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P11.10: PRESSURE-INDEPENDENT ASSOCIATION BETWEEN AORTIC STIFFNESS AND LEFT VENTRICULAR CONCENTRIC GEOMETRY

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P11.09

SHEAR STRAIN IN THE COMMON CAROTID ARTERIAL WALL RELATED TO AGE?

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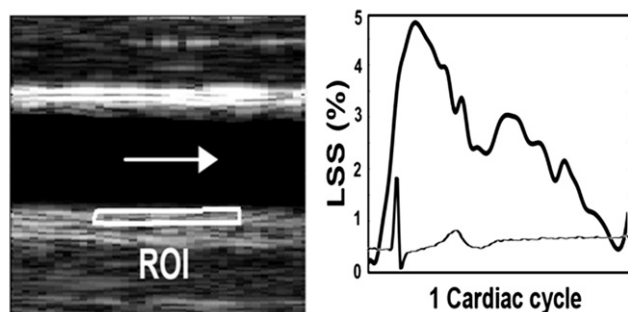
The primary trigger for myocardial infarction and stroke is destabilization of atherosclerotic plaques. It has been hypothesized that locally increased longitudinal shear strain (LSS) facilitates the development of vulnerable plaques [1]. LSS is defined as the change of longitudinal deformation in radial direction. Ultrasound strain imaging allows local assessment of LSS [2]. In 8 asymptomatic volunteers (age: 20–64 yrs.) radiofrequency (rf) ultrasound data of the common carotid artery were acquired in longitudinal direction using a Medison Accuvix V10, equipped with an L5-13 linear array transducer ($f_c = 8.5$ MHz). In each volunteer rf data were acquired at three beam steering angles during multiple cardiac cycles [3]. Simultaneously the ECG-signal was recorded. LSS was estimated in a selected region-of-interest (ROI) using a coarse-to-fine cross correlation based algorithm [3,4]. The estimated shear strain showed a cyclic pattern with an increase during the systolic and a decrease during the diastolic phase. The maximum LSS ranged between 3 and 17% and appeared to decrease with age. This decrease could be related to stiffening of the arterial wall. This study provides initial normal values of LSS in the common carotid artery. The maximum LSS appears to decrease with age. Further validation in patients will open the door for clinical predictions of plaque rupture.

[1] Idzenga, T. et al. Bioscience Hypotheses, 2011

[2] Idzenga, T. et al. Ultraschall in der Medizin, 2011

[3] Hansen, H. et al. Physics in Medicine and Biology, 2010

[4] Lopata, R. et al. Ultrasound in Medicine and Biology, 2009



P11.10

PRESSURE-INDEPENDENT ASSOCIATION BETWEEN AORTIC STIFFNESS AND LEFT VENTRICULAR CONCENTRIC GEOMETRY

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Background: Systolic blood pressure (BP) is the main pressure determinant of left ventricular (LV) mass in hypertension. It is uncertain whether arterial stiffness and central hemodynamics are related to LV mass and geometry independently of brachial, central or 24-hour BP level.

Methods: 744 consecutive never-treated subjects with uncomplicated essential hypertension (men 59%, age 49 ± 11 years, BP $149/93 \pm 16/10$ mmHg) underwent M-mode echocardiography and 24-hour BP monitoring. Carotid-femoral pulse wave velocity (cfPWV), aortic augmentation and aortic BP were evaluated by applanation tonometry.

Results: Women with LV hypertrophy (LV mass >51 g/m^{2.7}) had a higher cfPWV (10.5 ± 3 vs 9.3 ± 2 m/s, $p < 0.001$), augmentation (21 ± 7 vs 16 ± 7 mmHg, $p < 0.001$) and heart rate-corrected augmentation index ($.37 \pm .08$ vs $.34 \pm .12$, $p = 0.04$). Similar data were found in men. LV relative wall thickness (RWT) but not LV mass index was significantly associated with cfPWV independent of age and brachial, central or 24h systolic BP (see Table). The association of aortic augmentation with LV mass and RWT was no longer significant after adjustment for age and systolic BP. In a multiple regression model, 24h systolic BP, LV mass and cfPWV (all $p < 0.05$) independently predicted LV-RWT when a consistent number of risk factors was simultaneously controlled for.

Conclusion: The impact of aortic PWV on LV concentric geometry is independent and additional to that of peripheral, central or 24h BP.

P11.11

SYSTEMIC LUPUS ERYTHEMATOSUS AND CARDIOVASCULAR EVENTS

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Objective. To identify the frequency and character of cardiovascular events in patients with systemic lupus erythematosus (SLE) and to examine the risk factors for their development.

Materials and methods. The database of SLE was looked through to determine the frequency of cardiovascular events among the patients with the following case control study being designed. Seventy two patients formed the case control study out of which 27 had a cardiovascular event in the past and 45 were controls without the event matching the control by disease duration.

Results. Since 2003 year 175 patients were diagnosed with SLE and treated at tertiary rheumatology center. Twenty seven out of them have experienced the cardiovascular events and some of them for several times. In total 37 cardiovascular events were diagnosed. Angina pectoris was the most common event. Patients with cardiovascular events were older at the time of the event, more likely to have higher platelet counts in the blood, lower hemoglobin and less disease activity index score compared to controls. Cases were also more likely to have taken higher doses of corticosteroids [$17.8(11.5)$ vs $12.9(8.0)$] and higher white blood cell count in the blood [$7.54(3.53)$ vs $5.44(2.71)$]. In multivariable logistic regression analyses, only leucocytosis was significant risk factor for the development of cardiovascular events. The other two factors: age and the use of higher steroid doses have drawn near but haven't crossed the level of statistical significance. This research was funded by a grant (No. MIP – 83/2010) from the Research Council of Lithuania.

P11.12

B2-MICROGLOBULIN, PULSE PRESSURE AND METABOLIC ALTERATIONS IN PATIENTS ON HEMODIALYSIS

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Background/Aim: Pulse pressure (PP) is a result of arterial stiffness seen in dialysis patients, but may be a consequence of fluid overload. We examined the role of beta2-microglobulin (β_2M) in PP in relation to metabolic alterations in patients on different hemodialysis (HD) modalities.

Methods: We studied 76 hemodialyzed patients on regular HD ($n = 34$), predilution bagged hemodiafiltration ($n = 19$) and online predilution hemodiafiltration ($n = 23$). β_2M levels were measured by radioimmunoassay, and the clearance of β_2M was assessed by Kt/V for β_2M . Arterial stiffness was measured as carotid femoral pulse wave velocity, and PP was derived. Insulin levels were measured using immunoradioassay, and insulin resistance was calculated using homeostasis model assessment insulin resistance (HOMA-IR). Serum bicarbonate levels were measured using a blood gas analyzer, and percent sodium removal was calculated.

Results: β_2M levels predict increased PP ($p = 0.02$) adjusting for age, HD modalities, HD duration, HOMA-IR and percent sodium removal. β_2M was positively associated with HOMA-IR ($r = 0.306$, $p = 0.007$). Serum bicarbonate levels and carotid-femoral pulse wave velocity were inversely associated ($r = -0.719$, $p = 0.001$).

Conclusions: β_2M levels were positively associated with PP, which was influenced mainly by dialysis modality fluid and sodium balance and less by arterial stiffness. β_2M levels were positively associated with insulin resistance. Uremic acidosis may contribute to arterial stiffness.

P11.13

CORONARY CALCIFICATION IN YOUNG AND MIDDLE-AGED MEN WITH CORONARY ARTERY DISEASE

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Objective: To compare the presence and extent of coronary calcification in young and middle-aged patients with new onset coronary artery disease (CAD) with matched controls without a history of CAD.