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Commentary: There are chords in the human heart that had better not be vibrated

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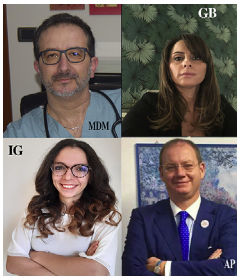

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CENTRAL MESSAGE

Tensive forces on artificial mitral chordae have different effects depending on the employed surgical technique, showing that running chordae are more resistant than loop and interrupted ones.

Posterior leaflet prolapse is the most common cause of mitral valve regurgitation in the Western world, and, notably, the easiest lesion to be repaired. The gold standard technique for its repair is resection, first introduced by Alain Carpentier,[1] but recently newer techniques have been proposed and have become commonly used. Perier and colleagues[2] introduced the "respect rather than resect" approach and, since then, many authors have published their results with the use of artificial chordae.[3,4] Still, a biomechanical study on the actual force needed to disrupt the artificial chordae is lacking. Mateo Marin-Cuartas and colleagues[5] elegantly describe the differences among 3 of the most-used techniques to implant artificial chordae: running,[6] standard interrupted,[7] and loop.[8,9] The neochords were attached to 3-dimensional plastic models representing papillary muscles and mitral valve leaflets and, by applying a tensive force on both fixtures, authors measured the needed force to disrupt the artificial chordae. They demonstrated that running chordae needed the greatest force to be ruptured even if that resulted in failure of the technique if there was just one running chordae. Moreover, as expected, the site of rupture was near the knot, more commonly in patients with either loop or interrupted chordae. Given these findings, running chordae should be implanted in multiple sets, because, even if they are more resistant to disruptive forces, a single rupture would lead to the failure of the chordae. Nevertheless, the forces used in the test are greater than those physiologically experienced in patients.

Surgical manipulation, degeneration of artificial chordae, and chronically worsening tensive forces over time might explain late failure of artificial chordae, which is, at any rate, rare.[10] Recently, Mutsuga and colleagues[4] showed that also in vivo a less-resistant chordae (CV4) breaks easier than a more resistant one (CV5); of course, a thicker chordae is harder to manipulate in surgery. Marin-Cuartas and colleagues[5] demonstrated through bioengineering that not only are thicker chordae more resistant but are also more resistant when they are implanted in a running fashion. We believe Marin-Cuaratas and colleagues[5] open up the way to more biomechanical studies on the behavior under physiological conditions (and, therefore, to lower forces) of the different techniques of chordae implantation under physiological conditions, leading to a scientifically guided choice (not only based on the surgeon preferences) of the best technique to implant neochordae.

Paraphrasing what Charles Dickens wrote, we can say that "there are chords in the human heart that had better not be vibrated…,"[11] and maybe they are artificial chordae implanted not in a running fashion.

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