Longitudinal Visualization of Spontaneous Coronary Plaque Rupture by 3D Intravascular Ultrasound

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A 60-year-old man, 4 years after an anterior myocardial infarction at the middle segment of the left anterior descending coronary artery (LAD), underwent coronary angiography (CAG) because of severe continuous chest pain for $\geq$3 hours 3 weeks earlier. CAG revealed no significant stenosis but showed a wall fissure with a double-contrast opacification at the proximal segment of the LAD (short arrow on CAG in the Figure), which had not been detected by CAG 4 years earlier. This ulceration may have developed at the time of chest pain, and any thrombus might have formed at the lesion, then autolyzed. Two-dimensional intravascular ultrasound (2D-IVUS) revealed a plaque ulceration in an eccentric plaque (Figure, asterisk). The rupture occurred at the shoulder of the plaque, which is considered to be present in patients with acute coronary syndrome. Longitudinal reconstruction of the consecutive IVUS images (L-IVUS), sequentially obtained by a motorized pullback device from the proximal LAD, provided a spatial representation of the plaque rupture. The rupture occurred at the middle portion of the hypoechoic plaque surface (asterisk) and had a residual thin flap that probably corresponded to a thin fibrous cap. Calcification was observed on the base of this plaque. Outlined views of the plaque rupture are shown in the right panel of the Figure for both 2D- and L-IVUS views. This L-IVUS image clearly depicted the longitudinal ulceration of the plaque, as well as which area in the surface of the plaque was vulnerable to rupture along the vessel wall.
2D-IVUS and L-IVUS images of spontaneous coronary plaque rupture. Cx indicates circumflex branch of left coronary artery; Diag, first diagonal branch of left coronary artery; LMT, left main trunk; short arrow, wall fissure with double-contrast opacification at proximal segment of LAD on CAG; and *, plaque rupture.
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