Efficacy of Excimer Laser Coronary Angioplasty for Repeated In-Stent Restenosis With Neointimal Hyperplasia and Underexpanded Stent

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A 78-year-old woman was diagnosed with acute coronary syndrome and had undergone coronary artery bypass grafting 6 years prior. At 5 years and 1 month after CABG, she developed unstable angina pectoris (UAP), and coronary angiography (CAG) revealed severe stenosis in the saphenous vein graft (SVG). After predilatation at 20 atm with a 2.0-mm Lacrosse NSE ALPHA®, a 2.25/28-mm everolimus-eluting stent was deployed, and post-dilatation was performed at 28 atm using a 2.25-mm balloon. After 10 months, she developed non-ST-elevated myocardial infarction due to in-stent thrombosis, and underwent drug-coated balloon angioplasty (DCB) following a 2.5-mm non-compliant balloon dilatation at 22 atm. After 10 months, she developed recurrence of UAP 6 months later. CAG showed in-stent restenosis (ISR) of the SVG with an underexpanded stent (Figure A,B, red arrow). Intravascular ultrasound (IVUS) revealed peri-stent hard fibrous tissue in the underexpanded stent (Figure a-c, yellow arrows). Optical coherence tomography (OCT) showed heterogeneous neointimal hyperplasia and the underexpanded stent (minimum stent area: 1.82 mm²) immediately before revealing the minimum lumen area (Figure d-f, Supplementary Movie). Excimer laser coronary angioplasty (ELCA) (1.4-mm, fluence 45 mJ/mm², frequency 25 Hz) (Figure C) evaporated the neointimal hyperplasia (Supplementary Figure H, I), and DCB after balloon dilatation at 22 atm with a 2.5-mm balloon was performed. CAG and IVUS showed that the stent was fully expanded (Figure D,E, g-i). The stent area measured by OCT increased to 4.08 mm² (Figure j-l, Supplementary Movie). She had no ISR or coronary events after 1 year.

We demonstrated that ELCA is effective for the treatment of repeated ISR with neointimal hyperplasia and stent underexpansion. Furthermore, IVUS and OCT clarified the mechanism, showing that ELCA evaporates the neointimal hyperplasia and facilitates better expansion of the previously implanted stent (Supplementary Figure A–I).

Supplementary Files

Supplementary Movie. Pre-ELCA and final optical coherence tomography findings. ELCA, excimer laser coronary angioplasty.

Please find supplementary file(s); http://dx.doi.org/10.1253/circj.CJ-20-0690

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