

Intentional Fenestration Using ELCA to Prevent Side-Branch Compromise in RCA ISO involving a Bifurcation

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A 57-year-old man with a history of angina pectoris and dyslipidemia underwent percutaneous coronary intervention (PCI) of the right coronary artery (RCA) with drug-eluting stents 10 years earlier. Coronary computed tomography angiography was performed to evaluate his chest pain revealed in-stent occlusion (ISO) of the RCA, and PCI was subsequently performed. Electrocardiography revealed a bifascicular block without ischemic ST-T abnormalities. Transthoracic echocardiography revealed a left ventricular ejection fraction of 60% with no significant wall motion abnormalities.

Preprocedural coronary angiography demonstrated a long segment of ISO in the RCA, extending from the right ventricular branch to the mid segment of the posterior descending artery (PDA), while the posterolateral artery was jailed by the previously implanted stent. Atrioventricular groove collateral channels from the left circumflex artery supplied the PLA, whereas a well-developed direct communicating channel from the left anterior descending artery was connected to the PDA. The distal cap of the CTO was clearly visualized with contralateral injection.

An 8-F Amplatz left-type guiding catheter (Medtronic) was engaged in the RCA for the antegrade approach, and a 5-F Judkins left-type diagnostic catheter (Terumo) was engaged in the left coronary artery for contralateral injection. A Conquest Pro 12 guidewire (Asahi Intecc), supported by Corsair Pro microcatheter (Asahi Intecc), successfully passed the entire in-stent segment and entered the PDA under contralateral injection from the left coronary artery.

IVUS after guidewire crossing demonstrated a membrane-like structure between the PDA and PLA, separating the two lumens, likely created by the Conquest Pro 12 deviating from the bifurcation of the PDA and PLA. The Conquest Pro 12 successfully entered the true lumen at the mid PDA segment. ELCA (1.7 mm, 45 mJ/mm², 25 Hz) was performed to reduce the large thrombus burden in the in-stent segment. IVUS after the first ELCA session demonstrated a reduction in thrombus burden, and the guidewire and IVUS catheter were in close proximity to the membrane-like structure separating the PDA and PLA. Given that ELCA might create a fenestration in the membrane-like structure, an additional ELCA session was performed targeting the structure. IVUS after the second ELCA session (60 mJ/mm², 40 Hz) using the saline infusion technique demonstrated successful disruption of the membrane-like structure, with restoration of blood flow communication between the PDA and PLA. Following the second ELCA session, a Sion guidewire (Asahi Intecc), supported by a Sasuke microcatheter (Asahi Intecc), easily advanced into the PLA.

Following pre-dilation with a 2.5-mm noncompliant balloon and a 4.0-mm scoring balloon, the long ISO lesion was treated using two 4.0-mm paclitaxel-coated balloons. Final angiography demonstrated adequate coronary flow without complications.

To the best of our knowledge, this is the first report case in which ELCA was intentionally used to create a fenestration to avoid side-branch compromise in ISO including a bifurcation lesion.