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Commentary: Innovation in the clinical care of congenital heart defects: Surgeons can and need to weigh in

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Tannous and Nugent¹ offer a very interesting perspective on interventionalists' current thinking and approach to transcatheter pulmonary valve replacement (PVR) for native right ventricle outflow tract (RVOT), the limitations of available devices, and what technologies could become available in the near term. They conclude that transcatheter PVR will become an option for most patients with native RVOT.

This is great news for patients. But there is still a world of uncertainties before transcatheter PVR becomes a safe, widely used, and sustainable option. The durability of transcatheter valves in a native/nonconduit RVOT is still unknown. Selection criteria and the influence of variable anatomy on device performance need to be investigated. The long-term outcomes of valve-in-valve procedures in this highly heterogeneous population remain to be shown.

Once these questions are answered, transcatheter-deployed bioprostheses will not be a panacea anyway. The valves currently being delivered still come with an

CENTRAL MESSAGE

Transcatheter technology offers less-invasive options to patients with native outflow tract but are not a panacea. Surgeons need to play an active role in innovation to develop disruptive devices.

inevitable risk of structural degeneration. These patients have an excellent life expectancy and start the clock of repeat PVR quite early in life. Multiple valve-in-valve transcatheter PVR procedures carry a risk of vascular injury, tricuspid valve injury, and the intracardiac accumulation of large amounts of materials.

Despite these uncertainties and limitations, interventionalists deserve thunderous applause for making the field advance. But sustainable and durable valve replacement in the congenital (especially growing) population remain an unmet clinical need, and there is a lot of room for innovation. Surgeons can weigh in. Surgeons need to weigh in. And surgeons can play a significant role at multiple levels.

On the clinical side, the surgical community needs to keep pushing for sparing the valve at the initial surgery and repairing the valve at redo surgery. Surgeons need to play a proactive role on multidisciplinary teams that include interventionalists and imaging cardiologists to counsel and educate patients on the pros and cons of all options.

On the research side, surgeons (and surgeon-scientists) are ideally placed to develop both evolutionary and revolutionary innovative solutions. Developing a new antistructural

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Disclosures: The author reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Sept 11, 2020; revisions received Sept 11, 2020; accepted for publication Sept 14, 2020; available ahead of print Sept 18, 2020.

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J Thorac Cardiovasc Surg 2021;162:972-3

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.09.050>

degeneration process for animal-derived tissue would bring more benefit to patients than designing a new transcatheter device based on a regular porcine or pericardial bioprosthesis. Surgeons can lead a collaboration with polymer scientists to develop a biostable and biocompatible polymeric material design to withstand the mechanical microenvironment of a cardiac valve.² Developing an autologous and living valve by tissue engineering is a complex task but needs more brains to be accomplished. Expandable valves or valved conduits that can be implanted surgically in a neonate and expanded at the catheterization lab multiple times to accommodate the growth without implanting a new device each time are currently being developed by some surgeon-scientists.^{3,4}

As Tannous and Nugent¹ nicely show, transcatheter PVR will be a good solution for many patients with native RVOT. But let's not be blinded by transcatheter innovations that

still expose patients to repeat procedures. Let's think disruptive. Let's think revolutionary. Let's think as surgeons.

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Commentary: Transcatheter valve therapy for the right ventricular outflow tract: Right as rain, ready for Roger

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Transcatheter therapy revolutionized the care of pediatric and adult patients with congenital heart disease. More than 2 decades have passed since the introduction of transcatheter pulmonary valve (TPV) implantation by Bonhoeffer and colleagues,¹ which resulted in significant paradigm shift in the way we think about the right

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CENTRAL MESSAGE

Transcatheter pulmonary valve implantation in both native and nonconduit-related right ventricular outflow tract is a valid alternative to standard surgery. Long-term data are needed.

ventricular outflow tract (RVOT). Although the most common underlying indication for TPV is previous surgical repair of tetralogy of Fallot (ToF) with pulmonary stenosis, a fair number of patients have pulmonary atresia with primary transcatheter intervention to open the RVOT.

The indications for pulmonary valve replacement have been clear and the majority of these patients present with chronic free pulmonary regurgitation with evidence of right ventricular volume overload. Transcatheter

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The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Sept 13, 2020; revisions received Sept 13, 2020; accepted for publication Sept 14, 2020; available ahead of print Sept 18, 2020.

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J Thorac Cardiovasc Surg 2021;162:973-4

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.09.047>