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Right ventricular remodelling after pulmonary thrombendarterectomie (PEA) for chronic thrombembolic pulmonary hypertension by cardiac MRI

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Introduction

About 5% of all patients suffering acute pulmonary embolism will develop chronic thrombembolic pulmonary hypertension (CTEPH). This in turn causes continuous detoriation of right ventricular function. Pulmonary thrombendarterectomy (PEA) is a possible cure of this condition with favourable long term prognosis. Cardiac magnetic resonance imaging (cMRI) is an excellent tool for measurement of right ventricular volumes and function.

Purpose

This study seeks to determine the changes of right ventricular geometry before and after PEA by cMRI and ist accuracy compared to invasive measurements.

Methods

19 patients (age 64 ± 23) underwent CINE TruFISP MRI (1.5 T, Siemens Sonata) 2 days before and 10 ± 1 days after PEA. Volumetric analysis was performed on 10 contiguous short axis slices covering the whole right ventricle with the Siemens Argus Tool. Ejection Fraction (RVEF), Enddiastolic (RVEDV)-, Endsystolic (RVESV)- and stroke (RVSV) volumes as well as right ventricular mass (RVMass) were computed. RVSV and RVEF measurements were correlated with pre- and postoperative invasive measurements of cardiac outpout (CO) by PA-catheter.

Results

Noninvasive measurements of RVSV and RVEF showed good correlation with invasive CO measures ($r = 0.6$, $p = 0.018$ for SV and $r = 0.66$, $p = 0.019$ for EF). RVEF, RVEDV and RVESV improved significantly over time while RVMass remained unchanged (RVEF from 18.6 ± 4.3 to 41.6 ± 11.5 $p = 0.008$, RVEDV from 200.4 ± 30.7 to 145.3 ± 33.2 $p = 0.0001$, RVESV from 163 ± 25.6 to 82.9 ± 14.9 $p = 0.001$, RVMass from 83.5 ± 16.3 to 68.9 ± 15.1 $p = 0.18$).

Conclusion

cMRI measurement showed good accuracy compared with PA-cath measurements. It is an excellent tool to document acute changes of RV-function and volumes before and after PEA. It shows immediate and significant improvement of both right ventricular function and volumes.