Echocardiographic Assessment of Complete Atrioventricular Canal Defects: A Balancing Act

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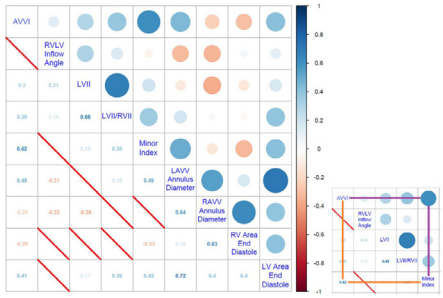
Unbalanced atrioventricular septal defects (AVSDs) exist on a spectrum. While the decision-making process to pursue univentricular physiology in cases of severe unbalance remains straightforward, milder cases present true diagnostic and treatment dilemmas.[1] Clearly, the goal should always be for a successful 2-ventricular repair whenever possible, as patients realize a significant long-term benefit over single ventricle physiology. However, diagnostic miscalculation of candidacy for biventricular repair can be severe and unforgiving. To date, echocardiographic assessment, including detailed morphometric analysis, has served a crucial role in determining the feasibility for biventricular reconstruction.[2–4]

In this issue of *Seminars in Thoracic and Cardiovascular Surgery*, Meza et al from the Congenital Heart Surgeons' Society (CHSS) applied a rich, multi-institutional CHSS data set of infants with unrepaired AVSDs to determine correlations among commonly used echocardiographic indices of unbalance and with measures of ventricular and common atrioventricular valve sizes.[5] The authors conclude that all regularly assessed echocardiographic measures of unbalance correlate poorly with one another, as well as with measures of ventricular and common valve sizes. The study employs an exhaustive look at interrelationships within the data set, maintaining rigorous quality assurance by the use of an established protocol for image acquisition[6] and a single echocardiographic reviewer, which makes the results both trusted and a valuable contribution to the field, but additionally, all the more unsatisfying to the practitioners charged with the decision to pursue single vs biventricular repair.

Admittedly, the degree to which correlation lacked in this study was surprising. Based on correlations with ventricular size, none of these measures appear to capture or quantify "unbalance" appropriately. The authors make an important point in recommending against the use of these measures in isolation for surgical decision-making. Quite simply, it just seems as if unbalance and the adequacy of the atrioventricular valves are incredibly complex entities. The study does not provide guidance as to how to best proceed in making crucial clinical decisions going forward with respect to assessing severity of unbalance in AVSDs. Rather, we are simply informed that our current measures are woefully inadequate. Perhaps a more sophisticated analysis technique, such as machine learning utilizing another unsupervised cluster would unmask correlations. However, this approach would only query established parameters. Potentially a whole new parameter is needed which would require some sort of unsupervised analysis to segment the overall population into groups that do not have any clinical bias attached to them. Alternatively, unbalance may be an entity that is best analyzed through a combination of functional and anatomic analyses. As such, computerized modeling or computational flow dynamics analysis may be required to elucidate subtle differences reflected by the degree of unbalance.

Meza et al should be congratulated for shedding light on our current inadequacies in assessing the degree of unbalance in AVSDs. Hopefully, this work will stimulate more investigations and eventually result in clear, data-driven guidelines for determining the appropriateness of single- vs 2-ventricular repair in



Correlogram demonstrating poor correlation between various echocardiographic measures of unbalance in AVSDs (1).

Central Message

Established echocardiographic measures of unbalance in AVSDs correlate poorly with one another and with measures of ventricular and common valve dimensions.

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this complex patient population, making this assessment less of a perceived balancing act.

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