

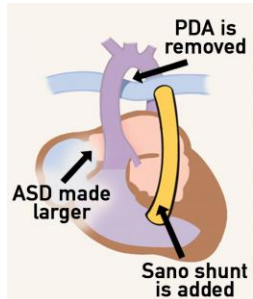
NextGen Neonatal Shunt Deployment for Congenital Heart Disease

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Need

Hypoplastic Left Heart Syndrome (HLHS) is responsible for up to **40%** of neonate cardiac mortality due to the severely underdeveloped left ventricle [1]



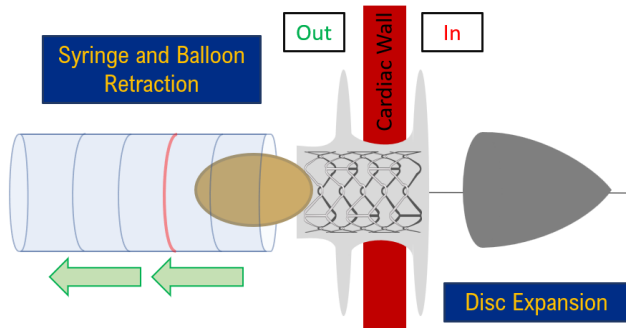
The Norwood Procedure [1]:

Establishes the right ventricle as the main blood pump of the body. Requires the excision of cardiac muscle to insert the shunt.

Objective:

Design a **single insertion** shunt deployment device that **stretches** the cardiac tissue to **maintain intended blood flow** in HLHS neonates.

Solution



Constraints

C1-C4:    

C5: ≤ 15 cm Length

See how it works!



Verification Testing Results

V3: Leak Test



R3: Non-leak Features	Results
No Leakage	PASS

V4: Compression Test



R4: Deformation Resistant	Elastic Moduli	Results
≥ 15 kPa	644.6 kPa	PASS

The device successfully deploys into a pig heart, while also meeting the outlined dimensional constraints, and maintains a flow rate of 0.5 L/min.

Conclusion & Impacts

Impact:

Retention of cardiac tissue leading to increased mechanical stability of the heart

Future Revisions:

1. Utilize biocompatible materials
2. Additional functionality of tip