

## Predictors of rapid plaque progression: an optical coherence tomography study

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**Background:** Two patterns of plaque progression have been described: slow linear progression and rapid step-wise progression. The former will cause stable angina when the narrowing reaches a critical threshold, while the latter may lead to acute coronary syndromes or sudden cardiac death.

**Purpose:** The aim of the study was to identify morphologic predictors for rapid plaque progression.

**Methods:** Patients who had OCT imaging during the index procedure and follow-up angiography with a minimum of 6-month interval were selected. Non-culprit lesion was defined as a plaque with a diameter stenosis  $\geq 30\%$  on index angiogram. Lesion progression was defined as the decrease of angiographic minimum lumen diameter  $\geq 0.4$  mm at follow-up (mean, 7.1 months). Baseline morphological characteristics of the plaques with rapid progression were evaluated by OCT. In a subgroup with follow-up OCT imaging for plaques with progression, morphological changes from baseline to follow-up were assessed.

**Results:** Among 517 lesions, 50 lesions showed progression. These lesions had a significantly higher prevalence of lipid-rich plaque (76.0% vs. 50.5%), thin-cap fibroatheroma (TCFA) (20.0% vs. 5.8%), layered plaque (60.0% vs. 34.0%), macrophage accumulation (62.0% vs. 42.4%), microvessel (46.0% vs. 29.1%), plaque rupture (12.0% vs. 4.7%), and thrombus (6.0% vs. 1.1%), compared to those without progression. The multivariable analysis identified lipid-rich plaque [odds ratio (OR) 2.17, 95% confidence interval (CI) 1.02–4.62,  $p=0.045$ ], TCFA (OR 5.85, 95% CI 2.01–17.03,  $p=0.001$ ), and layered plaque (OR 2.19, 95% CI 1.03–4.17,  $p=0.040$ ) as predictors of subsequent lesion progression. In a subgroup with follow-up OCT, a new layer was detected in 14/41 (34.1%) plaques.

**Conclusions:** Lipid-rich plaque, TCFA, and layered plaque were predictors of subsequent rapid plaque progression. A new layer, a signature of rapid progression through plaque disruption and healing, was detected in 1/3 of the cases.