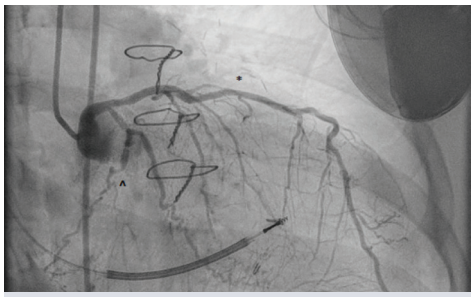
Cath Lab Digest

A product, news & clinical update for the cardiac catheterization laboratory specialist



CASE REPORT

Crossing a Severe Complex Lesion With a Rapid Exchange Low-Profile Angioplasty Balloon After Crossing Failure of Two Microcatheters

Prospero B. Gogo, Jr., MD, FACC, FSCAI

Complex percutaneous coronary interventions are encountered frequently during coronary angiography, occurring in approximately 1 in 5 of all patients referred for angiography, and in up to 50% of patients with a prior history of known coronary artery disease.[1] On the other hand, revascularization rates of these lesions with percutaneous coronary intervention (PCI) have historically been low, with only 10%-15% of patients undergoing an attempt with complex PCI.[2] Complex lesions are also a significant driver of referrals for revascularization via coronary artery bypass graft (CABG) surgery.

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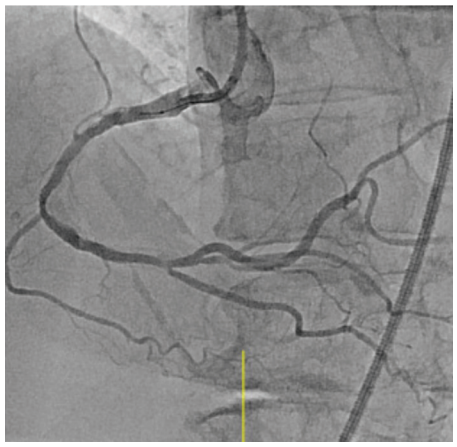
In This Issue

CALCIUM CORNER

The PCI Gender Gap in Treating Calcified Lesions: A Paradigm Shift

CLD talks with Suzanne J. Baron, MD, MSc, FSCAI.



Historically, why have women experienced worse percutaneous coronary intervention outcomes than men?

In general, our studies have shown us time and time again that both short and long-term mortality rates in women are higher after percutaneous coronary intervention (PCI), even in the contemporary era. The cause for this persistent finding is likely multifactorial and includes atypical presentations of coronary artery disease (CAD) with resulting delays in diagnosis, and invasive and noninvasive evidence-based treatment in female patients.

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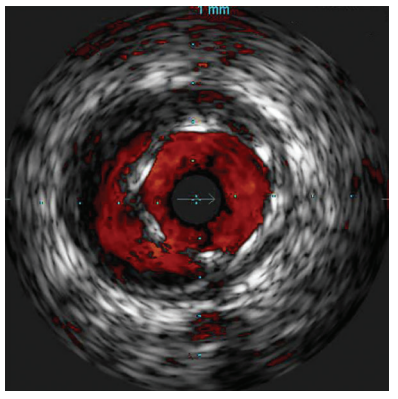
IMAGING IN PVD

The Consensus for Intravascular Ultrasound Use in Peripheral Vascular Intervention

CLD talks with Eric A. Secemsky, MD, MSc, RPVI, FACC, FAHA, FSCAI, FSVM.



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Crossing a Severe Complex Lesion With a Rapid Exchange Low-Profile Angioplasty Balloon After Crossing Failure of Two Microcatheters

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The case demonstrates the use of a low entry profile 1.5 mm PTCA balloon catheter (Takeru PTCA Balloon Dilation Catheter, Terumo Interventional Systems).

The technically challenging nature of complex PCI is one of the main barriers to more frequent attempts at treating these difficult lesions. Crossing the complex lesion with a guidewire can be very difficult, with some techniques including maneuvering guidewires through the subintimal space, only to re-enter the lumen of the vessel downstream past the lesion. Even if a guidewire crosses, it may still be extremely difficult to pass angioplasty balloons or other equipment to dilate the lesion due to severe fibrosis, calcification, and tortuosity.

In this case report, we describe the case of a patient undergoing a complex PCI of the left circumflex coronary artery. The case demonstrates the use of a low entry profile 1.5 mm PTCA balloon catheter (Takeru PTCA Balloon Dilation Catheter, Terumo Interventional Systems), used when two other low-profile microcatheters were unable to cross, leading to a successful outcome with eventual stenting of the culprit vessel and restoration of normal anterograde flow.

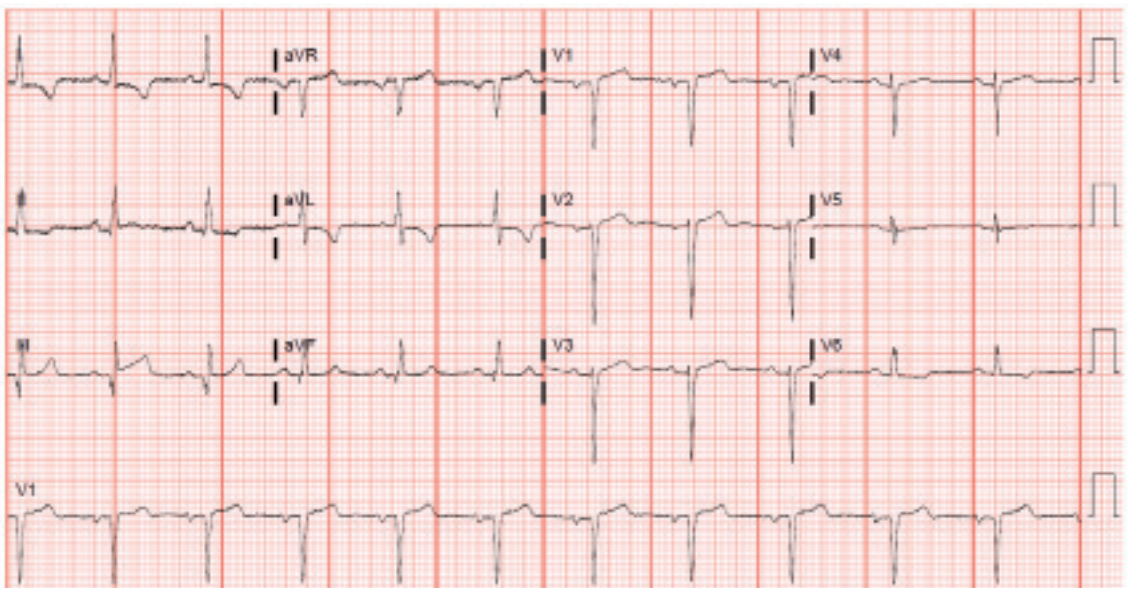

Figure 1. Initial electrocardiogram.

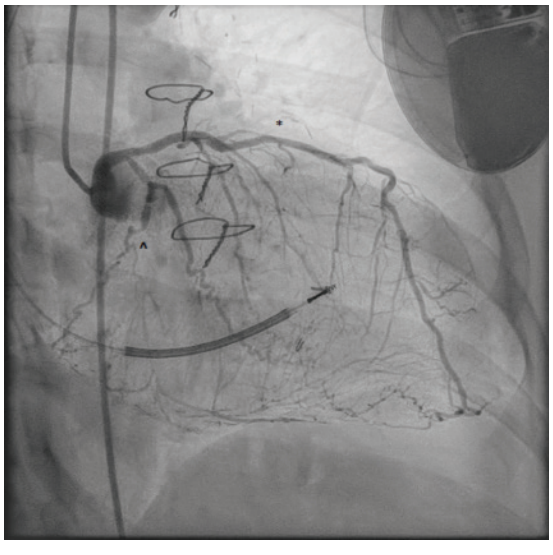

Figure 2. Right anterior oblique (RAO) caudal view; (*) patent left anterior descending (LAD) coronary artery stents; (^) complex lesion of the left circumflex (LCx) after the first obtuse marginal (OM1).

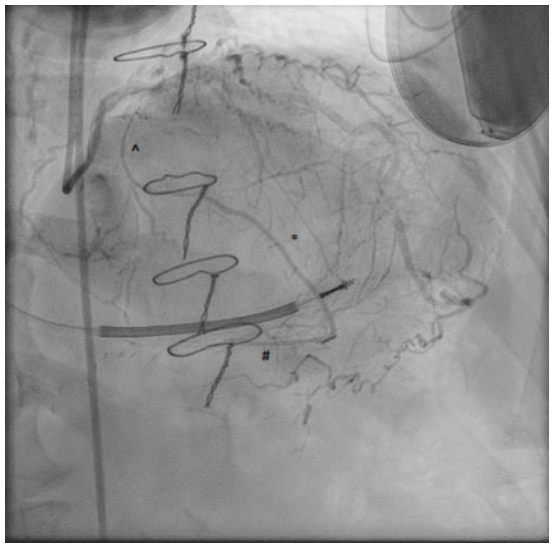

Figure 3. RAO cranial, (*) remains of free radial jump between (^) LCx and (#) right posterior descending artery (RPDA).

Case Report

A 59-year-old female with a past medical history significant for coronary artery disease, ischemic cardiomyopathy (left ventricular ejection fraction [LVEF] 30-35%), ventricular tachycardia, implantable cardioverter defibrillator implantation, type 2 diabetes, hypertension, and hyperlipidemia was transferred to our institution with progressive angina leading to an acute coronary syndrome with a peak troponin-I of 0.087 ng/mL. Her electrocardiogram demonstrated changes consistent with lateral ischemia (Figure 1).

The patient had a history of CABG more than 20 years ago and had undergone several PCIs after previous angiography had demonstrated the loss of all surgical bypasses. Her most recent PCI, one year prior, involved the proximal and mid segments of the left anterior descending artery, and she was also found to have chronic occlusions of the right coronary, left circumflex, and several diagonal branches.

Her right radial artery was known to be occluded from prior catheterizations and her left radial was used in her CABG previously; thus, cardiac catheterization was performed from the right femoral artery. Coronary angiography demonstrated (Figure 2) patent stents in the left anterior descending (LAD) and the complex lesion in the left circumflex (LCx) distal to the first obtuse marginal (OM1). The distal LCx supplied several posterolateral branches and filled via bridging and other ipsilateral collaterals. Interestingly, the remains of a free radial jump graft from the distal LCx also supplied the right posterior descending artery (RPDA) (Figure 3). The right coronary artery (RCA) was not engaged and was known to have a complex lesion in the proximal segment.

The non ST-elevation myocardial infarction (NSTEMI) mechanism was determined to be from demand related to the complex lesions, with the most likely source being the LCx segment, given the patient's ECG findings. Thus, ad hoc complex PCI of the LCx was planned. The JCTO score for the LCx lesion was calculated to be 3.

The ipsilateral collaterals to the culprit vessel precluded the need for dual access, and a 6 French

(F) VL3 guide catheter (Boston Scientific) was placed via the right femoral access. A Turnpike LP microcatheter (Teleflex) was used for wire support and exchanges. Initial crossing attempts with Runthrough NS Extra Floppy (Terumo Interventional Systems) and Fielder XT-a (Asahi Intecc) wires were unsuccessful. The lesion was crossed successfully with a MiracleBros 6 (Asahi Intecc) wire and the tip was clearly visualized in the remains of the jump graft (Figure 4). Attempts to then cross the lesion with Turnpike LP and Turnpike Gold microcatheters (Teleflex) for lesion dilation and possible wire exchange were unsuccessful despite very good guide support (Figure 5).

A Takeru 1.5 mm x 6 mm PTCA balloon was subsequently easily able to cross into the distal vessel and dilate the lesion with multiple inflations (Figure 6). After further predilation with larger PTCA balloons, technical success was achieved after successful placement of two Orsiro Mission drug-eluting stents (Biotronik) (Figure 7).

The patient was discharged the following day completely angina free and with a subjective increase in her LVEF on echocardiography to 40%-45%. She remained angina free at 15-day outpatient follow-up.

Conclusion

Ongoing incremental improvements in the equipment used for complex PCI is contributing to the increasing rate of success for these procedures, resulting in enhanced clinical outcomes for many patients. Very low-profile balloons have a minimal crossing profile, exceeding even that of dedicated crossing microcatheters. In this case, the use of the Takeru PTCA balloon allowed not only the crossing of a very tight, fibrous lesion even when crossing microcatheters were unable to do so, but the Takeru PTCA balloon was also able to successfully dilate the lesion to allow procedural success with placement of drug-eluting stents. ■

This article is supported by Terumo Interventional Systems.

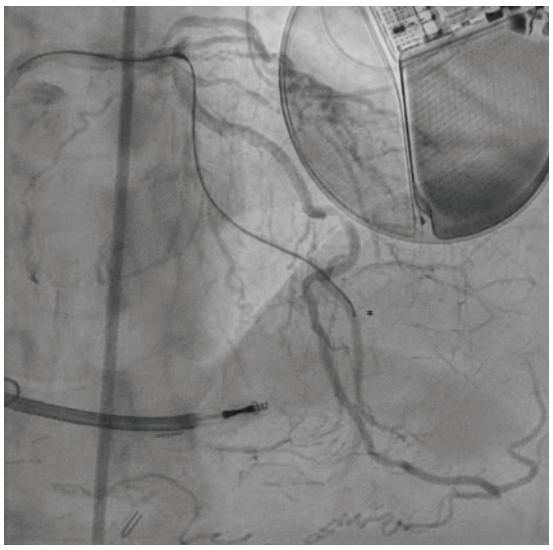

Figure 4. Tip of MiracleBros 6 wire (Asahi Intecc) (*) in the remains of the radial jump graft.

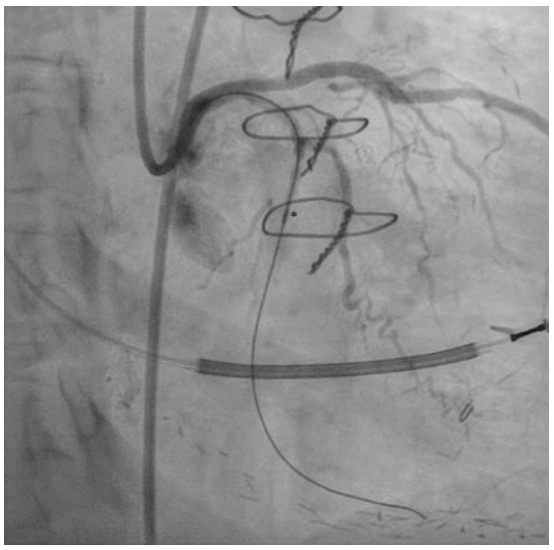

Figure 5. Turnpike LP and Turnpike Gold (*) (Teleflex) were unable to cross the complex lesion.

References

1. Iftikhar SF, Hu P. *Complex Coronary Artery Lesions*. 2022 Apr 30. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–. PMID: 30969721.
2. Muraca I, Carrabba N, Virgili G, et al. Chronic total occlusion revascularization: A complex piece to "complete" the puzzle. *World J Cardiol*. 2022; 14(1): 13-28. doi: 10.4330/wjc.v14.i1.13

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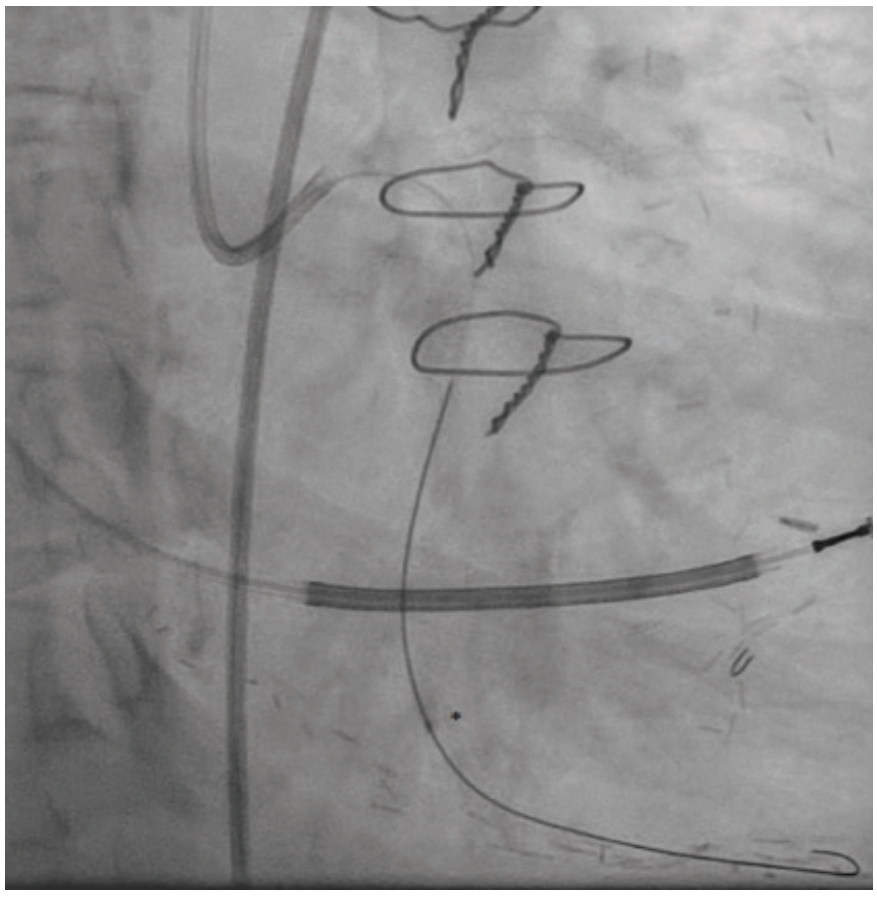

Figure 6. Takeru 1.5 mm x 6 mm PTCA balloon (Terumo Interventional Systems) dilation after successful lesion crossing. (*) Turnpike Gold microcatheter.

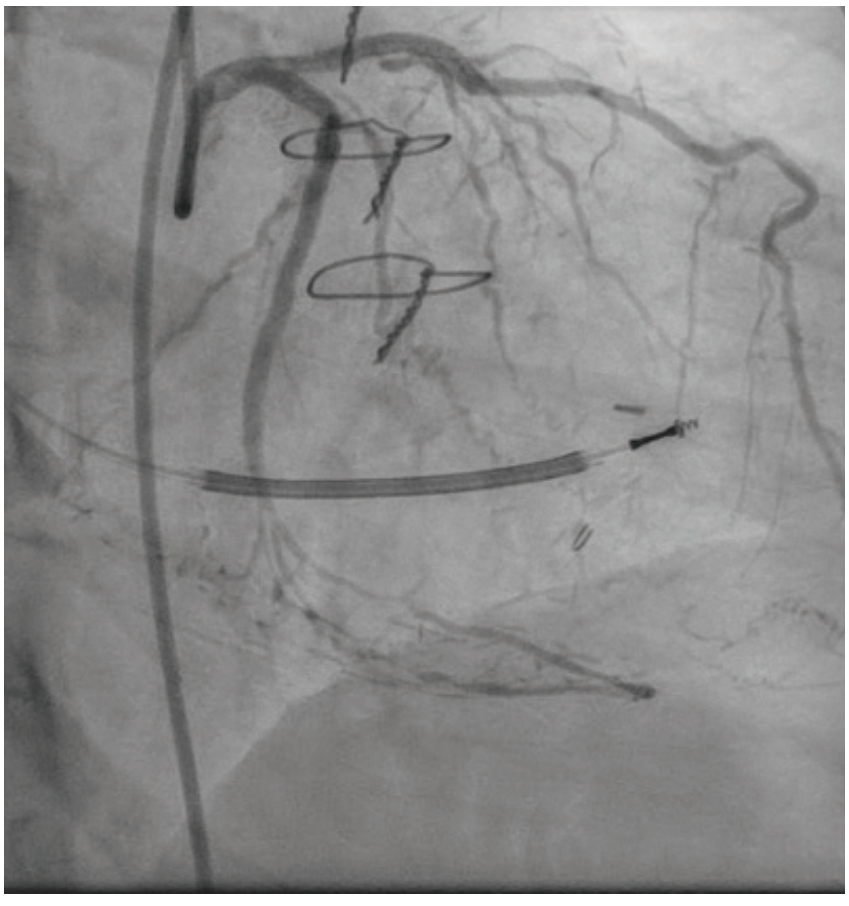

Figure 7. Technical success after placement of two Orsiro drug-eluting stents (Biotronik) from the proximal to distal LCx.