OPTIMISATION OF RESULTS IN BIFURCATION STENTING: INSIGHTS FROM BENCH MODELS, COMPUTATIONAL SIMULATIONS AND 3D OCT

i2 Poster Contributions
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Background: Provisional stenting is now the default approach for treatment of bifurcation lesions. It is however still controversial whether dilatation of the Side Branch (SB) after Main Vessel (MV) stenting is beneficial and when Kissing Balloon (KB) inflation should be performed. The aim of this study was to compare benefits of post-dilatation strategy such as KB technique in bifurcation stenting and compare it with a sequential SB-MV 2 step post-dilatation without kiss.

Methods: Optimisation strategies were compared in a series of drug eluting stents (n=2x13) used as main vessel stent in a representative coronary bifurcation silicone model. Stent apposition and stent area was quantified at different locations along the MV from micro-CT scans. Vessel wall stresses and detailed reconstruction of blood flow patterns were obtained in the model using Finite Element Analysis and CFD.

Results: SB ostial stenosis was on average 20.9 ± 8.7 % after KB and 25.6 ± 11.6 % after 2-Step sequential optimization (p=0.25, ns) compared to 69.2 ± 7.8 % without SB dilatation, p<0.0001. KB induced a significant asymmetric expansion of the lumen proximal to the SB and led to a higher risk of incomplete stent apposition at the proximal stent edge (36.4 ± 29.8 % vs. 3.8 ± 10.1 % for 2-step, p=0.0016). Similar patterns could be observed in patients after KB analyzed using OCT and 3D OCT reconstruction. SB dilatation alone without further MV post-dilatation is associated distortion of the stent at the MV ostium, resulting in a high risk of stent malapposition opposite the SB. Rate of malapposition in the bifurcation after KB and 2-Step was respectively 22.1 ± 8.9 % and 26.6 ± 8.9 %, a significant reduction compared to SB dilatation (55.3 ± 16.8 %, p<0.0001) or MV stenting only (47.0 ± 8.5 %, p<0.0005).

Conclusions: Sequential 2-step post-dilatation of the SB and MV may be a suitable alternative to final Kissing Balloon Inflation after provisional stenting of bifurcations.