



Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

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

P.018: ABDOMINAL AORTIC ANEURYSMS AND THEIR EFFECT ON ARTERIAL WAVE REFLECTION AND MORPHOLOGY

A. Swillens, L. Lanoye, J. De Backer, N. Stergiopoulos, P. Verdonck, F. Vermassen, P. Segers

To cite this article: A. Swillens, L. Lanoye, J. De Backer, N. Stergiopoulos, P. Verdonck, F. Vermassen, P. Segers (2007) P.018: ABDOMINAL AORTIC ANEURYSMS AND THEIR EFFECT ON ARTERIAL WAVE REFLECTION AND MORPHOLOGY, Artery Research 1:2, 56–57, DOI: <https://doi.org/10.1016/j.artres.2007.07.075>

To link to this article: <https://doi.org/10.1016/j.artres.2007.07.075>

Published online: 21 December 2019

P.014

AUGMENTATION INDEX IS A MORE PROMINENT PARAMETER AS COMPARED TO FLOW MEDIATED VASODILATION FOR THE DETECTION OF ARTERIAL WALL DYSFUNCTION IN YOUNG WOMEN WITH SYSTEMIC LUPUS ERYTHEMATOSUS

A. Cypiene¹, A. Laucevicus², A. Venalis¹, J. Dadoniene¹, R. Ruziene¹, L. Ryliskyte², Z. Petruilioniene², M. Kovaite², V. Skorniakov². ¹Institute of Experimental and Clinical Medicine, Vilnius University, Vilnius, Lithuania, ²Clinic of Heart Diseases, Vilnius University; Centre of Cardiology and Angiology, Vilnius, Lithuania

Background: Systemic lupus erythematosus (SLE) is a chronic inflammatory, autoimmune disease, which may lead to arterial dysfunction, and that could be the reason of enhanced development of atherosclerosis and premature aging of the arteries.

Aim of the study: was to assess whether aortic augmentation index (Alx) and endothelium-dependent flow-mediated dilatation (FMD) were modified in young age SLE women and which of parameters is more prominent.

Methods: We examined 30 SLE women (age 37.33 ± 9.22 years) with moderate disease activity (SLEDAI 18.40 ± 8.17) and 66 controls women (age 37.45 ± 8.69 years). Alx was assessed non-invasively by applanation tonometry (Sphygmocor v.7.01, AtCor Medical). The FMD test in a brachial artery was performed by the ultrasound system (Logiq 700, General Electric).

Results: In SLE women Alx (20.53 ± 12.40 vs 13.50 ± 10.14 ; $p=0.004$) was significantly higher as compared to the controls. Linear regression did not indicate direct relationship between arterial wall parameter Alx and presence of SLE. The main explanatory factor for Alx was MBP. FMD was not significant decrease in SLE women compared to the controls (9.25 ± 5.12 vs 9.69 ± 3.29 ; $p=0.670$) and it depends on vessel diameter, disease duration and body mass index.

Conclusions: Alx, not FMD, is a more prominent arterial wall parameter in the group of relatively young SLE women as compared to the controls. Nonetheless, the inclusion of additional factors shows that Alx is better explained by MBP. Relationship between SLE and measures of arterial wall parameters still remains unclear. Although there are evidences at least of indirect impact of SLE on arterial stiffness parameters.

P.015

AUTOMATED RADIO-FREQUENCY VERSUS MANUAL B-MODE ULTRASOUND COMMON CAROTID INTIMA-MEDIA THICKNESS MEASUREMENTS IN ROUTINE CLINICAL PRACTICE: A DIRECT COMPARISON OF RISK FACTOR RELATIONS AND ASSOCIATIONS WITH FUTURE EVENTS

S. Dogan, Y. Plantinga, J.M. Dijk, Y. van der Graaf, D.E. Grobbee, M.L. Bots. *Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht, Netherlands*

Background: Carotid intima-media thickness (CIMT) serves as an indicator of atherosclerosis and cardiovascular risk in observational and intervention studies. Off-line measurements from stored B-mode images using manual tracing or automated-edge-detection programs are the most applied methods. Direct measurements by automated radio-frequency (RF) approach might be an interesting alternative. We compared these methods in terms of risk-factor relations and associations with future events.

Methods: Data from participants of the SMART-study was used. Far wall common CIMT was measured with B-mode and automated RF. Detailed risk factor information was obtained. All participants were followed for occurrence of vascular events (mean follow-up 2.1 years). CIMT was related to risk factors with linear-regression models and to future events with Cox-Proportional-Hazards models.

Results: Data were available for 2146 participants. Intraclass correlation between two methods was modest (0.45). The relation between B-mode CIMT with age and systolic blood pressure was twice as strong as compared to RF CIMT. The relation of B-mode CIMT with events was stronger than for RF CIMT: vascular death (1.27 vs. 1.00) and ischemic stroke (1.45 vs. 1.03). In subjects with B-mode measured CIMT < 1.00 mm, RF CIMT showed stronger relationships with vascular death (1.30 vs. 0.80), although B-mode CIMT was stronger associated with ischemic stroke (3.70 vs. 0.97).

Conclusion: Given our findings, the choice for either B-mode CIMT or RF CIMT measurements in research is partly driven by type of study-population, expected presence of local atherosclerotic abnormalities, and of the main aim of the study (risk-factors or events).

P.016

THE ASSESSMENT OF ENDOTHELIAL FUNCTION IN BRACHIAL ARTERY MAY CONTRIBUTE TO THE DISCRIMINATION OF THE METABOLIC SYNDROME

L. Ryliskyte, M. Kovaite, A. Badariene, V. Dzenkeviciute, A. Cypiene, A. Laucevicus. *Vilnius University Hospital Santariskiu Klinikos, Heart Clinic, Vilnius, Lithuania*

Purpose: We aimed to investigate the relationship between the presence of the metabolic syndrome (MetS) and endothelial dysfunction in middle-aged subjects with signs of central obesity but without overt cardiovascular disease.

Methods: We studied 176 subjects (age 49.1 ± 6.4 , 40% of males) diagnosed with central obesity according to the IDF criteria. Patients underwent the detailed evaluation of cardiovascular risk factors (including blood tests for high sensitivity C-reactive protein, fibrinogen, serum glucose and lipid profile) and the evaluation of endothelial function by ultrasound assessment of flow-mediated dilatation (FMD) in the brachial artery.

Results: Totally 120 subjects (68%) were diagnosed with MetS, 56 (32%) had isolated central obesity or central obesity plus one additional component of MetS. FMD was significantly lower in patients with MetS as compared to the subjects without it ($6.4 \pm 3.9\%$ and $7.8 \pm 3.9\%$, $p=0.029$), although groups did not differ significantly regarding age, gender, diameter of the brachial artery, family history and smoking status. Serum high sensitivity C-reactive protein (hsCRP) but not fibrinogen was higher in patients with MetS ($p=0.013$ and $p=0.47$, respectively). Logistic regression analysis revealed that the presence of MetS is significantly predicted by the decrease of high density lipoproteins and flow-mediated dilatation ($p=0.0053$ and $p=0.0054$).

Conclusion: Association between impaired endothelial function and the presence of metabolic syndrome suggests that the assessment of endothelial function can have an additive value in the discrimination of patients with MetS.

P.017

THE INFLUENCE OF ETHNICITY ON FEMORAL-DORSALIS PEDIS PULSE WAVE VELOCITY: A STUDY COMPARING SOUTH ASIANS AND CAUCASIANS

B. McDonnell¹, C.M. McEnery², I.B. Wilkinson², J.R. Cockcroft¹. ¹Cardiology Department, Wales Heart Research Institute, Cardiff University, Cardiff, United Kingdom, ²Department of Clinical Pharmacology, Vascular Research Unit, University of Cambridge, Cambridge, United Kingdom

Background: South Asians living in the UK have lower rates of peripheral vascular disease (PVD) than Caucasians. The reason for this is unclear. Arterial stiffness is an independent risk factor for CV disease and may precede the development of clinically overt atheroma. Thus a possible explanation for this lower incidence of PVD in South Asians, is that they have increased arterial compliance in the femoral vascular bed compared to Caucasians.

Method: We investigated this hypothesis in measuring F-D PWV in 93 male volunteers, matched for age and mean arterial pressure (MAP). 43 healthy Caucasians (HC) and 50 healthy South Asians (HA), free from cardiovascular medication and known PVD were used in the analysis. F-D PWV was recorded using foot to foot pulse wave velocity (PP-1000 Hanbyul Meditech, Korea).

Results: F-D PWV was significantly higher in the HC group compared to the HA group (10.5 ± 2.4 v 9.4 ± 1.6 m/s, $P=0.019$).

Conclusion: F-D PWV was significantly lower in South Asians living in the UK compared to matched Caucasians. This finding may account for the decreased incidence of PVD seen in this ethnic group. In addition these data support the hypothesis that increased arterial stiffness may predispose to atheromatous disease.

P.018

ABDOMINAL AORTIC ANEURYSMS AND THEIR EFFECT ON ARTERIAL WAVE REFLECTION AND MORPHOLOGY

A. Swillens¹, L. Lanoye¹, J. De Backer², N. Stergiopoulos³, P. Verdonck¹, F. Vermassen⁴, P. Segers¹. ¹Cardiovascular Mechanics and Biofluid Dynamics, Institute of Biomedical Technology, Ghent, Belgium,

²Department of Cardiovascular Medicine, Ghent University Hospital, Ghent, Belgium, ³Laboratory of Hemodynamics and Cardiovascular Technology, Swiss Federal Institute of Technology, Lausanne, Switzerland, ⁴Vascular Surgery Department, Ghent University Hospital, Ghent, Belgium

Background: As already known in ancient times, cardiovascular disease can be traced by analyzing arterial (pressure) waveforms, for these can be attributed to cardiovascular properties like arterial geometry and elasticity. Consequently, we hypothesize that an abdominal aortic aneurysm (AAA) will influence arterial wave reflection and waveforms because it entails an arterial dilation accompanied by a change in arterial elasticity.

Methods: An experimental and numerical model, relying on an AAA-geometry reconstructed from patient CT-images, was designed. A silicon rubber AAA was inserted into a hydraulic bench model of the systemic circulation. Pressure and flow waves were simultaneously measured with and without aneurysm. The nature of the waves was determined with wave intensity analysis and the reflection coefficient. With the numerical model, arterial waves were simulated at the same locations. Results were verified in a preliminary study in 3 patients before and after AAA-repair.

Results and discussion: Both models demonstrated that AAA changed the nature of the reflected waves. A healthy arterial tree is characterized by positive reflections due to tapering and progressive stiffening, as was confirmed experimentally and numerically. An aortic dilation causes the opposite effect: we observed negative reflections in the upper aorta. A numerical parameter study showed that larger and more compliant AAA generated stronger negative reflections. The reflection coefficient measured in vivo increased after AAA-repair in all 3 patients, conforming the model findings.

Conclusions: Both models proved the impact of AAA on arterial waveforms elsewhere in the arterial system. These effects also appear measurable in humans.

P.019

CAROTID-RADIAL PULSE WAVE VELOCITY DURING THE TESTS ON REACTIVE HYPEREMIA IN PATIENTS WITH ISOLATED SYSTOLIC AND SYSTOLIC-DIASTOLIC ARTERIAL HYPERTENSION

A.A. Dzizinsky, K.V. Protasov, O.V. Fedorishina, S.G. Kuklin. *Advanced Medical Training Institute, Irkutsk, Siberia, Russian Federation*

Purpose: To evaluate the influence of tests on reactive hyperemia on peripheral vessel's elasticity in patients with isolated systolic (ISH) and systolic-diastolic arterial hypertension (SDH).

Methods: Patients with ISH (n=67) and SDH (n=75) similar in sex and age were examined. Two tests on reactive hyperemia were conducted. The first test included 5-minute cuff occlusion (CO), the second one – sublingual taking of 0.5 mg Nitroglycerin (NG). Carotid-radial pulse wave velocity (PWV-cr, "PulseTracePWV", Great Britain) was measured before and after the cuff decompression or 5 minutes after Nitroglycerin taking in CO and NG tests respectively. The PWV-cr dynamics was assessed by Wilcoxon criteria.

Results: The initial PWV-cr was significantly higher in patients with SDH in relation to ISH (10.3 and 9.8 m/s respectively; $p < 0.05$). The PWV-cr dynamics during the functional tests is presented in the table below.

	PWV-cr medians (m/s)					
	CO test			NG test		
	Before	After	%	Before	After	%
ISH	9.8	9.7*	-1	9.8	9.3	ns
SDH	10.3	10.0**	-2.9	10.6	9.8*	-7.6

* $p < 0.01$.

** $p < 0.05$.

During the functional tests PWV-cr exhibited a regular decrease in both groups due to the vessel's relaxation. But in cases of ISH it decreased to a lesser extent.

Conclusion: So we can suggest that ISH as compared with SDH was characterized by lesser tonus and depressed reactivity of upper-limb peripheral arteries.

P.020

INTERRELATIONS BETWEEN CAROTID-RADIAL PULSE WAVE VELOCITY AND BLOOD PRESSURE MONITORING DATA IN PATIENTS WITH ISOLATED SYSTOLIC HYPERTENSION

K.V. Protasov, A.A. Dzizinsky, D.A. Sinkevich, S.G. Kuklin. *Advanced Medical Training Institute, Irkutsk, Siberia, Russian Federation*

Purpose: To investigate the interrelations of carotid-radial PWV (PWV-cr) and its dynamics in occlusion test with 24-h BP-monitoring (ABPM) parameters in patients with isolated systolic arterial hypertension (ISH).

Methods: 112 ISH patients were exposed to ABPM. PWV-cr ("PulseTracePWV", Great Britain) was measured along with its dynamics (%) after a 5-min forearm cuff occlusion and the second measurement. According to the results of the occlusion test the patients formed two subgroups, in one of which PWV-cr decreased (n=66, 58.9%), while in the second group (n=46, 41.1%) it did not change or increased. In both groups mean parameters of ABPM were compared. Correlation and logistic regression analyses were applied.

Results: Initial PWV-cr of all patients correlated directly to diurnal diastolic BP (DBP) ($r = 0.40$, $p < 0.0001$). Inverse correlation was revealed between PWV-cr and low systolic BP (SBP) and DBP loads. The subgroups were similar in gender, age and 24-h SBP and DBP levels. At the same time the first subgroup nighttime SBP and DBP dipping indices were lower ($p = 0.0005$ and 0.003) and nighttime DBP and SBP were higher ($p = 0.005$ and 0.007) than those of the second group. Regression analysis showed that PWV-cr decrease is associated with non-dipping SBP and DBP patterns (OR=3.4, $p = 0.002$ and OR=3.8, $p = 0.007$).

Conclusion: In ISH patients the growth of peripheral arteries elasticity is followed by arterial hypotension prolongation during a day. PWV-cr dynamics in the occlusion test can have the predictive value in BP circadian rhythm disturbances assessment.

P.021

DYNAMICS OF CAROTID-RADIAL PULSE WAVE VELOCITY IN OCCLUSION TEST IS RELATED TO THE TARGET-ORGANS DAMAGE IN ESSENTIAL ARTERIAL HYPERTENSION

K.V. Protasov, A.A. Dzizinsky, D.A. Sinkevich, S.G. Kuklin. *Advanced Medical Training Institute, Irkutsk, Siberia, Russian Federation*

Purpose: To evaluate the importance of carotid-radial PWV (PWV-cr) dynamics in cuff occlusion test in heart, vessels and kidneys damage assessment in patients with essential arterial hypertension (AH).

Methods: 204 patients with AH (mean age 72.6 ± 7.2 years) were examined. PWV-cr ("PulseTracePWV", Great Britain) was measured before and after a 5-min forearm cuff occlusion. According to the results of the occlusion test the patients formed two subgroups, in one of which PWV-cr decreased (n=122), while in the second group (n=82) it did not change or increased. The cases of previous myocardial infarction (MI) were taken into account. Ankle-brachial index (ABI) and glomerular filtration rate (GFR) by MDRD formula were revealed. For criteria of peripheral artery disease (PAD) we used the ABI value < 1.0 , while for chronic kidney disease (CKD) it was $GFR/1.73 m^2 < 60$ ml/min. The incidence of previous MI, PAD and CKD were compared in both subgroups. To estimate relationships we used logistic regression analysis.

Results: The two subgroups of patients were similar in age, gender and PAD incidence. Previous MI and CKD occurred more often in the second subgroup compared with the first (28.9% vs. 13.9%, $\chi^2 = 6.9$, $p = 0.009$ and 65.4% vs. 43.7%, $\chi^2 = 9.1$, $p = 0.003$, respectively). Logistic regression analysis also proved that the lack of PWV-cr fall in occlusion test is associated with more frequent MI (OR=2.6, $p = 0.008$) and CKD (OR=2.4, $p = 0.002$) development.

Conclusion: PWV-cr dynamics in occlusion test reflecting peripheral arteries reactivity is associated with coronary heart and chronic kidney diseases occurrence and thus can have prognostic significance for target-organs affection.

P.022

COMPARISON OF COMPLIOR, SPHYGMOCOR AND ARTERIOGRAPH FOR ASSESSMENT OF AORTIC PULSE WAVE VELOCITY IN PATIENTS WITH ARTERIAL HYPERTENSION

M.W. Rajzer, M. Kłoczek, W. Wojciechowska, I. Palka, M. Brzozowska-Kiszka, K.L. Kawecka-Jaszcz. *Department of Cardiology and Hypertension Medical College Jagiellonian University, Krakow, Poland*

Background: Aortic pulse wave velocity (PWV) appears to be the "gold-standard" for evaluation of vascular changes in patients with arterial