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**Title: CARDIOVASCULAR MAGNETIC RESONANCE EVALUATION OF CHANGE IN MYOCARDIAL STRAIN FOLLOWING TRANSCATHETER AORTIC VALVE IMPLANTATION (TAVI) AND SURGICAL AORTIC VALVE REPLACEMENT (SAVR).**

**Background:** TAVI is the treatment of choice for patients with severe symptomatic aortic stenosis (AS) who are at high surgical risk. AS results in changes in myocardial strain and twist. Myocardial strain, strain rate and twist can be measured with myocardial tagging CMR. It is not known how TAVI affects LV diastolic and systolic function as measured by CMR tagging. The objective was to determine changes in myocardial strain following Transcatheter Aortic Valve Implantation (TAVI) and Surgical Aortic Valve Replacement (SAVR).

**Method:** 25 TAVI patients (age 80±6 years, male 14 (56%), EuroSCORE 22±14) and 25 SAVR patients (age 73±7 years, male 17 (68%), EuroSCORE 7±3) underwent CMR (1.5T, Intera CV, Philips Healthcare) before and 6 months after treatment. Tagged cine images were acquired at the apex, mid-ventricle and base with a complementary spatial modulation of magnetization (CSPAMM) pulse sequence (FOV 300mm, matrix 128x128, slice thickness 10mm, tag separation 8mm, 18 phases, typical TR/TE 30ms/6ms, flip angle 25°). Data were analysed using inTag© software (Creatis, Lyon, Fr). Endocardial and epicardial contours were drawn and segmented into 3 layers.

**Results:** Following TAVI, peak Lagrangian circumferential strain increased in the mid-LV (Table 1). There was no significant change in apical or basal circumferential strain. (Table 1). LV twist decreased after TAVI and peak systolic strain rate increased but there was no change in early diastolic strain rate. There was no significant change in strain or strain rate after SAVR, but LV torsion did decrease (Table 1).

**Conclusion:** TAVI results in an improvement in mid-LV circumferential strain, and a decrease in myocardial twist. Systolic strain rate increased following TAVI but there was no significant change in

diastolic strain rate. This suggests that whilst systolic function improves, diastolic function does not improve in severe AS at 6 months post-TAVI.

**TABLE 1. Changes in strain, strain rate, twist and torsion after TAVI and SAVR**

| | TAVI N=25 | | | SAVR N=25 | | |
|---|---|---|---|---|---|---|
| | **Baseline** | **6 months** | **p value** | **Baseline** | **6 months** | **p value** |
| **Peak circumferential strain** | | | | | | |
| Base | –0.18±0.06 | –0.20±0.06 | 0.13 | –0.19±0.05 | –0.19±0.04 | 0.56 |
| Mid | –0.19±0.06 | –0.22±0.06 | 0.02 | –0.21±0.06 | –0.20±0.04 | 0.46 |
| Apex | –0.20±0.06 | –0.20±0.07 | 0.81 | –0.19±0.06 | –0.18±0.07 | 0.20 |
| **Peak mid-ventricular strain rate** | | | | | | |
| Systolic ($S^{-1}$) | –0.91±0.23 | –1.11±0.22 | 0.001 | –1.06±0.37 | –1.17±0.34 | 0.16 |
| Diastolic ($S^{-1}$) | 0.91±0.55 | 0.88±0.43 | 0.98 | 1.13±0.57 | 1.22±0.63 | 0.48 |
| **LV Twist ($^0$)** | 16.6±5.2 | 13.9±5.2 | 0.03 | 14.8±7.8 | 13.75±4.9 | 0.48 |
| **LV Torsion** | 13.8±4.1 | 11.9±4.6 | 0.05 | 11.5±9.3 | 5.16±2.0 | 0.01 |

**Figure 1. Example of inTag analysis using complementary spatial modulation of magnetization (CSPAMM). Diastole (A, C) and systole (B, D).**