

Different CMR imaging modalities for native and patch-repaired right ventricular outflow tract: impact on percutaneous pulmonary valve replacement planning

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Introduction: Percutaneous pulmonary valve implantation (PPVI) in native or patched right ventricular outflow tract (RVOT), although still off-label, has proven to be feasible. The procedure is highly dependent on the size of the RVOT. The biggest percutaneous valve available in fact, measures 29 mm and in cases of excessive dilatation of the RVOT, PPVI may not be possible. Several methods exist to evaluate the size of the RVOT by cardiovascular magnetic resonance (CMR). We evaluated different CMR modalities for measuring RVOT diameters.

Methods: Thirty-one consecutive patients with native or patched RVOT were retrospectively evaluated. CMR was part of follow-up of patients with corrected Tetralogy of Fallot or pulmonary stenosis with significant pulmonary regurgitation (PR). CMR protocol included different sequences for the assessment of RVOT diameter, namely 3D-SSFP-whole-heart in systole, diastole and contrast-enhanced-MR-angiography (ceMRA). Diameters of the RVOT were assessed by the three sequences. The term RVOT is defined as the anatomic region from the right ventricular infundibulum to the branching of the pulmonary artery. Additionally, in patients who underwent cardiac catheterization (n=11) for PPVI, vessel diameters assessed by cine-angiography were compared to CMR.

Results: Systolic diameters of RVOT were significantly larger compared to diameters taken in diastole and ceMRA (median difference 5.0 mm and 3.8 mm). Diastolic and ceMRA diameters did not differ significantly. CMR diameters taken in systole showed no statistical difference to diameters taken by cine-angiography, while diastolic and ceMRA diameters were significantly smaller. PPVI was feasible to a maximal CMR diameter of 31 mm measured by SSFP-whole heart sequence in systole.

Conclusion: Absolute diameters of native RVOT differ depending on the CMR sequence and on timing of acquisition (systolic vs diastolic). Angiographic diameters best correlate to systolic CMR values. Data may help to select RVOTs suitable for PPVI.

