Subjectivity matters

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Disclosures: Author has nothing to disclose with regard to commercial support.

Received for publication Aug 12, 2017; accepted for publication Aug 19, 2017; available ahead of print Sept 28, 2017.

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J Thorac Cardiovasc Surg 2017;154:2044-5

0022-5223/\$36.00

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<http://dx.doi.org/10.1016/j.jtcvs.2017.08.068>

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Central Message

Conal realignment not only enlarges the subaortic area anatomically but may lead to improved laminar flow in the left ventricular outflow tract.

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Many studies have evaluated surgical techniques to relieve stenosis and the risk of recurrent subaortic obstruction necessitating reoperation in patients with interrupted aortic arch and left ventricular outflow tract (LVOT) obstruction. In this issue of the *Journal*, Soquet and colleagues¹ report their experience with modified direct closure of the ventricular septal defect (VSD) in 5 patients. The technique aims at alignment of the deviated conal septum without resection, thereby enlarging the subaortic outflow tract. The presented technique convinces through simplicity and the thoughtful approach to the mechanism of LVOT obstruction. The results, although limited by the small number of patients, are good, with only 1 patient needing subsequent resection of recurrent obstruction.

The technique presented by Soquet and colleagues¹ is not entirely new and shares concepts with other reports in various pathologic settings of malalignment of the conal septum.²⁻⁴ Luciani and associates² used left-sided placement of the VSD patch to pull the conal septum out of the outflow tract into the plane of the ventricular septum. Fulton and coworkers³ described the use of an intentionally small VSD patch to avoid bulging into the LVOT. Till and associates⁴ reported a modification of VSD closure in tetralogy of Fallot to realign the LVOT by using either direct or patch closure of the VSD. These approaches shift the conal septum to achieve a more homogeneous outflow tract.

Studies have indicated that it is not the degree of LVOT obstruction but rather the size of the aortic valve annulus that puts a patient at risk for outflow tract reinterventions.⁵ This may be caused by the relative underestimation of LVOT gradients in the setting of an unrestrictive VSD and the resulting difficulty in objectifying severity of obstruction. Adequate growth has been suggested in patients without addressing subaortic obstruction as well,⁶ and decision making is preferably guided by aortic valve rather than LVOT dimensions. Patients with annular diameters (in millimeters) smaller than the patient's weight (in kilograms) are deemed at high risk for recurrent obstruction.^{7,8} But even in patients with aortic annular

dimensions (in millimeters) larger than body weight (in kilograms) + 1 mm, who additionally show deviation of the conal septum, the rate of reoperation remains strikingly high.⁸ Addressing the conal malalignment is therefore an essential component in achieving enduring relief of the obstruction.

Although the technique offers a thoughtful approach to subaortic obstruction in interrupted aortic arch, the selection criteria of Soquet and colleagues¹ complicate the interpretation. The choice of adequate aortic valve diameters of 4 mm and 5 mm in patients weighing less and more than 3 kg, respectively, selects patients with a lower risk of reintervention. It is also questionable whether an undersized VSD patch indeed increases its malalignment with the conal septum significantly in systole and whether direct closure should be preferred. Unfortunately, there are few details mentioned regarding the characteristics of the VSD and whether size and extent were considered when selecting patients to undergo the modified technique.

The intriguing hypothesis of the surgical approach presented by Soquet and colleagues,¹ ie, the alignment of the outflow tract with the ventricular septum, not only enlarges the subaortic area anatomically but may lead to improved laminar flow as well, thereby decreasing the risk for recurrence of obstruction even further. It would be exciting to see detailed analysis of intraventricular flow patterns by 4-dimensional magnetic resonance flow imaging or computational fluid dynamics to objectify further what we subjectively consider a physiologically appropriate shape of the LVOT.

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