Alterations in left atrial structure and function in chronic heart failure patients with functional mitral regurgitation after MitraClip

Authors:
C Ozturk¹, T Fasell¹, JM Sinning¹, N Werner¹, G Nickenig¹, C Hammerstingl², R Schueler³, ¹University Hospital Bonn, Cardiology, Pneumology and Angiology - Bonn - Germany, ²Medipark Heart and Vascular Medicine, Cardiology - Cologne - Germany, ³Elisabeth Hospital, Cardiology - Essen - Germany,

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Background: The MitraClip procedure has been increasingly performed as an established treatment alternative for symptomatic patients with moderate to severe mitral regurgitation (MR) at prohibitive surgical risk. Left ventricular (LV) reverse remodelling following MitraClip has been shown in different studies. Left atrial (LA) volumes are believed to decrease following interventional reduction of MR. However, effects of MitraClip on LA function are not well understood.

Objectives: In this study we aimed to evaluate the effect of MitraClip on LA structure, volumes and function in chronic heart failure patients with functional MR.

Methods: All patients underwent 3D transthoracic echocardiography prior to the MitraClip procedure and at follow-up (FU) with offline evaluation of LA function and geometry using dedicated software (TomTec Image Arena, 4D LV-Analysis, Munich, Germany). FU examinations were performed 10±3.4 months after the procedure.

Results:
We prospectively included 75 consecutive surgical high risk (Logistic EuroScore: 17.2±13.9%) patients (Age: 77±9years, 22% female) with symptomatic moderate to severe MR without atrial fibrillation. All patients underwent MitraClip following heart team decision without perinterventional major complications.

Baseline echocardiography showed impaired left ventricular function (Ejection fraction (EF): 32.6±11.2%), moderate to severe MR, increased systolic right ventricle pressure (RVSP: 46.1±10.5 mmHg) and elevation in estimated left ventricle enddiastolic pressure (E/E´ ratio: 15.6±7.3) in the patient cohort.

There was no relevant mitral stenosis after the procedure (MPG: 3.3±0.5 mmHg), however the MPG increased significantly after the procedure (p=0.05). The E/E´ ratio significantly increased at FU (15.6±7.3, 24.1±13.2, p=0.05) as well. The left atrial (LA) volumes and LA-muscular mass (End-diastolic volume [LA-EDV] and end-systolic volume [LA-ESV]) significantly increased at FU (LA-EDV: 83.1±39.5ml, 115.1±55.3ml, p=0.012; LA-ESV: 58.4±33.4ml, 80.1±43.9ml, p=0.031; 105.1±49.3gr, 145.4±70.6gr, p=0.013). LA stroke volume significantly increased after the procedure (24.6±12.5ml, 34.9±19.1ml, p=0.016). LA EF and atrial global longitudinal strain (LA-GLS) showed no significant changes at FU (LA-EF: 31.7±12.8%, 31.1±12.3%, p= 0.8; LA-GLS: -10.8±5.4%, -9.7±4.45%, p=0.4).

Despite no relevant changes during FU, baseline E/E´ ratio (AUC: 0.652) and baseline aGLS (AUC: 0.694) were found to be independent predictors for mortality.

Conclusion:
Transcatheter MV repair (TMVR) with the MitraClip procedure improves atrial stroke volume, increases atrial volumes and muscular mass acutely after the procedure. It might be explained by the acutely increased MPG and LVEDP after the MitraClip procedure. Baseline aGLS and E/E’ ratio were found to be independent predictors for mortality.