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Clinical Assessment of Intraventricular Blood Transport in Patients Undergoing Cardiac Resynchronization Therapy LORENZO ROSSINI, UC San Diego, P. MARTINEZ-LEGAZPI, Y. BENITO, C. PEREZ DEL VILLAR, A. GONZALEZ-MANSILLA, A. BARRIO, R. YOTTI, Hospital Gregorio Maranon, Madrid, A.M. KAHN, UC San Diego, S.C. SHADDEN, UC Berkeley, F. FERNANDEZ-AVILES, J. BERMEJO, Hospital Gregorio Maranon, Madrid, J.C. DEL ALAMO, UC San Diego — In the healthy heart, left ventricular (LV) filling generates flow patterns which have been proposed to optimize blood transport by coupling diastole and systole phases. We present a novel image-based method to assess how flow patterns influence LV blood transport in patients undergoing cardiac resynchronization therapy (CRT). Solving the advection equation with time-varying inflow boundary conditions allows to track the transport of blood entering the LV in the different filling waves, as well as the transport barriers which couple filling and ejection. The velocity fields were obtained using echocardiographic color Doppler velocimetry, which provides two-dimensional time-resolved flow maps in the apical long axis three-chamber view of the LV. We analyze flow transport in a group of patients with CRT devices as well as in healthy volunteers. In the patients under CRT, the device programming was varied to analyze flow transport under different values of the atrioventricular (AV) conduction delay and to model tachycardia. This analysis illustrates how CRT influences the transit of blood inside the LV, contributes to conserving kinetic energy and favors the generation of hemodynamic forces that accelerate blood in the direction of the LV outflow tract.

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