Commentary: The nature of aortic root disease, patients' prognoses, and Marcus Aurelius' *Meditations*

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Statue of the Roman Emperor and philosopher Marcus Aurelius, 121-180 AD, Rome, Italy.

Central Message

Depressed LVEF has a prognostic impact after root surgery, but it needs to be appreciated in the light of its pathophysiologic mechanism.

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Since the 2000s, the standardization of techniques and appropriateness of indications have rendered increasingly predictable the results of aortic root replacement surgery (ARR), which was once associated with remarkable operative risk. In current practice, extending the repair beyond the aortic annulus in elective cases of aneurysm disease (in patients with preserved left ventricular ejection fraction [LVEF] and in experienced centers) is associated with a mortality rate (0.7%¹) that evokes state-of-the-art, low-risk, primary isolated aortic valve replacement. One further, less hidden message of the current article by Langer and colleagues¹ consists in the prognostic impact on patients undergoing ARR of preoperatively depressed LVEF: early mortality increases to 5% in patients with preoperative LVEF between 50% and 40% and to 14% in patients with LVEF lower than 40%.

Such effect in the ARR cohort seems to be greater than observed in patient subgroups undergoing isolated aortic valve surgery or coronary revascularization with similarly depressed LVEF. This message represents the justification of this research paper and constitutes the basis to discuss prediction of outcomes, patient counseling, and projection of health care costs (hospital stay and the rate of several postoperative complications are also well stratified by LVEF subgroups). A restricted cubic spline curve is also appropriately presented, with the intent to evaluate a nonlinear relationship between LVEF (as a continuous variable) and an outcome (death). The authors must be commended for these insights, for the first time in an exclusive ARR series.

One first comment recalls the need for preoperative multimodal evaluation of the more severe cases in the perspective of advanced heart failure therapies (left ventricular assist devices or heart transplantation) should myocardial failure occur postoperatively. Hence, cooperation within heart failure centers is required for the safer management of these patients and guarantee a second-line strategy.

One second comment is the low number of patients included in the lower LVEF strata (8.4% and 10% of the global population), evoking the authors' preoperative patient selection and refusal of an unknown number of cases presenting with depressed LVEF. In the interpretation of results, the possibility of selection bias in that sense should be considered.

As a third comment, information about the underlying pathophysiologic mechanisms leading to LV dysfunction is lacking from the present manuscript. In the great majority of patients receiving ARR for thoracic aortic aneurysm (and despite that mixed indications to surgery were encompassed herein, including infective endocarditis and acute dissection), depressed LVEF is likely related to aortic valve dysfunction in these patients. As a lesson learned from aortic valve surgery, the immediate postoperative behavior of a failing LV (as well as the chances of reverse remodeling in the long term) can be significantly different according to the modality of valve failure associated with depressed LVEF, in particular, predominant valve regurgitation (with chronic volume overload and dilated LV cavity) versus severe valve stenosis (where valve replacement yields immediate relief of pressure overload). Such information, beyond crude LVEF value and its interpretation on the basis of cubic spline analysis, must be considered for both a rational appreciation of prognosis and patient counseling and is lacking in the current paper. Other variables to be evaluated are the degree of LV dilatation, the thickness of the LV myocardium, and the residual transvalvular gradient. As

indicated by Marcus Aurelius in his second-century *Meditations*, the first step in approaching a problem should rely on the appreciation of its nature: “This thing, what is it in itself, in its own constitution? What is its substance and material? And what its causal nature (or form)?”²

References

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2. *The Meditations of Marcus Aurelius Antoninus*. Translated by George Long 1862. Book VIII, 11. Charleston, SC: Nabu Press; 2010.