



Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

Journal Home Page: <https://www.atlantis-press.com/journals/artres>

P2.12: A NOVEL MARKER EXPRESSES THE EFFECT OF THE NONLINEARITY IN THE ARTERIAL PRESSURE-VOLUME RELATIONSHIP ON THE PULSE PRESSURE: CHARACTERISTICS AND PROGNOSTIC SIGNIFICANCE IN HYPERTENSIVE PATIENTS

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To cite this article: Benjamin Gavish*, Michael Bursztyn (2015) P2.12: A NOVEL MARKER EXPRESSES THE EFFECT OF THE NONLINEARITY IN THE ARTERIAL PRESSURE-VOLUME RELATIONSHIP ON THE PULSE PRESSURE: CHARACTERISTICS AND PROGNOSTIC SIGNIFICANCE IN HYPERTENSIVE PATIENTS, Artery Research 12:C, 8–9, DOI: <https://doi.org/10.1016/j.artres.2015.10.218>

To link to this article: <https://doi.org/10.1016/j.artres.2015.10.218>

Published online: 7 December 2019

Results: Forty-eight patients participated in the study. The average age was 60.8 ± 13.4 years. The mean dialysis vintage was 58 ± 66 months. Patients received adequate renal replacement therapy and the mean urea reduction ratio was 72 ± 6.6 . At the onset and at the end of the study, no major hemodynamic changes were detecting (mean systolic/diastolic blood pressure ($147. \pm 20/78 \pm 11$ vs $138 \pm 20/77 \pm 10$ mmHg) according to our aforementioned criteria. Compared to pre- dialysis, an improvement in the test score was revealed after dialysis, paired t-test ($p=0.03$). Mean values of MMSE pre and post was 26.61 ± 3.24 and 28.86 ± 1.98 respectively (amelioration of 2.25 points).

Conclusions: Our results illustrate the better performance of cognitive function that can be observed after a single dialysis session, in absent of hypotensives episodes. These results may be used as a starting point, in an effort to evaluate the best possible time, pre or post dialysis, to provide medical advice to these patients.

P2.9

A NOVEL SPECKLE TRACKING TECHNIQUE FOR INVESTIGATING REGIONAL MOTION OF THE CAROTID WALL: SPATIO-TEMPORAL VARIATION IN DISTENSION ASSOCIATES WITH PRESENCE OF CALCIFIED PLAQUE

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Background: Arterial calcification may lead to regional variation in distension imposing stresses on the arterial wall that predispose to plaque rupture. The objective of this study was to use a novel speckle tracking method to investigate regional motion of the carotid wall and to determine whether this relates to subclinical disease.

Methods and results: Measurements were obtained on 256 subjects from the Twins UK cohort (mean \pm SD age 62 ± 10.2 years). The left carotid was imaged for an assessment of plaque and calcification. Speckle-tracking was then used to measure regional circumferential strain of the left common carotid in 6 separate 60° segments of the circumference of the arterial wall in a plaque free plane of the common carotid approximately 1 cm proximal to the bifurcation. Regional variation in circumferential strain around the circumference of the arterial wall was characterized by the standard deviation of circumferential strain and that of the time from onset of systole to peak circumferential strain in each segment. Spatio-temporal variation in circumferential strain characterized by variation in the time to peak circumferential strain was associated with age and presence of calcified plaque (regression coefficients 0.73 units/year and 14.2 increase for presence of calcified plaque, each $P < 0.001$) independent of other confounding factors and of other measures of arterial wall damage such as carotid intima-media thickening, carotid distensibility and carotid-femoral pulse wave velocity.

Conclusion: Arterial ageing and calcification are associated with spatio-temporal variation in distension of the carotid artery.

P2.10

EXAGGERATED EXERCISE BLOOD PRESSURE INDEPENDENTLY PREDICTS INCIDENT HYPERTENSION: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Exaggerated exercise blood pressure (EEBP) independently predicts cardiovascular (CV) events and mortality, but reasons underlying this increased CV risk are unclear. The association between an EEBP and incident hypertension (as a potential underlying risk factor) has been reported, but there has never been a pooled summary of risk estimates (RE). The aim of this study was to conduct a systematic review and meta-analysis of studies assessing the association between EEBP and incident hypertension among normotensive individuals.

Methods: Seven online databases were searched for studies that measured dynamic exercise BP and rates of incident hypertension (defined from clinic BP $\geq 140/90$ mmHg or out of clinic BP above guideline recommended values) among people who were normotensive at baseline. EEBP was defined as systolic BP during exercise (moderate or peak intensity), as well as the change from rest, or in acute recovery after exercise.

Results: 22 studies met inclusion criteria, totalling 31,130 participants aged 42.4 ± 8.9 years followed for 6.0 ± 2.6 years. Pooled meta-analysis at peak and moderate exercise intensity, adjusted for baseline (rest) BP, age, sex and other traditional CV risk factors revealed that an EEBP significantly

increased the risk for incident in-clinic hypertension (peak RE=1.52 [95% CI: 0.99, 2.33], I²=80.4%; moderate RE=1.90 [95% CI: 1.11, 3.28], I²=75.5%).

Conclusions: An EEBP independently predicts incident hypertension, thus indicating that clinicians supervising exercise stress testing should consider additional patient follow-up with respect to BP control and lifestyle intervention to reduce CV risk among patients with EEBP.

P2.11

EXERCISE REVEALS DIFFERENTIAL COUPLING BETWEEN AORTIC HAEMODYNAMICS AND LEFT VENTRICULAR TWIST MECHANICS

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Background: Hypertensive heart disease is characterised by raised left ventricular (LV) mass, a consequence of load-altered ventricular-arterial coupling. Prior to gains in LV mass, early functional changes in ventricular-arterial coupling must occur, however, these are difficult to detect from conventional loading parameters at rest. This study aimed to examine the coupling of systolic LV twist and diastolic LV untwisting rate with alternative central haemodynamic indices [excess pressure (XSP) and reservoir pressure (RP)] at rest and during exercise.

Methods: 44 healthy men (21 ± 2 years) were assessed at rest and during 40% of maximal exercise capacity. Aortic XSP and RP were derived from radial tonometry, with LV systolic twist and diastolic untwisting rate simultaneously quantified using echocardiography.

Results: Associations between LV twist and RP and XSP were observed at rest (0.51 and 0.37, $P < 0.01$ respectively). Whilst total pressure did not differ between those with low and high LV twist (1933 ± 666 vs. 2173 ± 561 Pa.s, respectively, $P=0.24$), the change in LV untwisting rate with exercise was associated with change in XSP in High-twist ($r=-0.60$, $P=0.006$), but not Low-twist ($r=0.10$, $P=0.65$). Conversely, Low-twist showed a significant relationship between the change in LV untwisting rate and change in RP ($r=-0.47$, $P=0.03$), not observed in High-twist ($r=0.27$, $P=0.27$).

Conclusions: Aortic XSP and RP are coupled to LV twist mechanics at rest, but coupling is differentially modified as a result of a standardised exercise challenge. In the absence of structural LV remodelling, these observations may represent an early indication of increased risk for negative LV remodelling in later-life.

P2.12

A NOVEL MARKER EXPRESSES THE EFFECT OF THE NONLINEARITY IN THE ARTERIAL PRESSURE-VOLUME RELATIONSHIP ON THE PULSE PRESSURE: CHARACTERISTICS AND PROGNOSTIC SIGNIFICANCE IN HYPERTENSIVE PATIENTS

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Arterial pressure-volume relationship frequently deviates from the linearity expected from an ideal elastic tube. As a result, pulse pressure (PP) can be split into an 'elastic' component (ePP) and an excess value PP-ePP. We define the ratio (PP-ePP)/ePP as arterial nonlinearity marker (NLM). **OBJECTIVE:** Determining NLM from ambulatory BP (ABP) measurements and investigating its clinical and demographic characteristics and prognostic significance in hypertensive patients. **METHODS:** Following a previously described model-based procedure, NLM was determined from the variability of systolic BP (SBP) and diastolic BP (DBP). The predictive power of NLM was estimated using Cox proportional hazards regression adjusted for age, gender, body mass index, mean heart period, SBP- and heart-rate dipping and hypoglycemic and antihypertensive medication status. NLM variation with age or DBP changes in 10-years or 10-mmHg intervals, respectively, was evaluated using adjusted ANOVA and pairwise comparisons for the grouped variables. **RESULTS:** We analyzed 1,999 ABP records of individual hypertensive patients, (age 56 ± 16 years, 55% women, 60% on antihypertensive medication and 9% with diabetes, average BP $139/79$ mmHg, median DBP 78 mmHg), followed 5 years for all-cause mortality, of whom 103 died. Mean(SD) [range] for PP were $60(14)[27-132]$ mmHg and for NLM $0.20(0.14)[-0.22-1.00]$. PP and NLM were positively correlated ($r=0.53$). NLM increased

for increasing age (20-80y) and decreasing DBP (100-60mmHg). Standardized hazard ratio (HR) mean[95% confidence interval](p-value) for NLM was 1.7 [1.18-2.45](p=0.005) for DBP ≤78mmHg (63 deaths) and 0.78[0.47-1.30](p=0.34) DBP >78mmHg (40 deaths). Similar HR values were found without adjustment. CONCLUSION: Arterial nonlinearity predicts mortality in hypertensive patients with low ambulatory DBP.

P2.13

BLOOD PRESSURE PROFILE CHANGES BETWEEN 7TH AND 11TH YEAR OF LIFE IN CHILDREN BORN PREMATURELY WITH EXTREMELY LOW BIRTH WEIGHT IN COMPARISON TO CHILDREN BORN ON TIME

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There have been research trials analyzing the impact of prematurity on the prevalence of hypertension, however the prospective, long-time observation is uncommon. The aim of this study was to evaluate the prevalence of hypertension at the age of 7 and 11 years of regional cohort of preterms with birth weight ≤1000g.

The study included 67 children with birth weight ≤1000g born in Malopolska. The control group consisted of 38 children born at term, matched for age. Each child underwent 24-hour ambulatory blood pressure measurement twice – at the age of 7 and 11 years. The presence of hypertension based on two definitions: 1) Mean Arterial Pressure ≥95 percentile for gender and height; 2) number of individual measurements ≥95 percentile for gender, age and height >25% was estimated.

At the age of 7 years preterm infants had significantly higher incidence of hypertension, defined on the basis of MAP (15%vs.0%; p<0.015), and on the percent of individual measurements (56%vs.33%, p<0.036). After taking into account the group of patients who received anti-HT treatment after first part of study, the incidence of hypertension at the age of 11 based on MAP was 19%vs.10% and based on individual measurements was 36,5%vs.24% (the differences are not statistically significant). In both time points a higher mean heart rate in the group of preterms was found (7 years of age: 93vs.87/min., p<0.001; 11 years of age 87vs.83/min, p=0.039).

Children born prematurely are predisposed to hypertension in later life. Persistence of increased heart rate in former preterms was shown.

P2.14

PARAMETERS OF ARTERIAL STIFFNESS IN OSTEOARTHRITIS PATIENTS AND IN HEALTHY CONTROLS

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Osteoarthritis (OA) and cardiovascular diseases (CVD) are prevalent conditions and often co-exist. Vascular involvement in pathogenesis of CVD and OA gives reason to investigate arterial stiffness in OA. The aim of this study is to investigate the associations between OA and arterial stiffness.

Arterial stiffness characteristics were measured with Sphygmocor device in 54 patients (age 62 ± 7,4 years (mean ± SD)) with end-stage osteoarthritis before knee and hip replacement and compared to 54 age and sex matched controls (61 ± 7,0 years). Independent Student's t-test was used to compare the means. Correlation between variables was determined using Pearson's correlation analysis and multiple regression analysis.

Aortic pulse wave velocity and augmentation index were increased in patients with OA compared to controls (8,8±1,6 m/s vs 7,9±1,5 m/s, p=0,004; 25,2±9,3% vs 21,2±10,4%, p= 0,04, respectively). The small artery elasticity index was significantly lower in OA patients than in healthy controls (3,2 (2,20-6,05)ml/mmHg×100 (median (interquartile range) vs 5,08 (3,1-8,39)ml/mmHg×100, p=0,007, respectively). The level of central systolic and diastolic blood pressure were related to LDL- cholesterol

(r=0,42; p=0,002; r=0,37; p=0,006, respectively) and urea (r=0,51; p<0,001) and urea level was also associated with aortic pulse wave velocity in the patients (r=0,51; p<0,001)

This study shows that patients with OA have increased arterial stiffness compared to healthy controls. Potential link between arterial stiffening and OA could suggest that alterations are involved in OA pathogenesis and be responsible for increased cardiovascular risk in OA patients.

P2.15

IRRITABLE AFFECTIVE TEMPERAMENT IS A PREDICTOR OF PULSE WAVE VELOCITY, WHEREAS HYPERTHYMIC AFFECTIVE TEMPERAMENT DETERMINES AUGMENTATION INDEX IN CHRONIC HYPERTENSION

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Background: Affective temperaments (anxious, depressive, cyclothymic, irritable and hyperthymic) are subclinical manifestations of major mood disorders and there is cumulating evidence about their involvement in somatic disorders as well. The aim of our study was to evaluate the associations of affective temperament scores with arterial stiffness parameters in hypertensive patients.

Methods: In this cross-sectional study, chronic, well-controlled hypertensive patients, with no history of depression, completed the TEMPS-A, Beck Depression Inventory (BDI) and Hamilton Anxiety Scale (HAM-A) autoquestionnaires in three GP practices. Arterial stiffness was measured with the tonometric PulsePen device.

Results: Altogether 183 patients were involved. In regression analysis irritable temperament score was a predictor of pulse wave velocity (adjusted for age, brachial systolic blood pressure, onset of hypertension, serum glucose, GFR-EPI, BDI and HAM-A, β=0.170, p=0.031), whereas hyperthymic temperament score was a predictor of augmentation index (adjusted for age, gender, smoking, heart rate, BDI and HAM-A, β=-0.211, p=0.004).

Limitations: The cross-sectional design of the study precludes the evaluation of causality.

Conclusion: Our results suggest that high irritable temperament score might be a marker of increased, whereas high hyperthymic score a decreased cardiovascular risk among chronic hypertensive patients, however, follow-up studies are required to confirm this hypothesis. The evaluation of affective temperaments seems to be a potential tool to study psychosomatic processes.

P2.17

FEASIBILITY OF USING COMPLIOR ANALYSE TO MEASURE CENTRAL SYSTOLIC BLOOD PRESSURE DURING DIALYSIS

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Central systolic blood pressure (cSBP) could be helpful to monitor hypotension during dialysis. However most cSBP devices are based on peripheral estimates which might be unreliable during the specific hemodynamic state of dialysis. Complior Analyse (Alam Medical, France) presents the advantage of measuring cSBP, hand-free, directly from the carotid artery with no mathematical estimation. Our study aims document cSBP variability from Complior Analyse before and during dialysis.

cSBP was measured in 19 stable patients (10M/9F, age:65±16yrs) with regular heart rate who underwent dialysis in Fresenius center, Montfermeil hospital, France (10 patients before dialysis, 13 patients 130±24min after the start of dialysis including 4 patients with data both before and during dialysis). Carotid waveforms were measured in triplicate within 5min and