OR-10

LEFT ATRIAL DIMENSION DEPENDS ON 24 HOUR AMBULATORY BLOOD PRESSURE DIPPING PATTERN AND LEFT VENTRICULAR GEOMETRY IN ARTERIAL HYPERTENSION


Left ventricular hypertrophy (LVH) is a common and powerful risk factor in arterial hypertension, while concentric LVH is considered the most dangerous. It is well known that LV geometry and the dipping status according to 24h ambulatory blood pressure provide independent prognostic informations in hypertensive patients. On the other hand left atrial dilation is associated with increased cardiovascular risk in arterial hypertension.

The aim of this study was to evaluate the possible relationship between LA enlargement and LVH, LV geometry and dipping status. We studied 5175 consecutive untreated patients with essential hypertension. Dippers were 2976 and LVH had 2907 (1087 patients with eccentric and 1820 with concentric LVH), while 1236 patients had concentric remodeling. LA was measured from 2D derived M-mode tracings and LA index was calculated after correction with body surface area. The LA/aortic root ratio was obtained as well.

Non-dippers had larger LA in comparison to dippers (35 vs 32 mm, p<0.00001), as did patients with LVH compared to those without LVH (35 vs 31 mm, p<0.00001). LV geometry differentiated LA size (normal geometry 31mm, concentric remodeling 32mm, eccentric LVH 36 mm, concentric LVH 34 mm, F= 294, p<0.00001). Dippers without LVH had smaller LA compared to non dippers with LVH 34 mm, F=294, p<0.00001). Dippers without LVH had smaller LA compared to non dippers with LVH 31 vs 36 mm, p<.00001). Overall, dippers with normal geometry had the smallest LA (30.7 mm) and the non dippers with eccentric LVH had the largest LA (37.4 mm). These findings held true after correcting LA dimension for body surface area or aortic root diameter.

It is concluded that LA dimension is related to LV hypertrophy and geometry while 24 h ambulatory blood pressure dipping pattern adds to prognosis.

Key Words: Blood Pressure Dipping Pattern, Left Ventricular Geometry, Left Atrial Dimension

OR-11

AORTIC PULSE WAVE VELOCITY AS AN INTEGRATED INDEX OF VASCULAR FUNCTION: RELATIONSHIP TO MORTALITY AND THE EFFECT OF ETHNICITY

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Objective: To test the hypothesis that central aortic pulse wave velocity (PWV) as a measure of aortic compliance or distensibility, might be an independent risk factor for mortality, in African-Caribbean, Indian sub-continent (South Asian) and European origin people in Britain.

Design and Methods: From 1987-1990 we used a Doppler ultrasound technique [Wright et al, C Lin Sci 1990; 78:463-468] to measure aortic PWV, with probes at the root of the neck (aortic arch waveform) and just above the bifurcation, with the person lying flat for >5mins,averaged over 45-120 cardiac cycles. 3 BPs were measured before and 3 after the PWV. Random samples of type 2 diabetes patients attending out-patients and a community-based population from the 3 ethnic groups (77% response) who were all glucose tolerance (GT) tested were the controls, as previously described [Lancet 1991; 338: 842-847]. Participants’ death certificates were tagged and obtained via the NHS central register.

Results: 232 Europeans (Eur.), 151 South Asians (SA) and 101 African-Caribbeans, were followed for 11 years, 242 women and 329 men; more men died (63.5% vs. 36.5%). At baseline, African-Caribbeans were slightly younger (58 yrs) than other groups (Eur. 62y, SA 60y) but despite higher BPs in both those still alive (144/83, vs. 138/77.1 (Eur.), 135.7/77.2 (SA) mmHg) and those who later died (156/87 vs. 150.3/79.8 and 153.3/80.4 mmHg), PWV was slower at 10.7 (95%CI 10-11.4) vs. 11.5 (11.1-12, Eur) and 11.3 (10.7-11.8, SA). At any given BP level, PWV was faster in those who died. In Cox regression models, adjusting for baseline differences in variables and follow-up, mortality was independently predicted by age (6, 4-9, % increase per year older, p<0.0001), sex (women 38, 11-55, % less, p=0.06), PWV (38, 8-81 % per m/sec, p<0.0001) which displaced BP, GT status (47, 17-84, % increase for each category with normoglycaemia as unity, p<0.001). Current smokers had a 62 (10-238) % excess mortality (p=0.01) while risk was reduced for Caribbeans (0.38, 0.22-0.67, % of other groups, p<0.01).

Conclusions: Aortic PWV predicts mortality across all degrees of glucose tolerance, displacing SBP, perhaps because it is further down the causal pathway. Those dying during follow-up, at any level of BP, have stiffer vessels either before or after diagnosis of diabetes. Despite high blood pressure, people of African-Caribbean origin retain a degree of protection from premature vascular mortality, in line with reduced national rates of coronary heart disease.

Key Words: Arterial Compliance, Mortality, Ethnicity

OR-12

CAFFEINE INCREASES AORTIC STIFFNESS IN HYPERTENSIVE PATIENTS

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Background: Caffeine is the most widely consumed pharmacologically active substance. Aortic elastic properties are important determinants of left ventricular function and coronary blood flow and have been identified as prognosticators of cardiovascular risk.

Methods: To investigate the acute effect of caffeine on aortic stiffness we studied 10 treated hypertensive patients (age 62±7 years) in a randomized, double-blind, crossover fashion (250 mg of caffeine orally -equivalent to 2-3 cups of coffee- and placebo). Carotid-femoral pulse wave velocity was measured as an index of aortic elasticity. Pulse wave velocity (=dL/dt, where dL is the distance travelled by the pulse and dt the time delay between the corresponding foot of pulse waves) was measured using an automated, non-invasive device (Compilo®) that has been previously validated.

Results: Caffeine lead to an increase in pulse wave velocity (by 0.47 m/sec, figure) which denotes increase in aortic stiffness. This effect was accompanied by an increase in systolic and pulse pressure (by 11.4 and 7.7 mmHg respectively; P<0.05 for both).

Conclusions: Caffeine leads to an acute increase of aortic stiffness.
This finding has important implications for left ventricular function and coronary blood flow and provides a new insight into the effects of caffeine on the cardiovascular system.

Key Words: Caffeine, Stiffness, Arteries

OR-13
EARLY STIFFENING OF LARGE ARTERIES IN HYPERTENSION
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Indices of arterial distensibility are impaired in hypertension, but it is unclear whether arterial stiffness is already present in the early stage of the disease. The aim of the present study was to investigate whether changes in the mechanical properties of the large arteries may occur in young subjects with borderline to mild hypertension.

We studied 100 never treated stage I young hypertensive subjects (85 males) with a mean age of 35.0±8.6 years and 30 age-matched normotensive subjects of control. To obtain a measure of arterial compliance, a model was used that divides the total systemic arterial compliance into large artery or capacitive compliance and small artery or oscillatory compliance. To this aim, radial arterial pulse waves were recorded with an arsenal tonometer sensor array. In addition, in all subjects pulse wave velocity was measured by using applanation tonometry. The Augmentation Index was calculated as pressure wave above its systolic shoulder divided by pulse pressure.

Both large artery compliance (18±5 vs 15±4 ml/mmHg10, p<0.01) and small artery compliance (9±4 vs 7±3 ml/mmHg100, p=0.03) were significantly lower in the hypertensive than the normotensive subjects. Pulse wave velocity was greater in the former (8.5±1.4 vs 7.9±1.0 m/sec, p=0.04) as was the augmentation index (108±30% vs 93±21%, p=0.02). Within the hypertensives, indices of arterial stiffness were positively related to age and blood pressure (p<0.01). In a multiple regression analysis, age (p=0.01), sex (female, p=0.001), systolic blood pressure (p<0.001), and heart rate (p=0.007) were independent predictors of large artery stiffness.

In conclusion, the present data show that compliance of both large and small arteries can be impaired in young subjects in the early stage of hypertension. Measurement of arterial distensibility can better define the cardiovascular risk profile of these subjects.

Key Words: Large Arteries, Borderline Hypertension, Compliance

OR-14
NON INVASIVE ESTIMATION OF CENTRAL PULSE PRESSURE: COMPARISON OF 2 METHODS

Objective: Several techniques have been proposed for the non-invasive measurement of central pulse pressure (PP). The aim of the present study was to compare 2 different methods: measurement of central PP by applanation tonometry of the carotid artery and estimation from the Pulse Wave Velocities (PWV) using the “water-hammer” formula. Applanation tonometry is considered as a reference method for the measurement of PP in the right common carotid artery (CCA) which has been shown to be identical to the PP in the ascending aorta at the branching off from the CCA.

Method: In 111 haemodialysis patients (H) and 40 patients free of cardiovascular treatment and event/injury (N), carotid PP was measured by applanation tonometry (Sphygmocor®) at the right CCA by alternatively calibrated tonometer-derived pressure waves [1]. BP was measured with a mercury sphygmomanometer at the right arm following the WHO guidelines and PParm calculated. Compil® was used for the measurements of carotid-femoral PWV (PWVCF) and carotid-radial PWV (PWVCR). Central PP was then calculated as PParm x √(PWVCF/PWVCR).

Results: The H patients had significant higher SBP, DBP and PParm than the N patients. Age and genders were not different between the 2 groups. Central PP obtained by the water-hammer formula (PPPWV) tended to be overestimated (p<10⁻⁵):

The overestimation was higher in the N group (p=0.031).

Conclusion: (PPPWV) is a segmental (carotid femoral) PP, when the central PP measured by tonometry is a local one, this might explain the observed difference between the 2 methods.


Key Words: Central Pulse Pressure, Non-Invasive Measurement, Pulse Wave Velocity