

Invited Commentary for: Essential Role of Cardiac Computed Tomography for Surgical Decision Making in Children with Total Anomalous Pulmonary Venous Connection and Single Ventricle. This is AAI (Alternative Additional Imaging) not AI (Artificial Intelligence).

Randy Stevens¹, jie sun², Amy Throckmorton³, and erica poletto⁴

¹St. Chrstopher's Hospital for Children

²st.christopher's hospital for children

³Drexel University

⁴Drexel University College of Medicine

March 28, 2022

Abstract

Total Anomalous Pulmonary Venous Connection combined with Single Ventricle represents a cardiac and extra-cardiac diagnosis that may benefit from alternative additional imaging to reach a complete anatomical diagnosis and continued treatment strategy.

JOCS-2022-ORIG-237

Title: Invited Commentary for: Essential Role of Cardiac Computed Tomography for Surgical Decision Making in Children with Total Anomalous Pulmonary Venous Connection and Single Ventricle. This is AAI (Alternative Additional Imaging) not AI (Artificial Intelligence).

Short Title: CT is Essential in TAPVC and SV

Word Count:

Authors:

Randy M. Stevens, MD, FACS

Pediatric Cardiac Surgery

St. Christopher's Hospital for Children

Drexel University College of Medicine

Jie Sun, MD

Pediatric Cardiology

St. Christopher's Hospital for Children

Drexel University College of Medicine

Amy Throckmorton, PhD

Associate Professor
Biomedical Engineering
Drexel University
Erica Poletto, MD
Pediatric Radiology
Section chief, CT and Cardiac Imaging
St. Christopher's Hospital for Children
Drexel University College of Medicine

Corresponding Author:

Randy M. Stevens, MD, FACS
Pediatric Cardiac Surgery
St. Christopher's Hospital for Children
Drexel University College of Medicine
Rstev2@gmail.com

Keywords: Total Anomalous Pulmonary Venous Connection, Single Ventricle, Computed Tomography, Echocardiography, Pulmonary venous obstruction.

Data Availability Statement: N/A

Funding: None

Conflict of Interest: None

IRB approval: N/A

Abstract:

Total Anomalous Pulmonary Venous Connection combined with Single Ventricle represents a cardiac and extra-cardiac diagnosis that may benefit from alternative additional imaging to reach a complete anatomical diagnosis and continued treatment strategy.

Invited Commentary:

The use of alternative additional imaging in the diagnosis and surgical treatment planning of congenital heart and adult congenital heart continues to illustrate the limitations of current therapy and may greatly aid the survival of these patients. In this study, Vasquez Choy et al. performed a retrospective chart review examining limitations of echocardiography with additional imaging of Computed Tomography (CT) in patients with a diagnosis of Single Ventricle (SV) and Total Anomalous Pulmonary Venous Connection (TAPVC). The time period studied is recent, from 2016 until 2021, and is a small sample size of 13 patients. However, the patients represent a difficult challenge of single ventricle functional diagnosis and the additional diagnosis of TAPVC. Most (8/13) patients in this study had a primary diagnosis of unbalanced atrioventricular septal defect (AVSD) with pulmonary atresia (n=6) or arch obstruction (n=2).

While most congenital intra-cardiac diagnosis can successfully be determined, pediatric echocardiography may have limitations to diagnose extra-cardiac pulmonary venous confluence abnormalities. In this study, the authors noted that utilizing echocardiography gave a complete anatomic diagnosis in 1 of 13 patients, while the CT gave 13/13 cases complete anatomic diagnosis. Historically, the use of diagnostic angiography has been performed. The authors highlight the difficulty of diagnostic angiography and note their institution's transition to CT. The authors do not however suggest an either/or comparison rather a benefit to AAI.

How soon can imaging studies, obtained from CT, be constructed into 3D models, virtual reality, or other modalities to aid in surgical correction or catheter based intervention? This study will aid the reader to note additional imaging complementary to echocardiography. The patients examined in the time group are noted to have 4 deaths, all related to challenges associated with single ventricle physiology such as extra cardiac complications (gastrointestinal bleeding, septic shock, and progression of neurological congenital abnormalities). The next challenge in consideration of MRI compared to diagnostic catheterization for stage II palliation and complementary examinations may serve as a manuscript many readers will be eager to see in follow up. The authors note the survival of 9 of 13 patients alive at the end of data collection, long term, will have most readers cheering for successful completion to stage III palliation and success for this difficult and complex group of TAPVC and single ventricle patients.

References

Vasquez Choy A. L., et.al. Essential Role of Cardiac Computed Tomography for Surgical Decision Making in Children with Total Anomalous Pulmonary Venous Connection and Single Ventricle. JOCS 237 2022.