New Technique Using a Scoreflex Balloon Catheter for a Case of Unsuccessful Delivery of the Coronary Stent System

Shuji Sato, Hiroshi Mikamo, Masayo Suzuki, Takuo Iizuka, Hirofumi Noike

We encountered a case in whom a coronary stent was unable to be passed through the curved region in the mid-coronary artery during PCI for a peripheral lesion of the right coronary artery. We employed a new and simple technique using a Scoreflex balloon catheter, the so-called Scoreflex method, by which the stent was successfully advanced without a new device. Here, we report the effectiveness of this method.

KEY WORDS: Scoreflex balloon catheter, anchor method, slip through method, percutaneous coronary intervention

I. Introduction

We sometimes experience cases in which it is difficult to deliver a stent to the targeted position due to coronary characteristics. In such cases, use of another device is often required. Here, we report a new technique using the Scoreflex balloon that enables stent delivery without using other devices.

The Scoreflex balloon catheter, a unique balloon catheter which was launched in the market in 2009, has two major characteristics. Firstly, it is equipped with a nitinol integral wire on the balloon surface, which trackability at stenotic lesions due to the “rail effect” and prevents slipping during balloon dilation. In addition, the dual wire system, comprised of the nitinol integral wire on the balloon surface and a guide wire, facilitates precise focusing of the force of the balloon for specific areas of the plaque, so that the plaque can be fractured and the stenosis effectively dilated. Secondly, the length of guide wire lumen of Scoreflex balloon are extremely short compare to general monorail balloon (0.9 cm vs 30 cm) and its exit port is located at the distal portion of the balloon (Fig. 1).

II. Case

A 70-year-old man with chest pain was admitted for diagnosis and therapy; his coronary angiography showed organic stenosis in the distal right coronary artery (Fig. 2).

Percutaneous coronary intervention was initiated from the right inguinal region, using FR4.0 7 F (Femoral Curve Right, Boston Scientific, MA, US) as the guide catheter and Sion (Asahi Intecc, Japan) as the guide wire. Predilation using a Scoreflex balloon 3.0×15 mm was performed before a Promus stent 3.0×28 mm (Boston Scientific, MA, US) was advanced. However, the stent could not be moved through the curved region of the artery in segment 3 even when the buddy wire method was used. Therefore, the Scoreflex method was employed.

Procedural steps of the Scoreflex method used here (Fig. 3A, B)

1) The Scoreflex balloon was advanced to the distal region beyond the position of the stent. The stent was then mounted on the guide wire that delivers the Scoreflex balloon. Consequently, the stent could be passed through segment 3 relatively easily.

2) The guide wire was withdrawn to the tip of the stent balloon, and detached from the Scoreflex balloon.

3) The Scoreflex balloon (detached from the guide wire) was withdrawn to the lumen of the stent, was advanced to the distal region again. The stent deployed at the target lesion, and the percutaneous coronary intervention could be completed.

Post PCI angiography following post stenting in segment 3 displayed an optimal result (Fig. 4).

An overview of the Scoreflex method is shown in Fig. 5.

III. Discussion

Possible reasons for unsuccessful delivery of the coronary stent system may include insufficient support of a guide catheter, and the complex mechanical properties and structure of coronary arteries including calcification, tortuosity, and the degree of stenosis. Methods to overcome these problems include the buddy wire method, anchor method, slip through method, and the use of a Wiggle guide wire (Abbott Vascular, CA, US) or guide catheters.
Fig. 1 Scoreflex balloon catheter.

Fig. 2 Right coronary artery. The Promus stent could not be passed through the lesion as indicated by the arrow.

Fig. 3 A, B: Scoreflex method.
(1) The Scoreflex balloon catheter is located distal to the target lesion, and the coronary stent system is located at the target lesion. The guide wire extends from the tip of the Scoreflex balloon. (2) The guide wire was withdrawn to the wire lumen of the coronary stent system. The guide wire was detached from the wire lumen of the Scoreflex balloon. (3) Scoreflex balloon was withdrawn to the guide catheter.

Fig. 4 Post PCI angiography.

Fig. 5 Overview of the Scoreflex method.
for tortuous or calcified lesions such as child in mother method. However, all of these require a new guide wire and/or balloon catheter. Moreover, since required placement of new guide wire which may enter the false lumen of the coronary artery dissection, consequently, for the reliable wiring, a new system like Crusade (KANEKA, Japan) is required. Placement of a new guide wire is not necessary when using child in mother but the procedure is more complicated.

Issues concerning the Scoreflex method
1. Use of a ≥7 F guide catheter is necessary, since the Scoreflex balloon and coronary stent system are delivered at the same time.

2. Trackability of the Scoreflex balloon
   Compared with conventional balloons, the Scoreflex balloon is rather inflexible with a stiff and long nose portion, and the short wire lumen makes it difficult to maintain the coaxial position between the balloon catheter and the guide wire, leading to poor trackability in the curved regions of coronary arteries. Therefore, the use of a Scoreflex balloon for tortuosity coronary arteries, especially Shepherd’s crook right coronary arteries, is considered difficult. On the other hand, for relatively linear coronary arteries such as the left anterior descending branch, it can be advanced successfully and it is useful even for lesions where intravascular ultrasound does not pass through.

   Although the Scoreflex method used for the present case is similar to the slip through method, technically, the balloon catheter was used rather than a buddy wire as a guide wire. If the Scoreflex balloon had been dilated to deliver the coronary stent system, it would have been called the anchor method. However, in the present case, the stent was passed through without dilation of the balloon. It is considered that the curved region of the coronary artery where the stent had not been able to be passed through was straightened by the shaft of the Scoreflex balloon.

Based on these reasons, the Scoreflex method is considered to be a new and simple method that can be used to overcome resistance in coronary stent passage without additional device.

IV. Conclusion

The Scoreflex method has been shown to be a simple and effective method without necessity for use of an additional device. For cases of difficult stent delivery, this method may be considered before considering other methods.

References
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