1.4: ASSOCIATION OF 24 HOUR AORTIC AMBULATORY BLOOD PRESSURE MONITORING WITH LEFT VENTRICULAR MASS

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**1.4 ASSOCIATION OF 24 HOUR AORTIC AMBULATORY BLOOD PRESSURE MONITORING WITH LEFT VENTRICULAR MASS**

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**Introduction:** There is evidence suggesting the superiority of office aortic blood pressure (BP) over office brachial in the management of arterial hypertension. The 24-hour ambulatory blood pressure monitoring (ABPM) is regarded as the optimal method for assessing BP profile; the non-invasive 24-hour aortic ABPM is now feasible.

**Objective:** To investigate the association and possible superiority of 24-hour aortic BP over 24-hour brachial and office BP (aortic or brachial) in the assessment of target organ damage. Non-invasive 24-hour aortic and brachial ABPM was performed using Mobilo-O-Graph, IEM, a validated brachial cuff based oscillometric device which calibrates the obtained brachial pressure waveform either using SBP and DBP (calib 1) or MBP and DBP (calib 2).

**Design and methods:** 184 subjects (mean age 55.4 ± 14 years, 54% male, 48% hypertensives) underwent aortic pressure (b) and aortic pressure (SphygmoCor) BP assessment, 24-hour aortic and brachial ABPM and cardiac ultrasound.

**Results:** The correlation of BP indices with left ventricular mass indexed for body surface area as well as the R square values from multivariate analysis are provided in the table. Using Fisher’s z-transformation it was shown that among all SBP parameters only aSBP calib2 had significantly higher correlation coefficient with LVMass compared to office brachial SBP; aSBP calib2 tended to have marginally significantly closer correlation with LVMass than aSBP calib1 (p = 0.085). For the provided correlation coefficients (age & gender):

<table>
<thead>
<tr>
<th></th>
<th>Univariate models: Pearson correlation coefficients</th>
<th>Multivariate models: R square values</th>
</tr>
</thead>
<tbody>
<tr>
<td>bSBP office (mmHg)</td>
<td>0.29***</td>
<td>0.204</td>
</tr>
<tr>
<td>aSBP office (mmHg)</td>
<td>0.28*</td>
<td>0.221</td>
</tr>
<tr>
<td>bSBP 24h (mmHg)</td>
<td>0.39**</td>
<td>0.292</td>
</tr>
<tr>
<td>aSBP 24h calib1 (mmHg)</td>
<td>0.33**</td>
<td>0.266</td>
</tr>
<tr>
<td>aSBP 24h calib2 (mmHg)</td>
<td>0.503**</td>
<td>0.347</td>
</tr>
</tbody>
</table>

(***p<0.001 for the provided correlation coefficients)

1.5 BLOOD PRESSURE-INDEPENDENT ASSOCIATION BETWEEN AORTIC CHARACTERISTIC IMPEDANCE AND LEFT VENTRICULAR MASS IN HYPERTENSION

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**Background:** It is uncertain whether pressure/flow ratio in the proximal aorta, namely aortic characteristic impedance (Zc), is related to left ventricular (LV) mass independently of blood pressure (BP) level.

**Methods:** 435 never-treated subjects with uncomplicated essential hypertension free from overt cardiovascular disease (men 62%, age 48.1 ± 11 years, BP 148/92 ± 16/10 mmHg) underwent M-mode echocardiography and 24-hour BP monitoring. Aortic waveform was obtained from tonometric radial waveform with a validated generalized transfer function (SphygmoCor). Aortic Zc and forward (Pf) and backward (Pb) wave amplitudes were calculated from central waveform using an aortic blood flow model based on higher-order Windkessel theory (ArcSolver). [Weber T et al, Hypertension EPub May 14, 2012].

**Results:** Patients with LV hypertrophy (LV mass > 51 g/m²²) had a higher brachial systolic BP (153±18 vs 146±15 mmHg, p<0.001), central systolic BP (142±18 vs 133±16 mmHg, p<0.001), aortic Zc (0.235±0.08 vs 0.211±0.06 AU, p<0.001), Pf (31.7±9 vs 28.6±7 mmHg, p<0.001), and Pb (19.8±7 vs 18.1±5 mmHg, p=0.02), while reflection magnitude (Pb/Pf) did not differ (0.62±0.10 vs 0.63±0.10, p=0.3). After controlling for age, sex, and mean arterial pressure as a measure of distending pressure, LV mass index maintained an independent association with Zc (partial r=0.14, p=0.002), while the association of either Pf or Pb with LV mass became no longer significant. In a multiple linear regression model, Zc independently predicted LV mass index (p=0.116, p<0.005) along with age, mean arterial pressure, and body mass index.

**Conclusion:** Aortic characteristic impedance has a significant, pressure-independent relationship with LV mass in human hypertension.