

Abstract Submitted  
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**Intraventricular filling in physical models of the left ventricle: influence of aortic pressure** NICHOLAS NELSEN, MILAD SAMAEI, ARVIND SANTHANAKRISHNAN, Oklahoma State University — Clinical studies using medical imaging have provided evidence on the formation of an intraventricular vortex in the left ventricle (LV) during diastolic phase of the cardiac cycle. However, the question of how the vortex characteristics are altered with aortic pressure remains unclear. This is of relevance to hypertensive heart disease and heart failure with normal ejection fraction. Using an experimental left heart simulator, we have previously shown that increasing LV wall stiffness results in reduction of the filling vortex circulation. In this study, we investigate the effects of varying aortic pressure in addition to wall stiffness. A series of flexible-walled LV models with varying wall stiffness were tested in a pulsatile flow loop. 2D particle image velocimetry was used to visualize intraventricular flow and calculate filling vortex circulation. The flow circuit was first setup with the least stiffness LV physical model, and tuned to physiological aortic pressure, cardiac output and ejection fraction. We then iteratively tested LV models with increasing stiffness without changing circuit variables. Comparisons of the filling vortex circulation with changing aortic pressure relative to the baseline and increased LV stiffness models will be presented.

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