P2.12: COMPARISON OF THE CENTRON CBP301 AND SPHYGMOCOR XCEL DEVICES FOR THE ESTIMATION OF CENTRAL PRESSURE


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P2.11
ESTIMATION OF LV STROKE VOLUME BY IMPEDANCE CARDIOGRAPHY: ITS RELATION TO THE AORTIC RESERVOIR
J. J. Wang 1, G. de Vries 2, J. V. Tyberg 2
1Fu Jen Catholic University, New Taipei City, Taiwan, ROC
2University of Calgary, Calgary, Canada

Impedance cardiography (ICG) is a noninvasive technique used to estimate left ventricular stroke volume (SV_LV) using thoracic impedance (Z). It remains controversial, partly because ICG parameters have not been successfully related to hemodynamic events. We hypothesized that the change in Z may be proportional to the variation in thoracic blood volumes, primarily aortic blood volume.

Nine anesthetized dogs were divided into two groups: the “Aortic Volume Group” (n=5), where aortic and IVC (inferior vena cava) dimensions were measured ultrasonically, and the “Reservoir Volume Group”, where aortic and IVC reservoir volumes were calculated using the reservoir-wave approach. Measurements were made under control conditions, with nitroprusside, with methoxamine (Mtx), and after volume loading. In both groups, the maximum rate of increase in Z (ΔZ), (dZ/dt)max, strongly correlated with the maximum rate of change in aortic/reservoir blood volume (r2=0.85 and 0.95, respectively), which in turn were proportional to SV_LV. As shown in the figure, the aortic reservoir volume (V_Ao reservoir) explains SV_LV in that measured aortic flow (Q_Ao) equals the sum of dV_Ao reservoir/dt and calculated Q_out. The LV and IVC contributions to hemodynamic events. We hypothesized that the change in SV_LV is related with the maximum rate of change in aortic/reservoir blood volume (ΔZ), which in turn was proportional to SV_LV. As shown in the figure, the aortic reservoir volume (V_Ao reservoir) explains SV_LV in that measured aortic flow (Q_Ao) equals the sum of dV_Ao reservoir/dt and calculated Q_out. The LV and IVC contributions to hemodynamic events.

We conclude that the change in thoracic impedance (Z) during the cardiac cycle is proportional to the change in aortic reservoir volume, which mechanistically explains why ICG and standard measures of cardiac output have sometimes been shown to correlate well.

P2.12
COMPARISON OF THE CENTRON CBP301 AND SPHYGMOCOR XCEL DEVICES FOR THE ESTIMATION OF CENTRAL PRESSURE
University of Cambridge, Cambridge, United Kingdom

Non-invasive devices for determining central blood pressure (BP) are available, which are suitable for routine clinical use. The aim of this study was to compare estimates of central systolic BP (cSBP) provided by two recently developed, cuff-based devices: the Centron CBP301 and the SphygmoCor XCEL. Both devices were compared with the SphygmoCor system.

In 103 subjects (58 females), age range 18-84 years, brachial BP was measured and cSBP derived using the XCEL and Centron devices. Radial artery waveforms were recorded and calibrated, in turn, to the brachial systolic and diastolic BP obtained with the XCEL and Centron devices. Brachial cuff pressures measured with the XCEL and Centron devices were highly correlated (r=0.93, P<0.001; SBP; r=0.90, P<0.001; DBP) and in good agreement, with a mean difference of 1.7 mmHg (P=0.2) for SBP and 1.4 mmHg for DBP (P=0.3, Table 1). Similarly, estimates of cSBP were also highly correlated (r=0.90, P<0.001) and in good agreement (mean difference of 1.7 mmHg, P=0.2). When each device was compared with the SphygmoCor, there were strong correlations between estimates of cSBP (r=0.97, P<0.001; Centron; r=0.98, P<0.001, XCEL). There was also good agreement, with a mean difference of 0.4 mmHg (P=0.9, Centron) and 0.4 mmHg (P=0.7, XCEL).

The Centron and XCEL devices produce similar estimates of brachial and central pressure, and both provide similar estimates of cSBP to the SphygmoCor. These cuff-based devices have the advantage of being operator-independent and simple to use, and are thus potentially suitable for use in routine clinical environments.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Estimates of cSBP provided by the Centron and XCEL devices.</th>
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<tbody>
<tr>
<td></td>
<td>XCEL</td>
</tr>
<tr>
<td>Brachial SBP (mmHg)</td>
<td>127±19</td>
</tr>
<tr>
<td>Brachial DBP (mmHg)</td>
<td>75±10</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>92±12</td>
</tr>
<tr>
<td>cSBP (mmHg)</td>
<td>115±16</td>
</tr>
<tr>
<td>Heart Rate (bpm)</td>
<td>68±12</td>
</tr>
</tbody>
</table>

P2.13
AUGMENTATION INDEX IS MORE AFFECTED BY CARDIAC FUNCTION THAN REFLECTION MAGNITUDE
B. E. Westerhof 1,2, S. C. A. T. Davis 3, J. P. van den Wijngaard 1, J. J. van Lieshout 3, N. Westerhof 4
1BMEYE, Amsterdam, Netherlands
2Heart Failure Research Center, Academic Medical Center, University of Amsterdam, Amsterdam, Netherlands
3Department of Biomedical Engineering and Physics, Academic Medical Center, University of Amsterdam, Amsterdam, Netherlands
4Department of Pulmonary Diseases, IJaR-VU, VU University Medical Center, Amsterdam, Netherlands

The augmentation index (AI) is a measure of wave reflection but also depends on the wave shapes of the forward and reflected pressure waves. The shape of the forward wave is determined by the interaction between the heart and the vasculature and thus is, in part, determined by cardiac function. The reflection magnitude, (RM, the ratio of the backward and forward waves) depends on the wave shapes of the forward and reflected pressure waves. The shape of the forward wave is determined by the interaction between the heart and the vasculature and thus is, in part, determined by cardiac function. The reflection magnitude, (RM, the ratio of the backward and forward waves) depends on the wave shapes of the forward and reflected pressure waves.