

Abstract Submitted
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Left ventricular filling under elevated left atrial pressure
MANIKANTAM GADDAM, MILAD SAMAEI, ARVIND SANTHANAKRISHNAN, Oklahoma State University — Left atrial pressure (LAP) is elevated in diastolic dysfunction, where left ventricular (LV) filling is impaired due to increase in ventricular stiffness. The impact of increasing LAP and LV stiffness on intraventricular filling hemodynamics remains unclear. We conducted particle image velocimetry and hemodynamics measurements in a left heart simulator (LHS) under increasing LAP and LV stiffness at a heart rate of 70 bpm. The LHS consisted of a flexible-walled LV physical model fitted within a fluid-filled chamber. LV wall motion was generated by a piston pump that imparted pressure fluctuations in the chamber. Resistance and compliance elements in the flow loop were adjusted to obtain bulk physiological hemodynamics in the least stiff LV model. Two LV models of increasing stiffness were subsequently tested under unchanged loop settings. LAP was varied between 5-20 mm Hg for each LV model, by adjusting fluid level in a reservoir upstream of the LV. For constant LV stiffness, increasing LAP lowered cardiac output (CO), while ejection fraction (EF) and E/A ratio were increased. For constant LAP, increasing LV stiffness lowered CO and EF, and increased E/A ratio. The implications of these altered hemodynamics on intraventricular filling vortex characteristics will be presented.

Arvind Santhanakrishnan
Oklahoma State University

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