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# Optimal Approach for Uncrossable Stent Restenosis

## Laser and Rotational Atherectomy Assessed by 3-Dimensional Optical Coherence Tomography

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A 75-year-old man admitted with unstable angina underwent coronary angiography demonstrating tandem in-stent restenosis in the proximal-segment of the left anterior descending artery. Optical coherence tomography (OCT) detected underoptimal stent implantation within circumferential atherosclerotic plaques with 2 calcium nodules protruding into the lumen. A 3-dimensional OCT reconstruction was performed (**Figure 1A**, Online Video 1). Initially a high-pressure balloon could not dilate the underexpanded stent as expected, whereas rotational atherectomy was effective in plaque modification for the proximal restenotic calcium nodule, followed by noncompliant balloon dilatation. Nevertheless, the 1.50-mm rotablator burr was unable to cross the distal lesion and the smallest available burr of 1.25 mm was ineffective (**Figure 1B**, Online Video 2). Therefore, excimer laser coronary atherectomy (ELCA) was undertaken. With a 1.4-mm ELCA catheter (Spectranetics, Colorado Springs, Colorado) using an energy of 50 mJ/mm$^2$ at a pulse repetition rate of 40 Hz, we delivered approximately 1,250 pulses over 3 runs. Following pre-dilatation with a 3.5-mm noncompliant balloon, 2 overlapping drug-eluting stents were implanted (3.5 mm × 36 mm Biomatrix, Biosensors, and 3*30 mm Synergy, Boston Scientific, Marlborough, Massachusetts), with good angiographic result. The OCT post-ELCA showed calcium fracture and multiple dissection planes, extending deeply into calcified plaque. The OCT confirmed good stent expansion and apposition (**Figure 1C**, Online Video 3).

ELCA and rotational atherectomy provide particular characteristics that allow the treatment of a large

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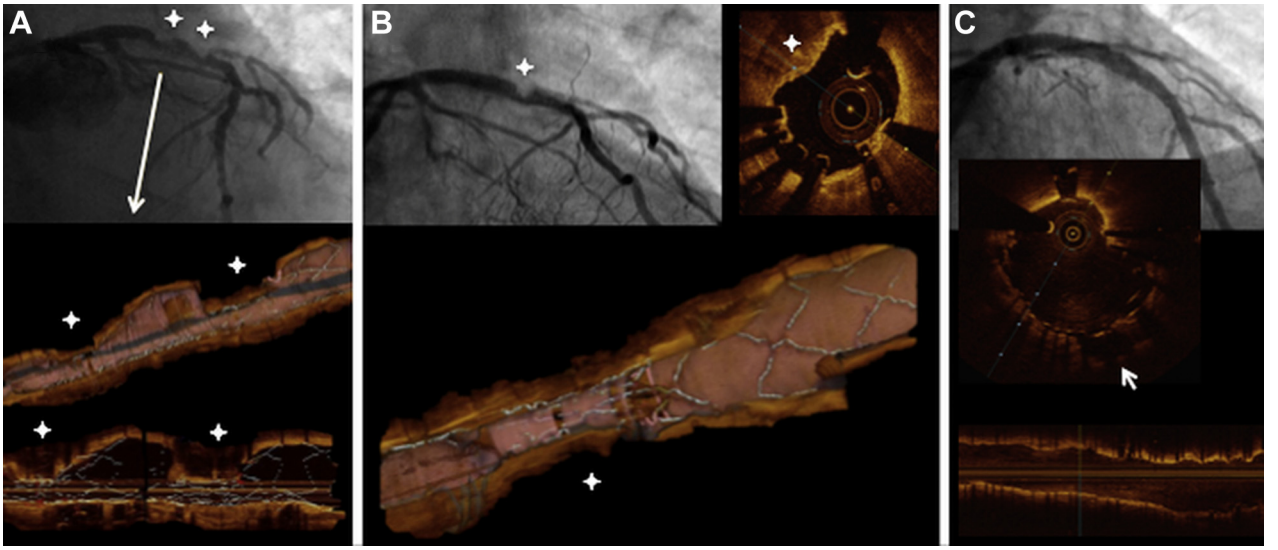
**FIGURE 1 Laser and Rotational Atherectomy for Severe Stent Restenosis Evaluated by Optical Coherence Tomography**




**(A)** On tandem in-stent restenosis by angiography, 3-dimensional optical coherence tomography (OCT) and longitudinal 2-dimensional OCT. *Calcium nodules (Online Video 1). **(B)** Uncrossable distal in-stent restenosis by angiography and 3-dimensional OCT reconstruction; underoptimal stent implantation due to calcium nodule **(asterisks)** detailed by OCT (Online Video 2). **(C)** Good angiographic result and plaque rupture **(arrow)** with appropriate stent apposition by OCT (Online Video 3).

number of cases of underexpanded stents due to severely calcified lesions (1). The OCT is recommended for the optimal approach to treat these lesions and to confirm the correct stent implantation at the end of the procedure (2,3).

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**KEY WORDS** laser atherectomy, rotational atherectomy, stent restenosis

**APPENDIX** For supplemental videos, please see the online version of this paper.