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Peri-Strut Low Intensity Areas Identified by Optical Coherence Correlated with the Degree of Neointimal Formation After 3 Years Following Stent Implantation in Humans

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Background: Different long term healing patterns are frequently observed with Optical Coherence Tomography (OCT) following stent implantation. Although some of these findings seem to suggest abnormal healing, the clinical implications of these findings are still unknown.

Methods: A total of 99 patients in whom a stent was implanted (total of 125 stents, 32 bare metal stents (BMS), 30 paclitaxel-eluting stents (PES), and 63 sirolimus-eluting stents (SES)) were followed with angiography and OCT beyond 3 years (average age=49±2.1 years). Strut by strut analysis was performed in 3,053 cross-sectional images yielding to a total of 30,302 analyzable images. Per- strut Low Intensity (PLI) images were defined as the presence of homogenous low intensity area around a stent strut without significant signal attenuation behind the area. The severity of PLI was assessed by quantifying the number and degree of PLI features in all analyzable imaging frames.

Results: PLI presence was found in 19.4% of BMS, 12.6% of PES, and 6.0% of SES struts (p<0.001). The mean neointimal thickness on struts with PLI was significantly higher than that without PLI regardless of the stent type (BMS=0.62±0.30 versus 0.29±0.18 mm; PES=0.47±0.27 versus 0.19±0.18 mm; SES=0.56±0.31 versus 0.14±0.15 mm; p<0.0001). The severity of PLI correlated with the neointimal area and also with angiographical late loss in all stent types (p<0.0001). The severity of PLI correlated with angiographical binary restenosis even after adjustment with neointimal area in all stent types (odds ratio=9.785 to 34.72, p<0.05).

Conclusions: The presence of PLI in neointima appears to correlate with the severity of neointimal proliferation in the late phases of stent healing. The clinical implications of these findings need further investigation.