Everybody is different: A plea for individualizing treatment of aortopathy

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Two different individuals dancing the rhythm of life, sculpted in bog oak by the author.

Central Message

Current aortopathy guidelines in bicuspid aortic valve are a solid basis for general decision making; evolution needs iteration of knowledge for individualization to approach the optimal treatment.

See Article page 473.

*The gods did not reveal, from the beginning,
All things to us, but in the course of time
Through seeking we may learn and know things better.
But as for certain truth, no man has known it,
Nor shall he know it, neither of the gods
Nor yet of all the things of which I speak.
For even if by chance he were to utter
The final truth, he would himself not know it:
For all is but a woven web of guesses.*

—Xenophanes (c 570-475 BCE)

Everybody is genetically different living in a different environment—the rhythm of life. The resulting phenotype, such as aortopathy in patients with a bicuspid aortic valve, is unique, calling for individual treatment.¹ To find the optimal treatment or final truth would require performing competing procedures in the same patients at the same time. This is impossible, ergo we cannot find the final truth.² The next hope lies in randomized trials; however, these are not available, so we are left with knowledge from observational studies. Borger and colleagues³ are to be congratulated for the great efforts in condensing the best available knowledge and evidence in the executive summary of the American Association for Thoracic Surgery guidelines on bicuspid aortic valve-related aortopathy presented in this issue of the *Journal*, giving us clinicians a welcome background, a guide as well as a safe feeling of general decision making.

The guidelines, however, are based mainly on an absolute diameter, leaving some kind of uncertainty for the individual patient, which is newly inflamed by reporting that dissection has occurred at a mean diameter of 40.1 mm, which is lower than assumed.⁴ This is in part related to the fact that the aortic wall ruptures when the wall stress exceeds the tensile strength of the tissue (safe knowledge), whereby wall stress is related not only the diameter but also to the pressure and the quality of wall tissue (Law of Laplace). For wall stress calculation, the doubling of

pressure, which is possible during exercise or emotional stress, is the same as doubling the diameter, indicating that blood pressure is a real enemy that can change instantaneously and unpredictably. Normally, this is uneventful; in patients with bicuspid aortic valve, however, the quality of the wall tissue is inferior to normal, resulting in a higher incidence of dissection than in the general population.⁵ This situation is not fully satisfying, calling for improving guidelines by identifying and integrating new risk factors. Some new factors are emerging, such as aortic regurgitation, growth of aorta, aortic wall thickness, family history, and phenotype complex. These are already listed in the executive summary, providing a gentle hint for a more individual approach. However, how do the age, body surface area, and sex relate to the diameter? A 41-mm diameter in a 1.6-m² body surface area woman at 21 years of age, which is more than 50% larger than normal and by definition an aneurysm, is more pathologic than a 41-mm diameter in a 2.2 m² body surface area man at 70 years of age.⁶ These aspects need further evaluation to approach individualized treatment (Figure 1).^{7,8} By the way, do we know whether aortopathy is related to nutrition, such as occurs in bees, in which the phenotype is changed by nutrition-induced methylation,⁹ and might it become possible to normalize aortic wall tissue by gene manipulation or drugs¹⁰?