Indexed Aortic Area in Bicuspid Valve Disease

An Important Step Toward a More Personalized Approach to Risk Prediction and Clinical Decision Making

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Never put off until tomorrow what you can do the day after tomorrow.

—Mark Twain

The decision to undertake thoracic aortic repair in patients with progressive aortic dilation in the setting of bicuspid aortic valvular disease remains a point of much discussion and continuing investigation. The ongoing work to find an optimal cutoff value for intervention that balances surgical risk and risk of dissection or rupture to optimize patient care is perhaps best reflected in the most recent American College of Cardiology/American Heart Association guidelines (2014) that recommended a 5.5 cm threshold for surgery in regard to patients with bicuspid valves. This is a notable change from the 2010 guidelines which cited a 5 cm threshold. These thresholds have informed clinical decisions for decades but are inherently limited because they do not adjust for patient size (body surface area or height) or sex. Growing awareness of the limitations of unadjusted 2-dimensional measurements of the aorta has driven a desire for further refinement of noninvasive risk assessment leading to the introduction of the concept of the ratio of aortic area:height. Importantly, a threshold of ≥10 cm²/m has been shown to be strongly prognostic on a large scale inclusive of assessment of prognostic use for mortality.1

In this issue of Circulation: Cardiovascular Imaging, Masri et al10 from the Cleveland Clinic provide data as to the clinical use of indexed aortic area for risk stratification in a population of 969 bicuspid aortic valve (BAV) patients followed for a median of 10.8 years (Interquartile Range, 9.6–12.3). Using either aortic root or ascending aorta area:patient height ratio, the authors report an increased hazard for cardiovascular death and the downstream structural components of the aortic wall or some combination of cardioprotective signaling molecules that thereby establish a milieu promoting pathology within the aortic wall. Such cellular changes inevitably lead to pathological changes in overall aortic physiology and altered biomechanics that are reflected in studies showing reduced aortic elasticity and increased stiffness in BAV and associated with poor cardiovascular outcomes. How to directly assess such physiological and cellular changes through imaging remains in development. Although such goals may seem far out of reach, the potential for using magnetic resonance imaging with specific contrast agents targeting key structural components of the aortic wall or some combination of imaging with risk stratification based on genetics associated with BAV aortopathy or the use of circulating biomarkers that have been recently reviewed and proposed for BAV aortopathy prediction exists. Although the maturation of such techniques and subsequent integration into mainstream practice holds promise, the current analysis by Masri et al10 allows the field to move forward toward better risk prediction, thereby enabling more informed clinical decisionmaking. Ultimately though, for these data to be truly impactful, adjusted aortic area to guide surgical intervention needs to be validated prospectively in a randomized multicenter trial showing improved clinical outcomes when compared with the traditional approach of using nonindexed aortic.
Disclosures

Dr. Leipsic serves as a consultant for Edwards Lifesciences, and provides core lab services for Edwards Lifesciences, Medtronic, Tendyne, and NeoVasc. The other authors report no conflicts.

References

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Key Words: Editorials ■ aorta ■ aortic valve ■ bicuspid ■ endothelium ■ risk assessment

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Circ Cardiovasc Imaging. 2017;10:e006593
doi: 10.1161/CIRCIMAGING.117.006593
Circulation: Cardiovascular Imaging is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 1941-9651. Online ISSN: 1942-0080

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circimaging.ahajournals.org/content/10/6/e006593

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