EARLY DETECTION OF IMPROVEMENT OF LEFT VENTRICULAR FUNCTION AFTER UNDERSIZED MITRAL ANNULOPLASTY FOR FUNCTIONAL MITRAL REGURGITATION: TWO-DIMENSIONAL SPECKLE TRACKING ECHOCARDIOGRAPHY

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Background: Undersized mitral annuloplasty (UMAP) is widely employed for patients with functional mitral regurgitation (FMR). Although UMAP is expected to improve left ventricular (LV) function, it is only demonstrated by a gradual improvement of LV ejection fraction (EF) in the chronic stage. Two-dimensional speckle tracking echocardiography (2D-STE) is a sensitive tool capable of detecting regional LV myocardial strain. We examined whether peak systolic strain and torsion measured by 2D-STE could detect the improvement of LV function before LVEF increase following UMAP in patients with FMR.

Methods: We studied 15 patients (mean age 60±9 years) with FMR due to dilated cardiomyopathy undergoing UMAP. In addition to conventional standard measurements (end-diastolic diameter: EDD, end-systolic diameter: ESD, ejection fraction: EF), 2D-STE was performed to measure peak systolic radial (RS), circumferential (CS), and longitudinal strain (LS) and rotation before and 4±2 weeks after the operation. LV torsion was defined as the difference between apical rotation and basal rotation.

Results: After UMAP, EDD, ESD, EF and LS remained unchanged (EDD 71±12 vs. 69±11 mm, ESD 61±13 vs. 60±13 mm, EF 25±7 vs. 27±9% and LS -5.9±4.2 vs. -6.0±3.7 %, all p=ns), while RS and CS were significantly improved at the mid-ventricle (RS 20.6±10.8 vs. 24.5±11.6%, CS -9.6±5.2 vs. -12.8±5.6%, both p<0.05) and apex (RS 15.0±12.2 vs. 18.7±8.6%, CS -4.4±3.0 vs. -7.8±4.8%, both p<0.05). In contrast, RS and CS were not changed at the basal level (RS 25.8±12.3 vs. 25.5±13.6%, CS -14.6±8.2 vs. -13.8±7.7%, p=ns). Apical and basal rotation significantly changed from 3.5±0.7 to 9.2±2.1 degrees and from -2.1±0.7 to -3.8±1.0 degrees (p<0.05, respectively). Consequently, LV torsion was significantly increased from 5.6±1.0 to 13.0±1.9 degrees (p<0.05).

Conclusion: Peak systolic radial and circumferential strain and LV torsion significantly increased in the early postoperative period in patients with FMR after UMAP before EDD, ESD, EF and longitudinal strain showed significant changes. Strain and torsion may be effective in evaluating early and subtle changes in LV performance.