

POSTER PRESENTATION

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Comprehensive work up of right ventricular reverse remodelling after successful pulmonary endarterectomy for chronic thromboembolic pulmonary hypertension - a cardiac magnetic resonance study

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Background

About 3.8% of patients suffering an acute pulmonary embolism will develop chronic thromboembolic pulmonary hypertension (CTEPH). As a consequence of increasing pulmonary pressure and resistance right ventricular systolic and diastolic function deteriorate while right ventricular volumes increase. Pulmonary thromboendarterectomy (PEA) offers a potential cure with excellent longterm outcome. Cardiac MRI is an ideal tool to monitor remodelling and reverse remodelling before and after PEA, because it allows complete volumetric coverage of the complex right ventricular geometry. Several non invasive parameters which characterize diastolic, systolic and ventriculo-arterial properties can be derived from these measurements. To quantify the remodelling potential of the right ventricle we performed volumetric measurements before and after PEA

Methods

Methods: 65 consecutive patients who completed retrospectively ECG gated CINE MRI were included, mean age 41 ± 124 years, 28 female. Volumetric measurements were performed 2 ± 0.5 days pre and 10 ± 2 days post surgery by SSFP Cine sequences (TE: 1.58 ms, TR: 4.8 ms, flip angle: $>60^\circ$, slice thickness: 8 mm, 2 mm interslice gap) covering the whole right ventricle from apex to base. Ejection Fraction (EF), enddiastolic volume (EDV), endsystolic volume (ESV), stroke volume (SV), diastolic ventricular

interaction (left shift of the septum) (DVI) and ventriculo-arterial coupling (Ea-pulm/Es-RV) were derived from volumetric measurements. Right heart catheter measurements in standard procedure were evaluated, if available (retrospective data).

Results

Results: Pulmonary artery mean pressure and resistance decreased from 46 ± 12 mmHg and 663.2 ± 247.8 dynes \cdot s \cdot cm⁻⁵ respectively preoperatively to 31 ± 9 mmHg and 368.1 ± 206.2 postoperatively. EF improved from $26 \pm 12\%$ to $44 \pm 10\%$ ($p = 0.00001$), EDV and ESV decreased significantly (EDV 186.3 ± 63.5 to 148 ± 47.2 ml, $p = 0.00001$; ESV 140.6 ± 61 to 84.8 ± 37 ml, $p = 0.00001$). DVI with septal left shift was recorded in 80% of patients pre PEA and only 26% of patients post PEA, $p = 0.00001$. Ea-pulm/Es-RV was markedly increased before PEA (3.9 ± 2.8) and significantly decreased to near normal values after surgery (1.4 ± 1.2 , $p = 0.0001$).

Conclusions

Conclusion: CTEPH before and after PEA is like an on/off phenomenon of pulmonary hypertension and therefore allows to study the reverse remodelling capability of the right ventricle. Cardiac MRI derived parameters reflect changes of function, loading conditions and remodelling. We were able to demonstrate improvement in diastolic properties, ejection fraction, remodelling and loading conditions of the RV in one comprehensive

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examination. Therefore Cardiac MRI is ideally suited to monitor hemodynamic changes non invasively.

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