A Modified Approach in the Repair of Type I and II Truncus Arteriosus Promotes Branch Pulmonary Arterial Growth and Limits Early Re-Operation

Objective: The repair of Truncus Arteriosus (TA) often involves excision of the branch pulmonary arteries from the truncal root. However, manipulation of the branch pulmonary arteries during the repair can limit future growth and result in early (< 3 years) right ventricular outflow tract (RVOT) reoperation. For more than 20 years, we have used a modified approach in the repair of Truncus Arteriosus (TA) maintaining the branch pulmonary arteries in-situ. By minimizing branch pulmonary arterial manipulation at the time of TA repair, we hypothesized that our modified approach would promote branch pulmonary arterial growth and limit early right ventricular outflow tract (RVOT) reoperation.

Methods: For infants requiring repair for type I and II TA, a hockey stick incision was made on the truncal root and extended onto the left pulmonary artery. The truncal root was septated from the pulmonary artery using a Gore-Tex™ patch, keeping the branch pulmonary arteries in-situ. The ventricular septal defect closed, and a short (< 2 cm) aortic homograft used to re-establish right ventricular to pulmonary artery continuity. Echocardiograms measured pre-operative and follow-up branch pulmonary artery diameter, and corresponding Z-scores. Early re-operation was defined as any RVOT reoperation within 3 years.

Results (150): Between 1998-2020, 41 sequential infants with type I or II TA were repaired using the modified approach (Type I-28, Type II-13). With 100% follow-up at 8.5 ± 6.5 years, survival was 92.8%, 92.8% and 85.7% at 5, 10, and 15 years respectively. Follow-up left and right pulmonary artery z-scores were similar to baseline measurements (Figure 1). A total of 79% and 80% of follow-up left pulmonary artery (LPA) and right pulmonary artery (RPA) Z-scores either increased or remained within 1.0 Z-score of the pre-operative measurement. Only 7.3% (n=3) follow-up RPA z-scores were >1.0 z-scores from baseline measurements. Of the 22 children who required reoperation during the follow-up period, only 9.7 % (n=4) required early RVOT reoperation: one for conduit failure in conjunction with proximal branch pulmonary artery stenosis, one for endocarditis, and one for isolated conduit failure, and one for RVOT reoperation at the time of truncal valve replacement. Cumulative freedom from reoperation was 76.8%, 47.8%, and 14.1% at 5, 10, and 15 years respectively.

Conclusion: Maintenance of the branch pulmonary artery architecture using a modified approach in the repair of either type I and type II TA allows for branch pulmonary arterial growth in the majority of children. Adoption of this modified approach appears to minimize early RVOT reoperation.

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Figure 1.

Pre-operative and Follow-up Left Pulmonary Artery (LPA) and Right Pulmonary Artery (RPA) Z-scores.