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COMPARATIVE INVESTIGATION OF MECHANICAL CHARACTERISTICS OF STABLE AND UNSTABLE CAROTID ATHEROSCLEROTIC PLAQUES
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The prognosis of patients with carotid atherosclerosis is determined by the factor of unstable atherosclerotic plaque. Change of longitudinal strain in junction place of healthy artery wall to plaque determined by local artery elasticity and leads to instability.

Aim of the study: Comparative investigation of mechanical characteristics of the stable and unstable plaques in a carotid artery.

Methods: In the main group (MGr) were studied 16 plaques with stenosis 70-90%, and control group (CGr) 33 plaques with stenosis 25-45%. Carotid ultrasound examinations (PHILIPS IU22) were performed for estimated structure and stenosis of plaques. The “healthy” wall stiffness (free from plaques -j(hw)- and plaques zone stiffness (in adventitia -j(ladv)- and in plaques surface -j(pl)-) were estimated using echo-tracking method by ALOKA7 b/M mode ultrasound imaging.

Results: In the MGr majority of plaques had structure with hypoechogenic area (~50%) and calcification, third plaques had rough or ulcerated surface. In CGr dominated heterogeneous plaques with smooth surface. In both groups [j(hw)] was significantly lower, than [jadv] (MGr: 8.95±3.14 vs 22.73±10.43, CGr: 9.43±2.64 vs 14.45±6.7, p<0.001), [j(pl)] was significantly higher than [j(ladv)] (MGr: 22.73±10.43 vs 7.7±5.04; CGr: 14.45±6.7 vs 11.69±6.84, p<0.001). Relative changes of plaques zone stiffness (100-<b>j(pl)/j(ladv)<</b> was significantly higher in the MGr (51±28±24.17% vs 26.93±21.45%, p=0.036).

Conclusions: Our results confirm presence the significant gradient of stiffness in junction place of healthy artery wall to plaque. In group with unstable plaques this gradient was significantly higher, that allows considering the possibility of the unstable plaques criteria developing by echo-tracking method.

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P10.10
THE EFFECT OF ANTIHYPERTENSIVE TREATMENT ON ARTERIAL STIFFNESS AND SELECTED MATRIX METALLOPROTEINASES PLASMA ACTIVITY
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The aim of the study was to compare the effects of 5 selected drugs on arterial stiffness and matrix metalloproteinases (MMPs) plasma activity in patients with essential arterial hypertension (HT). Material and methods: 95 pts. with HT stage 1 and 2, (N=19 in each treatment group) were treated for 6 months by: quinapril 20-40 mg/d (group-1), amiodipine 5-10mg/d (group-2), hydrochlorothiazide 12.5-25mg/d (group-3), losartan 50-100 mg/d (group-4), bisoprolol 5-10 mg/d (group-5). Before and then after 1,3 and 6 months of treatment office blood pressure (BP) was measured using Omron M5-i device. Carotid femoral pulse wave velocity (PWV) was measured using 3 devices CompiloR®, Sphygmocor® and Arteriograph®. Plasma concentration of (MMPs): MMP1, MMP2, MMP3, MMP9 and MMPs tissue inhibitor (TIMP1) was measured twice i.e. before and after 6 months of treatment using micro-ELISA method. Results: At the baseline no differences between groups were observed in BP, PWV and MMPs activity. ANOVA for repeated measurements revealed for all groups during treatment significant decrease in systolic BP (p<0.001), diastolic BP (p<0.001), PWV (p<0.001), MMP2 (p<0.05) and MMP3 (p<0.001) and increase of TIMP1 (p<0.001) plasma concentration. No between treatment groups differences were observed in above mentioned effects. Decrease of PWV was in significant relation to its baseline value (R=0.498, p=0.00041), decrease of MMP3 (p<0.211, p=0.022) and increase of TIMP1 (p<0.263, p=0.0052). Conclusion: Antihypertensive treatment reduces arterial stiffness proportionally to its baseline value and independently of the used drug. The reduction of arterial stiffness depends on decrease of extracellular matrix degradation.

P10.11
THE EFFECT OF WALL MOTION ON THE HAEMODYNAMICS OF MIDDLE CEREBRAL ARTERY (MCA) ANEURYSM
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External forces, accelerations and displacements, due to sudden motions of head or trauma, may affect the haemodynamics and flow patterns in a cerebral aneurysm. Despite several studies on blood flow dynamics and arterial wall mechanics in intracranial aneurysms, limited investigations considered the external forces or motion of the arterial wall. Therefore in this study, we have numerically analyzed the effects of wall movement on cerebral aneurysms with the fluid and structure interaction (FSI) theories. A 3Dimentional Model of Middle Cerebral Artery (MCA) aneurysm (geometry adopted from R. Torii et al., Int. J. Numerical Methods in Fluids, 54:995–1009, 2007) was constructed and exposed to a realistic head motion in sagital plane. Blood was considered as a homogeneous, incompressible constitutive law for a better understanding and characterization of the arterial wall mechanical behavior.