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P.021: DYNAMICS OF CAROTID-RADIAL PULSE WAVE VELOCITY IN OCCLUSION TEST IS RELATED TO THE TARGET-ORGANS DAMAGE IN ESSENTIAL ARTERIAL HYPERTENSION

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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

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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

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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

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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

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