



## Case Reports

## Side-branch technique for difficult guidewire placement in coronary bifurcation lesion



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## ABSTRACT

Despite tremendous advances in technology and skills, percutaneous coronary intervention (PCI) of bifurcation lesion (BL) remains a particular challenge for the interventionalist. During bifurcation PCI, safe guidewire placement in the main branch (MB) and the side branch (SB) is the first step for successful procedure. However, in certain cases, the complex pattern of vessel anatomy and the mix of plaque distribution may make target vessel wiring highly challenging. Therefore, specific techniques are required for solving this problem. Hereby, we describe a new use of side-branch technique for difficult guidewire placement in BL.

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## 1. Introduction

Bifurcation lesion (BL), accounting for 20% of PCI procedures, is truly technically challenging and remains a difficult lesion subset to treat [1,2]. Compared with simpler lesions, BL intervention is associated with more complex procedures, lower procedural success rates, and higher clinical event rates [3]. During the PCI procedure, the first and critical step is the safe placement of the guidewire in the main branch (MB) and the side branch (SB). However, when the bifurcation take-off angle is wide and there is severe stenosis with a large plaque distributed in the proximal MB, primary wiring becomes difficult. In previous studies, various approaches have been described to facilitate guidewire manipulations. These approaches include shaping the guidewire tip curvature, use of stiffer or hydrophilic polymer coating guidewire, the double wiring technique, and advancing a micro-catheter or balloon closer to the BL in order to increase the back-up support [4–6].

Here, we report the use of side-branch technique to solve difficult guidewire placement in BL. In this article, we review two typical cases to describe the tips and tricks useful for success in difficult target vessel access.

## 2. Technique description

## 2.1. Case 1 (Fig. 1)

A 69-year-old male with a past medical history of diabetes, hypertension and smoking was referred for cardiac catheterization after being admitted for symptoms of unstable angina and elevated bio-markers diagnostic for a non-ST-elevation myocardial infarction (NSTEMI).

Coronary angiography showed a Medina [7] classification (1, 1, 1) bifurcation lesion involving a mid left anterior descending artery (LAD) with 95% stenosis and a first diagonal branch (D<sub>1</sub>) lesion with 90%, D<sub>2</sub> lesion with 90%. The proximal-LAD diameter was approximately 5 mm, while the diameter of the mid-LAD and D<sub>2</sub> was approximately 2.75 mm each. The SKS technique was chosen in this case because of the large proximal vessel.

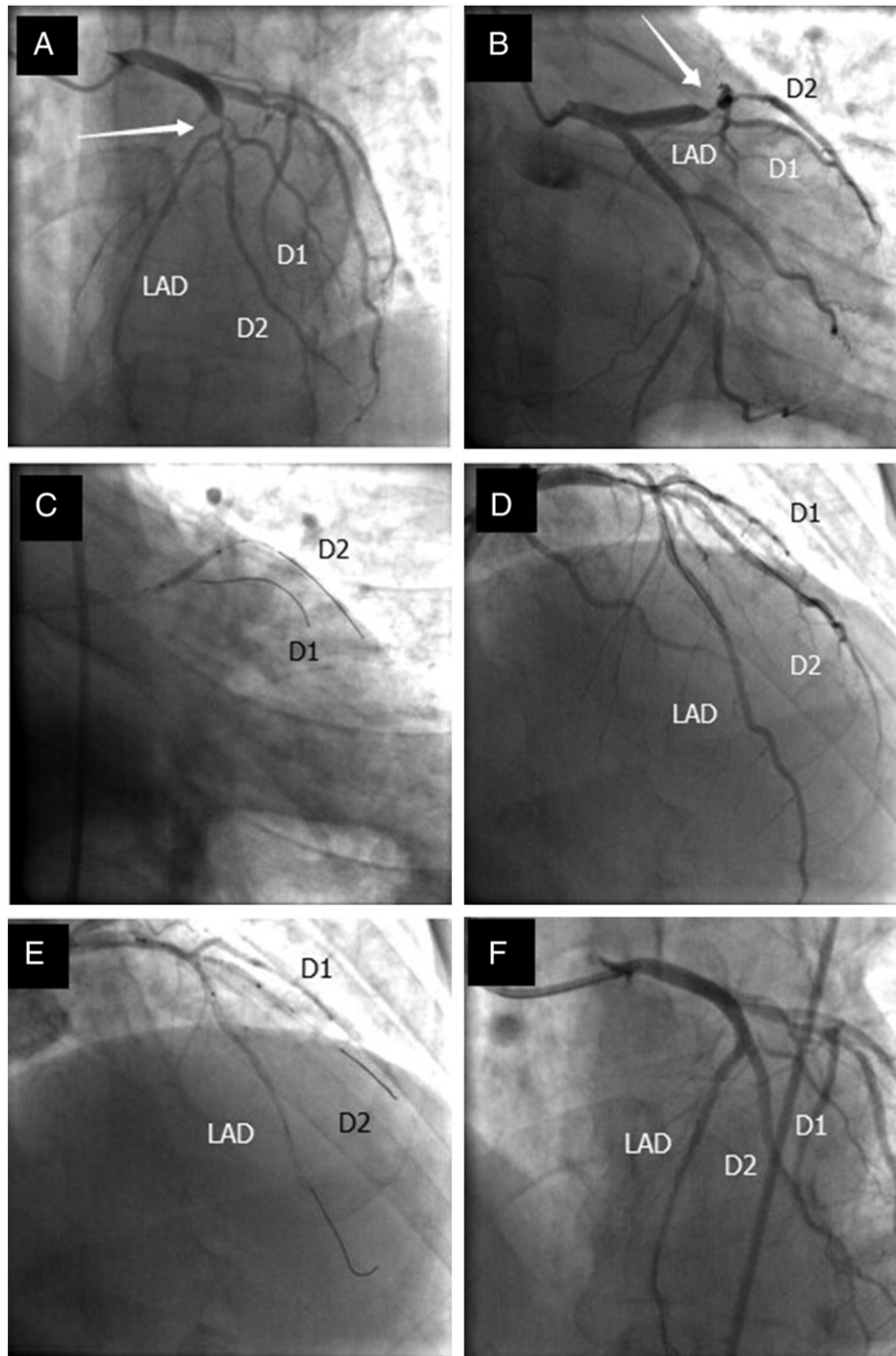
Angioplasty to the bifurcation lesion in the mid-LAD was performed through the right femoral approach using a 7 French EBU3.5 guiding catheter (Launcher®, Medtronic, USA). First, a 0.014" BMW guidewire (Abbott Laboratories, Abbott Park, USA) was maneuvered into the D<sub>1</sub>, with a second guidewire advanced into the D<sub>2</sub>. Then, a BMW guidewire was advanced into LAD. However, this attempt was unsuccessful. The guidewire always slipped away into the diagonal branch (D<sub>1</sub> or D<sub>2</sub>). After that, it was exchanged to a Pilot 50 guidewire (Abbott Laboratories, Abbott Park, USA) with an appropriately shaped tip curvature. It failed as well. At this moment, we put a 2.5\*20 mm balloon into the D<sub>2</sub> and inflated it to 8 atm. Then, the tip of the BMW guidewire easily entered into the LAD. There was no acute and post-procedural complication.

## 3. Case 2 (Fig. 2)

A 36-year-old male with a past medical history of hypertension and smoking was referred for angina and inferior ischemia on electrocardiogram (ECG). Coronary angiogram revealed an 80% stenosis in the middle of right coronary artery (RCA), and a Medina classification (0, 1, 1) bifurcation lesion at the crux of the RCA of 99% extending into the ostium of the posterior lateral artery (PL). The posterior descending (PD) artery has Ostia 99% disease. The left coronary system had no obvious stenosis. PCI was performed via the right femoral approach using a 7 French JR4.0 guiding catheter (Launcher®, Medtronic, USA). First, a BMW guidewire was advanced into the PD. Then, we used a floppy guidewire (Runthrough-Hypercoat®) to enter into the PL, but the attempt failed.

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**Fig. 1. Case 1.** A and B: Left coronary angiogram shows a bifurcation (White Arrow) lesion in the mid LAD. C: The attempts using a BMW and a Pilot 50 guidewire both failed to enter into the LAD. Then a 2.5\*20 mm balloon was put into the D2 and inflated to 8 atm. D: After the inflation of the balloon, a BMW guidewire easily entered into the LAD. E: Two stents were deployed at LAD and D2 simultaneously. F: The final result after stenting.

In the mean time, the patient felt severe chest pain and coronary angiography showed acute total occlusion of the PL. In this situation, we put a 2.5\*20 mm balloon into the ostium of PD and dilated it to 12 atm. After that, the PL was recanalized and a BMW guidewire entered the PL without difficulty. Then, we proceeded to pre-dilate the ostium of PL with a 2.5\*20 mm balloon. Finally, the BL was achieved with culotte stenting and the whole process showed no complications.

#### 4. Discussion

Safe guidewire placement in the target vessel at the beginning of the bifurcation PCI is a critical technical step for successful procedure. When

the bifurcation take-off angle is wide and there is severe stenosis with a large plaque distributed in the proximal MB, manipulating a guidewire into the target vessel is very difficult, especially when the guidewire constantly enters an unwanted SB. The usual approaches to tackle the situation include: shaping the guidewire tip curvature, exchanging the guidewire to stiffer or hydrophilic polymer coating one, utilizing the double wiring technique, and advancing a micro-catheter or balloon closer to the BL with the view to increasing the back-up support. However, these approaches very often fail.

The side branch technique was initially applied in the CTO lesion with the SB located near the proximal end of it [8]. When the CTO guidewire couldn't penetrate into the CTO lesion, a floppy guidewire

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