Optical Coherence Tomography Findings in a Case of Acute Coronary Syndrome Caused by Coronary Vasospasm

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SUMMARY

Culprit lesions of acute coronary syndrome (ACS) were observed by intravascular optical coherence tomography (OCT). OCT images revealed diffuse intimal thickening, reduced lumen area with vascular contraction, and thrombus formation. No OCT images of atherosclerotic plaque disruption were found. Vascular contraction disappeared and the lumen was dilated after intracoronary injection of nitroglycerin. The main mechanism of ACS in this case was therefore considered to be coronary vasospasm. OCT may be useful for evaluating the mechanism of ACS. (Int Heart J 2010; 51:291-292)

Key words: Coronary vasospasm, Acute coronary syndrome, Optical coherence tomography

Atherosclerotic plaque disruption and subsequent flow-limiting thrombus formation is a major mechanism of acute coronary syndrome (ACS).1 Although coronary vasospasm is correlated with the onset of ACS,2 its contribution is not fully understood. Optical coherence tomography (OCT) provides high-resolution images (approximately 10 μm) and reveals characteristics of the coronary vessel wall.3,4 We herein report a case of ACS caused by spontaneous coronary vasospasm with OCT documentation.

CASE REPORT

A 42-year-old man with hypertension was admitted to our institution because of continuous severe chest pain. Although an electrocardiogram showed ST-segment elevation in leads II, III, and aVF, laboratory data for myocardial necrotic markers on admission, including troponin T (< 0.01 ng/mL) and creatine kinase MB (51 U/mL), were not elevated. Coronary angiography revealed subtotal occlusion in the middle portion of the right coronary artery after intracoronary injection of nitroglycerin (0.2 mg). OCT (ImageWire®, LightLab Imaging, Westford, MA, USA) observation was performed for the culprit lesion and OCT images revealed a protruding thrombus distal to the subtotal occlusion and diffuse intimal thickening characterized by coronary vasospasm (Figure 1A). After intracoronary thrombectomy and administration of 0.5 mg nitroglycerin, TIMI 3 flow on angiography was obtained. Repeat OCT observation showed marked dilatation of the lumen and vessel diameters with a residual thrombus. In this case, there was no evidence of atherosclerotic plaque disruption in the OCT images (Figure 2). Peak troponin T was 0.04 ng/mL.

Figure 1. Initial angiographic and optical coherence tomography findings at the culprit lesion of acute coronary syndrome. A: Coronary angiograms show subtotal occlusion in the middle portion of the right coronary artery. B, C and D: Cross-sectional OCT images indicate a protruding thrombus distal to the subtotal occlusion (arrowheads) and diffuse intimal thickening (arrows) characterized by coronary vasospasm. Minimal lumen area was 0.78 mm², vessel diameter was 2.55 mm, and measurable maximal intimal thickness was 0.75 mm at the coronary vasospasm lesion.
ng/mL, however, creatine kinase MB did not increase during the course of the disease. He was discharged with the administration of nifedipine (40 mg/day), isosorbide mononitrate (40 mg/day), and nicorandil (30 mg/day), and is free from any chest symptoms.

**DISCUSSION**

For the first time, our OCT images directly show that spontaneous coronary vasospasm and thrombus formation result in ACS despite no plaque disruption. The first OCT observation of the culprit lesion revealed diffuse intimal thickening leading to reduced lumen area, a finding which was similar to a previous report on coronary vasospasm provoked by acetylcholine.\(^5\) Repeat OCT, which was performed after TIMI 3 flow was obtained on angiography, revealed marked dilatation of the lumen area. These findings suggested that this ACS case was caused by spontaneous coronary vasospasm. In addition, repeat OCT showed no evidence of atherosclerotic plaque disruption, although residual thrombi disturbed observation of the circumferential vessel wall, and this finding indicated that this ACS case was not caused by plaque disruption. Based on these findings, we concluded that stent implantation was not required and completed the percutaneous coronary intervention after only performing of thrombectomy. OCT, a high resolution modality, may be useful for evaluating the mechanism of coronary artery disease and deciding on therapeutic strategies for ACS.

**REFERENCES**