Anti-inflammatory Effect of Arsenic Trioxide Eluting Stents in a porcine coronary model

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Background: Previous research from our group has demonstrated trioxide (As2O3) induced apoptosis of human T lymphocytes and dendritic cells in a dose-dependent manner. AESs induced less foreign body reactions of fibrin-platelet and cytokines production of these two kinds of inflammatory cells were evaluated by flow cytometry and enzyme-linked immunosorbent assays. Fifty-five pigs underwent placement of 139 oversized stents in the coronary arteries with histologic analysis, As2O3 levels evaluation, endothelial function analysis, immunohistochemical and western blot analysis.

Results: As2O3 induced apoptosis of human T lymphocytes and dendritic cells in a dose-dependent manner. AESs induced less foreign body reactions of fibrin-platelet deposition and acute inflammatory cells infiltration than BMS and polymer-coated stents (PCSs). There was no significant difference in extensive endothelialization and endothelial function between AESs and BMSs after 4 weeks post stent implantation. Stent-based As2O3 delivery effectively inhibited expression of inflammation-associated proteins such as monocyte chemoattractant protein-1 (MCP-1) and interleukin-6 (IL-6), in agreement with the western blotting results. Conclusion: As2O3 eluting stents favorably modulate neointimal formation 4 weeks after stent implantation. The quick elution of the drug from the biodegradable coating material, less augmentation of early inflammatory reactions, and quick endothelialization of the stent surface might contribute to the long-term safety and efficacy.

Optical Characteristics of Neointimal Formation Correlate with Histological Markers of Stent Healing in a Porcine Model of Restenosis

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Background: The Svelte Stent-on-a-Wire (SOAW) is a thin strut novel device consisting of a balloon expandable cobalt chromium stent premounted onto a single lumen fixed-wire delivery catheter platform. We evaluated the performance of the novel Svelte Stent-on-a-Wire, in comparison with the MultiLink Vision (ML Vision) balloon expandable stent, in porcine coronary arteries.

Methods: Eight Yorkshire swine (30-day follow-up cohort) and 7 Yucatan mini-swine (90-day follow-up cohort) were implanted with either Svelte SOAW or control ML Vision. Acute performance characteristics were graded by interventionalists during implantation. Angiographic assessments were performed at the index procedure and at 30 or 90 days post-implantation. Scanning electron microscopy (SEM) histological and immunohistopathometric analysis of stented segments were performed after angiographic follow-up.

Results: Acute implantation performance was similar between the 2 stent types. At 30 days deflation time was significantly lower in the Swivel SOAW group (9.56±0.96 vs 4.70±0.93 s, p < 0.05). Angiographic late loss was similar for both stents at 30 (0.83±0.59 mm vs 0.88±0.71mm, p = 0.969) and at 90 days (0.76±0.35 mm vs 0.83±0.35 mm, p = 0.679). SEM analysis showed complete endothelialization at 30 days in both stent types. The presence of inflammatory cells was minimal and equivalent for both stent treatments at both time points. There was no in-stent thrombus in either stent group. Histopathological assessment demonstrated minimal injury and equivalent inflammation at 30 and 90 days with Swivel SOAW and ML Vision stents as well as endothelialization, neointimal maturation, adventitial fibrosis and neointimal fibrin. Histomorphometric analysis showed no differences between the 2 groups in stent, lumen, media or neointimal areas at either 30 or 90 days post-implantation.

Conclusion: At 30 and 90 days after implantation in porcine coronary arteries, the heterogenous patterns (43.1%). Presence of EEL rupture behaved similarly (73.9% in layered, 46.6% in heterogeneous, 22.4% in homogenous pattern). Optical density and area was showed that the homogeneous pattern had the narrowest standard deviation (0.99±0.10 vs 0.26±0.22 in heterogeneous and 0.42±0.24 in layered pattern) and the highest mean value (105.9±17.6 vs. 83.0±17.1 in heterogeneous and 84.0±12.9 in layered pattern). Conclusion: The optical characteristics of neointimal formation seen in OCT properly correlated with the presence of several histological findings involved in stent healing. The biological implications of these findings in clinical outcomes require further investigation.