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Malabsorption of a Bioresorbable Vascular Scaffold System Leading to Very Late In-Scaffold Restenosis More Than 3.5 Years After Implantation

Assessment by Optical Coherence Tomography

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A 47-year-old man was admitted because of unstable angina pectoris for the past 4 weeks and symptom progression within the past 2 h. Forty-four months previously, a non-ST-segment elevation myocardial infarction was revascularized using 2 bioresorbable vascular scaffolds (BVS) (3.0 × 18 mm and 2.5 × 28 mm Absorb, Abbott Vascular, Santa Clara, California) implanted into the left circumflex coronary artery and post-dilated with a 3.0-mm noncompliant balloon. Angiography and optical coherence tomography (OCT) (Ilumien, St. Jude Medical, St. Paul, Minnesota) performed directly after implantation showed an excellent early result, without any gap or overlap (**Figures 1A to 1C**).

Subsequent coronary angiography yielded a focal in-scaffold restenosis of the left circumflex coronary artery (**Figure 1D**). OCT revealed the presence and incomplete resorption of scaffold struts over the entire BVS length (**Figure 1E**). While in the distal BVS segment, a homogeneous pattern of neointima was demonstrated over the struts (**Figure 1F**), the proximal BVS segment showed restenosis caused by neointima proliferation and a scaffold collapse displaying parts of uncovered intraluminal scaffold struts (**Figures 1G and 1H**). The lesion was treated by the implantation of a drug-eluting stent (3.5 × 23 mm XIENCE, Abbott Vascular), with an excellent primary result (**Figure 1I**).

Clinical studies investigating BVS implantation in simple lesions in humans have shown low restenosis and major adverse cardiac event rates and complete strut resolution by OCT after 5 years (1). Experimental data in a porcine model revealed that BVS are still discernible 2 years after implantation, and OCT and histologic examination confirm complete wall integration of the scaffold after 3 and 4 years (2). However, very sparse imaging data in humans beyond 2 years are available that indicate evidence of discernible struts over the entire BVS length (3,4). But this patient clearly demonstrated the presence of

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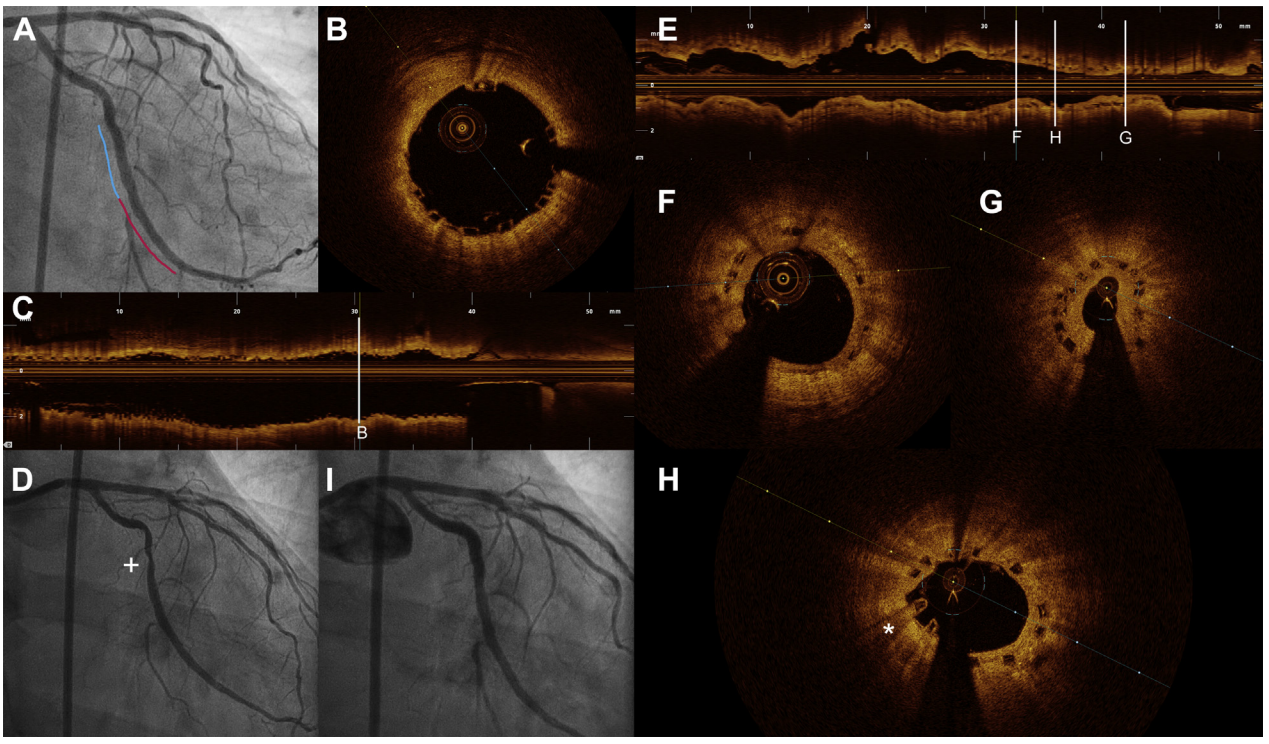
FIGURE 1 Coronary Angiography and Optical Coherence Tomography



Coronary angiography **(A, D, I)** and optical coherence tomography (OCT) **(B, F to H)** with longitudinal view **(C, E)**. **(A, B)** Coronary angiography and OCT after implantation of bioresorbable vascular scaffold (BVS). **Blue and red lines** indicate the positions of both BVS. **(C)** Longitudinal view after primary implantation. **(D)** Coronary angiography demonstrates focal in-scaffold restenosis 44 months after implantation **(white +)**. **(E)** Longitudinal view 44 months after implantation. **White lines** correspond to the cross sections. **(F)** Distal scaffold with struts and neointima. **(G)** Focal restenosis of proximal BVS. **(H)** Free scaffold struts marked with a **white asterisk**. **(I)** Coronary angiography after in-BVS drug-eluting stent implantation.

passive scaffolding after 3.5 years, with development of late BVS restenosis due to malabsorption despite optimal early result. Potential reasons for delayed or prolonged resorption (i.e., inflammatory processes) can only be speculated.

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