Impact of Preoperative Aortic Regurgitation on Long-Term Autograft Durability and Dilatation in Children and Adolescents Undergoing the Ross Procedure

Objective
Primary aortic regurgitation (AR) is a well-established risk factor for autograft reintervention in adults. The aim of this study was to examine the impact of preoperative AR on long-term autograft durability following the Ross procedure in children and adolescents.

Methods
From 1993 to 2020, 92 consecutive patients between 1 and 18 years old underwent a Ross procedure (mean age 11.3±4.1). The autograft was implanted using a full-root technique in n=90 (98%) patients and included in a Dacron graft in n=2 (2%). Patients with aortic stenosis [AS group] (n=62; 67%) were retrospectively compared to those with aortic regurgitation or mixed aortic disease [AR group] (n=30; 33%). The mean length of follow-up was 6.4±7.1 years. The primary endpoint was the incidence of > moderate AR or autograft reintervention. The secondary endpoints were changes in autograft dimensions analyzed using mixed effect models.

Results
Both groups had a similar age at surgery. AS patients more often had other complex left-sided lesions (55.6% vs 9.7%, p<0.001) and prior cardiac interventions (92.9% vs 32.3%, p<0.001) compared to the AR group. The median native aortic annulus z-scores were significantly larger in the AR group (2.9±0.4 vs 0.7±0.3, p<0.001). The incidence of more than moderate AR or autograft reintervention was 32 ±14% in the AR group and 11±7% in the AS group at 10 years, p=0.03 (Figure). The annulus z-scores increased in both groups over time: from 0.7±1.7 at baseline to 3.2±1.6 at 10 years in the AS group (p<0.001) and from 1.8±2.2 at baseline to 5.6±1.8 at 10 years in the AR group (p<0.001). But, the annulus dilated at a faster rate in the AR group compared to the AS group (p=0.03). Similarly, the autograft Sinus of Valsalva z-scores increased in both groups over time: from 1.8 ± 2.1 at baseline to 4.6±2.4 at 10 years in the AS group (p<0.001) and from 2.9±2.3 at the baseline to 5.7±2.4 at 10 years in the AR group (p<0.001). However, there was no difference in the rates of sinus of Valsalva growth over time.

Conclusion:
Children and adolescents with AR undergoing the Ross procedure have a higher rate of autograft failure than those with AS. While all the patients demonstrated an increase in autograft dimensions overtime, patients with AR have a more pronounced dilatation at the annulus. Akin to adults, a surgical aortic annulus stabilization technique that modulates growth is needed in children.

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