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Edge-to-edge mitral valve repair in patients with secondary mitral regurgitation: impact of tethering pattern on clinical, echocardiographic and procedure-related characteristics

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Edge-to-edge mitral valve repair (E2E-MVR) has emerged as a therapeutical option in patients with secondary mitral regurgitation (SMR). Two tethering patterns (TP) have been described in SMR: symmetric and asymmetric. However, information on the implications of these TP on E2E-MVR is limited.

Our aim was to assess the impact of mitral valve TP on clinical, echocardiographic and procedure-related characteristics in patients undergoing E2E-MVR.

We consecutively recruited 62 patients with at least moderate SMR who underwent E2E-MVR in our center between 2011 and 2019 and analysed clinical, echocardiographic and procedure-related characteristics according to TP, which we classified into symmetric and asymmetric considering jet direction and mitral valve leaflet position during systole by means of two-dimensional transesophageal echocardiography (Figure 1).

In our series, 43 patients (69.3%) had symmetric TP and 19 (30.7%) had asymmetric TP. Asymmetric TP was associated with ischemic aetiology (52.6% vs 23.3%, $p = 0.02$) and a non-significant trend to higher frequency of male sex (89.5% vs 67.4%, $p = 0.07$), diabetes mellitus (52.6% vs 27.9%, $p = 0.06$), massive regurgitation (78.9% vs 58.1%, $p = 0.11$) and higher values of left ventricular ejection fraction (LVEF) ($34 \pm 9\%$ vs $28 \pm 11\%$, $p = 0.06$).

There were no differences in procedure-related characteristic between groups, in particular in number of devices (1.63 [IQR 1-2] vs 1.52 [IQR 1-2], $p = 0.27$), number of grasplings (3.21 [IQR 2-4] vs 2.78 [IQR 2-3], $p = 0.16$) and time of procedure ($95 \pm 38\text{min}$ vs $107 \pm 43\text{min}$, $p = 0.29$). Procedural success (defined as SMR severity reduction ≥ 2) was high in both groups (89.5% vs 74.4%, $p = 0.18$).

At discharge, there was a significant reduction in effective regurgitant orifice area (EROA) in ($0.36 \pm 0.16\text{cm}^2$ vs $0.15 \pm 0.10\text{cm}^2$, $p < 0.001$) and pulmonary artery systolic pressure (PASP) ($46 \pm 12\text{mmHg}$ vs $40 \pm 12\text{mmHg}$, $p = 0.004$). LVEF was impaired in patients with asymmetric TP but not in patients with symmetric TP (difference in LVEF after procedure: $-5 \pm 9\%$ vs $-0 \pm 8\%$, $p = 0.03$).

In our study, asymmetric TP was related to the ischemic aetiology of left ventricular dysfunction. Procedural characteristics, and EROA and PASP reductions at discharge were similar regardless of TP. However, patients with asymmetric TP had a significantly impairment in LVEF, probably because of afterload mismatch phenomenon.

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