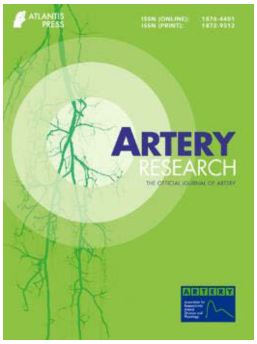

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P142: AORTIC ROOT STIFFNESS AND MECHANICAL PROPERTIES OF HEALTHY ADULTS

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Methods: In the present study, we enrolled 12 normotensive subjects and 8 hypertensive patients undergoing an election surgical intervention; (11/20 were severely obese). All patients underwent a biopsy of subcutaneous fat during surgery. Subcutaneous small resistance artery structure was assessed by wire myography and the M/L was calculated. WLR of retinal arterioles was obtained by SLDF and AO (SLDF, Heidelberg Engineering, Heidelberg, Germany and RTX-1, Imagine Eyes, Orsay, France). Functional (basal) and structural (total) microvascular density were evaluated by capillaroscopy before and after venous congestion.

Results: The results are summarized in the Table (slope of the relation: $p < 0.01$ RTX-1 vs. SLDF).

	Basal capillary density in the nailfold/M/L	Total capillary density in the forearm / ML	Basal capillary density in the dorsum of the finger / M/L	Total capillary density in the dorsum of the finger /ML
Correlation coefficients (n = 20)	0.53, $r^2 = 0.28$, $p < 0.05$	0.50, $r^2 = 0.25$, $p < 0.05$	0.17, $r^2 = 0.29$, p = NS	0.34, $r^2 = 0.12$, p = NS
	W/L retinal arterioles (SLDF)/ M/L	W/L retinal arterioles (RTX- 1)/M/L	W/L retinal arterioles (SLDF)/ W/L retinal arterioles (RTX-1)	
Correlation coefficients (n = 20)	0.54, $r^2 = 0.29$, $p < 0.01$	0.90, $r^2 = 0.81$, $p < 0.001$	0.71, $r^2 = 0.50$, $p < 0.001$	

Conclusions: Our data suggest that AO has a substantial advantage over SLDF in terms of evaluation of microvascular morphology, since it is more closely correlated with the M/L of subcutaneous small arteries, considered a gold-standard approach.

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AORTIC ROOT STIFFNESS AND MECHANICAL PROPERTIES OF HEALTHY ADULTS

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Background: Arterial stiffness, often expressed in terms of pulse wave velocity (PWV), is an important risk factor for cardiovascular disease. PWV can be determined locally and non-invasively, by means of ultrasound.

Aim: To assess PWV, local compliance (Cs), distensibility (Ds) and Young's modulus of the aortic root using non-invasive ultrasound measurements.

Methods: 10 healthy volunteers aged 21—39, 1 male, were scanned using ultrasound (GE, Vivid E95) with a phased array transducer 1.5—4.5MHz. DICOM images were recorded from the parasternal long axis: M-mode for diameter measurements, and apical 5- chamber view for blood Doppler velocity, sequentially. Each measurement was repeated 3 times for 20s. Velocity and diameter waveforms were extracted offline in Matlab based on grey-scale thresholding. PWV was determined using the ln(D) U- loop method [1]. Wall thickness was extracted from the B-mode images used to measure the diameter. Distensibility and compliance were calculated as $Ds = 1/(\rho \cdot PWV^2)$, $Cs = dA/dP = Ds \cdot A$, where $\rho = 1050 kg/m^3$ blood density, A is the cross- sectional area, and Young's modulus was calculated as previously described [2] using the Bramwell-Hill and Moens-Kortweg equations.).

Results: Across all patients mean PWV was $3 \pm 0.8 m/s$, mean distensibility was $1.3 \cdot 10^{-4} \pm 0.61 \cdot 10^{-4} Pa^{-1}$, and mean compliance was $0.6 \pm 0.31 m^2 Pa^{-1}$. The average wall thickness was $0.4 \pm 0.06 cm$ while Young's modulus was $63.6 \pm 40.4 kPa$. These results are comparable to corresponding values reported in the literature using other techniques.

Conclusions: Aortic root PWV, distensibility, compliance and Young's modulus can be determined using ultrasound measurements of diameter and velocity. Further studies are required to investigate the potential clinical utility of aortic root parameters.

References

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VALIDITY OF PULSE WAVE VELOCITY AND AUGMENTATION INDEX MEASUREMENTS IN PATIENTS WITH ATRIAL FIBRILLATION

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Background: Individualized weighing of the risk-benefit of anticoagulation is recommended in patients with atrial fibrillation (AF) that have low established risk scores or, conversely, are at increased risk for bleeding[1]. Parameters of arterial stiffness and wave reflection could improve risk stratification, but their use has not been validated in arrhythmia[2—3].

Methods: We measured carotid-femoral pulse wave velocity (PWV), central augmentation index (AI) and central pulse pressure (CPP) using the SphygmoCor (AtCor Medical, Sydney, Australia) system in 34 patients (53 to 85 years; 25 males) with AF before and after elective electrical cardioversion. Agreement was assessed using the intraclass correlation coefficient (ICC) and the coefficient of variation, completed with Bland-Altman plots.

Results: Following cardioversion, mean arterial blood pressure (MAP) and heart rate (HR) decreased significantly by 7 mmHg and 18 bpm respectively. PWV decreased from 11.8 m/s to 10.7 m/s, AI increased from 24% to 29%, and CPP rose from 45 mmHg to 50 mmHg. The decrease in PWV was related to the decrease in MAP (beta = 0.57; $R^2 = 0.33$; $P < 0.001$) whereas changes in AI and CPP were related to the decrease in HR (AI: beta = −0.59; $R^2 = 0.35$; $P < 0.001$, CPP: beta = −0.52; $R^2 = 0.26$; $P = 0.001$).

After adjustment for changes in MAP and HR, reliability analysis showed an excellent agreement for PWV (ICC = 0.89; 95%CI: 0.79—0.95) but moderate agreement for AI (ICC = 0.59; 95%CI: 0.17—0.80). Excellent agreement was also found for CPP (ICC = 0.89; 95%CI: 0.78—0.94).

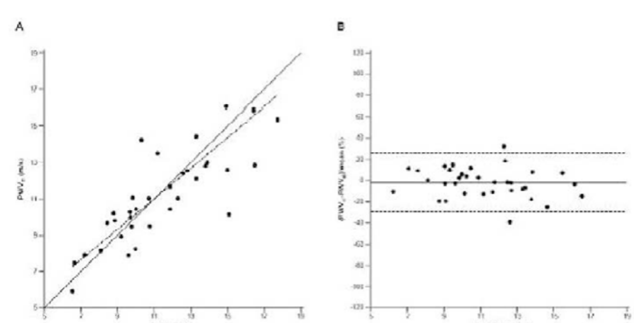

Figure 1. A. Scatter plot showing PWV before (PWV_{t0}) and after (PWV_{t1}) cardioversion. The solid line Is the Ihie of identity, the broken line the regression line for PWV_{t1} vs PW_{t0} (Passini & Bablok regression). B. Bland-Altman plot showing the proportional difference (%) between P╲) between PWV after (PVW_{t1}) and PWV before (PWV_{t0}) cardioversion. The solid line represents the mean value ot PWV and the dotted lines mean ± 2 SD.