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Is extension of Florida Sleeve indications taking us in the right direction?

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Aortic valve (AV) and aortic root pathologies can be approached in different ways. These range from replacement therapies to valve-preserving techniques (reimplantation or remodelling technique). Although most surgeons are comfortable with composite graft replacements (modified Bentall procedure), valve-sparing procedures remain somewhat challenging. Effectively, valve-sparing approaches require a more in-depth understanding of the aortic root anatomy and valve function.

Hitherto, many perfectly good AVs have thus ended up in the bucket. Therefore, taking into consideration the benefits of valve preservation, while attempting to minimize its' challenges, Hess *et al.* [1] have devised a method, which combines the benefits of valve preservation with a 'more simplified' approach to repair functional type-1 aortic regurgitation: 'the Florida Sleeve (FS)'. Instead of replacing the aortic root, it is wrapped with a prosthetic graft instead, which theoretically remodels the functional aortic annulus from the base of the root to the sinotubular junction, thereby remodelling and containing an aortic root aneurysm and preventing further dilation, as well as resolving its' related aortic regurgitation (type 1).

But is it truly simpler, or the better technique to use? We have our doubts. In this study, Holubec *et al.* [2] share their experience with the David procedure (DV) versus FS for various indications, with a propensity score-matched analysis. But even so, the propensity matching could not eradicate the most important difference between groups: the surgical indication and, as such, the mean aortic root size remained significantly different between both groups.

There was no statistically significant difference in AV or root reoperations at 5 and 10 years, or freedom from AR $\geq$ moderate between both approaches. Although the 5- and 10-year survival was not statistically different, there nevertheless appears to be a trend towards better survival in the DV group. After propensity score matching, only around 50 patients were left in each group. One could argue that with a higher-powered study the difference would have been more obvious, and statistically significant, as evident in their entire cohort analysis. Moreover, the median follow-up time was 7.8 years in the DV group but only 4.6 years in the FS group, and we do not necessarily agree that shorter

cardiopulmonary bypass time or aortic cross-clamp time in the FS group also means that the procedure is less complex. It indicates that more surgery was likely required in the DV group, but that does not necessarily add to the complexity. Moreover, in our own experience [3] and others, we know that cardiopulmonary bypass times for DV can be much shorter overall.

Thus, we must be carefully translating the study results into clinical practice. The original indication for the FS operation was aortic regurgitation, secondary to dilation of the aorta and in tricuspid AV phenotypes (type 1 disease). Hess *et al.* did not treat any patients with type 2 or 3 disease, or bicuspid AVs (BAVs) [1, 4]. Hence, a very narrow indication, which does not apply to most patients who require treatment, for example type 1 and type 2 disease, often coexists. Therefore, the results achieved by Hess *et al.* cannot be simply extended to other indications with the assumption that similar results may be obtained. The investigators in this study utilized the FS operation more liberal, and in lieu of the DV procedure in patients with higher risks and more complex valve pathologies. The question, therefore, arises if this was a necessary evolution of this technique. BAVs, in particular, are very heterogenous valves and require an individualized approach [5]. Something that the FS technique will likely never be able to provide. Moreover, the liberal use of patch material should also be discouraged due to overall inferior long-term results.

Also, the investigators did not use FS in patients with large aneurysms. This, however, introduces a selection bias into their study. There is no clear equipoise between the 2 approaches, as they are not simply interchangeable. Nonetheless, the FS operation, in a majority of cases, requires cardiopulmonary bypass, cross-clamping and arresting of the heart and transection of the aorta, just as the DV operation. But the root dissection to the ventriculo-aortic junction and around the proximal coronary arteries, without coronary button mobilization, in our experience, is quite difficult. To obtain an effective annuloplasty, the graft must be placed at the level of the basal ring. This however can lead to coronary injuries, coronary compression, distortion of the valve, etc. Thus, the notion that FS is simpler, is therefore somewhat misleading. It is still major surgery, which requires a serious

aortic root dissection. And a shorter bypass time alone is no justification for employing FS over DV. The DV, if done right, is straightforward and very safe with excellent long-term outcomes, and applicability to any AV phenotype or disease mechanism (types 1, 2 and 3).

In our experience, different techniques can achieve good short- or intermediate-term results for up to 15 years, but the correct technique will also provide good long-term results. We have learned this from our BAV-repair experience [6]. The reimplantation technique allows for additional modification of valve geometry, which has led to excellent long-term outcomes, but further modifications of valve geometry are unlikely feasible with the FS technique. The authors are careful in their final conclusion however and admit that more information is needed. Meanwhile, we already know that the reimplantation technique can be safely taught and when mastered, it can certainly overall improve cardiopulmonary bypass and cross-clamp times. Thus, why further employ a technique with very limited indications and utility, while we already have a proven technique for every indication and disease type, especially BAV, with documented excellent outcomes [6]. If we have gained further insights from this study, then it is the knowledge that the FS technique cannot just be utilized in lieu of the reimplantation technique.

We welcome innovations, when it provides the necessary means to treat the entire gamut of AV and root pathologies, just

as previous techniques, possibly providing even better outcomes and safety. But extending the use of the FS beyond its' initial indication should be carefully revisited in our opinion, with greater scrutiny.

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