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Challenging treatment of in-stent restenosis in a coronary bifurcation by implantation of a bioresorbable scaffold under optical coherence tomography guidance

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A 67-year-old male patient with stable angina, hypertension and hypercholesterolemia who underwent bare metal stent (BMS) implantation in the distal right coronary artery (RCA) (Azule 3 × 9 mm) and everolimus-eluting stent (EES) implantation in the first diagonal branch (D1) (Xience 2.25 × 18 mm) and in the proximal circumflex branch (LCx) (Xience 3 × 28 mm). One year subsequent to the precedure the patient was readmitted for relapse of the angina Canadian Cardiovascular Society scale II, exhibiting a positive exercise test. The coronary angiography showed a distal-edge in-stent restenosis (ISR) in the distal RCA, extending to the posterior descending artery (PDA), Medina 110 bifurcation (Fig. 1A). Optical coherence tomography (OCT) showed predominantly fibrolipidic restenotic tissue, with minimal lumen area (MLA) 1.95 mm^2, minimal lumen diameter (MLD) 1.57 mm, proximal reference vessel diameter (RVD) 3.1 mm, distal RVD 2.75 mm and lesion length 21.2 mm (Fig. 1B, C).

Optical coherence tomography-guided implantation of a bioresorbable scaffold (BRS) to treat the bifurcation ISR was performed through a radial approach, using a 6 french guiding-catheter. Guidewires were placed in the PDA and in the posterolateral artery (PLA), in order to protect the side branch in case of an eventual occlusion. Predilation 1:1 with a non-compliant (NC) balloon 3.0 × 18 mm (16 atm) was performed until the balloon was completely expanded in angiography. A second OCT run verified fragmentation of restenotic tissue and sufficient luminal gain to ensure adequate scaffold expansion. A poly-lactide BRS (ABSORB 3 × 28 mm) was then slowly deployed at 12 atm, holding pressure for 60 s. Proximal-optimalization-technique with an NC-balloon 3.25 × 15 mm (16 atm) was then performed by placing the proximal edge of the distal marker of the balloon at the carina of the PDA-PLA bifurcation, with an optimal angiographic result (Fig. 1D). A final OCT pullback showed optimal apposition and expansion (MLA 5.3 mm^2/MLD 2.6 mm; Fig. 1E), structural integrity of the device and clear access to the PLA side branch through the scaffold struts (Fig. 1F). Three-month follow-up documented an optimal clinical and angiographical result (**Suppl. Video 1**).

Poly-lactide BRS are supposed to resorb completely [1–5], depending on the specific device and on patient/local conditions. The resorption restores vasomotion and eventually normal endothelial

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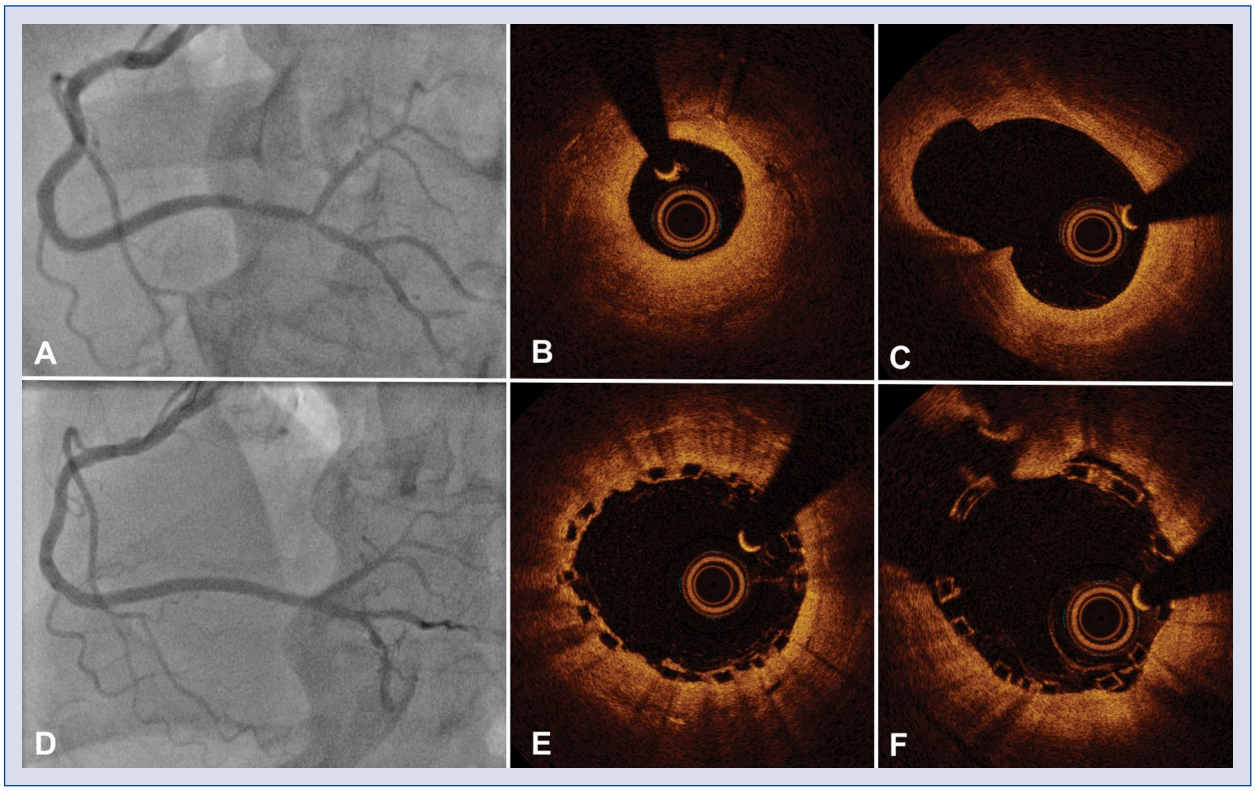

Figure 1. A, D. The coronary angiography shows a distal-edge in-stent restenosis in the distal right coronary artery, extending to the PDA, Medina 110 bifurcation; **B**, **C**. Optical coherence tomography (OCT) shows predominantly fibrolipidic restenotic tissue; **D**. An optimal angiographic result after proximal-optimalization-technique with a non-compliant-balloon 3.25 × 15 mm (16 atm) performed by placing the proximal edge of the distal marker of the balloon at the carina of the PDA-PLA bifurcation; **E**, **F**. Optimal apposition, expansion and structural integrity of the device and clear access to the PLA side branch through the scaffold struts as assessed by OCT; PDA — posterior descending artery; PLA — posterolateral artery.

function [2, 6, 7]. Moreover, the disappearance of a permanent foreign body in the vessel wall is also intended to minimize inflammation and risk of device failure, i.e. very late BRS-thrombosis, neoatherosclerosis, restenosis and catch-up phenomenon. Nonetheless, the suitability of polylactide BRS for bifurcations is currently a matter of debate, with reported higher risks of side branch occlusion [8] and of scaffold rupture following some bifurcation techniques [9, 10]. Some scientific reports however, focus on dedicating interventional techniques to minimize these risks [10, 11]. ISR is also a challenging scenario for BRS, because the expansion of the scaffold is sensibly inferior than in on-label indications [12] and reported clinical outcomes are inconsistent to date [13, 14]. The current case reports the successful treatment of a lesion combining both bifurcation and ISR challenges, by implanting a BRS. OCT-guidance played an instrumental role in achieving an optimal result and it may be considered for all off-label indications of BRS devices.

Conflict of interest: None declared

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