

P587

4D Flow cardiac magnetic resonance quantification of mitral regurgitation, comparison with transthoracic echocardiography

S. Ribeyrolles¹, J.L. Monin¹, A. Rohnean², C. Diakov¹, C. Caussin¹, A. Sarran², J.F. Paul²¹ *Institut Mutualiste Montsouris, Department of Cardiovascular Medicine, Paris, France;* ² *Institut Mutualiste Montsouris, Department of Cardiovascular Imaging, Paris, France*

Background: Mitral valve regurgitation (MR) is currently primarily assessed by a multiparametric approach with transthoracic echocardiography (TTE) that can be further completed by 2D Cardiac Magnetic Resonance (2D CMR) in case of doubt or poor acoustic window. TTE and 2D CMR have nevertheless imperfect agreement in terms of MR quantification. Time-resolved phase-contrast cardiac magnetic resonance imaging with flow-encoding in three spatial directions (4D Flow CMR) could help in MR quantification.

Purpose: Compare 4D Flow CMR quantification of MR with TTE using a multiparametric approach.

Methods: We conducted a monocentric, prospective study at the Institut Mutualiste Montsouris in Paris between November 2016 and 2017 including patients with chronic primitive MR. MR was evaluated with a multiparametric approach by two cardiologists with TTE and quantitatively by two radiologists with 4D Flow CMR. MR was classified as mild, moderate or severe and evaluated blindly with consensus in case of disagreement. 4D Flow CMR measurements consisted in quantifying MR regurgitant vol-

ume (RV) and MR regurgitant fraction (RF). 4D anterograde mitral flow was compared to left ventricular stroke volume using 2D-cine CMR.

Results: 33 patients were included. Inter-observer agreement was good in TTE ($\kappa=0.75$ 95% CI [0.57–0.92]) and excellent in 4D Flow CMR (ICC=0.94 95% CI [0.79–0.95]). Agreement with TTE was excellent using optimized thresholds (Mild: $RV \leq 20\text{mL}$ $RF \leq 20\%$, Moderate: $RV=21\text{--}39\text{mL}$ $RF=21\text{--}36\%$, Severe: $RV \geq 40\text{mL}$ $RF \geq 37\%$): $\kappa=0.93$ 95% CI [0.8–1] for RV and $\kappa=0.90$ 95% CI [0.7–0.9] for RF. A validation cohort confirmed that the 4D flow thresholds as determined were accurate for MR grading. Agreement between 4D anterograde mitral flow and 2D-cine CMR left ventricular stroke volume was also excellent (ICC=0.92 95% CI [0.85–0.96]).

Conclusion: 4D Flow CMR is a reliable tool for MR quantification. It provides direct quantitative evaluation of MR with low inter-observer variability. It may therefore be used as a gatekeeper before therapeutic decisions such as surgery.