National Pediatric Cardiology
Quality Improvement Collaborative

Research Explained

Relation of Norwood Shunt Type and Frequency of Arrhythmias at 6 Years (from Single Ventricle Reconstruction Trial, SVR Trial)

Cain N, Saul JP, Gongwer R, et al. Am J Cardiol. 2022 Apr 15;169:107 – 112. doi: 10.1016/j.amjcard.2021.12.056.

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ABOUT THIS STUDY

Why is this study important?

- This study shows that neither the type of shunt nor the type of Fontan is associated with life threatening arrhythmias in young patients (out to 6 years post procedure)

What is the goal of the study?

- This is a study that compares the two modifications of the Norwood stage I procedure, the Blalock Taussig shunt and the Sano shunt, and the differences in abnormal heart rhythms, specifically ventricular arrhythmias (abnormal rhythms from the lower chambers of the heart) or sudden death at 6 years of follow up between the two groups.
- In addition to the types of shunts used, they evaluated the type of Fontan the patients had (lateral tunnel vs extracardiac conduit).

How was this study performed?

- The authors used data collected from a large multi-center clinical trial called the Single Ventricle Reconstruction (SVR) Trial and a later follow-up study (SVR-II).
- The data collected was from young patients enrolled in the trial from 2005 through 2008.
- Authors evaluated how many patients from each group had ventricular arrhythmias and the significance of those abnormal rhythms using EKGs and Holter monitor recordings.
    - Holter monitors are much more sensitive in finding minor rhythm abnormalities compared to EKGs
- Authors evaluated how many patients died suddenly, including those who might have died from the abnormal rhythms.

What were the results of the studies?

- 325 patients evaluated.
- Analysis suggested that it was unusual for patients to have abnormal rhythms before the Fontan procedure.
- At 6 years of follow up, 2% in each group had abnormal rhythms on EKG but 54% of the Blalock Taussig shunt patients and 60% of the Sano shunt patients had abnormal ventricular rhythms documented on Holter.
- None of the abnormal rhythms were dangerous rhythms.
- The incidence of abnormal ventricular rhythms also did not differ by type of Fontan.
- Lateral tunnel Fontan patients had slower heart rates, and more atrial ectopy (an extra or premature heartbeat from the upper chambers of the heart) than the extracardiac Fontan patients.
    - None of these abnormal atrial rhythms caused a death.
- While death was related to prolonged QRS duration, the QRS duration was not statistically different in any of the groups.
    - The QRS duration or complex is the spike within an EKG trace that reflects the contraction of the ventricle.

What are the limitations of the study?

- The study only has 6 years of follow up. The authors noted that follow up with the study population is necessary to provide further analysis.
- The effect of arrhythmias may still be obscured, given the low overall occurrence of significant arrhythmias within the study population.

What it all means

- Abnormal rhythms were not significant in any of the groups studied, by shunt at Norwood palliation or by type of Fontan operation.
- Only finding associated with death or transplant was a prolonged QRS duration and that was no different between any of the groups studied.
- This suggests that abnormal rhythms are not significant or associated with sudden death in single ventricle population in the first 6 years after Norwood palliation.