

Old Dog, New Tricks



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In this edition of *Seminars in Thoracic and Cardiovascular Surgery*, Andersen et al describe a 3-patch technique to repair supravalvular aortic stenosis and left main coronary artery ostial stenosis. While this technique is well described, the authors present a case series of younger patients when compared to previous reports.

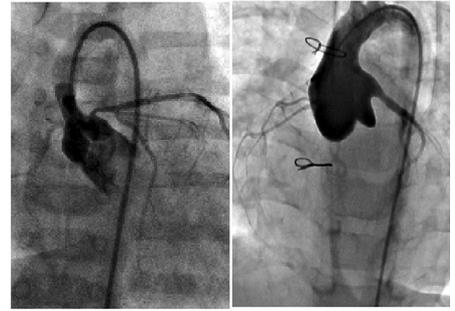
Their technique involves division of the aorta above the sinotubular junction followed by vertical incisions in the non-coronary sinus and right coronary sinus. The vertical incision in the left coronary sinus is extended onto the left main coronary artery almost to the bifurcation. All 3 incisions are then patched with glutaraldehyde-fixed autologous pericardium or pulmonary homograft. Then, when indicated, the ascending aorta and/or aortic arch are augmented using either deep hypothermic circulatory arrest and/or regional cerebral perfusion. The aorta is reconstructed, the patient is weaned from cardiopulmonary bypass, and the reconstruction is interrogated with echocardiography. The technique was applied to 8 patients ranging in age from 2 days to 18 months. The mean gradient by echocardiography dropped from 57 to <10 mm Hg in all cases. All patients also underwent either cardiac catheterization or computed tomography angiography after the repair and all cases demonstrated unobstructed coronary blood flow.

Supravalvular aortic stenosis has 2 general phenotypes—discrete and diffuse. When associated with coronary ostial stenosis, patients with supravalvular aortic stenosis are at risk for major adverse cardiac events. Various techniques have been described to repair supravalvular aortic stenosis. McGoon et al reported the single-patch repair in 1961.¹ This technique involves a vertical incision from the ascending aorta through the stenotic area and into the midportion of the noncoronary sinus. The stenotic ridge is excised and the aortic incision is reconstructed with a prosthetic patch. In 1977, Doty et al reported a 2-patch augmentation method.² This technique involves a pantaloony patch that is used to augment the noncoronary sinus and the right coronary sinus. Brom described a 3-sinus repair in 1988.³ This employs 3 triangular patches to enlarge each sinus. In 1993, Myers et al and Chard and Cartmill reported an interdigitating repair which involves incisions into all 3 sinuses and augmentation of each sinus using a flap of native aorta created by offset vertical incisions

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Pre- (A) and postoperative (B) angiography after relief of aortic and coronary stenoses.

Central Message

The 3-sinus repair for supravalvular aortic stenosis is expanded to young patients with left main coronary stenosis.

in the ascending aorta.^{4,5} In general, 1 technique is not thought to be superior over the others, and all 4 are acceptable methods. Early mortality is low (0–5%) for all techniques, and gradient reduction can be successfully accomplished with any approach.⁶

Coronary artery ostial stenosis is present in up to 18% of patients with supravalvular aortic stenosis.⁶ This can be documented in a variety of ways including coronary or computed tomography angiography, echocardiography, and direct inspection. Debate exists over what constitutes a “significant” coronary stenosis. This associated lesion is felt to be a risk factor for major adverse cardiac events and should be repaired at the time of operation. Techniques include coronary ostioplasty and coronary artery bypass grafting. Coronary ostioplasty is thought to be more reliable, and as demonstrated in the report by Andersen et al, it can be applied to the smallest patients including neonates. And, as also shown, it can be incorporated into one of the patches used to relieve the supravalvular aortic stenosis.

This case series by Andersen et al describes a technique that was first reported 30 years ago. The authors demonstrate how this operation can be successful in the youngest of patients, including a 3.5 kg neonate. Also shown is how 1 of the 3 patches can be tailored to relieve important ostial stenosis of the left main coronary artery. The authors report using 10–12 mm triangular patches, but also admit using the “eyeball test” to properly augment each sinus. This is important as one of the potential problems with the multisinus repair is oversizing the patches and causing early and/or late aortic insufficiency. While the determination of how to label a coronary stenosis “significant” was not

discussed, experienced congenital heart surgeons, including these authors, have a sense of what stenoses should be repaired. Anesthetizing these patients is not without risk and obtaining multiple preoperative diagnostic studies after angiography has been completed to either prove or confirm a coronary stenosis is significant is neither practical nor safe. It is important to document reduction of the aortic gradient and flow in the proximal coronary artery after the operation using intraoperative echocardiography. Small patients, challenging repairs, and those with any suggestion of coronary insufficiency should be considered for early angiography to better evaluate the reconstructed proximal coronary artery. The authors achieved both gradient reduction and relief of coronary obstruction in all patients in the series and are commended on their excellent results in this young cohort.

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