

P4379

# Pathophysiology of left atrial filling in mitral regurgitation. A new volumetric flow rate index describing disturbed left atrial filling behavior in mitral regurgitation by 3D TTE

D. Frumkin<sup>1</sup>, K. Stangl<sup>1</sup>, A. Muegge<sup>2</sup>, T. Buck<sup>3</sup>, B. Plicht<sup>3</sup>

<sup>1</sup>Charité - Campus Mitte (CCM), Department of Cardiology and Angiology, Berlin, Germany; <sup>2</sup>University Hospital St. Josef, Cardiovascular Center, Bochum, Germany; <sup>3</sup>Heart Center Westfalen, Klinikum Westfalen, Department of Cardiology, Dortmund, Germany

**Background:** In chronic mitral regurgitation (MR) the left atrium (LA) is one of the first cardiac structures involved in remodeling by progressive volume overload. Real-time three-dimensional echocardiography is able to monitor volumetric changes of the left atrium during the heart cycle.

**Purpose:** We hypothesized that chronic volume overload due to MR leads to detectable changes in the LA filling behavior described by mean and maximum filling flow rates and their relation called volumetric flow rate index.

**Methods:** We prospectively analyzed data of 36 patients in different stages of chronic MR and 13 patients without MR. Transthoracic echocardiography was conducted using the Epiq 7G Ultrasound System. Standard 2D- and 3D apical 4-chamber views were recorded and stored for offline analysis. We generated volume-time-curves by 3D volume analysis to derive mean and maximum volumetric flow rates during LA reservoir, conduit and pump phase. Volumetric flow rate index was calculated as the quotient of mean flow rate/maximum flow rate.

**Results:** Average MR severity, calculated with the MR Scoring system in-

troduced from Buck et al. and implicated in the ESC Guidelines, was 6.2 points ( $\pm 2.5$ ) according to Grade I-II. We included 13 patients without MR, 18 with mild MR, 12 patients with moderate MR, 6 patients with severe MR. Left ventricular ejection fraction was similar in the different groups ( $51.2 \pm 12.3\%$ ). Maximum and mean flow rate showed no significant correlation with MR severity. Correlation of MR severity with LA dilation ( $\text{ml}/\text{m}^2$  BSA) was  $r=0.41$ ;  $p<0.001$ . Flow rate index showed strong significant correlation with MR severity in left atrial reservoir phase ( $r=-0.75$ ;  $p<0.001$ ). There was no statistically relevant difference of volumetric flow rate parameters in left atrial pump and conduit phase.

**Conclusions:** We observed a significant correlation of the volumetric flow rate index to MR severity in the left atrial reservoir phase with stronger correlation than MR severity to left atrial dilation. The results of this work encourage further investigations to establish the presented volumetric flow rate index as a progression marker of MR and to evaluate its prognostic value.

