Patterns of Lesion Calcification in Infarct-Related Arteries: An Intravascular Ultrasound Analysis of 250 Patients With Acute Myocardial Infarction


Background: Calcium is considered part of end-stage atherosclerosis. In patients with chronic stable angina undergoing intervention, 73% of target lesions contain calcium (70% of which is superficial) with a mean arc of 115° (47° ± 1 quadrant) located mostly at the site of the minimum lumen area. Previous studies suggested that acute myocardial infarction (MI) lesions are less calcified than chronic stable angina lesions.

Method: We assessed calcium within infarct-related arteries (IRA) in 250 consecutive patients (mean age 62 ± 12 years, 172 males) within 2 months of the onset of MI. The arc, length, and location of calcium were measured using pre-intervention intravascular ultrasound (IVUS).

Results: Calcium was observed in 222 (88.9%) infarct-related arteries (166 patients had >1 quadrant of calcium). In 152 IRAs calcium was remote from the culprit lesion. In 194 culprit lesions that contained calcium (of which only 68, 27.2% contained >1 quadrant), calcium was seen at the minimum lumen site in 122 and remote from the minimum lumen site in 77. Overall, the arc of calcium measured 62 ± 91.8° at the minimum lumen site; calcium within the lesion, but remote from the minimum lumen site, measured 72 ± 91.8°; and IRA calcium not located in the culprit lesion measured 81 ± 80.9° (P < 0.0001). However, when only image slices containing calcium were included, the arc of calcium measured 131 ± 93.1° versus 122 ± 76.6° versus 134 ± 80.7° (P = 0.4). Importantly, calcium distribution was significantly different among these three locations.

Conclusion: IVUS shows that calcium in infarct-related arteries is less often in the culprit lesion and, when in the culprit lesion, is deep and remote from the site of the minimum lumen area; decidedly different from the location and severity of calcium in chronic stable angina. This different pattern of calcium in MI patients may either contribute to the instability of a culprit lesion or may be the end product of the culprit lesion’s necrotic core.

Coronary Atherosclerosis Is More Advanced in the Patients With Acute Myocardial Infarction Than Unstable Angina

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Background: The formation of intra-coronary yellow plaques can be assessed by angioscopy, and is advanced in patients with acute myocardial infarction (AMI). However, the difference in the extent of coronary atherosclerosis between unstable angina (UA) and AMI, which are both acute coronary syndrome, has not been clarified.

Methods: Angioscopic examinations were performed in 54 patients with AMI and 22 patients with UA. The prevalence of yellow plaques and thrombus and the color grade of yellow plaques were evaluated for the whole culprit artery. The color grade was determined as 0 (white), 1 (slight yellow), 2 (yellow), or 3 (intensive yellow) for each plaque detected. Angioscopically, atherosclerosis was assessed by number of yellow plaques (N), maximum (MC) color grade of observed yellow plaques, and the prevalence of thrombus (PT) in the non-culprit segments.

Results: Mean color grade (1.9 ± 1.7, P = 0.05) of yellow plaques and the prevalence of thrombus (93% vs. 77%, P = 0.05) at the culprit lesion were not different between AMI and UA. However, atherosclerosis assessed by N (mean, 1.8 ± 1.2, P = 0.04), MC (3.1 ± 0.9, P = 0.008), and PT (39% vs. 10%, P = 0.05) was significantly advanced in patients with AMI than UA.

Conclusions: Although plaques at culprit lesions of UA and AMI had similar appearance, angioscopically determined atherosclerosis is more advanced in patients with AMI than UA.