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A COMPARISON OF POST-STENTING WALL SHEAR STESS BETWEEN XIENCE AND RESOLUTE: INTERIM ANALYSIS FROM THE SHEAR-STENT TRIAL

Poster Contributions
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Authors: *David Molony, Adrien Lefieux, Kaylyn Crawford, Imran Shah, Sameer Khawaja, Ryan Dunn, Jessica Navas-Simbana, Goran Stankovic, Dejan Milasinovic, Bon Kwon Koo, Hiromasa Otake, Takashi Akasaka, Javier Escaned, Andrejs Erglis, Yoshinobu Murasato, Ki-Bum Won, Eun Seok Shin, Shaoliang Chen, SR, Chang-Wook Nam, Joo Myung Lee, Alessandro Veneziani, Habib Samady, Northeast Georgia Health System, Gainesville, GA, USA, Emory University, Atlanta, GA, USA*

Background: Wall shear stress (WSS), the frictional force of blood on the lumen wall, has been found to correlate with atherosclerotic plaque initiation and progression. In native vessels it is spatially heterogenous which results in focal changes in plaque. Implantation of a stent results in increased spatial heterogeneity, however these WSS patterns have not been extensively examined in stented vessels. This is attributable to the requirement of high resolution imaging such as OCT and complex methods required for accurate 3D reconstruction. In this work we present an interim analysis of the Shear-Stent trial and compare WSS patterns between Resolute and Xience drug-eluting stents.

Methods: Patients enrolled in the Shear-Stent trial (n=86) were randomized to either Xience (n=41) or Resolute (n=45) stents. This interim analysis compares WSS in patients with Xience (n=19) or Resolute (n=18) stents. Angiography and optical coherence tomography (OCT) images were combined to generate a 3D model of the lumen. Stent struts were identified in OCT images and a point cloud was generated. A stent template for each platform was then deformed to match the corresponding point clouds before being deformed to the 3D lumen model. Under the assumption of steady flow computational fluid dynamics (CFD) was used to compute WSS in each patient. As flow was not measured and OCT pullbacks did not extend back to the artery ostium WSS was normalized by the WSS in the region proximal to the stent.

Results: The percentage of surface area (%area) exposed to low and high normalized WSS was compared between both platforms. No significant difference was seen between Xience and Resolute for both %area exposed to low WSS (p=0.45) and %area exposed to high WSS (p=0.46).

Conclusion: We have demonstrated a workflow for computing WSS in stented coronary vessels. In an interim analysis of the Shear-Stent trial no significant difference was observed in the area exposed to low or high WSS between Xience and Resolute. Future analysis will determine the relationship between WSS and neo-intima growth after 12 months.