10) were collected. BMI decreased from 47.5 ± 11.6 kg/m² before surgery to 35.5 ± 8.5 kg/m² six months after surgery. FMD after six months has significantly improved. Median flow mediated dilatation before intervention was 6.5% (IQR 2-10.7) and after operation 8.5% (IQR 6.2-16.8). Improvement in FMD was higher in patients who underwent by-pass surgery (median 142% (IQR: 85-463)) in comparison to sleeve gastroectomy intervention (median 118% (IQR 67-246)) but no statistical significance was observed between two groups.

**Conclusions:** Bariatric surgery resulted in significant improvement in endothelial function and may have potential impact on reduction of cardiovascular risk.

**P8.11 EFFECT OF CARDIAC RESYNCHRONISATION THERAPY ON THE AUTONOMIC NERVOUS SYSTEM FUNCTION**

Anna Przybyła *, Danuta Czarnecka

Department of Cardiology, Interventional Electrophysiology and Hypertension, Jagiellonian University, Medical College, Cracow, Poland

**Development of cardiac resynchronisation therapy (CRT) in recent years became a breakthrough in treatment of severe heart failure. The aim of this study was evaluation of CRT effect on the autonomous nervous system function.**

**Methods:** The study covered a group of 55 patients (45 men, 10 women; mean age 67.04±9.13 years) with chronic heart failure stable for at least 3 months, in the NYHA functional class III or IV despite optimal pharmacotherapy, with a reduced left ventricular ejection fraction (LVEF) < 35%, wide QRS complexes > 120 ms, and sinus rhythm present during the examination. Before the resynchronisation system was implanted and after three months of observation arterial baroreflex sensitivity (BRS) was evaluated with the sequence technique, and with the \( \alpha \) coefficient and the transfer function.

**Results:** Three months after implantation of the CRT device, a statistically significant increase in the arterial baroreflex sensitivity was observed for all methods used in the study, both when lying and breathing spontaneously (BRSseq: 5.96±2.07 ms/mmHg vs 7.64±4.73 ms/mmHg, \( p = 0.001 \); \( \alphaLF: 6.04±4.44 \) ms/mmHg vs 7.68±5.09 ms/mmHg, \( p = 0.029 \); \( \alphaHF: 6.53±3.19 \) ms/mmHg vs 10.15±6.84 ms/mmHg, \( p = 0.001 \); TLF: 3.18±3.05 ms/mmHg vs 4.18±3.17 ms/mmHg, \( p = 0.01 \); \( TT HF: 3.54±2.02 \) ms/mmHg vs 5.72±4.24 ms/mmHg, \( p = 0.001 )\) and when lying with breathing controlled. Furthermore, after three months from the CRT implementation, all monitored BRS indicators were significantly reduced in response to orthostatic stimulus. Such modulatory ability was not observed before implantation of the CRT device.

**Conclusions:** The study confirmed the beneficial effect of the CRT on the autonomous nervous system function.