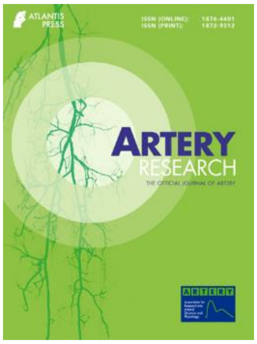


Artery Research

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

P6.20: EFFECTS OF DIFFERENT MEASUREMENT TECHNIQUES ON CAROTID STIFFNESS EVALUATION

N. Di Lascio, V. Gemignani, E. Bianchini, R.M. Bruno, F. Stea, L. Ghiadoni, F. Faita

To cite this article: N. Di Lascio, V. Gemignani, E. Bianchini, R.M. Bruno, F. Stea, L. Ghiadoni, F. Faita (2013) P6.20: EFFECTS OF DIFFERENT MEASUREMENT TECHNIQUES ON CAROTID STIFFNESS EVALUATION, Artery Research 7:3_4, 159–159, DOI: https://doi.org/10.1016/j.artres.2013.10.201

To link to this article: https://doi.org/10.1016/j.artres.2013.10.201

Published online: 14 December 2019

Conclusion: Ageing influences observed arterial stiffness values at given blood pressures through underlying changes in the properties and mechanical loading of arterial wall constituents.

P6.18
CAROTID-FEMORAL PULSE WAVE VELOCITY ESTIMATED BY AN ULTRASOUND SYSTEM

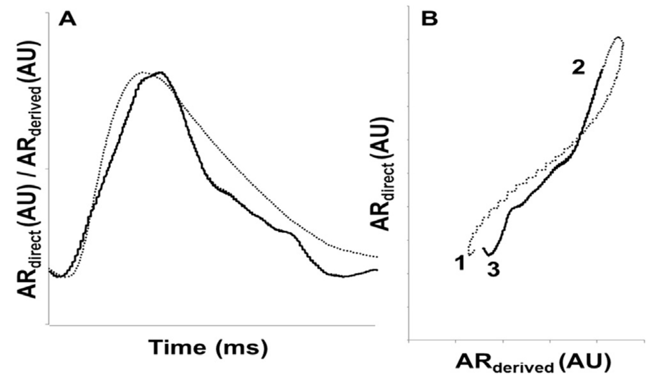
M. Collette [1,3], C. Morizzo [2], M. Kozakova [2,4], C. Palombo [2], G. Leftheriotis [3]
[1]*Centre de recherche du groupe ESAIP, Saint Barthélemy d'Anjou, France*
[2]*University of Pisa - Department of Internal Medicine, Pisa, Italy*
[3]*UMR CNRS 6214/INSERM 771 - CHU d'Angers, Angers, France*
[4]*Esaote SpA, Genova, Italy*

To date, regional aortic stiffness can be evaluated by the reference tonometric technique via the pulse wave velocity (PWV) measured in two points: the carotid and the femoral arteries. Based on a similar intersecting tangent algorithm, we have developed a new method for the determination of carotid-femoral PWV using a high-resolution echo tracking ultrasound system. Herein, PWV can be computed from the measurement of the transit time between the foot of the carotid diameter waveform and the foot of the femoral diameter waveform. The study was carried out on 50 consecutive patients at rest (29 men, mean age 30 ± 18 yrs) recruited on the occasion of a vascular screening for atherosclerosis. Carotid-femoral PWV was determined by a trained operator using a tonometric technique, (PWVpp, PulsePen, Italy), and an echotracking ultrasound system, (PWVus, e-tracking Alpha 10, Aloka, Japan). Relationship between PWVpp and PWVus was evaluated by linear regression. A Pearson's correlation coefficient of $r = 0.95$ was found between both variables (95% confidence interval 0.90-0.99; $P < 0.0001$; PWVus= 0,91*PWVpp+0.44). The Bland–Altman plot comparing PWVpp and PWVus showed a systematic offset of -0.07 m.s-1 with a limit of agreement from -1,33 to 1,19 m.s-1. Our results show an excellent and significant correlation between both techniques which confirms that ultrasound system can provide a reliable estimate of the regional aortic stiffness like the tonometric technique does. Additional studies are now needed to show the simplicity of the measurement using ultrasound system while maintaining reliability even in overweight patients.

P6.19
PHYSIOLOGICAL CORRELATES OF AORTIC RESERVOIR AND EXCESS PRESSURE IN MAN

M. G. Schultz [1], J. E. Davies [2], A. Hardikar [3], S. Pitt [3], A. D. Hughes [2], J. E. Sharman [1]
[1]*Menzies Research Institute Tasmania, University of Tasmania, Hobart, Australia*
[2]*International Centre for Circulatory Health, National Heart and Lung Institute, Imperial College London, London, United Kingdom*
[3]*Royal Hobart Hospital, Hobart, Australia*

Background: Central (aortic) blood pressure (BP) indices independently predict cardiovascular events and all-cause mortality, but the physiological mechanisms underlying aortic BP waveform morphology are subject to debate. The 'aortic reservoir' and 'excess pressure' are proposed as determinants of aortic BP, but this relationship has only been assessed using a mathematically-derived aortic reservoir-excess pressure model ($AR_{derived}$ and $XP_{derived}$). This study aimed to directly measure the aortic reservoir (AR_{direct}; by cyclic change in aortic volume) and determine the relationship with $AR_{derived}$ and aortic BP.
Methods: Ascending aortic BP and Doppler flow velocity were recorded via intra-arterial wire in 10 males (aged 62±12 years) during coronary artery bypass graft surgery. Simultaneous ascending aortic transesophageal echocardiography was used to measure AR_{direct}. Published mathematical formulae were used to determine $AR_{derived}$ and $XP_{derived}$. A direct excess pressure (XP_{direct}) was calculated by subtracting AR_{direct} from aortic BP.
Results: When normalised to the same scale (Figure A), AR_{direct} (solid line) was strongly and linearly related to $AR_{derived}$ (broken line) during systole ($r = 0.980$, $P < 0.001$, Figure B, point 1-2) and diastole ($r = 0.987$, $P < 0.001$ Figure B, point 2-3). The cyclic relationship between aortic BP and AR_{direct} was qualitatively and quantitatively ($P > 0.05$) similar to the cyclic relationship between aortic BP and $AR_{derived}$. Furthermore, XP_{direct} was linearly related to $XP_{derived}$ during systole ($r = 0.909$, $P < 0.001$) and diastole ($r = 0.663$, $P < 0.001$).
Conclusion: Aortic reservoir and excess pressures are physiological phenomena highly related to mathematically-derived aortic reservoir, excess pressure and aortic BP.



P6.20
EFFECTS OF DIFFERENT MEASUREMENT TECHNIQUES ON CAROTID STIFFNESS EVALUATION

N. Di Lascio [1], V. Gemignani [1], E. Bianchini [1], R. M. Bruno [1], F. Stea [1,2], L. Ghiadoni [2], F. Faita [1]
[1]*Institute of Clinical Physiology, National Council of Research, Pisa, Italy*
[2]*Department of Internal Medicine, University of Pisa, Pisa, Italy*

In recent years, great attention has been placed on local carotid elasticity. Carotid pulse wave velocity (cPWV) can be considered a surrogate marker for carotid stiffness evaluation. Aim of this study was to compare four different techniques for carotid stiffness assessment.
Ten young healthy subjects (34.7±6.9 years, 40% males, BMI 21.6±2.2 kg/m^2) were enrolled. For each volunteer, four different carotid stiffness measurements were obtained: i) ultrasound carotid stiffness (CS) values were estimated from US diameter and tonometric pulse pressure measurements combined by Bramwell-Hill equation ii) $cPWV_{loop}$ values were calculated from US simultaneous measurements of diameter and flow velocity using the lnD-V loop slope iii) $cPWV_{MRI}$ values were obtained from velocity-encoded MRI images using QA method iv) $cPWV_{Acc}$ values were achieved by means of a new accelerometric system which consists in two percutaneous accelerometers placed 2.4 cm apart on the subject's neck; PWV is calculated dividing the distance between the sensors for the time delay between the signals.
Table 1 shows the results of the comparisons between CS (5.39±0.76 m/s), $cPWV_{MRI}$ (5.81±0.77 m/s), $cPWV_{loop}$ (4.18±0.96 m/s) and $cPWV_{Acc}$ (5.12±1.25 m/s) values. All the comparisons exhibit satisfying correlations. The only non-significative bias is shown by the comparison between CS values and $cPWV_{Acc}$ ones while the comparison between CS measurements and $cPWV_{loop}$ evaluations provides the lowest standard deviation of the difference.
In conclusion, this preliminary study suggests that attention should be placed when using different methods of carotid stiffness assessment, especially in case of comparison between values obtained with different methods.

Table 1

	Mean Difference ± SD of difference (m/s)	R^2
CS vs $cPWV_{loop}$	1.29±0.42	0.81
CS vs $cPWV_{MRI}$	-0.51±0.54	0.55
CS vs $cPWV_{Acc}$	0.27±0.75	0.67
$cPWV_{loop}$ vs $cPWV_{MRI}$	-1.77±0.56	0.71
$cPWV_{loop}$ vs $cPWV_{Acc}$	-1.16±0.57	0.66
$cPWV_{MRI}$ vs $cPWV_{Acc}$	-0.92±0.99	0.39

P6.21
EFFECTS OF PHARMACOLOGICAL DRUGS ON THE AORTIC PRESSURE PULSE: UNDERSTANDING MECHANISMS THROUGH MODELLING

S. Epstein [1], H. Fok [2], P. Chowienczyk [2], J. Alastruey-Arimon [1]
[1]*Kings College London, London, United Kingdom*
[2]*Kings College London BHF Centre, Department of Clinical Pharmacology, St Thomas' Hospital, London, United Kingdom*

Aortic pulse pressure and other pulsatile components of the aortic pressure pulse are important predictors of cardiovascular outcomes, however the