

The authors reported no conflicts of interest.

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to the young generations so that they can grow eliminating at least one of the many Hamletic doubts with which cardiac surgeons are daily faced.

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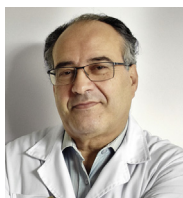
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<https://doi.org/10.1016/j.jtcvs.2020.09.136>



REPLY: AORTIC ROOT ENLARGEMENT, AGAIN AND AGAIN

Reply to the Editor:

In their Letter to the Editor published in this issue of the *Journal*, Martino and colleagues¹ comment on a recently published article by Tam and colleagues² on the subject of enlargement of the narrow aortic root (ARE) for implantation of a larger prosthesis than what the native annulus would otherwise permit. This article was accompanied by an invited commentary that I wrote.³ In the end, we all came out in favor of ARE; thus, there is not much to argue about in this letter, which was solicited by the Editor-in-Chief of the *Journal*.



However, this letter does serve to lend further support to 3 aspects related to the procedure. First, ARE is a relatively simple procedure and can be performed by any cardiac surgeon, irrespective of level of experience, after a short learning curve. As emphasized in my commentary, there are several simpler techniques than those originally described by Manoughian and Nicks, especially those that avoid interference with the anterior mitral valve leaflet, yet with similar efficacy. Curiously, neither Martino and colleagues nor Tam and colleagues detailed the techniques used in their respective experiences.

Second, the procedure has been demonstrated to be safe, with few added complications during surgery, and durable in the long term, with very low incidences of prosthetic dehiscence or aneurysmatic degeneration of the patch used for enlargement. Here, the only point still under discussion is the type of material used: fresh or glutaraldehyde-treated autologous pericardium, bovine pericardium, or synthetic patch. I have used bovine pericardium starting from the beginning in the 1980s, but autologous tissue is being increasingly used, again with long-term freedom from degeneration.

Third, ARE ordinarily achieves what it is meant to—that is, permits the insertion of a one- or two-size-larger prosthesis. The final sizing of the valve substitute must also consider the patient's body surface area, with the aid of readily available tables, to avoid patient-prosthesis mismatch (PPM). Here there is a difference between mechanical valves and bioprostheses, not only because the latter are usually slightly less hemodynamically efficient, but also because PPM appears to accelerate prosthetic biodegradation.

In summary, ARE has become an important tool in the cardiac surgeons' armamentarium and should be used more frequently. Some groups perform it in up to 20% of their cases, which matches my most recent experience. Furthermore, it can be performed by the vast majority of surgeons, even less experienced ones, which responds well to the plea by Martino and colleagues that it "should be taught to the young generations," preferably using simpler methods.

Citing Einstein, "everything should be made as simple as possible, but not simpler."

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<https://doi.org/10.1016/j.jtcvs.2020.10.143>



REPLY: FACT OR FICTION: THE BENEFIT OF AORTIC ROOT ENLARGEMENT DURING AORTIC VALVE REPLACEMENT
Reply to the Editor:



De Martino and colleagues¹ present an interesting perspective in their letter, suggesting that cardiac surgeons be trained in aortic root enlargement to prepare them for surgical conundrums they will invariably face in their career. Indeed, a cardiac surgeon's decision to perform root enlargement with aortic valve replacement (AVR) versus isolated AVR is not random, but rather based on tangible and imperceptible variables, including surgeon experience, baseline patient characteristics, and operative anatomy. Bearing this in mind, and acknowledging the lack of definitive randomized evidence on the subject, root enlargement with AVR cannot be assumed to be as safe as isolated AVR based solely on observational evidence.

In their study of 53 patients, Celiento and colleagues² found enlargement of the aortic annulus with AVR to be associated with an actuarial survival of 37% at a mean follow-up of 8.9 years. Tam and colleagues³ reported the safe addition of root enlargement to isolated AVR in terms of early mortality (root replacement with AVR vs isolated AVR: 2.0% vs 2.1%; $P = 1.00$) and late mortality (73.1% vs 75.4%; $P = .17$). Despite rigorous propensity matching, however, their data remain observational and thus must be interpreted in the context of important limitations. An environment of clinical and personal equipoise cannot be assumed in observational studies. Surgeons performing root enlargement are typically more experienced, and treatment allocation and performance biases are important hidden confounders. Preoperative aortic valve area and annular size are other important variables influencing the choice of technique, and in the absence of echocardiographic data, as in the study of Tam and colleagues, it is difficult to state whether root enlargement was performed only in patients who needed it for the placement of a larger valve. Other factors that may have influenced the choice of

operation include patient activity level, age, sex, and left ventricular function.⁴ For instance, the risk-to-benefit ratio of root enlargement would be more acceptable in a younger patient with a long life of vigorous physical activity ahead compared with an elderly, sedentary patient. As Bortolotti and colleagues remark, root enlargement itself is a heterogeneous procedure, and the observations of Tam and colleagues could not factor this in. Based on the current evidence, considering root enlargement with AVR to be associated with similar outcomes as isolated AVR is at best a hypothesis.

Although every effort must be made to avoid significant patient-prosthesis mismatch in AVR, the addition of root enlargement can lead to important complications and requires experience and careful planning. Only randomized allocation of sufficient number of patients to root enlargement with AVR and isolated AVR groups can allow equal baseline distribution of known and unknown confounders. Thus, it must be reiterated that it is only under these conditions that differences in outcomes between the groups can be attributed to true treatment effect and conclusions can be drawn. Until such evidence is available, each patient requires careful subjective and objective assessment to guide the choice of operation.

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