Abstract Submitted
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Elucidating Left Ventricular Hemodynamics and Aggregation Zones Using Platelet-focused Lagrangian analysis[1] VENKAT KESHAV CHIVUKULA, FANETTE CHASSAGNE, JENNIFER BECKMAN, CLAUDIUS MAHR, ALBERTO ALISEDA, University of Washington — Left Ventricular Assist Devices (LVAD) have improved significantly over the last three decades and its use has expanded beyond the original Bridge-to-transplant indication. Thromboembolic complications, however, have not decreased in frequency or severity despite the advances in pump design. We investigate unfavorable hemodynamics in the left ventricle (LV) of a HF patient implanted with an LVAD. High-fidelity computational fluid dynamics are used to quantify thrombogenicity in the LV for several implantation configurations. Platelet Lagrangian tracking characterize the mechanical stimuli along individual trajectories, including residence time and shear stress history. Rigorous statistical analysis reveals recirculation zones inside the LV where platelet aggregation and thrombus formation can occur. PIV in a flow phantom implanted with a real-world LVAD provides validation. Clinically relevant parameters and patient management strategies for intermittent aortic valve opening that encourage the patient's ventricular contraction are assessed to optimize intraventricular flow patterns. Risk stratification is demonstrated to develop strategies that minimize stroke risk and have the potential to improve patient outcomes.

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