

Impact of neoatherosclerosis observed at very late phase after coronary stent implantation on subsequent adverse events

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Background: Despite the reduction in late thrombotic events with newer generation coronary stents, late stent failure remains a concern following stent implantation. Neoatherosclerosis (NA) is a cause of in-stent restenosis and acute thrombotic occlusion originating from the stented segment by disruption of the in-stent atheroma. Although the clinical impact of NA at 1 year has been reported, clinical significance of NA observed at very late phase remains to be determined. We sought to investigate the association between optical coherence tomography (OCT) findings at very late phase after stenting and subsequent clinical outcomes.

Methods: A total of 195 patients with 316 stents (including 74 bare metal stents, 48 first-generation DES, and 194 second-generation DES) without stent failure who underwent OCT examination at >3 years (4.9 [3.9–5.8] years) after stent implantation according to the prespecified protocol were investigated. OCT analysis included the presence of lipid-laden neointima, macrophage, malapposition, thrombus, and plaque rupture within the stents. NA was defined as having lipid-laden neointima. The criteria for the diagnosis of NA were signal-poor region in continuous frames, lipid length longer than 0.3 mm, and invisible stent strut at NA site. Quantitative OCT measurement included lipid length (LL), lipid arc, minimum lumen area (MLA) at the stented segment and minimum stent area (MSA). Major adverse cardiac events (MACE) including all-cause death, non-fatal my-

ocardial infarction, and clinically driven revascularization were assessed. MACE-free survival rate was compared between patients with stent showing NA (NA group) and those without NA (non-NA group). Furthermore, in per-stent basis analysis, stent failure including remote revascularization and stent thrombosis of the stent after follow-up OCT examination was assessed.

Results: NA was identified in 50 stents (15.8%) in 38 patients (19.5%). During the median follow-up period of 2.1 [1.0–2.8] years after OCT examination, 15 MACEs (7.7%) were captured in the total cohort, of which stent failure was observed in 5 stents (5/316, 1.6%). In patient-based analysis, patients with NA had more frequent MACE than those without (18.0% vs 5.1%, $p=0.01$). Kaplan-Meier analysis revealed that significantly higher MACE rate was detected in NA group than in non-NA group ($\chi^2=5.4$, Log-rank $p=0.02$). In stent-based analysis, NA stents had more frequent stent failure than those without (8.0% vs 0.4%, $p=0.002$).

Conclusions: NA observed by OCT at >3 years after implantation were associated with subsequent worse clinical outcomes in both patient and stent-based analysis. NA at the very late phase after stenting might be the therapeutic target of secondary prevention and OCT examination at very late phase after stenting may help identify high risk patients of subsequent MACE.