Abstract: P1559

3D echocardiography improves the agreement between left ventricular and right ventricular stroke volumes in healthy individuals.

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3D Echocardiography

Citation:

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Background/Introduction: Calculation of the LV and RV stroke volumes (SV) with the volumetric method can be useful for assessment of valvular regurgitant volumes and intracardiac shunt ratios. However, this method often yields significant differences between the estimated LV and RV SV even in healthy subjects. We hypothesized that this discrepancy can be largely due to the assumption of LV and RV outflow tract circularity which forms the basis of 2D derived areas.

Purpose: To assess if the use of 3D transoesophageal (TOE) derived LVOT and RVOT areas can improve the agreement between LV and RV stroke volumes using the volumetric approach in healthy subjects with no valvular abnormality or intracardiac shunt.

Methods: We studied 20 patients (9 Males, age: 51±19 y) submitted to TOE for various reasons, who had normal cardiac anatomy and function and good quality 3D TOE LVOT and RVOT data. Two dimensional TOE measurements of the LVOT and RVOT diameters were made in a zoomed mid oesophageal long axis and short axis view respectively; using these measurements 2D TOE LVOT and RVOT derived areas were calculated assuming circularity. In a similar way, we calculated the 2D LVOT and RVOT areas using data from transthoracic echo (TTE) for each patient. Offline analysis of the 3D TOE data allowed direct planimetry of the LVOT and RVOT areas devoid of any geometric assumptions. Finally, calculation of the 2D TTE, 2D TOE and 3D TOE LV and RV stroke volumes were performed for each patient based on the acquired data. The difference between LV and RV stroke volume (which theoretically should be around zero) for each technique and for each patient was also calculated.

Results: The mean LV and RV SV for the whole cohort, did not differ significantly within each method: 2D-TTE. However, the mean absolute difference between LV and RV stroke volumes for each technique was significantly lower with the use of 3D TOE compared to both 2D TTE and 2D TOE. Mean values and dispersion of absolute differences for each method are shown in Figure 1.

Conclusions: Compared to 2D, use of direct 3D TOE RVOT and LVOT planimetry yielded significantly less difference between RV and LV stroke volumes in healthy individuals. This finding can have potential clinical implications for more accurate assessment of valvular regurgitant volumes or intracardiac shunts.

<table>
<thead>
<tr>
<th></th>
<th>Absolute mean difference between LV and RV</th>
<th>95%ΔE</th>
<th>F(2.38)</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>TTE 2D</td>
<td>18,65±11,72</td>
<td>(13,2-24,1)</td>
<td>8.63</td>
<td>0.001</td>
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<tr>
<td>TOE 2D</td>
<td>13,45±12,44</td>
<td>(7,6-19,3)</td>
<td>8.63</td>
<td>0.001</td>
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<tr>
<td>TOE 3D</td>
<td>6,45±3,62</td>
<td>(4,8-8,1)</td>
<td>8.63</td>
<td>0.001</td>
</tr>
</tbody>
</table>
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