

P3372

Prediction of outcome in functional mitral regurgitation using the average pixel intensity method

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Background: Functional mitral regurgitation (FMR) is a frequent finding in patients with systolic heart failure. However, the echocardiographic grading of MR is challenging and different severity cut-offs are recommended by international guidelines. We developed and validated a novel echocardiographic parameter to grade MR, the average pixel intensity (API) method, based on pixel intensity analysis of the continuous wave Doppler signal.

Purpose: In this study, we assessed the long-term predictive value of the API method on clinical endpoints in FMR.

Methods: Transthoracic echocardiography was performed in consecutive heart failure patients with reduced EF (HF-REF) (n=221). MR was assessed using the API method, vena contracta width (VCW), effective regurgitant orifice area (PISA-EROA) and regurgitant volume (PISA-RV). The primary clinical events were major adverse cardiac events (MACE: cardiovascular mortality, mitral valve surgery, percutaneous mitral intervention or heart failure hospitalization).

Results: The API method was feasible in 97% of all FMR patients, which

was significantly higher than parameters such as VCW, PISA-EROA and PISA-RV. 84 patients (37%) had one or more clinical events during the follow-up period (cardiovascular mortality (20%), mitral valve surgery (5%), percutaneous mitral intervention (5%), heart failure hospitalization (16%) or heart transplantation (2%)). Based on ROC curves, an API cut-off of 121 au was defined as "severe" MVP-MR with an overall better sensitivity and specificity than current guideline-recommended parameters. On multivariate analysis, MR graded with API was independently predictive for clinical events, whereas PISA-based methods were not independent. In addition, pulmonary pressures and NYHA class were powerful independent predictors of clinical outcome in FMR on multivariate analysis.

Conclusions: The API method better predicts clinical events and outcome in FMR compared to established grading methods. Therefore, the API method may be considered for grading FMR severity in clinical practice.

