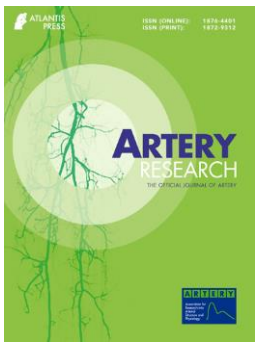

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02.04
DETERMINANTS OF ARTERIAL STIFFNESS IN PATIENTS WITH CORONARY ARTERY DISEASE

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Purpose: Arterial stiffness (AS) is associated with, and a predictor of, outcome in patients with renal and cardiovascular disease. In this study we measured different indices of arterial stiffness, and determinants of these, in subjects with various degrees of coronary artery disease (CAD). We also assessed their predictive value, and that of renal function, for cardiovascular morbidity and mortality.
Methods: Subjects were included following evaluation of CAD at coronary angiography. AS was measured using pulse wave velocity (PWV), pulse wave analysis (PWA) and digital volume pulse (DVP) analysis. Renal function was assessed using serum creatinine concentration $[creat]_{sr}$ and estimated glomerular filtration rate (eGFR) using the Cockcroft & Gault equation. Subjects with a history of renal disease were excluded. The primary-endpoint was a composite of hospitalisation due to cardiovascular causes and all-cause mortality.
Results: 284 subjects (210 males), with a mean age of 62 years, were included. Compared with PWV, the augmentation, reflection and stiffness indices did not confer similar information. PWV was determined by age, heart rate, systolic BP, body mass index and $[creat]_{sr}$ ($R^2 = 0.38$, $p < 0.001$), and negatively associated with eGFR ($R^2 = 0.30$, $p < 0.001$). Follow-up was for a mean of 1.5 years. A lower eGFR ($p < 0.01$), PWVs above the median ($p < 0.05$) and degree of CAD ($p < 0.001$) predicted a shorter time to a composite end-point.
Conclusion: In our study renal function rather than traditional cardiovascular risk factors determined AS. EGFR, PWV and degree of CAD were predictive of cardiovascular outcome.

Free Communications

04.01
ENHANCED EXTERNAL COUNTERPULSATION TREATMENT IMPROVES ARTERIAL WALL PROPERTIES AND WAVE REFLECTION CHARACTERISTICS IN PATIENTS WITH REFRACTORY ANGINA

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Background: Early return of reflected pressure waves from the lower body, resulting from increased arterial stiffness, augments central aortic pressure and increases left ventricular (LV) afterload and myocardial oxygen demand. Enhanced external counterpulsation (EECP) acutely enhances coronary perfusion (supply) and reduces LV afterload (demand). However, the mechanism(s) responsible for the sustained beneficial effects of EECP treatment are unclear.
Objectives: To determine if arterial properties and wave reflection characteristics are favourably altered after EECP treatment in patients with refractory angina.
Methods: Radial artery pressure waveforms were recorded by applanation tonometry and central aortic pressure waveforms generated using a mathematical transfer function in 20 patients with stable refractory angina. Data were collected before and after 34 one-hour EECP sessions. Augmentation index (AI_a) and timing of the reflected pressure wave were calculated from the aortic waveform.
Results: EECP treatment caused a decline in AI_a and an increase in reflected wave travel time. These modifications in wave reflection characteristics caused a decrease in aortic systolic pressure and wasted LV pressure energy. The average number of angina episodes and Canadian Cardiovascular Society (CCS) class, both decreased in concordance with the physiologic changes due to EECP treatment.
Conclusions: EECP treatment reduces arterial stiffness and improves wave reflection characteristics in patients with refractory angina. These changes decrease LV afterload and myocardial oxygen demand and reduce the number of angina episodes and therefore, enables patients to participate in continuous exercise programs which in turn may provide long term benefits and sustained improved quality of life.

04.02
THE METABOLIC SYNDROME IS ASSOCIATED WITH CENTRAL AND PERIPHERAL ARTERIAL STIFFNESS IN YOUNG WOMEN BUT NOT IN MEN: THE MEDIATING ROLE OF INSULIN RESISTANCE AND LOW-GRADE INFLAMMATION. THE NORTHERN IRELAND YOUNG HEARTS PROJECT (NIYHP)

I. Ferreira[1]*, C.A. Boreham[2], J.W.R. Twisk[3], A.M. Gallagher[4], I.S. Young[5], L.J. Murray[1], C.D.A. Stehouwer[1]. *[1]Academic Hospital University of Maastricht, Netherlands, [2]University College, Dublin, Ireland, [3]VU University Medical Center, Amsterdam, Netherlands, [4]University of Ulster, Jordanstown, United Kingdom, [5]Queen's University Belfast, Belfast, United Kingdom*

Increased arterial stiffness may explain, at least in part, the increased cardiovascular and diabetes risk associated with the metabolic syndrome (MetS). However, the mechanisms linking the MetS to an increased (central and/or peripheral) arterial stiffness are incompletely understood and gender differences may exist. We therefore examined whether: (1) the (clustering of the) risk factors (RFs) of the MetS is associated with stiffness of central and peripheral arterial segments; (2) these associations were similar in men and women; and (3) insulin resistance and low-grade inflammation mediated any such associations.
Subjects were 313 young men and women (mean age of 23), participating in an ongoing longitudinal study (NIYHP). Subjects were categorized according to the number of RFs of the MetS; in addition, a continuous MetS score was calculated. Arterial stiffness was assessed by measuring pulse wave velocity (PWV) in three arterial segments (non-invasive optical method).
The prevalence of the MetS was similar for men (10.6%) and women (10.5%). After adjustment for potential confounders and other RFs, PWV of the three arterial segments investigated increased with increasing traits of the MetS in women only. Women with the MetS, as compared to those without RFs of the syndrome, had greater PWV of the aorto-iliac (+14.0%, $p = 0.016$), the aortic-radial (+13.2%, $p = 0.010$) and aorto-dorsalis pedis (+11.8%, $p = 0.011$) segments. A great deal of the association (up to 75%) between the MetS and aortic-iliac PWV was mediated by heart rate, inflammation markers (CRP and fibrinogen) and insulin resistance (HOMA-IR), whereas these variables did not explain much of the association between the MetS and PWV of the peripheral segments.
Young women with the MetS show increased stiffness of peripheral and central arteries, a mechanism that may explain their increased cardiovascular risk. Low grade inflammation, insulin resistance and sympathetic activation explain much of the adverse impact of the MetS on central, but not peripheral, arterial stiffness.

04.03
AORTIC STIFFNESS, CENTRAL PULSE PRESSURE AND THE RISK OF PRIMARY CORONARY HEART DISEASE IN OLDER ADULTS. THE ROTTERDAM STUDY

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Aim: We investigated whether aortic stiffness and central pulse pressure were predictors of coronary heart disease in apparently healthy subjects.
Methods and Results: We included 2024 subjects participating the third examination phase of the Rotterdam Study, a large ongoing population-based study. Aortic stiffness was measured as the carotid-femoral pulse wave velocity. Finger blood pressure was measured (Finapres) and central pulse pressure was calculated using upper arm level correction and a generalized transfer function. Information on smoking habits and previous cardiovascular disease were obtained. Body mass index was calculated. Serum total cholesterol and HDL cholesterol values were determined and diabetes mellitus was defined. The carotid IMT was assessed. Subjects with previous coronary heart disease were excluded from the analyses. Cox's proportional hazard regression analysis, adjusted for cardiovascular risk factors was carried out. To facilitate comparisons among central pulse pressure and aortic stiffness each measure was divided by its standard deviation. The mean age of the participants was 71.4 years, 39.5% were men. During a mean follow-up time of 6.1 years, 109 subjects developed coronary heart disease. Hazard ratios and corresponding 95% CI of coronary heart disease for change of 1 standard deviation of aortic stiffness and central pulse pressure were 1.27 (1.06–1.51) and 1.20 (1.00–1.44), respectively. When both measures were included in the same statistical model, the prognostic value of aortic