12.02: VARIATIONS OF WAVE REFLECTION INDEXES INDUCED BY ACUTE BLOOD PRESSURE CHANGES AT DIFFERENT ARM HEIGHTS

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Acute blood pressure (BP) changes might influence augmentation index (AIx), an integrated dimensionless measure of reflected wave timing and amplitude. In 30 healthy subjects (49 ±16 years, 43% men), supine brachial BP and radiotransmitter waves (applanation tonometry, SphygmoCor) were obtained with the right arm supported in 3 different positions at the heart level (0°), raised by 30° (+30°), and lowered by 30° (-30°). BP and tonometric measures were also obtained on the contralateral arm, which was held at the heart level during the examination.

Brachial systolic/diastolic BP was 121 ±67/8 ±8 mmHg. Radial AIx was 64 ±19%, and estimated central AIx 27 ±14%. As expected, changes in arm position modified substantially mean BP (96 ±12 mmHg at -30°, 85 ±11 mmHg at 0°, 74 ±11 mmHg at +30°, all P < 0.001). Radial and central AIx were both reduced at -30° (71 ±22% and 17 ±17%), and increased at +30° (97 ±21% and 30 ±14%, all P < 0.001) vs corresponding values at 0°. Heart rate and contralateral BP and AIx did not change. Changes in radial and aortic AIx were strongly related each other (r = 0.76, P < 0.001). Percent variation in radial AIx (highest minus lowest, divided by AIx at heart level) had a strong inverse relationship with age (r = -0.43, P < 0.001) and systolic BP (r = -0.37, P < 0.001).

In conclusion, acute gravitational upper-limb BP changes generate opposite changes in radial AIx. Acute changes in radial AIx decrease with age and BP levels, and might represent a novel index of vascular aging. Artifactual changes in aortic AIx may arise in the presence of radial-aortic distending pressure gradient.

**P12.05 AMBULATORY ARTERIAL STIFFNESS INDEX: ANOTHER AMBIGUOUS STIFFNESS INDEX?**

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**Background:** Central blood pressure (BP) may be more predictive of cardiovascular events than brachial BP. A cuff-based ambulatory central BP monitor is now available; the aim of this study was to compare values of central BP between this device and the SphygmoCor device.

**Methods:** Two studies were conducted. Study 1: We compared seated central systolic BP (cSBP) and pulse pressure (cPP) between the Mobil-o-graph and SphygmoCor devices. Study 2: We compared cSBP and cPP between the Mobil-o-graph and SphygmoCor devices at rest and during light bicycle exercise, corresponding to approximately 12 and 25 watts.

**Results:** Study 1 contained 51 healthy subjects (mean age 51 ±20yrs, 31 females) and study 2 contained 20 subjects (mean age 43 ±11yrs, 9 females). Study 1: The mean difference between devices was 1 ±5mmHg, P = 0.18 (cSBP) and 0.4 ±4mmHg, P = 0.54 (cPP). There was a strong correlation between devices for cSBP (r = 0.94, P < 0.0001) and cPP (r = 0.92, P < 0.0001). Study 2: The mean difference in cSBP between devices was 1 ±3mmHg at rest and 1 ±6mmHg at the highest workload. The mean difference in cPP between devices was 0 ±3mmHg at rest and 0.6 ±6mmHg at the highest workload. The devices were strongly correlated at rest (r = 0.72, P < 0.0001, cSBP) and (r = 0.87, P < 0.0001, cPP) and at the highest workload for (r = 0.94, P < 0.0001, cSBP) and (r = 0.85, P < 0.0001, cPP).

**Conclusion:** Non-invasive measurement of central BP by the mobilograph device is in good agreement and highly correlated with the widely used SphygmoCor device, both at rest, and in response to light exercise simulating everyday activities during which ambulatory BP measurements might be made.

**P12.04 HOW MUCH DOES PRESSURE WAVE REFLECTION CONTRIBUTE TO AUGMENTATION INDEX?**

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**Background:** Aortic pulse pressure can be partitioned into the height of the first systolic shoulder (P1) and augmentation pressure AP. P1 is thought to be determined by an outgoing pressure wave generated by ventricular contraction and AP by a backward wave “reflected” from the distal circulation. Augmentation Index (AIx = AP / cPP) is commonly used to quantify wave reflection. Nitroglycerin (NTG) has a powerful effect to reduce AIx which has been attributed to a reduction in wave reflection. The objectives of this study were to examine the contribution of forward and backward waves to AIx at rest and after administration of NTG.

**Methods:** A ComboWire 9500 catheter (VolcanoCorp, USA) with a Doppler probe and a pressure sensor at the tip was placed in the aortic root in 21 subjects (11 men, aged 45–81). Simultaneous measurements of aortic blood flow velocity and blood pressure were made at baseline and after the administration of sublingual NTG (400 μg). Using wave decomposition, AIx was expressed as the summation of forward and backward components, FAIx and BAIx respectively.

**Results:** AIx decreased by 17.3% (from 39.5 ±3.6 to 22.2 ±5.0%, P < 0.001) after NTG. The decrease in AIx was attributable to a similar decrease in both forward and backward components (decreases in FAIx and BAIx by 8.7% and 8.6% respectively (P < 0.05).

**Conclusions:** These results suggest the forward wave is a major determinant of AIx and that the role of reflection in mediating effects of NTG may be less than previously thought.