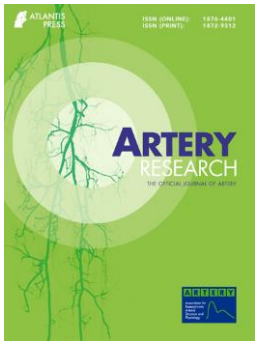

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11.7: AORTIC CALCIUM SCORE AFFECTS NON-INVASIVELY OBTAINED ESTIMATES OF CENTRAL BLOOD PRESSURE IN PATIENTS WITH ADVANCED CHRONIC KIDNEY DISEASE

Rasmus K. Carlsen, Christian D. Peters, Esben Laugesen, Simon Winther, Dinah S. Khatir, Hans E. Boetker, Morten Boettcher, Per Ivarsen, My Svensson, Niels H. Buus

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11.7
AORTIC CALCIUM SCORE AFFECTS NON-INVASIVELY OBTAINED ESTIMATES OF CENTRAL BLOOD PRESSURE IN PATIENTS WITH ADVANCED CHRONIC KIDNEY DISEASE

Rasmus K. Carlsen [1], Christian D. Peters [1], Esben Laugesen [2], Simon Winther [3], Dinah S. Khatir [1], Hans E. Boetker [3], Morten Boettcher [4], Per Ivarsen [1], My Svensson [5], Niels H. Buus [6]
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Background: We recently reported that central blood pressure (BP) obtained non-invasively in chronic kidney disease (CKD) patients significantly underestimated the central BP with decreasing eGFR in comparison with invasively measured true central BP in the aorta. This post-hoc analysis investigated whether the presence of aortic calcification affected non-invasive estimates of central BP.
Methods: CKD stage 4-5 patients undergoing coronary angiography were included. Invasive aortic BP was measured through angiography catheters. Non-invasive central BP was obtained with the SphygmoCor device. Calcium score (CS) in the aorta was quantified using CT.
Results: Twenty-four patients were enrolled (meanSD): 63% males, age 53±11 years, and eGFR 95 ml/min/1.73 m^2. Invasive aortic SBP was 152±23 mmHg. Estimated central SBP was 133±20 mmHg. Ten patients had a CS=0 in both ascending and descending aorta, 2 patients had ascending aortic CS>0 while 8 patients had descending aortic CS>0 and 4 patients had both ascending and descending aortic CS>0. In patients with CS>0 in the descending aorta, central SBP was underestimated by 4(117) mmHg (P=0.02) compared to patients with CS=0. No significant difference was found between patients with and without calcium in the ascending aorta (P=0.13). In patients with CS>0 in both descending and ascending aorta central SBP was underestimated by 14(326) mmHg (P=0.02) compared to patients with CS=0 in both segments.
Conclusion: In advanced CKD, aortic calcification significantly affected the difference between estimated and invasively measured central BP. This may question the usefulness of non-invasive estimates of central BP in high-risk patients with severe aortic calcification.

11.8
AORTIC SYSTOLIC BLOOD PRESSURE IS NO LONGER MARKER OF THE ARTERIAL STIFFNESS IN STABLE PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

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The aim of the study was to assess arterial stiffness and its diagnostic and prognostic value in patients with arterial hypertension (AH) and heart failure with reduced ejection fraction (HFrEF).
Methods: In 93 stable patients (75% male, age 64±9 years (MSD), history of myocardial infarction 67%, diabetes mellitus 32%, blood pressure (BP) 131±14/80±10 mmHg with AH, symptoms and signs of HF, LV EF <40% and NT-proBNP >100 pg/ml applanation tonometry and 2-dimentional echocardiography were performed. Mann-Whitney and Spearman tests were considered significant if p<0.05.
Results: Patients with NYHA III compared with patients NYHA II class had lower central systolic (118±12 vs 134±10 mmHg, p<0.001), diastolic (82±10 vs 87±15 mmHg, p<0.05) and pulse BP (36±7 vs 46±6 mmHg, p<0.001), time to reflected wave (Tr) (131±15 vs 145±21 ms, p<0.05), higher augmentation index (AI) (26±7 vs 16±8%, p<0.001), carotid-femoral pulse wave velocity (PWV) (13.5±4.1 vs 9.2±1.5 m/s, p<0.001). Central systolic and pulse BP positively correlated with EF and paradoxically negatively correlated with PWV. In prospective study AI ≥25, Tr <135 ms were associated with adverse outcomes. PWV ≥15 m/s increased risk of HF hospitalizations. AI ≥35%, Tr <116 ms increased risk of all-cause death.
Conclusions: In patients with AH and HFrEF dissociation between central systolic and pulse BP and arterial stiffness markers was revealed. Patients with more severe HF/ poor prognosis had lower systolic and pulse PP but higher PVW and AI. In this population central systolic and pulse BP were more dependent on LV systolic function and were no longer markers of aortic elasticity.

11.9
PARAMETERS OF ARTERIAL STIFFNESS HAVE INDEPENDENT PROGNOSTIC VALUE IN STABLE PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

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The purpose of the study was to determine the prognostic value of ventricular-arterial coupling (VAC) in patients with arterial hypertension (AH) and stable heart failure with reduced ejection fraction (HFrEF).
Methods: In prospective study (follow-up 12-24 months, median 18 months) prognosis of 93 stable patients with controlled hypertension and HFrEF was evaluated. Adverse outcomes included all cause death or first HF hospitalization. 2-dimentional echocardiography was used to assess arterial elastance (Ea) and end-systolicLV elastance (Ees). VAC was assessed as the ratio Ea/Ees. Arterial stiffness was assessed using applanation tonometry. Clinical and demographic parameters, parameters of LV function, VAC and arterial stiffness were included in multivariate analysis. P<0.05 was considered significant.
Results: Adverse outcomes were revealed in 39% of patients (15% deaths, 24% HF hospitalizations). The following factors increased the risk of adverse outcomes: LVEF <25%, index of VAC ^{3}3.3, stroke work (SW)/pressure volume area (PVA) (LV work efficiency) <38%, augmentation index (AI) ≥25%, time to reflected wave(Tr) <135. Pulse wave velocity ≥15 m/s, office systolic BP <120 mmHg were associated with increased risk of HF hospitalizations. AI >35%, office systolic BP <120 and diastolic BP <70, Tr <116, SW/PVA <48% were associated with increased risk of all-cause death.
Conclusions: Parameters of VAC and arterial stiffness have independent prognostic value as well as LVEF and BP in patients with AH and HFrEF. Assessment of VAC via Ea/Elv, an additional noninvasively derived metric, can be used for risk stratification of patients with HFrEF.

11.10
ARTERIAL ELASTANCE IS ASSOCIATED WITH CENTRAL BLOOD PRESSURE AND ARTERIAL PERIPHERAL RESISTANCE IN PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

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Objective of the study was to assess ventricular-arterial coupling (VAC), parameters of left ventricular (LV) work efficiency and their determinants in patients with arterial hypertension (HTN) and stable heart failure with reduced ejection fraction (HFrEF).
Methods: In 93 stable patients with HTN and HFrEF 2-dimentional echocardiography was used to assess arterial elastance (Ea) and end systolic LV elastance (Ees). VAC was assessed as the ratio Ea/Ees. Mann-Witney test and multivariate analysis was performed. P<0.05 was considered significant.
Results: The range of VAC was 0.9-4.7. VAC >1.2 (upper optimal level) was revealed in 87%. Ea positively correlated with aortic systolic BP, office diastolic BP, arterial peripheral resistance, systole duration, negatively — with body mass index (BMI). Ees positively correlated with EF, office systolic and diastolic BP, negatively — with *LV mass index* (LVMI). Increased VAC was associated with decrease of office and aortic systolic BP, BMI, LV EF, increase of LVMI and NT-proBNP.
Conclusions: Impairment of functioning of cardio-vascular system assessed by increased value of VAC> 1.2 was revealed in 87% of patients with HTN and stable HFrEF. Increase of VAC was associated predominantly with decrease of Ees and LV work efficiency (SW/PVA). In HFrEF LV and arterial system matched to maximize SW. VAC and its components are associated with echocardiographic parameters and markers of arterial stiffness.