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Commentary: Beyond the boundaries of left ventricular outflow tract obstruction

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CENTRAL MESSAGE

Reduced interstrut distance increases LVOT obstruction after mitral valve replacement.

The hemodynamic assessment of left ventricular outflow tract (LVOT) obstruction after mitral valve replacement has always represented a challenge. High interference with LVOT anatomy and function could be responsible for poor surgical outcomes, especially in patients affected by hypertrophic cardiomyopathy, with an unfavorable mitroaortic angles and small left ventricle dimensions.[1] The preservation of anterior mitral leaflet (AML) limits left ventricle impairment[2]; however, its full retention may increase the risk of LVOT, causing interference and obstruction during systole.

To avoid this complication, several surgical techniques suggest performing mid-portion AML resection.[3] In contrast, prosthesis design may also play a pivotal impact; increased interstrut distance, a reduction of the strut height, and partial prosthesis aterialization may reduce the risk as well. The concept of "neo-LVOT" has recently increased after the expansion of mitral transcatheter valve replacement procedures.[4] However, whereas surgical AML resection is a simple and direct vision surgical procedure, percutaneous treatments present several drawbacks. In this regard, the introduction of transcatheter intentional laceration of the AML (LAMPOON technique) would probably offer new perspectives.[5] But how could we better understand the complex hemodynamics beyond LVOT obstruction?

In this issue of the *Journal*, Brunel and colleagues[6] described an animal model to study LVOT obstruction after mitral valve replacement. Five adult sheep underwent 3 consecutive beating-heart procedures with the implantation of an asymmetric porcine bioprosthesis (Mosaic; Medtronic, Minneapolis, Minn) in the mitral position. The largest and smallest interstrut sectors were alternatively positioned in the LVOT (8 vs 7 times, respectively). LVOT obstruction with subsequent dumping of cardiac index occurred in ~85% of cases, spontaneously in more than a half of the narrow interstrut insertions only. Conversely, a bolus of adrenaline was required to precipitate obstruction of the remaining attempts, the wide interstrut setting requiring a greater dose. Placement of narrow sector in LVOT was further associated with a holo-systolic obstruction, rather than late-systolic only. Unfortunately, the use of a few healthy models without left ventricle enlargement and mitral regurgitation could limit a faithful evaluation of the pathologic hemodynamics. In light of these results, all bioprosthetic valves brands should address this issue, indicating on the prostheses, the interstrut distance. The current study not only provides new insights on the LVOT influence of bioprosthetic interstrut length but also describes a useful normothermic beating-heart animal model for studying the prevention of LVOT obstruction. Further application of this technique in the field of transcatheter options has all to be discovered.

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