Commentary: What is the best surgical technique to repair partial anomalous pulmonary venous return into the superior vena cava? We still do not know

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Central Message

The double-decker technique is a promising procedure for PAPVR to the SVC. But a way to select the technique that brings the best hemodynamics and outcomes for a specific patient's anatomy is needed.

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In this issue of the *Journal*, Hongu and colleagues¹ from Kyoto describe an innovative technique for partial anomalous pulmonary venous return to the superior vena cava (SVC) that is based on a double-barreled arrangement of systemic and pulmonary venous channels. They demonstrate promising results, with no supraventricular arrhythmias and no systemic or pulmonary venous obstruction in a series of 21 patients operated on during a span of 20 years with a median follow-up period of 11.0 years. Advantages of this technique are numerous: (1) the limited atriotomy is away from the sinus node, sinus nodal artery, and crista terminalis; (2) there is no incision across the cavoatrial junction; (3) an anastomosis of the entire circumference of the venous channels is avoided; and (4) both channels keep a growth potential. Their use of a 4-dimensional flow magnetic resonance imaging to calculate blood flow volumes, wall shear stress, and flow patterns is also of interest.

The outcomes of this technique are promising. Nevertheless, the small series of patients (21 during 20 years of practice) does not allow Hongu and colleagues¹ to state in a definitive way that postoperative complications are entirely avoided. A larger and multicentric series of patients is needed to formulate such a statement. Second, the anastomosis of the systemic channel beyond the sinoatrial nodal artery decreases the risk of injury to the sinus node. Things are not so simple in real life, however, because the exact location of the sinus node and this artery can vary, and the tension of the anastomosis of the systemic channel can compress the sinus node or the artery. Third, when the pulmonary veins enter high in the SVC or there is a lack of atrial tissue to work with, this technique brings a risk of kinking of the SVC–right atrial junction if too much tension is applied to the advancing flap of right atrial appendage to reach the SVC. Hongu and colleagues¹ state that

supplemental material is necessary only in exceptional cases, but this still represents 6 of 21 patients in the series. Fourth, the growth potential of the channels is not an appanage of the double-decker technique, and, although a flap of autologous pericardium may have growth potential,^{2,3} it is still controversial whether a patch does.

Despite these limits, the group from Kyoto¹ reports remarkable outcomes of an astute and ingenious new surgical technique to repair partial anomalous pulmonary venous return to the SVC, and they are to be congratulated for this significant contribution. We have now an additional technique to our armamentarium to treat this condition. The Warden, patch (single or double), and double-decker techniques are complementary options, with choice depending on the location of the sinus node artery, right atrial dilation, location of the pulmonary veins, SVC size, and so on. The next step that our community should focus on now is collaboration with engineers to apply the progress of computational modeling to this clinical question and set up a patient-based computational model to predict which technique would lead to less turbulent flow, and thus to the best long-term outcomes, for a specific patient with a specific anatomy, offering a personalized, tailored, and optimized decision for each patient.

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