Anatomic Insights Regarding Srivastava and Srivastava’s Correction Factor for Calculating the Diameter of the Virtual Aortic Annulus from the Distance between the Hinge Points of the Right and Noncoronary Cusps

To the Editor:

Correct measurement of the diameter of the virtual annulus of the aortic valve is important for estimating prosthetic size and for measuring aortic valve area using the continuity equation. When measuring the diameter of the virtual annulus in the parasternal long-axis view, it is important to recognize when a chord, particularly one that connects the nadirs of the noncoronary cusp (NCC) and the right coronary cusp (RCC), has instead been measured (Figure 1). This is suggested when the hinge points of both cusps are seen at the bases of their respective sinuses in systole and the line of closure of the aortic valve appears in the midline of the aortic root during diastole (Figure 1).

In the November 2021 issue of Journal of the American Society of Echocardiography, Srivastava and Srivastava proposed a novel way to ascertain the diameter of the virtual annulus when a chord, as previously described, has instead been measured. Based on geometric considerations, the authors suggest that the diameter of the virtual annulus can be calculated by multiplying chordal length by a correction factor of 1.154. It is, however, important to point out that the mathematical derivation of this correction factor relies on the anatomic assumption that the nadirs of all three aortic cusps are equidistant from one another. Since the three aortic cusps are, as a rule, unequal (right > non > left), this may not necessarily hold true. The derivation of this correction factor also rests on the assumption that the geometric center of the virtual annulus is the same as its anatomic center, which is often not the case.

In light of these considerations, it seems prudent that the correction factor proposed by Srivastava and Srivastava be validated experimentally before it is used in daily clinical practice.

Jeffrey J. Silbiger, MD
Matthew Cagliostro, MD, MPH
Icahn School of Medicine at Mount Sinai
Elmhurst, New York

Figure 1  (A) The measurement running from the RCC to the NCC (blue double-headed arrow) represents a chord. (B) When the same measurement is made in the parasternal long-axis view during systole (red double-headed arrow), the hinge points of both cusps are seen at the bases of their respective sinuses. (C) During diastole, when the aortic cusps close, their line of coaptation falls along the midline of the root. (D) Drawing of the aortic root: The red dots indicate the location of the hinge points in panel B. (E) The measurement running from the RCC to the base of the posterior interleaflet triangle (ILT) (yellow double-headed arrow), represents the true diameter of the virtual annulus. (F) When the same measurement is made in the parasternal long-axis view (red double-headed arrow), it spans from the hinge point of the RCC (at the base of the aortic root) to the point where the ILT and the AMC meet (asterisk). (G) Note that when the aortic valve cusps close, their line of coaptation is seen posterior to the midline of the aortic root (arrowhead). (H) The red dots indicate the location of the hinge points in panel F. Panels A and E were reproduced with permission from (2). AMC, Aorto-mitral curtain; IVS, interventricular septum; LCC, left coronary cusp; NCC, non-coronary cusp; RCC, right coronary cusp.

Conflicts of Interest: J.J.S. is member of the speakers’ bureau of Lantheus Medical Imaging.
Reprint requests: Jeffrey J. Silbiger, MD, Echocardiography Laboratory, Department of Cardiology, Elmhurst Hospital Center, Icahn School of Medicine at Mount Sinai, 79-01 Broadway, Room D3-24C, Elmhurst, NY 11373. (E-mail: jeffrey.silbiger@mssm.edu.)
REFERENCES


https://doi.org/10.1016/j.echo.2021.11.009