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Commentary: A device for the whole mitral valve apparatus

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CENTRAL MESSAGE

Mitral Touch is the device that deals with the whole mitral valve apparatus.

Ischemic mitral regurgitation (IMR) is complex disease caused by an alteration of the left ventricular (LV) geometry that distorts the whole mitral valve (MV) apparatus.[1] Valve dysfunction is mainly related to posterior and lateral displacement of papillary muscles, which leads to apical leaflets tethering and lack of coaptation.[2] In addition, the dilatation of septal lateral mitral annulus and the loss of systolic shortening of interpapillary muscle distance, with consequent slackness in the marginal and secondary chordae, alter the mitral force balance and contribute to IMR.[3] The optimal strategy is still a subject of debate, as plenty of surgical techniques have been described.[4] The most common surgical treatment is the restrictive MV annuloplasty: however, this is destined to failure over time, as the Cardiothoracic Surgical Trials Network (CTSN) trial showed an increased rate of recurrent mitral regurgitation at 2-year follow-up.[5] The major problem is that lone annuloplasty does not prevent the continuous LV remodeling and leaflet tethering. Therefore, more attention is given to the correction of subvalvular apparatus. We recently demonstrated that papillary muscle repair associated with mitral annuloplasty has a positive impact on LV remodeling, decreasing the LV end-diastolic and -systolic diameter values, reducing the risk of cardiac-related events, and most importantly is associated with 3-fold reduced risk of recurrent mitral regurgitation at follow-up compared with annuloplasty alone.[6] These techniques are often associated with coronary artery bypass grafting, require surgical revascularization, and in the presence of depressed LV function may increase surgical mortality. In this regard, percutaneous strategies as well as epicardial approaches have been developed with the aim of reducing mortality and morbidities, with controversial results.[7-10] The major limitation of these strategies is that they do not deal with the whole MV apparatus. Specifically, percutaneous treatments do not address LV geometry restoration, whereas epicardial approaches do not focus on annular dilatation.

In this issue of the *Journal*, Thourani and colleagues report the first-in-human preliminary results of the Mitral Touch (Mitre Medical Corp, Morgan Hill, Calif), an epicardial device made of titanium to reshape the MV annulus without the need for cardiopulmonary bypass and left atriotomy. Interestingly, the posterior arm presents a silicon pad, which once anchored, broadly distributes its load on the epicardial surface of the LV posterior wall, providing support to restore LV geometry and valve coaptation.[11] The concept is interesting, as this device addresses the whole MV apparatus, reshaping the MV annulus and LV. Despite the limited sample size, results are promising, since at 1 and 12 months, the authors had −35% and −31% LV end-systolic volume (ESV) reduction as well as −12% and −15% left atrial ESV reduction at 1 and 12 months, respectively. There was also some degree of right ventricular remodeling. However, an accurate review of supplementary tables identifies some limitations that should be investigated in a large study. First, despite the fact that technical implantation was 100% successful, the device was repositioned in 3 patients, showing that a learning curve is required. Second, patient 1001 did not show any benefit in terms of LV remodeling. Specifically, ejection fraction,

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Disclosures: Antonio Miceli is a consultant for LivaNova.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Dec 6, 2020; revisions received Dec 6, 2020; accepted for publication Dec 7, 2020; available ahead of print Dec 13, 2020.

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J Thorac Cardiovasc Surg 2021;161:959-60
0022-5223/$36.00

https://doi.org/10.1016/j.jtcvs.2020.12.019

LV ESV, and LV end-diastolic volume changed from 32%, 332 mL, and 251 mL at baseline to 30%, 361 mL, and 269 mL at 12 months. The lack of LV reshaping might be related to some bias that authors have not investigated. The silicon pad dimension might have been too short for patient's LV posterior wall, thus suggesting a problem of mismatch. Third, computed tomography measurements at follow-up did not investigate on the interpapillary muscle distance, which is considered an important determinant of MV force balance.

Because of these limitations, larger studies are required. Finally, I suggest authors to investigate whether Mitral Touch is suitable for a minimally invasive approach, leaving coronary disease to percutaneous coronary revascularization (hybrid solution).

IMR is a complex disease associated with poor outcomes if not treated. Plenty of solutions have been proposed with different strategies, but few have addressed the subvalvular apparatus. Mitra Touch is the first device that deals with the whole MV apparatus.

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