

Percutaneous Coronary Intervention for Tortuous Left Anterior Descending Artery with Bioresorbable Vascular Scaffold via the Transradial Approach

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Key Words: Bioresorbable vascular scaffold • Tortuous coronary artery disease • Transradial approach

INTRODUCTION

Bioresorbable vascular scaffolds (BVSs) offer an emerging option in the percutaneous treatment of coronary artery disease. BVSs allow for normal vasomotor vessel function to be restored, while also maintaining access for future coronary artery bypass grafting (CABG) if required. To date, percutaneous coronary intervention in tortuous vessels is a substantial challenge for interventional cardiologists, and need more technique and devices. We shared a case about the BVS implantation for tortuous vessel.

CASE

A 57-year-old man presented with near syncope and sudden chest discomfort. He was diagnosed to have non-ST elevation myocardial infarction due to high troponin-I level. He was a heavy smoker and had newly diagnosed, uncontrolled type 2 diabetes mellitus. Coronary angiography (CAG) showed a hazy lesion with 70-80% stenosis at the distal right coronary artery (RCA). The proximal left

anterior descending artery (LAD) had one lesion with critical stenosis and followed an S-shaped tortuosity with some coronary aneurysm (Figure 1A, 1B). The mid LAD had long tubular 70-80% stenosis (Figure 1A). Percutaneous coronary intervention was performed via the left radial artery, and one 3.5 × 23 mm everolimus-eluting stent (EES) (Xience Xpedition, Abbott Vascular, Santa Clara, CA) was deployed at distal RCA. The guiding catheter was changed to a 7 Fr. EBU 3.5 catheter (Medtronic AVE, Santa Rosa, CA, USA) using the sheathless technique. A 0.014 Fr. Runthrough wire (Terumo, Japan) was advanced to the distal LAD. After pre-dilatation with a 3.0 × 15 mm high-pressure balloon at the proximal to the mid-LAD, the BVS (Abbott Vascular) cannot pass the S-shape tortuous LAD even under fully passive guiding catheter (7Fr EBU 3.5) support. After failed of BVS passage, a 6 Fr. Guideliner could be advanced slowly after balloon anchoring (Figure 1C). One 3.0 × 28 mm BVS was deployed at the mid LAD (Figure 1D). However, coronary dissection worsened after the use of the Guideliner (Figure 1E). Due to the large vessel diameter of proximal LAD to distal LM bifurcation, one 3.5 × 15 mm EES and one 4.0 × 28 mm EES was deployed at the distal left main to the proximal LAD (Figure 1F, 1G). Final CAG showed a fair flow. The patient did not experience any symptoms in one-year follow-up period.

DISCUSSION

BVS has precludes the need for further metal layers and preserves the natural healing process of the coro-

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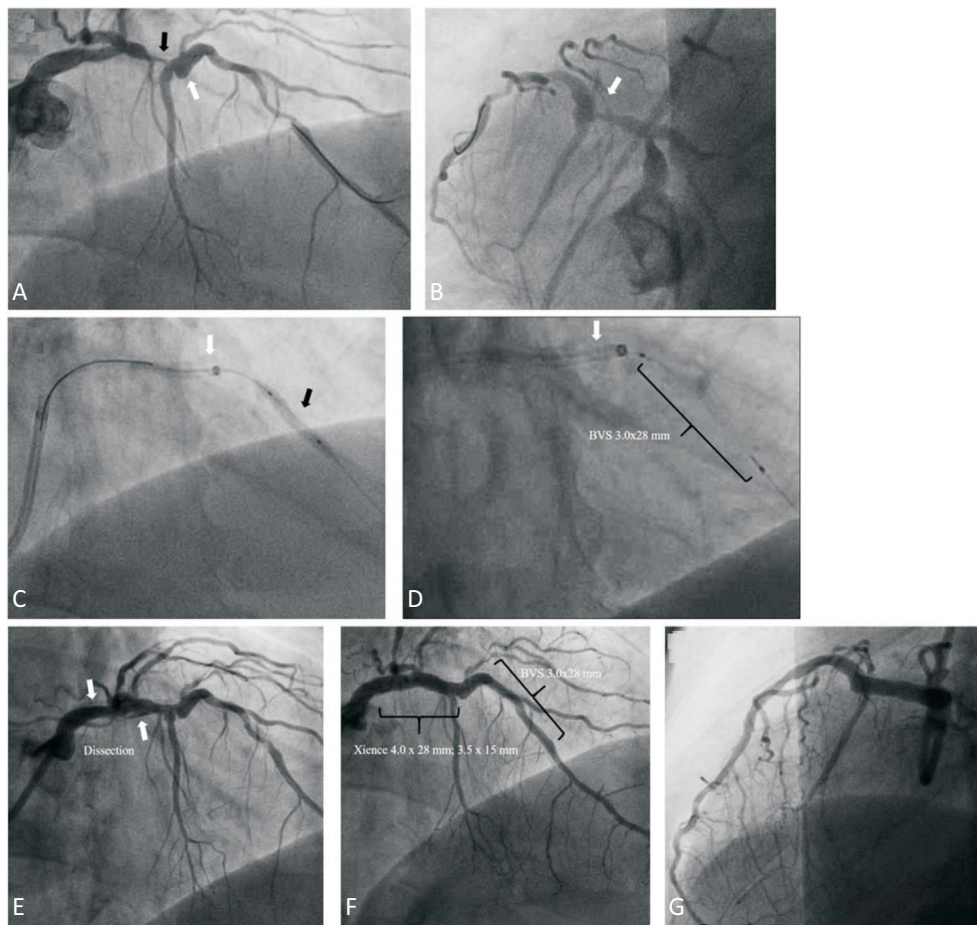


Figure 1. Coronary angiography. (A, B) The proximal left anterior descending artery (LAD) had one lesion with critical stenosis and followed an S-shaped tortuosity with some coronary aneurysm. (C) The 6 Fr. Guideliner could be advanced slowly after balloon anchoring. (D) One 3.0 × 28 mm bioresorbable vascular scaffold (BVS) (Absorb, Abbott) was deployed at mid LAD with the Guideliner support. (E) Coronary dissection worsened after the use of Guideliner. (F, G) One 3.5 × 15 mm everolimus-eluting stent (EES) (Xience Xpediton, Abbott Vascular, Santa Clara, CA) and one 4.0 × 28 mm EES were deployed at distal left main to proximal-LAD. One 3.0 × 28 mm BVS was deployed at mid-LAD.

nary artery. BVS promise complete bioresorption after 3 years, vessel lumen enlargement, reduction of the plaque to media ratio, and restoration of vasomotion. In a porcine coronary artery model, optical coherence tomography (OCT) struts became open box between two and half years and three years and dissolved black box between three years and three and half years, and either dissolved bright box or were indiscernible four years later.¹ In addition, the idea of “leaving nothing behind” after percutaneous coronary interventions is a very exiting concept in modern interventional cardiology, and also gives the chance of the possibility of future graft anastomosis in case of the need for CABG. In our case, the patient was relatively young patient, and may get long-term benefit form BVS implantation to restore

vasomotion and retain the chance of CABG if distal diseased vessel progressed gradually. The reason of two metallic drug-eluting stents in distal LM to proximal LAD was that the distal LM to proximal LAD vessel diameter was quite big, the upper limit of BVS was luminal diameter around 4.2 mm. Our case has significantly large vessel diameter than BVS could provide. A key point is the selection of patients who could potentially benefit most from the implantation of the BVS. However, no clinical trial could answer this question currently.

To date the use of BVSs has largely been restricted to patients recruited into clinical trials with a relatively small number of “real-world” patients treated with these devices.^{2,3} Randomized clinical trials just focused on the stable coronary disease with simple de novo coronary

lesions.⁴ No clinical trial was performed for the BVS use for torturous vessel. Actually, percutaneous coronary intervention in tortuous vessels is a substantial challenge for interventional cardiologists. Many techniques have been described to overcome the challenge, including the use of stiffer wires, buddy wires, the anchor balloon technique, and deep seating of the guide catheter.⁵ Due to the thick profile increases the difficulty of deliverability and pre-dilatation for lesion preparation, coronary tortuosity may limit the use of the BVS.

Everaert et al. suggested that Guideliner catheters are valuable to increase back-up support and device deliverability in tortuous vessels,⁶ and these aid devices should have bigger inner lumens when BVS use. The vessel tortuosity and calcification proximal to the lesion may provide extreme resistance for deployment of BVS. Therefore, prior to the delivery of BVS, appropriate evaluation of the proximal vessel for tortuosity and calcification, has become more important than with metallic stents to achieve a successful implantation. In this report, it is feasible for BVS implantation of a torturous vessel with a Guideliner catheter.

LEARNING POINTS

Even though coronary tortuosity may influence the deliverability of the BVS, it is still feasible for BVS implantation of a torturous vessel with a Guideliner catheter.

SOURCES OF FUNDING

None.

DISCLOSURES

None.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

HUMAN RIGHTS STATEMENTS AND INFORMED CONSENT

All of the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964 and later revisions.

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