



Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

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

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

Benyu Jiang*, Jing Wang, Tim Spector, Phil Philip J. Chowienczyk

To cite this article: Benyu Jiang*, Jing Wang, Tim Spector, Phil Philip J. Chowienczyk (2015) 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, Artery Research 12:C, 8–8, DOI: <https://doi.org/10.1016/j.artres.2015.10.215>

To link to this article: <https://doi.org/10.1016/j.artres.2015.10.215>

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 hypotensive 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

Benyu Jiang ^{1,*}, Jing Wang ¹, Tim Spector ², Phil Philip J. Chowienczyk ¹

¹King's College London British Heart Foundation Centre, Department of Clinical Pharmacology, London, UK

²Department of Twin Research, King's College, London, UK

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

Martin Schultz ^{*}, Petr Otahal, Dean Picone, James Sharman
Menzies Institute for Medical Research, University of Tasmania, Hobart, Australia

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

Martin Schultz ^{1,*}, Justin Davies ², Eric Stöhr ³

¹Menzies Institute for Medical Research, University of Tasmania, Hobart, Australia

²International Centre for Circulatory Health, Imperial College London, London, UK

³Discipline of Physiology & Health, Cardiff Metropolitan University, Cardiff, UK

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

Benjamin Gavish ^{1,*}, Michael Bursztyn ²

¹Yazmonit Ltd., Eshtaol, Israel

²Hadassah-Hebrew Univ Medical Ctr. Mount-Scopus, Jerusalem, Israel

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