

Coronary bifurcation treated with the hybrid mini-crush approach: a potential application of three-dimensional optical coherence tomography to optimise stent apposition

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A 55-year-old male underwent an exercise treadmill test which was positive at stage 1.

Coronary angiography (**Figure 1A, Moving image 1**) demonstrated a long segment of disease in the proximal-mid left anterior descending (LAD) artery. A fractional flow reserve study was positive at 0.71, with no localising lesion on hyperaemic pullback. In addition, >5 mm disease was present in the ostial-proximal first diagonal. A hybrid mini-crush approach was adopted.

The LAD was predilated with a 3.0 mm non-compliant (NC) balloon. A 2.25×24 mm Promus PREMIER (Boston Scientific, Marlborough, MA, USA) drug-eluting stent (DES) was implanted in the diagonal and three overlapping Absorb bioresorbable vascular scaffolds (BVS) (3.5×28 mm, 3.5×28 mm, 3.5×18 mm) (Abbott Vascular, Santa Clara, CA, USA) in the LAD. Post-dilatation of the LAD was performed with a 3.75 mm NC balloon. Low-pressure (six atmospheres) mini-kissing balloon post-dilatation (KBPD) was then performed using 3.0 mm and 2.5 mm NC balloons in the main and side branch (SB), respectively. The final angiographic result was excellent (**Figure 1B, Moving image 2**). Optical coherence tomography (OCT) was then performed using a Dragonfly™ Duo catheter (St. Jude Medical, St. Paul, MN, USA), and showed an acceptable result (**Figure 1C**).

Offline, fly-through three-dimensional reconstruction of the OCT images showed incomplete apposition of the DES at the diagonal ostium (**Figure 1D-Figure 1G**), in addition to underexpansion of the BVS in the proximal segment (**Figure 1H, white arrow**).

To ensure adequate apposition of the BVS and the SB stent, we propose higher pressure sequential balloon inflation in the BVS and the SB, followed by low-pressure mini-KBPD to correct any resulting distortion. The risk of BVS strut fracture using a 2.5 mm NC balloon for SB dilatation is ~13%. This, perhaps, could be mitigated by slower balloon inflation and/or using a smaller balloon at higher pressure.

Conflict of interest statement

The authors have no conflicts of interest to declare.

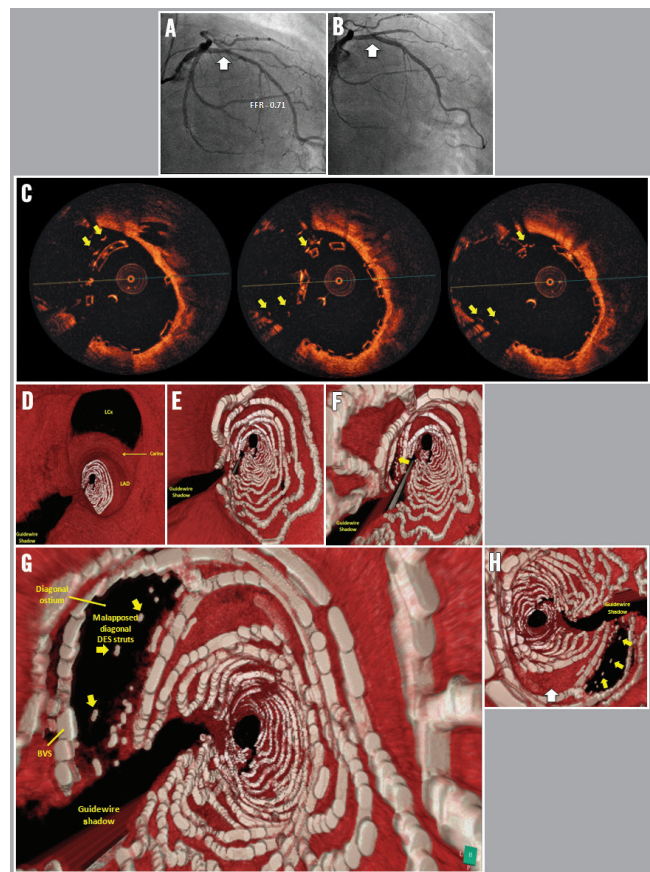


Figure 1. Two- and three-dimensional OCT of a hybrid mini-crush approach to LAD-diagonal bifurcation. A) & B) Pre- and post-coronary angiography. C) Corresponding 2D OCT. D-G) Fly-through 3D OCT from left main to LAD-diagonal. H) Reverse view LAD-diagonal bifurcation.

Supplementary data

Moving image 1. Coronary angiography demonstrating disease in the proximal-mid LAD and ostial-proximal first diagonal.

Moving image 2. Coronary angiography demonstrating final angiographic result.

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