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IMAGES IN INTERVENTION

Very Late Restenosis After Bioresorbable Scaffold Implantation Due to Simultaneous External Compression of the Scaffold and Intrascaffold Tissue Growth

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A 78-year-old man underwent percutaneous coronary intervention with implantation of a 2.5 × 28-mm Absorb bioresorbable scaffold (BRS) (Abbott Vascular, Santa Clara, California) in the mid-left anterior descending coronary artery, and treatment with a drug-coated balloon for recurrent metallic stent restenosis in the proximal segment (**Figures 1A and 1B**) (1).

Follow-up angiography at 7 months demonstrated no restenosis at the BRS site (**Figure 1C**). After 34 months, the patient returned with a recurrence of angina and underwent angiography, which demonstrated restenosis at the BRS site as well as recurrent metallic stent restenosis (**Figure 1D**). Intravascular ultrasound was performed at baseline, showing some residual scaffold struts. Although the vessel area was similar to that at the index procedure, the minimal lumen area was 1.73 mm^2 with a lumen loss of 3.68 mm^2, likely caused by simultaneous external compression (1.97 mm^2) and intrascaffold tissue growth (1.71 mm^2) (**Figure 2**).

By virtue of its bioresorption, the Absorb BRS begins to lose its radial strength approximately 6 months after implantation, and completely loses it by 12 months (2,3). Taking these processes into account, the mechanisms of BRS restenosis may be different to those in the setting of metallic stents, especially restenosis occurring in the very late phase.

On the basis of reports describing BRS restenosis (3,4), in the short-term, scaffold restenosis seems to be a result of intrascaffold tissue growth similar to that seen with metallic stents, and would be reasonable because the scaffold still maintains some degree of its radial strength during the period. On the other hand, little data are available regarding scaffold restenosis occurring in the very late phase. Although a case series suggested very late restenosis could be also attributed to intrascaffold tissue growth (3), data remain sparse.

In our case, very late restenosis appeared to be a result of the simultaneous external compression of the scaffold and intrascaffold tissue growth. This may suggest another potential mechanism of very late scaffold restenosis with progression of plaque behind incompletely resorbed scaffold struts.

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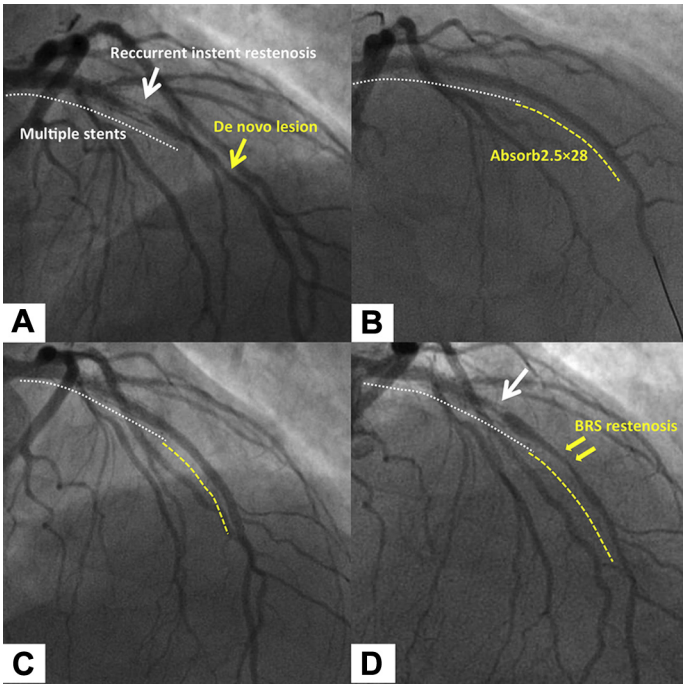
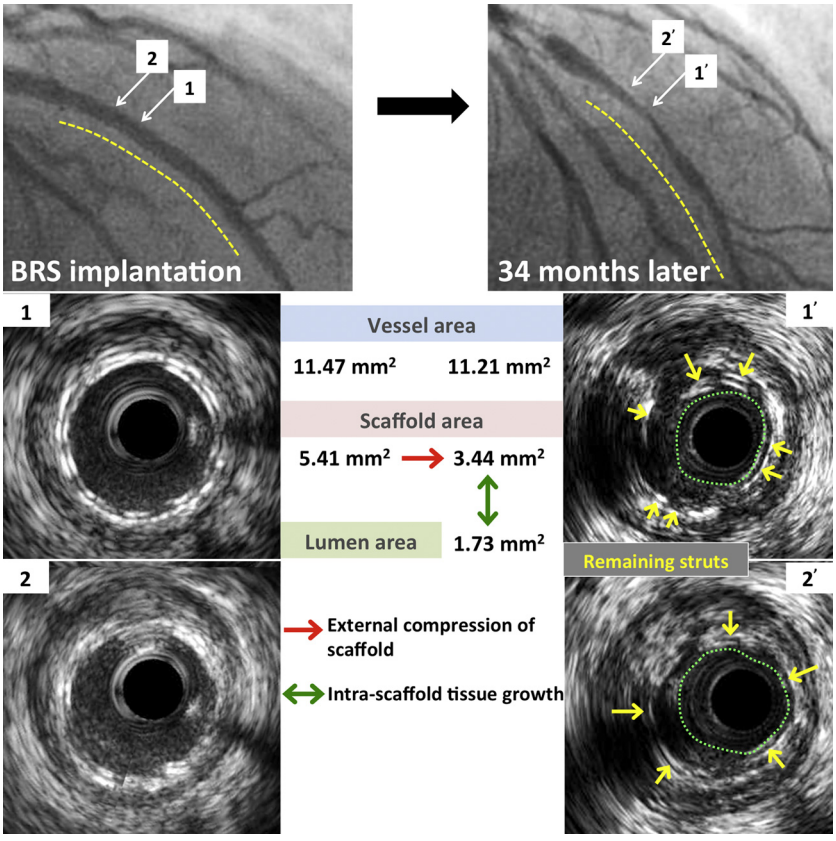
FIGURE 1 Angiography of the Index Procedure and Follow-Up



(A) Baseline angiogram demonstrating a de novo lesion **(yellow arrow)** in the mid-left anterior descending coronary artery (LAD) and recurrent restenosis **(white arrow)** within multiple metallic stents in the proximal LAD. **(B)** Final angiogram showing a good angiographic result following implantation of 1 bioresorbable scaffold (BRS) into the mid-LAD as well as drug-coated balloon treatment in the proximal LAD. **(C)** Follow-up angiogram after 7 months showing no restenosis at the BRS segment. **(D)** Follow-up angiogram after 34 months showing BRS restenosis **(yellow arrows)** as well as recurrent metallic stent restenosis **(white arrow)**. The **white dotted line** indicates multiple stents and the **yellow dashed line** indicates the BRS.

FIGURE 2 **IVUS Imaging at the Index BRS Implantation and at 34 Months Follow-Up**



At the site of minimal lumen area within the bioresorbable scaffold (BRS), the vessel area was similar (11.47 mm^2 at BRS implantation and 11.21 mm^2 at 34 months follow-up). IVUS imaging showed some remaining struts **(yellow arrow)** with the scaffold area decreasing at 34 months (5.41 mm^2 at implantation and 3.44 mm^2 at 34 months). Lumen area at 34 month was 1.73 mm^2 (the lumen loss during 34 months was 3.68 mm^2). This lumen loss (3.68 mm^2) was likely caused by the simultaneous external compression of the scaffold (5.41 mm^2 − 3.44 mm^2 = 1.97 mm^2) and intrascaffold tissue growth (3.44 mm^2 − 1.73 mm^2 = 1.71 mm^2). The **yellow dashed line** indicates the BRS. IVUS = intravascular ultrasound. The **green dotted line** indicates lumen area.

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