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IMAGES IN INTERVENTION

Overcoming Limited Depth Penetration of Optical Coherence Tomography With Wire Bias

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A 32-year-old man presented with acute chest pain and anterior ST-segment elevation on electrocardiography after rowing a surfboat. He was a smoker, overweight with a body mass index of 28, denied any illicit drug use, and had no other significant cardiovascular risk factors. He proceeded to primary percutaneous coronary intervention. Angiography demonstrated large caliber left coronary vessels, with a prominent filling defect at the floor of the proximal left anterior descending coronary artery (LAD) and good flow distally (Fig. 1A). The rest of the coronary arterial system was normal

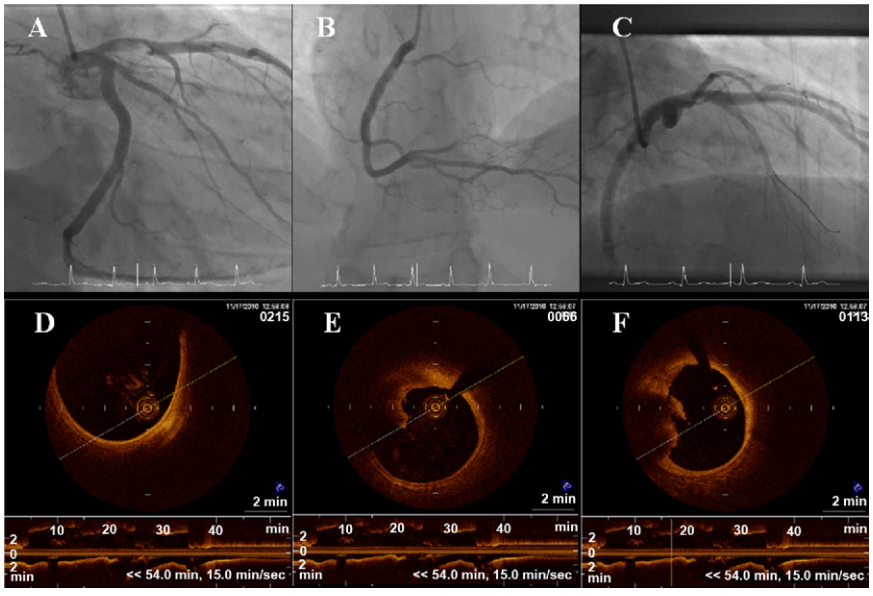

Figure 1. Angiographic and OCT Images of LAD Lesion

(A) Prominent filling defect at the floor of the proximal left anterior descending coronary artery (LAD), just proximal to the origin of a septal perforating branch. Left main coronary artery normal. Left circumflex artery normal. **(B)** Right coronary artery normal. **(C)** Coronary wire biased down septal perforating branch of the LAD. Thrombus subsequently successfully aspirated. **(D)** Large caliber proximal LAD. Far field of the vessel (9 to 1 o'clock positions) drops out and is not assessed by optical coherence tomography (OCT). **(E)** Ruptured atherosclerotic plaque in the LAD—visualized by OCT at the 9 to 10 o'clock positions, after biasing the wire down a septal perforating branch. **(F)** Further ruptured atherosclerotic plaque in the LAD—visualized by OCT at the 7 to 9 o'clock positions, after biasing the wire down a septal perforating branch.

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(Fig. 1B). After passing a coronary wire into the distal LAD, multiple attempts at aspiration thrombectomy were unsuccessful, and aspiration of the thrombus was instead achieved by biasing the wire down the septal perforating branch (Fig. 1C).

In a young patient with an acute coronary occlusion and otherwise normal coronary arteries, the diagnostic considerations include ruptured atherosclerotic plaque or embolism. Therefore, optical coherence tomography (OCT), a high-resolution intravascular imaging modality that allows the accurate evaluation of coronary vessel wall, was used in this case to look for coronary plaque rupture. One of the limitations of OCT is its limited depth of field in large caliber vessels, such as the proximal LAD in this case (Fig. 1D). However, wire biasing down the septal perforating branch allowed the OCT catheter to hug the floor of the LAD where the filling defect was originally seen. This maneuver facilitated visualization of a ruptured plaque (Figs. 1E and 1F).

Angiography is limited in evaluating plaque morphology. Optical coherence tomography has a resolution of 10 to 20 μm (an order of magnitude better than intravascular ultrasound) (1,2), allowing assessment of the surface cap, but has the drawback of lower tissue depth of penetration (2 to 3 mm vs. 10 mm for intravascular ultrasound) (3). This has obvious implications for vessels >3 mm in caliber. Wire bias represents an elegant strategy in overcoming this relative limitation, as illustrated by this case.

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