Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Non-Invasive Mapping of Intraventricular Flow Patterns in Patients Treated with Left Ventricular Assist Devices MARISSA MIRAMONTES, LORENZO ROSSINI, Mechanical Engineering, UCSD, OSCAR BRAUN, MICHELA BRAMBATTI, SHONE ALMEIDA, ADAM MIZERACKI, UCSD Medical Center, PABLO MARTINEZ-LEGAZPI, YOLANDA BENITO, JAVIER BERMEJO, Hospital Gregorio Maran, ANDREW KAHN, ERIC ADLER, UCSD Medical Center, JUAN C. DEL LAMO, Mechanical Engineering, UCSD — In heart failure patients, left ventricular (LV) assist devices (LVADs) decrease mortality and improve quality of life. We hypothesize echo color Doppler velocimetry (echo-CDV), an echocardiographic flow mapping modality, can non-invasively characterize the effect of LVAD support, optimize the device, thereby decreasing the stoke rate present in these patients. We used echo-CDV to image LV flow at baseline LVAD speed and during a ramp test in LVAD patients (Heartmate II, N=10). We tracked diastolic vortices and mapped blood stasis and cumulative shear. Compared to dilated cardiomyopathy (DCM) patients without LVADs, the flow had a less prominent diastolic vortex ring, and transited directly from mitral valve to cannula. Residence time and shear were significantly lower compared to healthy controls and DCMs. Aortic regurgitation and a large LV vortex presence or a direct mitral jet towards the cannula affected blood stasis region location and size. Flow patterns, residence time and shear depended on LV geometry, valve function and LVAD speed in a patient specific manner. This new methodology could be used with standard echo, hemodynamics and clinical information to find the flow optimizing LAVD setting minimizing stasis for each patient.

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Date submitted: 02 Aug 2017 Electronic form version 1.4