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Commentary: Understanding the mitral apparatus: Still missing some pieces

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CENTRAL MESSAGE

Surgical papillary relocation with mitral valve annuloplasty is associated with better outcomes.

Ischemic mitral regurgitation (IMR) is a complex disease associated with a poor prognosis. IMR is the result of post-ischemic left ventricular remodeling, which causes displacement of papillary muscles, annular dilatation, and leaflet tethering with consequent lack of coaptation and regurgitation.[1,2] The most common treatment of secondary mitral regurgitation (MR) is mitral valve annuloplasty (MVA). However, the solely reductive MVA is destined to failure over time, as it has been associated with a 66% rate of recurrent MR at 2-year follow-up.[3] The high rate of failure is probably related to the subvalvular mitral dysfunction. Correction of the subvalvular apparatus has been suggested to prevent recurrence of MR. Kron and colleagues[4] first pointed out the importance of relocating the posterior papillary muscle as an adjunct to standard annuloplasty. Since then, other different surgical techniques have been developed.[5,6] Recently, my group and I demonstrated that concomitant papillary muscle correction compared with MVA alone is associated with 3-fold risk reduction of recurrent MR at follow-up. In addition, papillary muscle relocation is also associated with greater freedom from cardiac-related events and better positive impact on left ventricular remodeling.[7]

In this issue of the *Journal*, Torkan and colleagues[8] describe a new surgical technique for IMR consisting of papillary muscle relocation with a multiloop suture. Specifically, authors propose a modification of Kron and colleagues' technique, adopting the Leipzig loop technique described by Mohr.[4,9] The procedure is interesting and potentially better than Kron's stitch, as the multiloop suture should reduce the stress on papillary tip. However, this technique presents some limitations. First, some degree of mitral valve tenting might remain in the presence of large left ventricles. In this regard, Fattouch and colleagues[5] suggest relocating both papillary muscles to minimize the risk of recurrence of MR. Second, authors use a complete rigid ring 2 sizes under from the obtained measurement. Although the complete rigid ring restores the annular geometry, the mitral annulus loses its physiologic movement during cardiac cycle, especially when undersized.[10] A restrictive mitral annuloplasty fixes the posterior leaflet and causes a reduction of the mitral valve opening with relative mitral stenosis under stress.[11] To avoid tension on the mitral leaflets, Kron and colleagues[4] recommend downsizing the annuloplasty by 1 size, whereas Fattouch and colleagues[5] propose choosing a ring according to anterior leaflet length. My suggestion is to perform a less-restrictive annuloplasty with a complete semirigid ring, which provides rigidity for annulus remodeling and maintains the flexibility during the cardiac cycle and avoids mitral stenosis. Finally, IMR is a disease of the left ventricle and papillary muscle that leads to valve dysfunction. Torkan and colleagues add evidence on the importance of addressing the problem of subvalvular apparatus in IMR. However, we need now to focus on left ventricular wall reshaping. Some external or internal ventricular-restraint devices have been developed, but more data are required.[6] In conclusion, a thorough understanding of the mitral apparatus will improve the results of mitral valve repair, but to date we are still missing some pieces.

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