Impact of plaque composition assessed by iMap™-intravascular ultrasound on Elevation of High Sensitive Cardiac Troponin T After Percutaneous Coronary Intervention

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Background: It remains unclear whether coronary plaque composition is associated with peri-procedural myocardial injury (PMI) after percutaneous coronary intervention (PCI). This study sought to determine the impact of plaque composition analysis by iMap™-intravascular ultrasound (iMap-IVUS) (Boston Scientific, Boston, MA), a recently developed intracoronary imaging system for tissue characterization, on PMI assessed using a highly sensitive assay for cardiac troponin T (hs-TnT).

Methods: We examined 56 culprit plaques in patients with 52 stable and 4 unstable angina pectoris by iMap-IVUS. The major tissue characteristics at minimal lumen area were classified as iMap-IVUS as fibrotic, lipidic, necrotic and calcified components, and those are described herein as relative plaque areas. The hs-TnT values were measured before and 24 hours after PCI, and differences were expressed as Δhs-TnT. High Δhs-TnT elevation was defined as Δhs-TnT level ≥ 0.037 pg/mL of median value. Patients were divided into 2 groups according to the presence (Group I, n = 28) or absence (Group II, n = 28) of high hs-TnT elevation.

Results: Compared with Group II, Group I had significantly higher percent necrotic area (43 ± 12 vs. 35 ± 18%, p = 0.012) and lower percent fibrotic area (42 ± 12 vs. 53 ± 20%, p = 0.016). The percent lipidic and calcified areas were similar between the two groups. Group I also had longer lesion length (17.9 ± 9.9 vs. 13.0 ± 4.9mm, p = 0.024), a lower frequency of direct stentng (18 vs. 54%, p = 0.011), and a higher frequency of post-dilation (89 vs. 61%, p = 0.014) than Group II. The Δhs-TnT level correlated positively with percent necrotic area (r = 0.40, p = 0.003), lesion length (r = 0.31, p = 0.021), and negatively with percent fibrotic area (r = -0.35, p = 0.008). In multivariate logistic regression analysis, a larger percent necrotic area (odds ratio [OR], 1.08; 95% CI, 1.025 - 0.51; p = 0.005) were independent predictors of high hs-TnT elevation.

Conclusions: Plaque composition analysis by iMap-IVUS is useful to predict the elevation of hs-TnT after PCI.

Impact of pre-diabetic status on coronary atherosclerosis: a multi-vessel angiographic study

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Background: Although diabetes mellitus is a major risk factor of coronary artery disease (CAD), there is no evidence that pre-diabetes including impaired fasting glucose and impaired glucose tolerance is associated with atherosclerosis of coronary artery. Angiography can identify vulnerable plaques as intense yellow plaques.

Methods: Sixty-seven patients with angiographic findings who undergoing angioscopic observation for plural main trunks of coronary arteries were enrolled. According to the American Diabetes Association guideline, patients were divided into 3 groups; non-diabetes (n=16), pre-diabetes (n=28) or diabetes (n=23). Color grade of coronary plaque was defined as grade 1 (light yellow), grade 2 (yellow), and grade 3 (intense yellow) based on angioscopic findings. Number of yellow plaque per vessel and maximum yellow grade were evaluated.

Results: There were no significant difference of baseline characteristics including low-density lipoprotein cholesterol among non-diabetes, pre-diabetes, and diabetes. Total number of yellow plaque significantly differed between the three groups (0.80±0.64, 1.45±0.81, and 1.63±0.99; P=0.01, respectively). Similarly, maximum yellow grade was different (1.44±1.03, 2.00±0.86, and 2.30±0.70; P<0.05, respectively). The two indices of pre-diabetes were higher than those of non-diabetes (P=0.02, and P=0.04, respectively), while they were similar between pre-diabetes and diabetes (P=0.44, and P=0.21, respectively). Multivariate logistic regression analysis showed that not only diabetes but also pre-diabetes were independent predictors of multiple yellow plaques [OR: 12.8, 95% CI: 2.26-72.2, P=0.004 and OR: 4.86, 95% CI: 1.11-21.3, P=0.04, respectively].

Conclusions: The degree of coronary atherosclerosis in patients with pre-diabetes patients was more advanced than those with non-diabetes, and plaque vulnerability on angiography was similar between pre-diabetes and diabetes. Slight or mild disorder of glucose metabolism, such as pre-diabetes may be a risk factor of CAD as well as diabetes.