Surgical Management of the Borderline Left Ventricle in Neonates and Infants

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The first description of hypoplasia of the left heart was in 1851 by Bardeleben, yet after over 150 years, management of the borderline left heart remains controversial. The etiology is thought to be reduced left-sided blood flow by obstruction (e.g. aortic stenosis), intrinsic to the left ventricle (LV, e.g. endocardial fibroelastosis), extrinsic compression (e.g. diaphragmatic hernia) or a combination thereof. There are genetic influences, as well. In a study of 38 probands with hypoplastic left heart syndrome (HLHS), 55% had a family member with a cardiovascular defect and 8% of siblings had HLHS.

There are few good tools to aid decision-making, and in general the choice of 1 or 2 ventricles comes down to individual “gestalt” and institutional bias. However, the ramifications of incorrect assignment can be severe. A few centers, notably Boston Children’s Hospital, have aggressively pursued rehabilitation of the borderline LV with a reported mortality of 12% and a rate of successful biventricular repair of 34%. Prevention of left-sided hypoplasia would be ideal. In our experience with 16 attempted fetal cardiac interventions (FCI). Of the 13 successes, there has been 1 premature delivery and comfort care, 7 biventricular repairs, and 5 single ventricle palliations.

In summary, management of the borderline LV remains challenging and incorrect decisions on 1 vs. 2-ventricle pathways can result in poor outcomes. Some borderline ventricles can be recruited, but such efforts are best limited to dedicated centers. FCI may allow for 2-ventricle repair or improved outcomes for single ventricle palliation.