Abstract Submitted
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Assessment of cardiac output effects on bioprosthetic pulmonary valve behavior using magnetic resonance velocimetry[1] NICOLE SCHIAVONE, CHRISTOPHER ELKINS, DOFF MCELHINNEY, JOHN K. EATON, ALISON MARSDEN, Stanford University — Tetralogy of Fallot (ToF), a congenital heart defect that affects 1 in every 2500 newborns annually, requires surgical repair of the right ventricular outflow tract (RVOT) and subsequent placement of an artificial pulmonary valve. The longevity of bioprosthetic valves is highly variable and there are no standard clinical guidelines regarding their placement or size selection during surgery. This work analyzes the hemodynamics in an RVOT model representative of ToF anatomy using magnetic resonance velocimetry (MRV) at three different cardiac outputs: 2 L/min, 3.5 L/min, and 5 L/min. The same 25mm surgical St. Jude Medical Epic valve was studied in each of the three cases. Valve leaflet motion and flow features, including location of stagnation and reverse flow regions, shape of the jet through the valve at systole, and asymmetry local to the valve, are significantly different for each cardiac output. For example, the asymmetry of the radial velocity during valve closing is more pronounced at lower cardiac outputs. In addition to MRV, high speed videos were taken to analyze the motion of the valve leaflets at each cardiac output.

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