Commentary: Phenotype vs. Physiology…. What’s at the Root of Ross dysfunction?

Aaron Eckhauser, MD MS

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Original Title: Commentary: Phenotype vs. Physiology…. What’s at the Root of Ross dysfunction?

Author: Aaron Eckhauser, MD MS

Professor of Surgery, Pediatric Cardiothoracic Surgery
Division of Cardiothoracic Surgery, Department of Surgery
University of Utah, Salt Lake City, UT

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Corresponding Author: Aaron Eckhauser, MD MS

100 N. Mario Capecchi Dr. Suite 2200
Salt Lake City, UT, 84113
Aaron.eckhauser@hsc.utah.edu
Work: 801-662-5566
Fax: 801-662-5571
Central Message: Pediatric patients with preoperative aortic insufficiency have worse long-term autograft durability after the Ross procedure compared to children with aortic stenosis or mixed disease.

Central picture legend: Aaron Eckhauser, MD MS

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In this month’s edition of *The Journal of Thoracic and Cardiovascular Surgery*, Bouhout et al report their 27-year experience studying 125 patients undergoing the Ross procedure to determine the impact of preoperative aortic insufficiency (AI) on long-term autograft durability\(^1\). They found that patients with preoperative AI vs aortic stenosis (AS) or mixed AS/AI had a significantly higher rate of autograft dysfunction compared to patients with preoperative AS or mixed disease (39% vs. 13%). By echocardiography, the sinuses of Valsalva dilated at similar rates between the two cohorts, but annular dilation occurred at a much faster rate in the AI cohort.

Importantly, this study not only reinforces the effect of preoperative aortic valve pathology on long-term outcomes in children undergoing the Ross procedure, but it also forces us to critically evaluate the way in which we preoperatively evaluate, make a surgical recommendation and counsel our patients. One of the major themes of this study is the effect of phenotype vs.
physiology on the aortic root in children. The authors dichotomized their cohort based on the primary aortic valve pathology prior to any surgical or catheter-based intervention. For instance, a neonate who presents with severe AS and undergoes a balloon valvuloplasty would be assigned to the AS cohort even if they develop severe AI and over the next decade developed a dilated annulus prior to presenting for aortic valve replacement. The inherent assumption is that phenotype is more impactful than years of physiology; and perhaps there is something phenotypically dysfunctional in AI patients that predisposes them to dilation. And while this argument is valid, the question cannot fully be answered in this study. It is important to consider the possibility that if patient cohort identification was predicated on pre-Ross physiology rather than preintervention phenotype that the results may vary.

A second theme is the impact of autograft support and stabilization in pediatric patients undergoing the Ross. In this study 11 patients received some type of an annular stabilization procedure and none of them have developed autograft dysfunction to date. The authors now stabilize an annulus starting at 18mm and downsize an annulus over 25mm using a variety of techniques. Additionally, while the authors reported similar amounts of sinotubular junction (STJ) enlargement over time between cohorts, optimal size necessitating STJ stabilization and method (aortoplasty, interposition graft) also remain unanswered. It is critical that we better determine optimal size and surgical methods for annular and STJ stabilization without negatively impacting somatic growth or long-term hemodynamics in children. What then is the optimal strategy for a 4 yr. old patient with an ascending aorta measuring 22mm with severe AI but an annulus of only 14mm?
While many questions remain about optimal timing and strategy to prolong autograft durability in children, we must remain very intentional about choosing the right patient to ensure the right outcomes. With the current explosion of (re)interest in the Ross, we need to ensure that we don’t falsely nullify the benefits of a terrific operation by employing it incorrectly in the wrong patients.

References
