Recurrent Coarctation in Neonatal Norwood-type Aortic Arch Reconstructions

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Purpose: Several studies have evaluated recurrent coarctation following the Norwood procedure for single ventricle (SV) anatomy. A Norwood-type arch reconstruction (NTAR), an extended homograft patch augmentation of the underside of the aorta, is also used in two-ventricle (2V) patients with a diffusely hypoplastic aortic arch, but outcomes following NTAR in 2V patients have not been well described.

Methods: A retrospective review was performed of 2V neonates with a diffusely hypoplastic aortic arch who underwent NTAR and SV neonates who underwent NTAR associated with the Norwood procedure at our institution from 2000-2010. The incidence of recurrent coarctation requiring intervention and associated risk factors were evaluated.

Results: Overall, 88 2V and 361 SV patients were included. Median follow-up was 2.5 years (IQR 1.0-5.9). Seventeen 2V patients (19.3%) and 35 SV patients (9.7%) required intervention for recurrent coarctation at a median of 0.5 (IQR 0.1-1.2) years since initial surgery. Freedom from intervention for recurrent coarctation at 1 and 5 years was 85% and 72% in 2V patients and 92% and 88% in SV patients. In the 2V group, the only factor associated with recurrent coarctation in univariate analysis was weight <2.5 kg (hazard ratio [HR] 4.3, p=0.01). In SV patients, female sex (HR 2.3, p=0.01), prematurity (HR 3.0, p=0.02), smallest arch dimension by echocardiography of <2 mm (HR 3.8, p=0.002), and palliation with a right ventricle to pulmonary artery shunt (HR 3.0, p=0.003) were all associated with recurrent coarctation in univariate analysis. In multivariate analysis, only smallest arch dimension <2 mm remained independently associated with recurrent coarctation. There was no survival difference in patients with and without recurrent coarctation.

Conclusion: While not associated with a significant mortality risk, recurrent coarctation is relatively common following NTAR. Recurrent coarctation occurred more frequently in 2V patients; however these patients were smaller and weight <2.5 kg was found to be the only factor associated with recurrent coarctation in this group. A diminutive aortic arch was the only independent predictor of recurrent coarctation in the SV group. Vigilance to the development of arch obstruction and further study of strategies and techniques to prevent recurrent coarctation, particularly in the smallest patients, is necessary.