Abstract Submitted
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Effect of mitral orifice shape on intra-ventricular filling fluid dynamics[1] IKECHUKWU OKAFOR, YAGNA ANGIRISH, AJIT YOGANATHAN, Georgia Institute of Technology & Emory University, ARVIND SANTHANAKRISHNAN, Oklahoma State University — The natural geometry of the mitral orifice is D-shaped. However, most current designs of prosthetic valves employ O-shaped orifice geometry. The goal of this study was to compare the effect of geometrical modification between the D and O orifice on the intra-ventricular fluid dynamics during diastolic filling. The different mitral orifice geometries were incorporated into an in vitro left heart simulator consisting of a flexible-walled anatomical left ventricle (LV) physical model enclosed in an acrylic housing. Physiological flow rates and pressures were obtained via tuning systemic resistance and compliance elements in the flow loop. A programmable piston pump was used to generate the LV model wall motion. 2D Particle image velocimetry measurements were conducted along multiple longitudinal planes perpendicular to the annulus plane. During peak diastole, the incoming jet width at the LV central plane was smaller for the D-orifice than that of the O-orifice. Further, the core of the vortex ring in the D-orifice was reduced in size compared to that of the O-orifice. The spatiotemporal spreading of the inflow jet as well as the propagation of the vortex ring will be discussed.

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