

**4D flow MRI to assess right ventricular outflow tract in patients undergoing transcatheter pulmonary valve replacement for severe pulmonary regurgitation**

*Karsenty C. , Malekzadeh-Milani S., Mousseaux E., Iserin L., Ladouceur M., Legendre A., Laredo M., Boudjemline Y., Soulat G.*

*Adult Congenital Heart Disease Unit, Cardiology Department, Hôpital Européen Georges Pompidou, France; Paediatric Cardiology, Necker Hospital, AP-HP, France; Paris Descartes University, Paris, France.*

Magnetic resonance imaging (MRI) is essential to assess right ventricular enlargement and function as well as the severity of pulmonary regurgitation before pulmonary valve replacement. Transcatheter pulmonary valve replacement (TPVR) has emerged as an alternative to surgical replacement but limited by the size of the right ventricular outflow tract (RVOT) especially in case of isolated PR. The aim of the study was to compare the measurements of native RVOT between different MRI imaging sequences and catheterization findings

**Methods:**

Single-center retrospective study of patients who underwent TPVI for severe pulmonary regurgitation assessed by 4D flow MRI, without significant residual RVOT obstruction between March 2015 and January 2017. Balloon calibration was used as the reference.

**Results:**

Sixteen adults with repaired tetralogy of Fallot were included (mean age: 39.9 +/- 12.9). 1 patient had a too large RVOT to achieve a TPVR, 1 patient had TPVR with Edwards XT 29mm valve, 2 patients had classical Melody 22m valve implantation procedure and the others had various techniques for Melody valve implantation in large RVOT (jailing or unconventional method). Mean RVOT measured 24.7 +/- 3.2mm by balloon calibration, 24.2 +/- 3.3 mm and 22.3 +/- 3.0mm by 4D flow MRI respectively in systole and diastole, and 21.4 +/- 2.9mm in 2D SSFP MRI. No statistical differences were found comparing different measurements dimensions. Good correlation was found between balloon calibration and MRI 4D flow in systole ( $r=0.78$ ,  $p=0.006$ ), while no correlation existed between balloon calibration, 2D MRI and 4D flow MRI in diastole. Balloon calibration was also well correlated to angiograms measurements ( $r=0.89$ ;  $p<0.0001$  and  $r=0.79$ ;  $p<0.0001$  respectively).

**Conclusion:**

4D flow MRI sequence allowing 3D measurement through the cardiac cycle, appears as an interesting technique to measure RVOT in daily practice and therefore to plan TPVI.