Valve-sparing root surgery in congenital heart disease—*Shoulda, coulda...*

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Central Message

Valve-sparing root surgery can be applied to many patients with aortic abnormalities in congenital heart disease.

See Article page e175.

The traditional indications for aortic valve preservation during root replacement (valve-sparing root replacement [VSRR]) include connective tissue disorders (Marfan and Loeys-Dietz syndromes), bicuspid aortic valve, and selected congenital heart defects. Patients with congenital heart disease (CHD) include those with (1) conotruncal abnormalities (tetralogy of Fallot, pulmonary atresia with ventricular septal defect, truncus arteriosus, and transposition of the great arteries), (2) palliated single-ventricle physiology, and (3) previous arterial switch or Ross procedures.¹

There is general consensus that the “reimplantation” technique (as opposed to the “remodeling” technique) is the preferred method, and the indications for prophylactic operation have been most clearly defined for the connective tissue disorders. Controversy exists as to the optimal timing for surgery on the aortic root in the case of CHD, in part because of the very low incidences of dissection and rupture.² At present, most congenital and aortic surgeons believe that the threshold for intervention in the patient with CHD is higher, usually an aortic diameter of at least 55 mm, or smaller aortas when other coexisting factors are present, such as aortic regurgitation (AR) or other right-sided cardiac lesions requiring operation (eg, pulmonary valve replacement).^{2,3}

The “shoulda” category of patients with CHD, patients who “should” have a VSRR, includes those with isolated root disease with an enlarging aorta or progression of AR. This most commonly includes those patients with a previous arterial switch or Ross procedure. Although right-sided surgery is also often required, the availability of percutaneous options to treat the dysfunctional pulmonary valve often “buys time” until the aortic root becomes the driving indicator to offer surgery. Although there are some minor technical issues to take into consideration with VSRR (eg, Lecompte takedown in the setting of previous arterial switch procedure or right ventricle to pulmonary conduit replacement with a previous Ross procedure), the VSRR has become reproducible and should

be offered in the vast majority of cases, particularly if there is onset or progression of AR.

The “coulda” category of patients with CHD, patients who potentially “could” have a VSRR, includes those with almost all the other CHD examples described previously. The issue to be considered is whether it is reasonable and appropriate to undertake VSRR in the setting of an operation that will be more lengthy or complex. The patient concerns in this arena include severe AR and other significant cardiac pathology necessitating intervention (eg, pulmonary, mitral, and tricuspid surgery, arrhythmia surgery, and coronary surgery). In addition, there may be cardiac anatomic issues that make VSRR more difficult, such as a dilated aortic annulus (some patients with a conotruncal anomaly may have a very dilated annulus, >36 mm), calcified ventricular septal defect patch that encroaches on the aortic valve cusps, or multiple previous sternotomies with dense adhesions. In addition, there may be patient factors that might suggest caution in the application of VSRR; these include depressed ventricular function and other organ system abnormalities (eg, renal, hepatic or pulmonary insufficiency) that might make it prudent to avoid the longer bypass time needed to perform the VSRR. All these examples represent patients who “could” have a VSRR, but the judgment of the surgeon is to not perform it in favor of a composite graft that would have a more predictable result with shorter bypass and crossclamp times.

Gomibuchi and colleagues⁴ are to be congratulated for their application of VSRR after a previous double-switch

procedure, as described in their case report in this issue of the *Journal*. On the basis of the premises outlined here, the case of Gomibuchi and colleagues⁴ would be placed in the “coulda” category. Their patient had severe AR and melena from gastrointestinal bleeding caused by preoperative ulcerative colitis. Although Gomibuchi and colleagues⁴ are to be commended for a successful VSRR procedure (with only 3 months of follow-up) and their desire to avoid long-term anticoagulation, one could argue that this was a “bit of a reach,” and the safer course of action would have been a bioprosthetic root replacement. This would have shortened the bypass time and also lessened the risk of needing a second bypass run if persistent AR had remained, a risk not desirable in a patient with gastrointestinal bleeding.

The importance of surgical expertise with the VSRR procedure and a flawlessly choreographed operation cannot be

overemphasized, because there frequently are technical challenges and extra “medical baggage” in adult patients with CHD that must be factored into the selective decision making.

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