EPOSTER'S SECTION

ENDOTHELIUM AND ATHEROSCLEROSIS

INTERMACHINE VARIABILITY BETWEEN THE SPHYGMOCOR CVMS AND SPHYGMOCOR XCEL DEVICE IN YOUNG HEALTHY ADULTS: A PILOT STUDY

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Objective: Carotid-femoral pulse wave velocity (cf-PWV) is considered the gold-standard measure for arterial stiffness. The SphygmoCor CVMS uses applanation tonometry on the carotid and femoral arteries, synchronized with an ECG signal. The more recent SphygmoCor XCEL eliminates the need for ECG gating by utilizing leg cuff detection of the femoral pulse in conjunction with carotid tonometry. The latter method is more time-efficient, but may yield different cf-PWV values. The aim of this pilot study is to validate the use of the SphygmoCor XCEL against the SphygmoCor CVMS.

Design and method: Measurements of the right carotid and femoral artery were conducted using the SphygmoCor CVMS (AtCor Medical), immediately followed by the SphygmoCor XCEL (AtCor Medical). These measurements were performed under standardized conditions, namely in a fasted state and after 15 minutes of rest in a supine position in a quiet room (20°). All measurements were done in triplicate and were repeated when they did not meet the quality control guidelines, as defined by the manufacturer. The mean difference and SD of the difference between the two devices was calculated and visualized through scatter plot and Bland-Altman analysis. Correlation coefficient as well as intraclass correlation (ICC) was calculated.

Results: A total of nine (5 females) non-smoking, physically active individuals were included, with a MEDIAN age of 21 years (21-36) and MEDIAN BMI of 21.8 (18,4-25,8). Mean cf-PWV measured by SphygmoCor CVMS was 8.11 ± 0.69 m/s and by SphygmoCor XCEL was 7.61 ± 0.16 m/s. Measurements by both techniques were significantly correlated (R = 0,75; P<0,05; Fig1). The mean difference between the two measurement techniques was 0.50 ± 0.81 m/s, which is 'acceptable' according to the ARTERY Society guidelines. Bland-Altman analysis revealed limits of agreement ranging from -1.09 to 2.09 m/s. A 'moderate' agreement was documented (ICC = 0.51).

Conclusions: In this pilot study, the SphygmoCor XCEL demonstrated acceptable agreement with the SphygmoCor CVMS. Bland-Altman plots show that with higher cf-PWV values, there could be a tendency towards overestimation of the cf-PWV by the SphygmoCor EXCEL. Further validation is needed in larger cohorts and other populations.

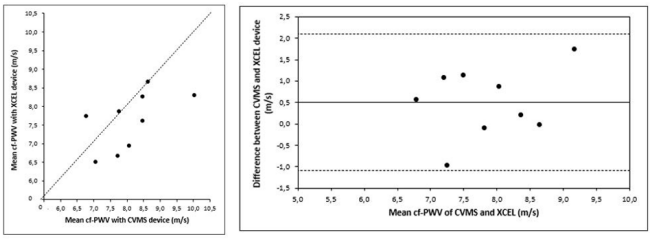

Figure 1. Scatter plot and Bland-Altman analysis.

ENDOTHELIAL FUNCTIONAL STATUS IN PATIENTS WITH HYPERTENSION AND TYPE 2 DIABETES MELLITUS AFTER COVID-19

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Objective: Aim of the study was to estimate endothelial functional status in patients with hypertension and type 2 diabetes mellitus (T2DM) who underwent Covid-19.

Design and method: 56 patients with hypertension and T2DM after coronavirus infection (Group I) and 56 patients with hypertension and T2DM without any history of Covid-19 (Group II) were enrolled in this study. Group I patients aged 43-75 years, mean age 62.4±12.5 years; male = 46% and Group II patients aged 42-77 years, mean age 63.6±13.7 years; male = 43%. Endothelial functional status was assessed by flow-mediated vasodilation of brachial artery (FMD). All statistical analysis were performed by SPSS 26.0 software.

Results: FMD of brachial artery was significantly decreased in patients with hypertension and T2DM after Covid-19 than those patients without Covid-19 (P<0.01). There were a correlation between Covid-19 and reduced FMD in Group I (r = 0.7, CI 95%, P = 0.032). When we assessed systolic function of the left ventricle, there were a positive correlation between reduced FMD and low ejection fraction (r = 0.6, CI 95%, P = 0.028), however this correlation were more pronounced in Group I (P = 0.001). Multivariate analysis revealed that reduced flow-mediated vasodilation of brachial artery was independent predictor of poor systolic function of patients with hypertension and T2DM especially in those after Covid-19 (odds ratio [OR] 1.52, P = 0.026). When we separately analyzed between men and women there were not any statistical significant changes between male and female (P>0.05).

Conclusions: Patients with hypertension and type 2 diabetes mellitus after Covid-19 had impaired FMD of brachial artery. Even though, there were positive correlation between flow-mediated vasodilation of brachial artery and reduced ejection fraction, patients with hypertension and T2DM after Covid-19 had strong correlation of it. In hypertensive patients with type 2 diabetes mellitus who have undergone Covid-19, FMD independently associated with poor left ventricular systolic function.

RISK OF ENDOTHELIAL DYSFUNCTION AND CAROTID ARTERIES INTIMA MEDIA THICKNESS DEPENDING ON GUANINE NUCLEOTIDE-BINDING PROTEIN BETA-3 AND ENDOTHELIAL NITRIC OXIDE SYNTHASE GENES' PO

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Objective: Endothelial dysfunction (ED) is an initial step to vascular insufficiency, atherosclerosis. The study is aimed to clarify the risk of ED and carotid arteries (CA) intima media thickness (IMT) changes depending on guanine-nucleotide-binding-protein-beta-3 (GNB3, rs5443) and endothelial-nitric-oxide-synthase (NOS3, rs2070744) genes' polymorphisms in essential arterial hypertension (EAH).

Design and method: One-hundred EAH patients with target-organ damage, moderate/high/very high cardiovascular risk were involved in the case-control study: 79.0% females, 21.0% males, mean age 59.87±8.02; disease duration 6-25 years. Control - 48 practically healthy persons . GNB3 (rs5443) and NOS3 (rs2070744) genes' polymorphisms examined in Real-Time-PCR. Soluble-Vascular-Cell-Adhesion-Molecule (sVCAM-1), total NO-metabolites (NO2-/NO3-), transcriptional activity of NOS3 gene, Endothelium-Dependent-Flow-Mediated-Dilation of the Brachial Artery (FMD BA) and carotid IMT were studied.

Results: Severe EAH course (SBP/DBP>160>100 mmHg) is associated with the structural changes of the CA (IMT>0.9 mm) increasing the likelihood more than 3.5 times [OR 95%CI:1.28-10.23; p = 0.012], atherosclerotic plaques on the CA

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– 4 and 3.5 times as much [OR 95%CI:1.18-13.59; p = 0.018 and 1.23-10.71; p = 0.014], and decreased NOS3 gene transcriptional activity by the mRNA level (<0.5 U) – threefold [OR 95%CI: 1.0-9.66; p = 0.042]). Moderate/severe ED enhance the risk of severe EAH 3-5.5 times [OR 95%CI:1.13-9.34; p = 0.025 and 1.96-14.45; p<0.001]. C-allele of NOS3 (rs2070744) gene elevates the risk of atherosclerotic lesion in CA 3.5 times [OR 95%CI:1.24-11.20; p = 0.019 and 1.22-10.18; p = 0.018], ED – by decrease of total NO metabolites (<25 μmol/l) and sVCAM-1 growth (>1050 ng/ml) almost 12 and 4 times [OR 95%CI: 1.23-112.7; p = 0.023 and 1.24-11.20; p = 0.019]. C-allele of NOS3 gene heighten the probability of low NOS3 gene expression by mRNA level (<0.5 U) 69 times [OR95%CI:17,72-520,0; p<0,001]. Minor T-allele (rs5443) increases the risk of CA changes by IMT (>0,9 mm) threefold [OR 95%CI:1.09-7.74; p = 0.027], CA atherosclerotic plaques – almost 10 and 5 times [OR 95%CI:2.55-38.0; p<0.001 and 1.61-13.27; p = 0.003]. T-allele of GNB3 gene enhances the probability of high sVCAM-1 (>1050 ng/ml) threefold [OR 95%CI:1.06-9.59; p = 0.032].

Conclusions: C-allele of NOS3 (rs2070744) gene contributes more to ED risk elevation. T-allele of GNB3 (rs5443) gene increases the risk of the carotid arteries structural changes.

ARTERIAL STIFFNESS IS A DETERMINANT OF THE WHITE-COAT EFFECT IN YOUNG SUBJECTS IN THE INITIAL STAGES OF HYPERTENSION

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Objective: The white-coat effect (WCE) evaluated from the difference between office and ambulatory blood pressure (BP) is often pronounced in young hypertensive subjects chiefly in people with isolated systolic hypertension (ISHY). The WCE in this setting is considered to merely reflect the alarm reaction to doctor's visit and to be a benign phenomenon. However, the WCE might be amplified in subjects with stiffer arteries. The aim of this study was to investigate whether the WCE in the young is influenced by individual vascular characteristics and whether this putative association may differ according to hypertension subtype.

Design and method: We examined 371 young-to middle age participants (mean age 31.1±8.7 years, 74.7% males). BP phenotypes were identified using ambulatory BP with a 24-hour BP cut-off of 130/80 mmHg. ISHY was present in 24.2 % of participants, isolated diastolic hypertension in 20.0%, systolic-diastolic hypertension in 30.1%, and normotension in 25.7%. Vascular stiffness was assessed by radial-carotid pulse wave velocity (PWV) and vascular compliance by radial tonometry. 24-hour urinary catecholamines were measured with HPLC in 101 participants. The association of WCE with arterial functional indexes was assessed with multivariable linear regression analysis controlling for ambulatory BP. Improvement in the models was expressed by the difference in the Akaike index(δ AIC)

Results: In the whole group, PWV was a significant predictors of the WCE with a δAIC of 9.9 (p = 0.001). In addition, a negative association was found between the WCE and large artery (p = 0.001) or small artery (p = 0.002) compliance. Twenty-four-hour urinary epinephrine and nor-epinephrine were totally unrelated to WCE. PWV was a significant predictor of the WCE also among the participants with ISHY with a δAIC of 8.2 (p = 0.002). This association was not present in the participants with isolated diastolic hypertension (p = 0.15) or systolic-diastolic hypertension (p = 0.28).

Conclusions: These data indicate that arterial stiffness rather than sympathoadrenergic activity is an important determinant of the surrogate measure of the WCE in young subjects in the initial stage of hypertension. This association was confirmed in the subgroup of participants with ISHY suggesting that in some individuals ISHY may not be a benign condition.

VASCULAR REMODELING AND FIBROSIS INDEXES IN NAFLD SUBJECTS

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Objective: Non-alcoholic fatty liver disease (NAFLD) is a growing public health problem and is related to an increased burden of cardiovascular disease. Aim of the study: to assess the relation between non-invasive scoring systems for liver fibrosis (Fibrosis-4 Index and NAFLD Fibrosis Score) and structural and functional vascular properties in NAFLD patients.

Design and method: The study enrolled 30 consecutive patients (mean age 64±13, BMI 29.3±6.1 kg/m², male 60%) who underwent hepatological evaluation in our department. Atherosclerotic burden was evaluated by B-mode ultrasound in each carotid artery segment (common, bulb, internal), bilaterally, and expressed as mean of carotid intima-media thickness (mean-IMT) and mean of maximum IMT (M-MAX), right common carotid artery distensibility and stiffness (CardioVascular Suite 4, Quipu, Italy). Aortic stiffness was measured by applanation tonometry (PulsePen DiaTecne, Italy) and was expressed as carotid-femoral pulse wave velocity (PWV).

Results: In our cohort vascular properties were: carotid mean-IMT 0.83±0.15 mm, M-MAX 0.98±0.17 mm, carotid distensibility 18.8±8.3 10^{-3}/kPa, and carotid compliance CC 0.88±0.40 mm²/kPa. We found a significant correlation between NAFLD Fibrosis Score and PWV (mean PWV = 10.9±2.9m/s; Fibrosis Score = -0.97±1.80; R = 0.422, p = 0.020), which remained significant after adjustment for mean arterial blood pressure and sex (p = 0.017). No correlation was found between carotid ultrasound parameters and fibrosis scores.

Conclusions: In NAFLD patients, our preliminary observation shows a correlation between a liver fibrosis score and PWV, an established marker of aortic stiffness, while no correlation was observed with carotid atherosclerosis markers. This vascular remodeling phenotype needs to be confirmed in a larger population.

ENDOTHELIAL FUNCTION, AS ASSESSED BY FLOW MEDIATED DILATION AND ASYMMETRIC DIMETHYLARGININE IS IMPAIRED IN NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS

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Objective: Endothelial dysfunction precedes the onset of clinically detectable atherosclerosis diabetes mellitus in type 2 (T2DM) and contributes significantly to the development of vascular complications and mortality. The aim of the present study was to investigate the endothelial function in patients with a recent diagnosis of T2DM.

Design and method: We studied patients with newly diagnosed T2DM (<6 months from diagnosis) that did not receive antidiabetic treatment (except for metformin) and otherwise healthy individuals matched for age and blood pressure (BP). We recorded somatometric, BP (office and 24-hour) and hematological (lipids, renal function, fasting glucose, HBA1c) data. We also calculate the 10-year atherosclerotic cardiovascular risk (ASCVD risk score). We determined endothelial dysfunction with 2 methods: Asymmetric Dimethylarginine (ADMA) by ELISA (enzyme-linked immunosorbent assay) and the gold standard non-invasive method Flow Mediated Dilation (FMD).

Results: Ninety subjects were studied, 33 patients with T2DM and 57 controls. Twenty T2DM patients were enrolled within 1 month from diagnosis, while the rest 13 had been diagnosed 3.69±2.14 months before. Similarly, 16 (48.48%) had received metformin for a median of 3 (interquartile range 18) weeks. T2DM showed significantly impaired FMD [4.68 (4.58)% versus 7.85 (7)%, (p = 0.012)] and higher ADMA [0.926±0.569 μmol/l versus 0.468 (0.27) μmol/l, (p = 0.032)], compared to controls. There was also an independent association of T2DM and FMD (Beta = -0.278, p = 0.012). Results were similar in the sub-group analysis of patients without hypertension. In this cohort, FMD lower than 7.5% was able to predict T2DM diagnosis with 87.5% sensitivity and 70.8% specificity.

Conclusions: Patients with a very recent diagnosis of T2DM show impaired endothelial function as demonstrated by FMD and ADMA findings. This assessment highlights the early severe, damaging effect of hyperglycemia on the endothelium, emphasizing the need for early detection and management.

ASSESSMENT OF ENDOTHELIAL FUNCTION BY FLOW-MEDIATED DILATION IN WELL-CONTROLLED PATIENTS WITH RHEUMATOID ARTHRITIS

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