Abstract Submitted
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Optimization of the assisted bidirectional Glenn for single ventricle palliation[1] ALISON MARSDEN, JESSICA SHANG, MAHDI ESMAILY-MOGHADAM, Stanford University, RICHARD FIGLIOLA, Clemson University, OLAF REINHARTZ, Stanford University, TAIN-YEN HSIA, University College London — For neonates with single ventricle physiology, a systemic-pulmonary shunt (e.g., a modified Blalock-Taussig shunt (mBTS)) is typically employed as an early-stage procedure in preparation for a later-stage bidirectional Glenn (BDG). Mortality rates with the mBTS are high, yet the BDG has poorer outcomes in neonates. The assisted bidirectional Glenn (ABG) augments the inadequate pulmonary flow associated with early BDG implementation in neonates through an additional shunt between the innominate artery and the superior vena cava (SVC). The shunt uses a nozzle to inject high-velocity flow to the SVC, elevating downstream pulmonary pressure. Previous simulations and animal studies verified feasibility and higher pulmonary flow rates. In numerical simulations, we explore shunt geometries and placements implanted into a 3D model of the aorta and pulmonary arteries, coupled with a lumped parameter network describing the remaining circulatory system. We seek an ABG shunt that optimizes hemodynamic variables such as pulmonary flow rate and oxygenation and constrains SVC pressure. The optimized ABG will be evaluated against the mBTS and the BDG in simulations and experiments. A successful implementation of the ABG would replace the mBTS and BDG procedures and reduce mortality rates.

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Jessica Shang
Stanford University

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