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Commentary: Truncal valve repair—different philosophies drive different strategies

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In the March 2019 issue of the *Journal*, Fujita and colleagues¹ from Japan report a surgical technique that they have used for truncal valve repair in 2 small children (4 months old and 1 year old) with quadricuspid truncal valves. Their philosophy is that truncal valve cusps are dysplastic and fragile, and the principle of their surgical technique is therefore performing subtotal excision of those dysplastic cusps (while preserving basal and commissural portions) and reconstructing them with ethanol-treated autologous pericardial extensions in a way to create a tricuspid valve. In both patients, postoperative echocardiography showed mild truncal valve regurgitation. On follow-up, 1 patient has moderate regurgitation 2 years after repair. The second patient, who initially had the ventricular septal defect left open, underwent closure of the defect 20 months after the initial surgery; by that time, this patient had moderate regurgitation requiring revision of the repair and has mild regurgitation 1 year after this last operation. Fujita and colleagues¹ stress that their technique did not cause valve stenosis and that it prevented heart failure and permitted annular growth, thus making it a meaningful bridge procedure until truncal valve replacement.

Significant truncal valve regurgitation is indeed a challenging problem in patients with truncus arteriosus. A number of studies have found significant truncal valve regurgitation to be associated with decreased early and late survivals after truncus arteriosus repair.^{2,3} Concomitant truncal valve surgery is also associated with a considerably high operative mortality risk.⁴ Truncal valve repair has been attempted simultaneously with or subsequent to truncus arteriosus surgery, and various techniques have been

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CENTRAL MESSAGE

Truncal valve repair with subtotal excision of dysplastic cusps and pericardial extensions is a valuable technique; however, methods that utilize native tissue should be considered the first choice.

described to fix those dysplastic valves.⁵⁻⁷ Although several groups have reported early improvement in valve regurgitation, the durability of repair has varied. A relatively large study from Boston (n = 36 patients) showed that freedoms from truncal valve reoperation after truncal valve repair were 91%, 55%, and 23% at 1, 5, and 10 years of follow-up.⁷ Other series have shown higher freedoms from reoperation, although many patients still had moderate regurgitation on follow-up.^{5,6} Needless to say, those results are suboptimal, and they can be attributed to the rarity of this disease and the heterogeneous array of valve dysplasia among those patients, subsequently decreasing individual experience and precluding the design of a uniformly successful surgical strategy to repair those diverse valve abnormalities.

Fujita and colleagues¹ recognized the limitations of traditional truncal valve repair techniques and based their current strategy on subtotal excision of the dysplastic cusps and the use of ethanol-treated autologous pericardium to extend those cusps and create a tricuspid aortic valve. Their viewpoint on this problem directed the design of their surgical approach, which discards the bulk of the native truncal valve cusps. Whether others should adopt the same repair model as first-line surgical therapy is questionable for several reasons: (1) Previous attempts to repair the aortic valve with cusp extensions in children with various valve

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pathologies, although initially successful, have been beset by late failure, which is generally attributed to degeneration and calcification of the patch material.^{8,9} (2) The early results of the 2 patients in the current report of Fujita and colleagues¹ do not seem to offer substantial improvement relative to published outcomes of established repair techniques. (3) Postrepair stenosis and lack of annular growth are not necessarily complications of the usual repair techniques. (4) New concepts of aortic valve repair with refinements in cusp reconstruction to increase effective height, correct prolapse, and increase coaptation area, in addition to annular reduction and stabilization, have all recently gained popularity and greatly increased the congenital aortic valve repair success rate.¹⁰ Those techniques have been applied in bicuspid and tricuspid aortic valve pathologies, in addition to other forms of congenital aortic valve disease, including failing Ross repair and aortic valve prolapse with ventricular septal defect, and after surgical repair of transposition of the great arteries and truncus arteriosus. I have personally performed all different truncal valve repair techniques; in my most recent 2 patients, I used the previously mentioned approach that used native tissue to create a tricuspid valve with adequate cusp height plus annular reduction, and my early results are encouraging. I believe that the recent superior results reported in aortic valve repair with those techniques are promising and can be potentially extrapolated to other congenital aortic valve pathologies, including truncal valve disease.¹⁰

In summary, philosophy drives strategy, consequently leading to wide variations in management approaches. Given the lack of optimal patch material in aortic cusp reconstruction, a strategy that uses native tissue and avoids extension is likely to be more successful. Results of current

modifications in aortic valve repair with native tissue are favorable and likely extendable to various forms of aortic valve disease. I therefore feel that the contribution by Fujita and colleagues¹ from Japan should not be considered a first-line surgical strategy in the repair of truncal valve, but rather a valuable technique in the armamentarium of surgeons that is reserved to those who are failed by other strategies.

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