ACC.17™

1257
JACC March 21, 2017
Volume 69, Issue 11

Interventional Cardiology

DIFFERENCE IN HEMODYNAMIC MICRO-ENVIRONMENT IN VESSELS SCAFFOLDED WITH ABSORB BVS AND MIRAGE BRMS: INSIGHTS FROM A PRE-CLINICAL ENDOTHELIAL SHEAR STRESS STUDY

Poster Contributions
Poster Hall, Hall C
Saturday, March 18, 2017, 3:45 p.m.-4:30 p.m.

Session Title: Coronary Intervention: Drug Eluting Stent & Scaffolds
Abstract Category: 21. Interventional Cardiology: Coronary Intervention: Devices
Presentation Number: 1240-139

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Background: *In silico* studies have provided robust evidence that stent design affects local hemodynamic forces,which appear as a major determinant of clinical outcomes following stent implantation. However, implications of different stent/scaffold configurations on local hemodynamic forces have not yet been investigated *in vivo* in a comparative fashion. Absorb verolimus-eluting Bioresorbable Vascular Scaffolds (Absorb BVS) has rectangular shaped struts with 157 micron thickness. As a novel scaffold, Mirage sirolimus-eluting Bioresorbable Microfiber Scaffold (Mirage BRMS) has circular shaped struts with 125 micron thickness.

Methods: The main epicardial coronary arteries of eight healthy mini pigs were implanted with six Absorb BVS and five Mirage BRMS. Optical coherence tomography (OCT) was performed and strut embedment/protrusion was assessed post scaffold implantation. The obtained OCT images were fused with angiographic data to reconstruct the coronary artery anatomy. Blood flow simulation was performed and endothelial shear stress (ESS) distribution was estimated on the top of the struts and at the luminal surface between the struts in each scaffold.

Results: In mixed effects analysis,there was no difference in the embedment depths in two scaffold groups; however the thicker struts in Absorb resulted in an increased protruded distance comparing to Mirage (152±140μm for Absorb, 117±123 μm for Mirage; p=0.003). This had an effect in the local hemodynamic environment. Mean ESS were higher in Absorb at the top-of-the struts (1.69±1.20 Pa) than in Mirage (1.53±0.91 Pa), (p<0.001) but lower in the areas between the struts (0.63±0.51 Pa vs, 0.98±1.01 Pa P<0.01) compared to Mirage. Both scaffold types revealed comparable percentages of vessel luminal surface exposed to recirculations.

Conclusions: In vivo computational modeling enables assessment of the effect of different scaffold designs on the local hemodynamic micro-environment. Mirage seems “hemo-compatible” with local coronary flow dynamics. Further research is required to examine the potential value of the *in vivo* computational modeling in optimizing scaffold configuration and clinical outcomes.