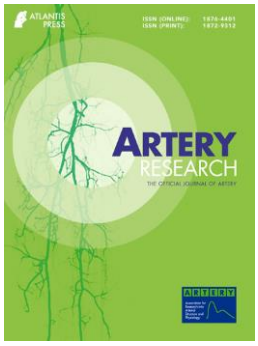

Artery Research

ISSN (Online): 1876-4401 **ISSN (Print): 1872-9312**
Journal Home Page: https://www.atlantis-press.com/journals/artres

4.8: INCREASED CARDIAC WORKLOAD IN THE UPRIGHT POSTURE IN MALE SUBJECTS: NON-INVASIVE HEMODYNAMICS IN MEN VERSUS WOMEN

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To cite this article: Pauliina Kangas, Anna Tahvanainen, Antti Tikkakoski, Jenni Koskela, Marko Uitto, Jari Viik, Mika Kahonen, Tiit Koobi, Emeritus Jukka Mustonen, Ilkka Porsti (2016) 4.8: INCREASED CARDIAC WORKLOAD IN THE UPRIGHT POSTURE IN MALE SUBJECTS: NON-INVASIVE HEMODYNAMICS IN MEN VERSUS WOMEN, Artery Research 16:C, 56–56, DOI: https://doi.org/10.1016/j.artres.2016.10.027

To link to this article: https://doi.org/10.1016/j.artres.2016.10.027

Published online: 7 December 2019

4.2±0.6 L/min meanSD p<0.001), higher Ctot (2.7±1.0 vs 2.0±0.4 ml/mmHg p<0.001), lower AIx (13±10 vs 32±11 % p<0.001) and lower GALA (41±15 vs 68±6 ° p<0.001). GALA was associated with Ctot and AIx. After vasopressors, MAP increase was associated with a decrease in Ctot (2.4±0.9 vs 1.7±0.7 ml/mmHg p<0.001), and an increase in AIx (21±14 vs 25±14 % p<0.001) and GALA (53±18 vs 61±16 ° p<0.001). Changes in GALA and Ctot after vasopressors were strongly associated (p=0.004).
Conclusions: PU Loop assessment from routine hemodynamic optimization management during GA and especially our novel GALA parameter could monitor cardiac afterload continuously in anesthetized patients, and may help clinicians to titrate vasopressor therapy.

4.7
MEASUREMENT OF ARTERIAL STIFFNESS USING A CONNECTED BATHROOM SCALE: CALIBRATION AGAINST SPHYGMOCOR

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Background: Measurement of arterial stiffness (AS) is still considered difficult. We developed a non-invasive technique to assess AS from a connected bathroom scale, based on ballistocardiography (BCG) and impedance plethysmography (IPG).
Methods: We included 198 subjects and patients, 111 for calibration study (cal), 88 for validation study (val), 34% hypertensives, mean age 48±17 years, 50% women. The scale pulse transit time (WS-PTT) was calculated as the difference between BCG systolic signals and IPG blood flow in the foot. Distance was estimated from body height and PWV was calculated. Carotid to femoral transit time (CF-PTT) was measured using Sphygmocor. Spearman and robust multivariate regressions were used.
Results: The WS-PTT correlated well with CF-PTT with R=0.69 in pooled population (cal 0.73, val 0.60). WS-PWV correlated with CF-PWV with R=0.73 (cal 0.67, val 0.59). The standard deviation of difference was 1.19 m/s with no significant bias compared with CF-PWV. Correlations of WS-PWV with age and blood pressure were similar (R= 0.69 and 0.60, resp.) to those of CF-PWV (R=0.67 and 0.60, resp.). These good correlations were non-trivial given the differences in wave paths, the fact that measurements are made in orthostatic position and totally investigator-free.
Conclusion: We show in two distinct populations that a simple user-oriented instrument such as a connected bathroom scale can estimate arterial stiffness with accuracy close to healthcare-oriented systems. Because these devices will be used by the general population, the availability of arterial stiffness data on very large, non-medicalized populations will change our management of well-being and health.

4.8
INCREASED CARDIAC WORKLOAD IN THE UPRIGHT POSTURE IN MALE SUBJECTS: NON-INVASIVE HEMODYNAMICS IN MEN VERSUS WOMEN

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Background: Men and women differ in the risk of cardiovascular disease, but the underlying mechanisms are not completely understood. We examined possible sex-related differences in supine and upright cardiovascular regulation.
Methods: Hemodynamics were recorded from 167 men and 167 women of matching age (~45 years) and body mass index (~26.5 kg/m2) during passive head-up tilt. None had diabetes, cardiovascular disease other than hypertension, or antihypertensive medication. Whole-body impedance cardiography, tonometric radial blood pressure, and heart rate variability were analyzed. Results were adjusted for height, smoking, alcohol intake, mean arterial pressure, plasma lipids and glucose.
Results: Supine hemodynamic differences were minor: lower heart rate (-4%) and higher stroke volume (+7.5%) in men than women (p<0.05 for both). Upright systemic vascular resistance was lower (-10%), but stroke volume (+15%), cardiac output (+16%), and left cardiac work were clearly higher (+20%) in men than women (p<0.001 for all). Corresponding results were observed in a subgroup of men and postmenopausal women (n=76, age >55 years). Heart rate variability analyses showed higher low frequency to high frequency ratio in supine (p<0.001) and upright (p=0.003) positions in men.
Conclusions: The foremost difference in cardiovascular regulation between sexes was higher upright hemodynamic workload of the heart in men, a finding not explained by known cardiovascular risk factors or hormonal differences before menopause. Heart rate variability analyses indicated higher sympathovagal balance in men regardless of body position. The deviations in upright hemodynamics could play a role in the differences of cardiovascular risk between men and women.

4.9
PROPORTIONAL PRESSURE RELATIONS IN THE PULMONARY ARTERIAL SYSTEM

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Background — Objectives: The pulmonary arterial system can be characterized by:
1. A constant product of Pulmonary Vascular Resistance (PVR) and Total Arterial Compliance (TAC) with Tau=PVRxTAC≈0.7 seconds (1).
2. A proportional relation exits between systolic and diastolic pulmonary artery pressure, sPAP, dPAP, with mean pulmonary artery pressure mPAP (2). Recently it was shown that the time constant Tau is affected by Pulmonary Arterial Wedge Pressure (PAWP), and thus not constant under all conditions (3).
We therefore questioned how the product PVRxTAC = Tau depends on PAWP.
Methods: We have studied proportionality of pressures in a group of patients (n=1054) and determined the contribution of Pulmonary Arterial Wedge Pressure.
Results: We found that sPAP=1.61mPAP and dPAP =0.62mPAP, for all PAWP between 1 and 31 mmHg. Calculating PVR and TAC in the standard way as PVR=(mPAP-PAWP)/CO and TAC=PP/SV, with CO: Cardiac Output, PP: Pulse Pressure, SV: Stroke Volume, and HR: Heart Rate, it follows that: PVRxTAC=(1-PAWP/mPAP)/HReq. 1
Comparison with Tedford's data (their fig 3C) is as follows:
PAWP Tau-TedfordTau-Eq. 1
6 mmHg 0.43s 0.48s
45 mmHg 0.18s 0.18s
Conclusions: These findings imply that for a certain PAWP and Heart Rate a hyperbolic relation remains, but the time constant Tau depends on the ratio of PAWP/mPAP and Heart Rate. A clinically measured low Tau could suggest a high PAWP.
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5.1
MILD REDUCTION OF GLOMERULAR FILTRATION RATE IS ASSOCIATED WITH INCREASED SYSTEMIC VASCULAR RESISTANCE INDEPENDENT OF CHANGES IN CARDIAC AUTONOMIC TONE

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Objective: Our aim was to evaluate the influence of mild impairment in kidney function on hemodynamics and cardiac autonomic tone.