INCREASED SEPTAL EXTRACELLULAR VOLUME ESTIMATED BY T1-MAPPING PREDICTS RIGHT VENTRICULAR PERFORMANCE IN PULMONARY HYPERTENSION

Poster Contributions
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Background: Pulmonary hypertension (PH) leads to progressive right ventricular (RV) failure. Post-contrast T1 mapping with cardiac magnetic resonance (CMR) has been validated for the quantification of myocardial extracellular volume, a surrogate of diffuse interstitial fibrosis. We aimed at evaluating the presence of septal fibrosis in PH patients with T1-mapping and its potential associations with RV performance and hemodynamic status.

Methods: 38 patients with known or suspected PH of various etiologies underwent 3-T CMR. Septal T1 time was quantified from a Look-Locker sequence acquired 5-15 minutes after gadolinium infusion (0.19±0.01 mmol/Kg). All patients underwent right heart catheterization within 100 days of CMR. Septal T1 times were correlated with CMR-derived RV volumes and ejection fraction (RVEF), and cardiac output, mean pulmonary pressure (mPAP), and vascular resistance obtained invasively.

Results: The mean age was 55.4±14.1 years and 44.7% of the patients were males. PH (mPAP>25 mmHg) was present in 60.5%. Shorter septal T1 times were found in patients with greater PH and RV failure severity (Table 1).

Table 1: Correlations of septal T1 time with CMR and right heart catheterization indexes.

<table>
<thead>
<tr>
<th>RVEF</th>
<th>RVEDVi</th>
<th>RVESVi</th>
<th>RV wall thickness</th>
<th>mPAP</th>
<th>PVri</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.71</td>
<td>-0.47</td>
<td>-0.60</td>
<td>-0.53</td>
<td>-0.37</td>
<td>-0.50</td>
<td>0.40</td>
</tr>
<tr>
<td>-0.005</td>
<td>&lt;0.005</td>
<td>0.001</td>
<td>0.02</td>
<td>0.001</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

CO: cardiac output; RVEDVi: right ventricular end-diastolic volume index; RVEF: right ventricular ejection fraction; RVESVi: right ventricular end-systolic volume index; mPAP: mean pulmonary artery pressure, PVri: pulmonary vascular resistance index.

Conclusion: A reduction in post-contrast septal T1 times, possibly indicating increased interstitial fibrosis, correlates well with RV structural and functional impairment and hemodynamic severity in PH. T1-mapping may constitute a novel approach for the evaluation of cardiac adaptation to pressure overload.