Flow equals grow? Dunno!

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During the past several decades, there has been growing enthusiasm to consider 2-ventricle conversion for those patients with palliated single-ventricle anatomy with enough potential to warrant consideration. Although this is rarely a straightforward choice, the decision becomes considerably more complex when the systemic ventricle is borderline in size, and most strategies that might promote ventricular growth remain largely theoretical. In this issue of the *Journal*, the Boston group of Oladunjoye and colleagues¹ describe their short-term experience with atrial septal restriction (without ventricular septal defect closure) as a recruitment tactic to improve candidacy for ultimate 2-ventricle conversion.

Of the 21 patients in the cohort, 86% had undergone a previous palliative procedure, and most had a hypoplastic left ventricle. Of the total, 70% ultimately reached biventricular conversion; notably, however, 2 of those patients died, and of the remaining 6 patients awaiting conversion, 2 are listed for transplant, and 1 has undergone a Fontan procedure. Importantly, the study was not intending to determine superiority of 2-ventricle conversion strategies relative to the Fontan procedure, and indeed many patients in the study cohort were otherwise considered prohibitively high-risk Fontan candidates.

Instead, Oladunjoye and colleagues¹ document ventricular growth after partial or full atrial septal restriction (without closing the ventricular septal defect) as a strategy to encourage forward flow in those patients in whom the left atrioventricular valve inflow was deemed adequate. The strategy draws on the Boston group's earlier work, which demonstrated increases in ventricular dimensions with atrial restriction.² Putting aside the challenges of lack of magnetic resonance imaging normative values, as well as the difficulty of echocardiographic anatomic assessment of valve dimensions and ventricular volumes in the unrepaired unbalanced atrioventricular canal, it remains purely speculative whether the increased flow encouraged by atrial restriction was a cause of ventricular growth. Indeed, in the absence of a control group, one cannot refute the null hypothesis that ventricular growth would have occurred with or without any atrial restriction at all.

Optimizing candidacy for 2-ventricle conversion requires careful strategy and planning.

Central Message

Patients with borderline systemic ventricles in the study cohort demonstrated ventricular growth after atrial septal restriction; the causality of this relationship is unknown but promising.

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The technique of Oladunjoye and colleagues¹ is straightforward and involves patch closure of the atrial defect (anchoring the patch along the common atrioventricular valve) with a 4-mm punch fenestration irrespective of patient size. The longer term hemodynamic effects of this restriction were not analyzed, and naturally the risk of left atrial hypertension at this stage (and with ultimate 2-ventricle conversion) remains unquantifiable, but not insignificant.² Moreover, if one considers the increased pulmonary venous return from shunt flow in a subset of the cohort, the choice of fenestration aperture size further becomes a Goldilocks paradox.

The Boston group, as always, are to be credited for examining provocative strategies to enhance congenital cardiac care. Indeed, for those who are poor Fontan candidates, the option of a salvage high-risk 2-ventricle conversion may be the best of bad choices. For others, the chess game is more intricate—28% of those who underwent 2-ventricle conversion in this cohort required reoperation in less than 5 months, and 65% required a right ventricle-to-pulmonary artery conduit that will require obligate exchange.¹ The ultimate question remains whether any interval procedures—such as atrial septal restriction—truly change the ultimate outcome, and thereby help to guide our therapeutic decision making for staged strategies.

References

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