P2.34: EFFECT OF DECREASED PERFUSION PRESSURE ON THE DILATATION AND NORMALISATION PROCESSES OF FOREARM SKELETAL MUSCLE VESSELS AFTER ARTERIAL OCCLUSION

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PERIPHERAL VERSUS CENTRAL PULSE PRESSURE VALUES IN CALCULATIONS OF CAROTID DISTENSIBILITY AND COMPLIANCE
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The aim of our study was to compare carotid compliance and distensibility calculations derived from central aortic pressure and peripheral brachial blood pressure measurements.

For this study 232 healthy, lifelong non-smoking, normotensive subjects (111 male & 121 female) were recruited (age 40+/−11 years, BMI 25.7+/−4.1 kg/m2). Augmentation index (Alx), central aortic pressure (Sphygmacor, Skidmore Medical, UK) and brachial blood pressure (Dynamap Pro, GE, USA), were measured using application tonometry. Stroke changes in common carotid diameter and intima-media thickness (CIMT) were measured from ultrasound (Philips HDXE, Philips, UK) Images using semi-automated software1 (QLAB, Philips, UK). Carotid compliance and distensibility were subsequently calculated using brachial and aortic pulse pressure values.

Mean Alx, PWV and CIMT was 16.45/4.1 kg/m2). Augmentation index (Alx), central aortic pressure (Sphygmacor, Skidmore Medical, UK), pulse wave velocity (PWV; Vcorder, Skidmore Medical, UK) and brachial blood pressure (Dynamap Pro, GE, USA), were measured using application tonometry. Stroke changes in common carotid diameter and intima-media thickness (CIMT) were measured from ultrasound (Philips HDXE, Philips, UK) Images using semi-automated software1 (QLAB, Philips, UK). Carotid compliance and distensibility were subsequently calculated using brachial and aortic pulse pressure values.

**Table 1** Spearman’s correlation analysis between brachial/aortic pulse pressure derived distensibility/compliance measurements. *p<0.05, **p<0.01, ***p<0.001.

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Comparison of maximal values of forearm Q revealed that the reduction of Pperf. did not affect dilatation process of skeletal muscle precapillary vessels, but caused a delay of Q normalisation during RH.

Conclusions: Dilatation and normalisation processes of skeletal muscle precapillary vessels are two different phenomena which are determined by different local factors. Dilatation reaction of precapillary vessels is determined by disappearing of dynamic component of transmural pressure after AO, but normalisation of resistance vessel tone is dependent from the repayment of O2 debt and blood supply conditions during RH.

VASCULAR CONTROL IN DIFFERENT PARTS OF FOREARM ARTERIAL VESSEL TREE IN HEALTHY SUBJECTS DURING RESTING CONDITIONS AND DECREASED PERFUSION PRESSURE
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Objective: To investigate the changes in the forearm magistral and capillary vessel tone in two different situations – during spontaneous changes in sympathetic activity and after reduction of perfusion pressure (P_{perf}).

Methods: Ten healthy volunteers were studied in supine position. Blood flow (I) and volume pulse amplitude (ΔV) in the forearm were recorded by venous occlusion plethysmographic method. Systemic arterial pressure was determined auscultatory on the upper arm. Distensibility (D) of magistral arteries was calculated as a ratio between ΔV and pulse pressure (ΔP). Homodynic resistance (R) was calculated as a ratio between mean arterial pressure and I in the forearm. All investigated parameters were studied during resting conditions and after passive raising the arm above heart level.

Results: In the resting conditions I in the forearm oscillated from 0.8-6.3 ml/100cm3 min. and corresponding changes was observed in D — when I increased D also increased and visa versa. After reduction of P_{perf}, forearm D always increased and after the increase of P_{perf}. - decreased. These changes in D occurred very rapidly (within 2-3 sec.) and remained permanent after the changing of P_{perf}. Whereas I in the forearm after reduction of P_{perf}, always decreased, but afterwards in 30% of the cases when initial value of I was below 2 ml/100cm3 min. isovolumic autoregulation occurred - I increased and within a minute stabilised on a new increased level.

Conclusion: Intramuscular vessel tone is submitted not only to sympathetic activity and Ptransm. changes as extramuscular arteries, but also to metabolic control.

FLOW-MEDIATED VASODILATION PULSE BY PULSE
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The measurement of flow-mediated dilatation (FMD) is a standard method to assess endothelial function in the arteries (1,2). In practice, FMD measures arterial dilatation after abruptly releasing the flow in previously clamped arteries (1,2). This clamping-releasing process might be considered as an experimental mimic of pulsation and, thereby, an FMD-equivalent measure might be determined by simply recording dilatation that is induced by the initiation of flow during the rise of a pulse.

By using piezolectric and photo-plethysmographic sensors, pressure (PP) and volume pulse (VP) waves were simultaneously recorded from adjacent digits, then their kinetics were compared. The systolic peak in the VP appeared with considerably slower kinetics as compared to that in the PP. The difference in the kinetics—either max. rate of rise or delay time (Fig. 1) computed after length-normalizing the pulses—was found to relate to the (a) subjects’ age, (b) systolic blood pressure and (c) pulse wave velocity. Importantly, the kinetic differences between the PP and the VP of older subjects were apparently eliminated by the administration of sublingual nitroglycerin, suggesting that the rate of rise in the VP is a measure of endothelium-dependent vasodilation.

Our results imply the existence of a nitric oxide-dependent, flow-mediated mechanism of arterial dilatation that operates pulse-by-pulse, on which basis a simple pulse contour analysis method, which might provide equivalent results as FMD, is developed to that assess endothelial function in the arteries.