Right ventricular end-systolic volume as prognostic factor of right ventricular remodeling after pulmonary valve replacement.

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BACKGROUND
Optimal timing for pulmonary valve replacement (PVR) in pulmonary regurgitation (PR) in congenital heart disease (CHD) is a controversial topic, specially in asymptomatic patients. Most guidelines consider a RV end-diastolic volume (RVEDV) over 150ml/m2 as indication for PVR.

METHODS
Retrospective analysis of clinical and cardiac MRI variables of asymptomatic CHD patients that underwent surgical PVR between September 2006 and February 2013. Only asymptomatic patients with both pre- and post-surgery MRI were included.

RESULTS
Thirty-five patients (74.3% males) were included. Mean age at PVR was 25.8 years (SD=7.18) and mean weight was 64.5 Kg (SD=12.03). Diagnosis: Tetralogy of Fallot (n=28), pulmonary atresia with VSD (n=2), primary PR (n=2) and PR after pulmonary stenosis treatment (n=2). Maximal RVEDV pre-PVR was 267ml/m2 and right ventricular end-systolic volume (RVESV) was 183 ml/m2.

RV size and function were established by MRI

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<th>Pre-PVR</th>
<th>Post-PVR</th>
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<tbody>
<tr>
<td>RVEDV (ml/m²)</td>
<td>162 (SD=39.1)</td>
<td>94 (SD=23.6)</td>
<td>&lt;0.001</td>
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<tr>
<td>RVESV (ml/m²)</td>
<td>87 (SD=28.9)</td>
<td>44 (SD=15.7)</td>
<td>&lt;0.001</td>
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<tr>
<td>RVEF</td>
<td>44.8% (SD=8.17)</td>
<td>52% (SD=9.9)</td>
<td>&lt;0.001</td>
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RVEDV= right ventricular ejection fraction.

In the multivariate analysis we observed that RVEDV after PVR related with the width of the QRS complex and RVEDV pre-PVR (R²= 0.335). We also observed a relationship between RVESV pre-PVR and the RVEF after PVR (R²= 0.374, AUC=0.902). Our patients with a RVEDV up to 170ml/m2 combined with a RVESV less than 90 ml/m2 achieved a good outcome, defined as RVEDV under 110ml/m2 (sensitivity 87.5%), RVESV under 55ml/m2 (sensitivity 100%) and RVEF over 50% (sensitivity 100%).

CONCLUSIONS
When deciding the optimal PVR timing in asymptomatic patients both RVEDV and RVESV should be considered. Larger prospective studies should be performed in order to establish the importance of RVESV in the timing for PVR and outcome of these patients.