Postoperative variation of the curling angle after mitral valve repair for degenerative mitral valve regurgitation

Objective: Systolic curling (SC) is defined as a downward and anteriorly directed systolic motion of the posterior mitral annulus (PMA), resulting in a curled appearance of the adjacent myocardium on cardiac imaging. According to previous studies, similarly to mitral annular disjunction, SC has been associated with arrhythmic MV prolapse. We developed and tested a method to measure the SC angle on patients affected by degenerative mitral regurgitation (DMR) who underwent surgical MV repair (MVR).

Methods: All patients treated with isolated surgical MVR for DMR at our Centre between January 1st 2022 and December 1st 2022 were included. Patients with concomitant coronary artery disease or previous ACS were excluded. The MIRA (Mitral valve annulus to Inferobasal wall Rotation Angle) was measured as following. On TTE parasternal long-axis view, end-systole, we measured the MIRA that is included between the line perpendicular to the LV posterior wall long axis (from the endocardium to the epicardium) at the level of the tip of the AML (AB) and the line connecting B and the insertion of the PML onto the mitral annulus (BC), as shown in Figure 1. A frame rate superior to 60% was used. We measured the MIRA in each patient at baseline, before surgery, and after MVR and we compared these values. All measurements were made by the same operator three times and the mean value was selected. An eyeball estimation of the presence of SC was made as well. Paired Student's t-test was used to make the comparison.

Results: Thirty patients were included. All of them underwent MVR, 28 had an annuloplasty ring implanted. Out of the 3 patient with no annuloplasty, 2 underwent transapical off-pump Neochord Implantation while 1 had a high risk of postoperative SAM and the surgeon opted for PML resection and Goretex neochord implantation only. At eyeball estimation, SC was present in 23 (77%) patients while after surgery it was visualized in 2 patients (7%) (p<0.001). Mean baseline MIRA was 55±12°, postoperative MIRA was 80±8°. MIRA angle was significantly higher after MVR (p<0.001) corresponding to less evident SC.

Conclusions: MIRA significantly increase after MVR with annuloplasty suggesting that preoperative SC is resolved by stabilization of the PMA provided by the annuloplasty ring. Resolution of SC might mitigate malignant ventricular arrhythmias in patients affected by arrhythmic DMR. Further studies to define the normal value of the MIRA are needed.

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