

Abstract Submitted
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Experimental investigation of the effects of inserting a bovine venous valve in the inferior vena cava of Fontan circulation ARVIND SANTHANAKRISHNAN, JACOB JOHNSON, MONICA KOTZ, ELAINE TANG, REZA KHIABANI, AJIT YOGANATHAN, Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology & Emory University, KEVIN MAHER, Sibley Heart Center Cardiology, Children's Healthcare of Atlanta at Egleston — The Fontan procedure is a palliative surgery performed on patients with single ventricle (SV) congenital heart defects. The SV is used for systemic circulation and the venous return from the inferior vena cava (IVC) and superior vena cava (SVC) is routed to the pulmonary arteries (PA), resulting in a total cavopulmonary connection (TCPC). Hepatic venous hypertension is commonly manifested in the Fontan circulation, leading to long-term complications including liver congestion and cirrhosis. Respiratory intrathoracic pressure changes affect the venous return from the IVC to the PA. Using a physical model of an idealized TCPC, we examine placement of a unidirectional bovine venous valve within the IVC as a method of alleviating hepatic venous hypertension. A piston pump is used to provide pulsatility in the internal flow through the TCPC, while intrathoracic pressure fluctuations are imposed on the external walls of the model using a pair of linear actuators. When implanted in the extrathoracic position, the hepatic venous pressure is lowered from baseline condition. The effects of changing caval flow distribution and intrathoracic pressure on TCPC hemodynamics will be examined.

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