



National Pediatric Cardiology  
Quality Improvement Collaborative

## Research Explained

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### Factors Associated with Morbidity, Mortality, and Hemodynamic Failure after Biventricular Conversion in Borderline Hypoplastic Left Hearts

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### ABOUT THIS STUDY

#### Why is this study important?

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- This study examines clinical outcomes in patients with borderline hypoplastic left heart deemed suitable for biventricular conversion from initial single ventricle palliation.
- Examining outcomes will help refine which patients are favorable candidates for biventricular recruitment and conversion.
- Inappropriately selected candidates can lead to increased morbidity and mortality with poor treatment options.
- This is the first study to identify predictors of diastolic dysfunction in borderline left heart patients.

#### What is the goal of this study

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- To examine outcomes of patients with borderline hypoplastic left heart and determine their outcome based on selection criteria.
- Refine criteria based on expert consensus, echocardiographic data, cardiac magnetic resonance data, and cardiac catheterization data, with emphasis placed on informed consent by the family.
- To analyze the risks associated with biventricular conversion, as opposed to the long-term morbidity and mortality that is associated with the Fontan procedure.

## How was this study performed?

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- Single center retrospective review of patients with borderline hypoplastic left heart from 2003 to 2017 who underwent biventricular repair after initial single ventricle palliation. Other anatomic lesions and patients with valvular atresia were excluded.
- Inclusion criteria included cardiac catheterization 6 months before surgical procedure

## What were the results of the study?

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- 43 patients were included and underwent biventricular conversion over the 14-year study period.
- 20 patients (or 46%) met primary outcome, defined as: (1) death, (2) transplantation, (3) take down to single ventricle, or (4) hemodynamic failure
- Freedom from primary outcome was 56% at 3 years and 50% at 5 years.
- 22 patients overall required reintervention, most commonly on the mitral valve (valvuloplasty or replacement); while 14 of 43 (or 33%) required mitral valve reintervention.
- Independent risk factors for primary outcome were:
  - (1) presence of endocardial fibroelastosis (EFE) by cardiac MRI or direct surgical visualization and
  - (2) indexed (using body surface area) left ventricular stroke volume  $\leq 28$  mL/m<sup>2</sup>
- Left ventricle filling pressures by catheterization were no different between those who met primary outcome and those that did not

## What were the limitations of the study?

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- Retrospective data collection at single center
- Potential selection bias as criteria for selection has evolved
- Small sample size may limit significance
- Time to hemodynamic failure might be overestimated

## What it all means

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- Scarring of the lining of the left ventricle and small volume of blood that is able to be ejected from the left ventricle may predict candidates that are not suitable for biventricular repair
- There was no significant difference in filling pressures by catheterization between those patients who met the primary outcome and those patients that did not.
- Mitral valve reintervention is common in patients who undergo biventricular repair

- Further studies are needed to continue to refine optimal candidacy for biventricular repair.