

Is 3D analysis of longitudinal strain useful to predict long-term cardiac events in patients undergoing early mitral valve surgery?

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Background: In patients with mitral valve prolapse (MVP) and significant mitral regurgitation (MR), the presence of reduced 3D left ventricular (LV) global longitudinal strain (GLS) has already been described. However, precise data about this finding in predicting long-term cardiac events are lacking, especially in patients after MV surgery. Particularly, few data are available about the role of 3D GLS in events prediction in patients diagnosed with Barlow or Fibro-Elastic-Deficiency (FED) disease.

Aim: To determinate whether 3D LV GLS may identify a subgroup of patients with MVP and severe MR at higher risk for cardiac events after MV surgery.

Methods: We studied 143 patients diagnosed with MVP with normal LV function, who underwent isolated MV surgery between 2011 and 2017 for severe MR. A comprehensive 2D transthoracic echocardiography (TTE) analysis was performed, degree of MR was obtained using the PISA method (Proximal Isovelocity Surface Area), degree of tricuspid regurgitation was visually estimated. 3D analysis using custom software provided measurement of left atrial (LA) and right atrial (RA) dimension, right ventricular (RV) dimension and function and LV size and function including global longitudinal strain (GLS). Cardiac events (including cardiac death, arrhythmia, hospitalization for heart failure, embolic events or arrhythmia) were recorded during a follow-up of 4.6 ± 2 years.

Results: Study patients were diagnosed with Barlow or FED in 92 (65%) and 51 (35%) of cases, respectively. The baseline 3D analysis showed left chambers dilatation with normal LV function and normal GLS, normal right chambers and systolic pulmonary artery pressure (sPAP). Based on 3D GLS, patients were divided in Group 1 (N=84, 59%, normal GLS $\geq -21\%$) and Group 2 (N=59, 41%, reduced GLS $< -20\%$). No differences were noted at baseline between groups (Table 1). At the follow-up, 43 events were recorded, including 1 death, 12 hospitalizations (3 for heart failure, 3 for embolic events and 6 for atrial fibrillation – AF) and 30 minor arrhythmic events, mostly premature ventricular complex (PVCs) and AF. The Kaplan Meier analysis showed no differences in cardiac events between groups (Figure 1, A). Among patients with Barlow, a significant difference in events was detected between patients with reduced and normal GLS at the Kaplan Meier analysis (Figure 1, B). This finding was not found in FED patients.

Conclusions: Patients undergoing MV surgery for MVP with initial LV remodeling and normal function, seem to be characterized by a low rate of major cardiac events. Interestingly, only in the Barlow population, a reduced 3D LV GLS strain may detect cases at higher risk of minor cardiac events, mostly minor arrhythmia.

