Abstract Submitted
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Hemodynamic Based Coronary Artery Aneurysm Thrombosis Risk Stratification in Kawasaki Disease Patients NOELIA GRANDE GUTIERREZ, Stanford University, M. MATHEW, B. MCCRINDLE, University of Toronto, A. KAHN, J. BURNS, A. MARSDEN, UCSD — Coronary artery aneurysms (CAA) as a result of Kawasaki Disease (KD) put patients at risk for thrombosis and myocardial infarction. Current AHA guidelines recommend CAA diameter >8 mm or Z-score >10 as the criterion for initiating systemic anticoagulation. Our hypothesis is that hemodynamic data derived from computational blood flow simulations is a better predictor of thrombosis than aneurysm diameter alone. Patient-specific coronary models were constructed from CMRI for a cohort of 10 KD patients (5 confirmed thrombosis cases) and simulations with fluid structure interaction were performed using the stabilized finite element Navier-Stokes solver available in SimVascular. We used a closed-loop lumped parameter network (LPN) to model the heart and vascular boundary conditions coupled numerically to the flow solver. An automated parameter estimation method was used to match LPN values to clinical data for each patient. Hemodynamic data analysis resulted in low correlation between Wall Shear Stress (WSS)/ Particle Residence Time (PRT) and CAA diameter but demonstrates the positive correlation between hemodynamics and adverse patient outcomes. Our results suggest that quantifying WSS and PRT should enable identification of regions at higher risk of thrombosis. We propose a quantitative method to non-invasively assess the abnormal flow in CAA following KD that could potentially improve clinical decision-making regarding anticoagulation therapy.

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