A coronary and a cusp

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Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Oct 22, 2018; accepted for publication Oct 23, 2018.

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J Thorac Cardiovasc Surg 2019;157:712-3

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2018.10.113>

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Central Message

The authors performed unroofing of an intramural left coronary artery with tricuspidization of a severely insufficient quadricuspid truncal valve in a 2.8-kg neonate with type I truncus arteriosus.

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The surgical repair of truncus arteriosus can be complex when associated with anatomic variants such as truncal valve abnormalities, anomalous coronary arteries, and interrupted aortic arch. Indeed, severe truncal valve regurgitation and coronary artery abnormalities are known to be independent risk factors for increased surgical mortality.¹ Heretofore, surgical techniques aimed at repairing truncal valve regurgitation have included, among others, the approximation of cusps to convert a quadricuspid to a tricuspid or bicuspid valve, the addition of cusp extensions, various annuloplasty techniques, and cusp/sinus excision with annular remodeling, sometimes with coronary artery translocation.² In this case report by Konstantinov and colleagues,³ an intramural left coronary artery, intimately associated with the rudimentary cusp of a severely regurgitant quadricuspid truncal valve in a 2.8-kg neonate, constituted an extraordinarily high-risk and complex surgical challenge.

Konstantinov and colleagues³ did not identify the intramural coronary artery preoperatively, and although this anomaly has been reported using preoperative transesophageal echocardiography,⁴ this forewarning must be the exception rather than the rule. This underscores the importance of performing a careful examination of the coronary artery anatomy after opening the truncal root to avoid the potential development of a catastrophic low cardiac output state postoperatively.⁵ The authors elected not to use fine sutures to reapproximate the intimal edges of the unroofed left coronary artery and the truncal root, a technique frequently used by other surgeons to minimize the possibility of developing a localized dissection at the translocated orifice of the unroofed coronary artery.⁶

The intramural course of the left coronary artery passed behind one commissure of the rudimentary cusp, through the wall of the sinus supporting this cusp, and exited the truncal root near the opposite commissure. This coronary anatomy precluded using the previously described technique of total resection of the rudimentary cusp with its

sinus.² Rather, Konstantinov and colleagues³ were compelled to devise an innovative and novel technique consisting of partial excision of the rudimentary cusp and sinus followed by reduction of the truncal annulus and root. A new left coronary cusp was then created by suturing the unexcised portion of the rudimentary cusp to the adjacent cusp that had been freed by commissural detachment, thereby transforming the severely regurgitant quadricuspid truncal valve into a competent tricuspid truncal valve. The accompanying video is a high-fidelity supplement to the elegant illustrations and clear article in describing the details of this unique and delicate procedure.

Konstantinov and colleagues³ report excellent clinical and echocardiographic results at 3 months follow-up. However, as with any new aortic/truncal valve repair technique, its merit will be determined by its results over the long term. One could speculate that the most vulnerable aspect of the repair, regarding its potential longer-term results, would be the durability of the newly constructed left coronary cusp. Pending further reports on its durability, this inventive technique should be considered when faced with a similar patient with truncus arteriosus, a severely regurgitant truncal valve, and this unique relationship between a coronary and a cusp.

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