P48: COMPARISON BETWEEN INVASIVE AND NON-INVASIVE METHODS: TO EVALUATE AORTIC STIFFNESS BY PULSE WAVE VELOCITY

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To link to this article: https://doi.org/10.1016/j.artres.2018.10.101

Published online: 7 December 2019
and geometric (diameter, ellipticity and curvature) parameters were investigated.

**Results:** Compared to HV, MFS presented larger aortic diameters only in the proximal Aao (p < 0.001) and Dao (p = 0.028). Increased ellipticity and a more distal location for the peak of aortic curvature were evident, even in the absence of dilation. Through most of the thoracic aorta, IRF was substantially lower in MFS, while SFRR was larger. Interestingly, non-dilated MFS had decreased IRF in the thoracic aorta compared to HV, although SFRR was not increased. Statistically-significant bivariate relations were found between arch IRF and arch ellipticity (R = 0.34) and proximal Dao peak curvature (R = -0.35). Local diameter was negatively correlated with local IRF (R = -0.3) and positively correlated to local SFRR (R = 0.605).

**Conclusions:** MFS presented altered ellipticity and curvature distribution, which are related to abnormal flow patterns even in the absence of dilation.

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**COMPARISON BETWEEN INVASIVE AND NON-INVASIVE METHODS: TO EVALUATE AORTIC STIFFNESS BY PULSE WAVE VELOCITY**

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**Objective:** To investigate if invasively measured aortic pulse wave velocity (PWV) is accurately estimated by non-invasive methods purporting to assess it.

**Methods:** One-hundred and two patients (30% female, age 65 ± 13 years) planned to undertake coronary angiography were evaluated with the following non-invasive devices: BPLab (Petr Telugin, Russia), Complor Analyse (Alam Medical, France), Mobil-O-Graph (IEM, Germany), pOpmetre (Axel-Life, France), PulsePen-ETT, PulsePen-ETTT (Datetecte, Italy) and SphygmoCor (AtCor, Australia). Aortic PWV was measured by aortic catheterization and simultaneous measurement of pressure waves above the aortic valve and at the aortic bifurcation (FS-Stiffcath, Flag Vascular, Italy).

**Results:** The devices evaluating carotid-femoral PWV showed a very strong agreement between each other (r² > 0.65) and with invasive aortic PWV (mean difference ± SD with invasive PWV: -0.73 ± 2.83 m/s (r = 0.41) for Complor-Analyse; 0.20 ± 2.54 m/s (r = 0.51) for PulsePen-ETT; -0.04 ± 2.33 m/s (r = 0.61) for PulsePen-ETTT; -0.61 ± 2.57 m/s (r = 0.49) for SphygmoCor). The finger-toe PWV, evaluated by the pOpmetre, and the PWV measured by BPLab showed a weak relationship with invasive PWV (respectively r = 0.12, 0.05), with carotid-femoral PWV measurements (r = 0.11, 0.010) and with age (r = 0.10, 0.06). PWV estimated with Mobil-O-Graph through a proprietary algorithm showed a good agreement with invasive PWV (mean difference ± SD = -1.01 ± 2.54 m/s; r = 0.51) and appeared to be strictly dependent on age-squared and peripheral systolic blood pressure (r² > 0.99).

**Conclusions:** Methods estimating carotid-femoral PWV should be considered the only non-invasive approach to reliably assess aortic stiffness. Aortic PWV values estimated by Mobil-O-Graph algorithm are also significantly related to invasive PWV, but do not offer any additional information on top of what provided by age and systolic blood pressure levels.

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**VALIDATION OF ULTRASOUND DETERMINATION OF LOCAL PULSE WAVE VELOCITY IN THE HUMAN ASCENDING AORTA AGAINST MRI MEASUREMENTS**

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**Background:** Pulse Wave Velocity (PWV) is a measure of arterial stiffness which predicts cardiovascular risk independently of blood pressure. Local PWV can be measured non-invasively in the ascending aorta of adults by means of Ultrasound (US), using successive recordings of Diameter (D) and velocity (U) 

**Aim:** To test US measurements of local PWV in the ascending aorta of human adults against MRI measurements of local PWV.

**Methods:** PWV in the ascending aorta of 8 healthy volunteers (age 22–34, 3 females) was measured using a Siemens MAGNETOM Aera 1.3T MRI scanner as per standard protocols with cine and phase contrast imaging (sampling frequency 100 samples/cardiac cycle) and D and U were calculated using validated software [2]. US images were recorded using GE Vivid E95 scanner with a 1.5–4.5 MHz phased array transducer. PLAX was used for diameter recordings and AASCH for velocity. Measurements were recorded for 20 s during a breath-hold. D and U waveforms were extracted from each imaging modality to calculate PWV using the ln(D/U)-loops technique [3].

**Results:** Average results are summarised in Table 1. The mean difference in PWV between MRI and US was 2.8 ± 0.3.

**Conclusions:** PWV measured by US shows excellent agreement with MRI in the ascending aorta of adults. Given US availability, this technique offers an easy, affordable and non-invasive means of determining PWV and mechanical properties of the ascending aorta; thus, providing a tool for screening studies.