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METHODS ARTICLE

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Clinical effective use of Conquest Pro 12 Sharpened Tip for chronic total occlusion intervention: A series of three case reports

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Abstract

A new chronic total occlusion (CTO) guidewire, Conquest Pro 12 Sharpened Tip (CP12ST), has a stronger penetration force than the original CP12 and a deflection effect that it does not have. The CP12ST enables us to advance into hard plaque that has not ever penetrated, which might change CTO treatment as shown in three cases.

KEYWORDS
coronary, CTO, deflection, penetration force, wire

1 | INTRODUCTION

Although the new algorithm and introduction of antegrade dissection re-entry (ADR) device have recently contributed to the success rate for chronic total occlusion-percutaneous coronary intervention (CTO-PCI),[1,2] we have still experienced to fail some CTO-PCI cases such as severe calcification.[3]

Regarding the ADR, the success rate of sticking with the original ADR guidewire (Boston Scientific) has been proven not to be so much high.[2] It does not have so much strong penetration force due to the large gap between the tip and shaft (Figure 1) and might be easy to prolapse due to its low tip flexibility (Figure 2). To overcome these issues, several CTO guidewires have been substituted instead of it, but the result was not enough in terms of the penetration force and tip flexibility (Figures 1 and 2).

Recently, the Conquest Pro 12 Sharpened Tip (CP12ST) (Asahi Intecc) has been specifically produced by sharpening the tip of the original CP12 (Asahi Intecc) for ADR (Figures 3 and 4). Then, it has gotten the strongest penetration force in all the CTO guidewires based on the calculation (Figure 5). Conversely, it might be considered to be risky to penetrate the coronary artery itself and its correct use needs to be proven with our clinical experiences. Therefore, we present three tough CTO cases effectively using it.

2 | CASE SERIES

2.1 | Case 1: For ADR

Case 1 is an 80-year-old male who was diagnosed with stable angina pectoris caused by a mid-right coronary artery (RCA) CTO. The CTO lesion analysis showed only the presence of a blunt proximal cap (Figure 6A,B) so the J-CTO score was 1.

Bilateral femoral access was obtained with 8 and 7 Fr systems for the RCA and left coronary artery (LCA), respectively. At first, the ULTIMATEbros3 guidewire (Asahi Intecc) was used for penetration to the CTO entry by checking with intravascular ultrasound (IVUS), but it progressed over the exit of CTO and made sub-intimal space (Figure 6B). In this situation, changing for ADR strategy was reported to be appropriate based on the CTO

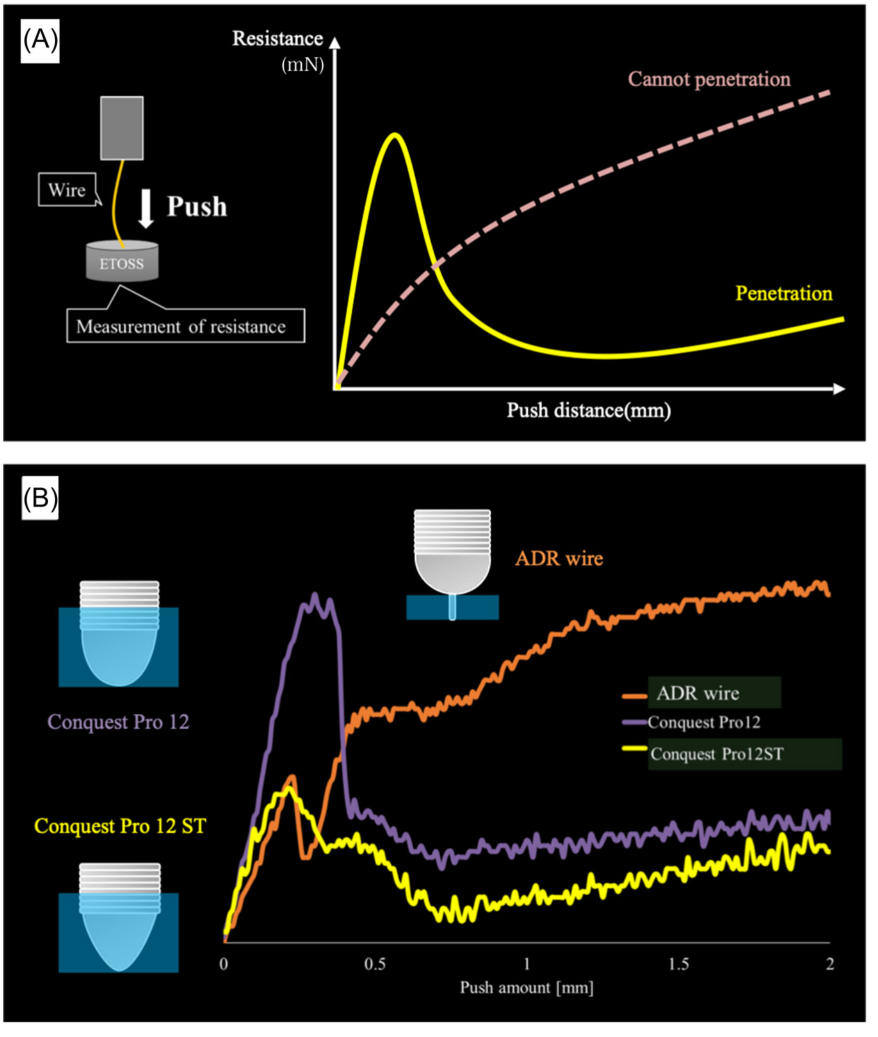


FIGURE 1 Penetration test using ETOSS by Asahi Intecc. (A) The way of penetration test checking resistance with ETOSS; in the case of penetration it indicates the yellow line; in the case of penetration failure it indicates the red line. (B) The penetration test results; the original ADR guidewire vs the CP12 versus CP12ST. ADR, antegrade dissection re-entry; CP12ST, Conquest Pro 12 Sharpened Tip.

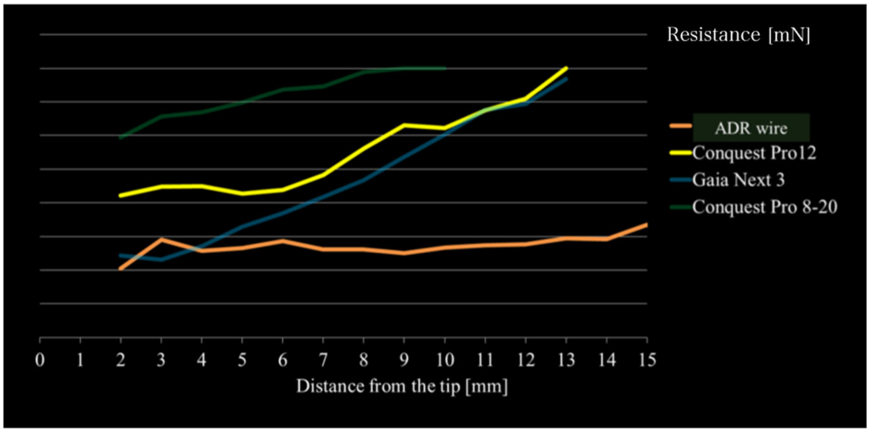


FIGURE 2 Tip flexibility test using ETOSS by Asahi Intecc.

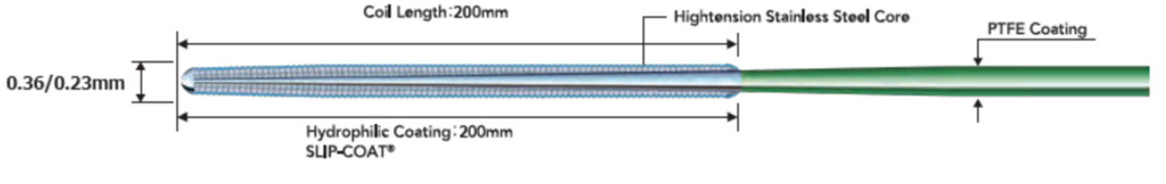
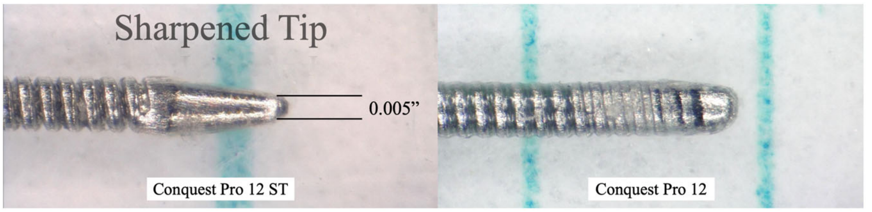


FIGURE 3 Illustrative image of the Conquest Pro 12 Sharpened Tip (CP12ST).

FIGURE 4 The guidewire tip of the Conquest Pro 12 Sharpened Tip (CP12ST) compared with the CP12.



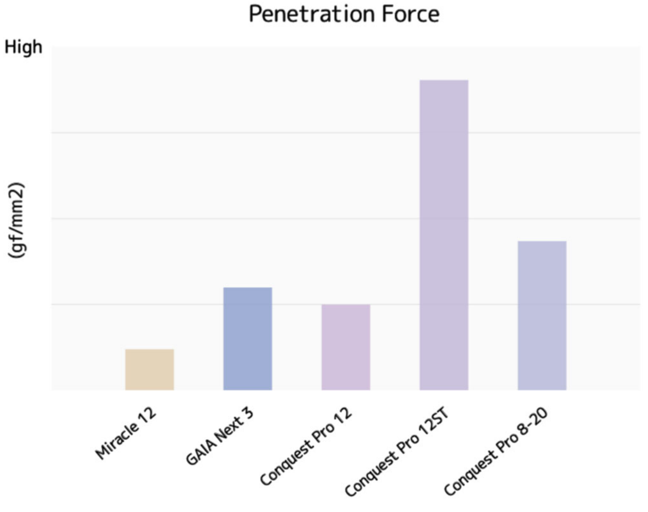


FIGURE 5 Penetration force of the Conquest Pro 12 Sharpened Tip (CP12ST) versus other chronic total occlusion (CTO) guidewires.

algorithm.[1] After the bougie using the Corsair Pro microcatheter (Asahi Intecc), the Stingray LP balloon (Boston Scientific) could be advanced easily in the sub-intimal lumen up to the optimal bridge point. By confirming the CTO exit from a couple of RCA bridge collateral channels, the CP12ST was successful to puncture towards the distal true lumen, after which switching to progress the X-treme XT-R guidewire (Asahi Intecc) (Figure 6C). The procedure was finished after pre-dilating and stenting (Figure 6D). No complications occurred during the patient's hospital stay, and follow-up revealed complete resolution of angina.

2.2 | Case 2: For angiography-based three-dimensional (3D) wiring

Case 2 is a 75-year-old female who was diagnosed as inferior old myocardial infarction (OMI) due to a mid-RCA CTO with severe calcified nodule (Figure 7A). At the last PCI, although the CTO lesion could not be penetrated even by the CP8-20 guidewire (Asahi Intecc) antegradely, a pull-through system created by reverse controlled antegrade and retrograde tracking only enabled stenting for severe stenosis at RCA#3. There remain an angiographic sub-lumen at the side of the calcified nodule. In this session, the remaining calcified nodule CTO is the target lesion to be treated. The CTO lesion analysis showed the presence of a blunt proximal cap, calcification and retry lesion so that the J-CTO score was 3.

For this second attempt, only one 8Fr system was constructed from femoral artery and the strategy was IVUS-guide PCI from the sub-lumen that had been made in the first session. At first, the IVUS-based 3D wiring with tip-detection method was tried under the support of Corsair Pro, but even the CP12ST could not penetrate the CTO entry. After checking the entry with IVUS (Figure 7B), the CP12ST supported by OTW balloon (3.0 mm) as anchor balloon technique was used to penetrate it angiographically under the guidance (Figure 7C).[4] The penetration under the system was successful by confirming the IVUS (Figure 7D). After optimal lesion preparation using the Rotablator (Boston Scientific) (Figure 7E) and noncompliant balloon, stenting in the severe calcified nodule could be completely performed (Figure 7F).

2.3 | Case 3: For single wire technique using deflection effect

Case 3 is a 68-year-old female who was diagnosed with inferior OMI. Diagnostic angiography showed a mid-RCA CTO with severely calcified nodule (Figure 8A). The CTO lesion analysis showed the presence of a blunt proximal cap and calcification so the J-CTO score was 2.

Bilateral femoral access was obtained with 8 and 7 Fr systems for the RCA and left main coronary arteries, respectively. First of all, the Gaia Next 3 guidewire (Asahi Intecc) was used for penetration to the tapered site of the CTO entry, but it could not pass through the true-lumen. Then, parallel wire technique on it was performed, and the CP8-20 was used for penetration to the center of the calcified nodule. However, it also progressed straight and could not catch up true-lumen (Figure 8B). In this situation, the strategy changed for single wiring with the CP12ST and was successful to puncture towards the distal true lumen by its deflection effect (Figure 8C, Movie 1). However, the IVUS delivery could not be performed and the calcified lesion was dilated by the small balloons (0.75 mm/1.0 mm/1.5 mm) sequentially. After the IVUS checking, optimal lesion preparation using the Rotablator (Figure 8D,E) and cutting balloon was conducted. The final angiography after stenting demonstrated a good impression as shown in Figure 8F.

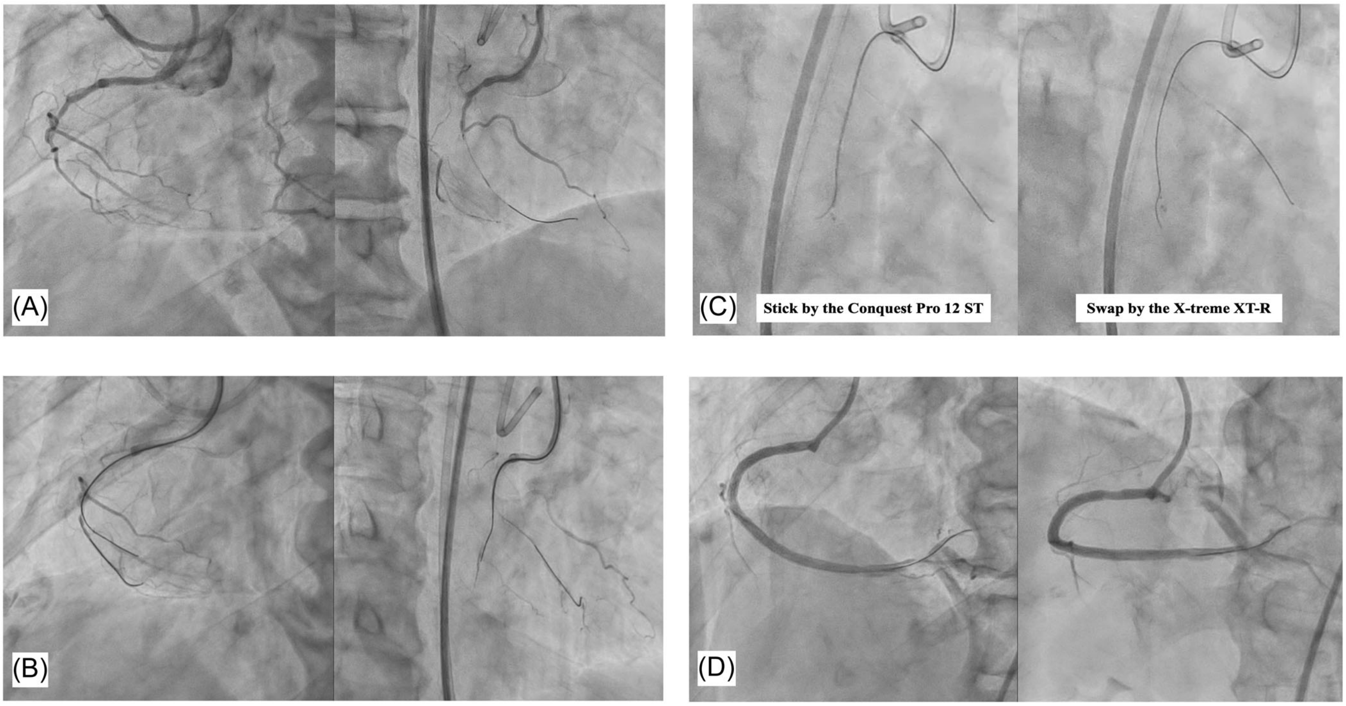


FIGURE 6 Case 1. (A) Initial CAG LAO view and RAO view before PCI. (B) Progress of the Ultimate Bross 3 for sub-intimal space. (C) Left image; puncture successfully performed using the CP12ST. Right image; exchange for the X-treme XT-R (Stick-and-Swap technique). (D) Final CAG LAO view and LAO/CRA view. CAG, coronary angiography; CP12ST, Conquest Pro 12 Sharpened Tip; LAO, left anterior oblique; RAO, right anterior oblique; PCI, percutaneous coronary intervention.

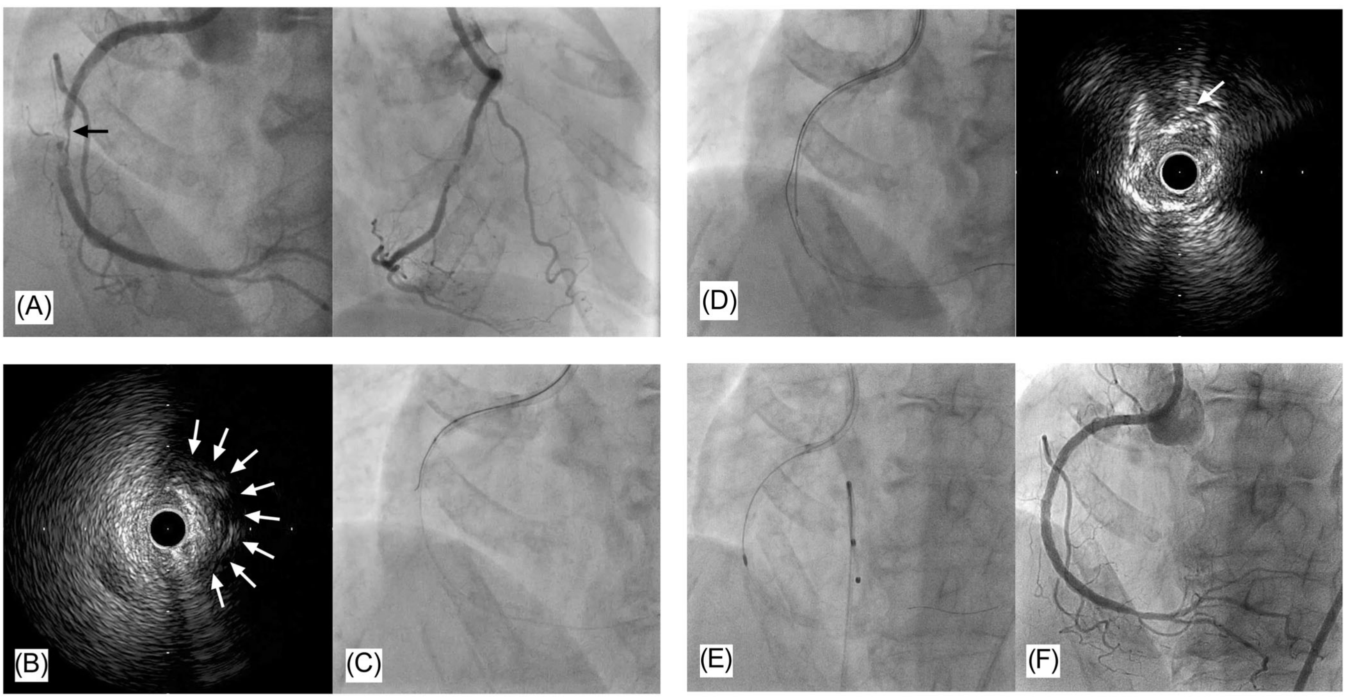


FIGURE 7 Case 2. (A) Initial CAG LAO view and RAO view before PCI. (B) IVUS image from sub-lumen; arrows indicate true-lumen calcified nodule. (C) Angiography-based 3D wiring with the CP12ST. (D) The CP12ST into true-lumen is confirmed by IVUS. (E) Rotational atherectomy under temporary pacing. (F) Final CAG LAO view. CAG, coronary angiography; CP12ST, Conquest Pro 12 Sharpened Tip; IVUS, intravascular ultrasound; LAO, left anterior oblique; RAO, right anterior oblique; PCI, percutaneous coronary intervention.

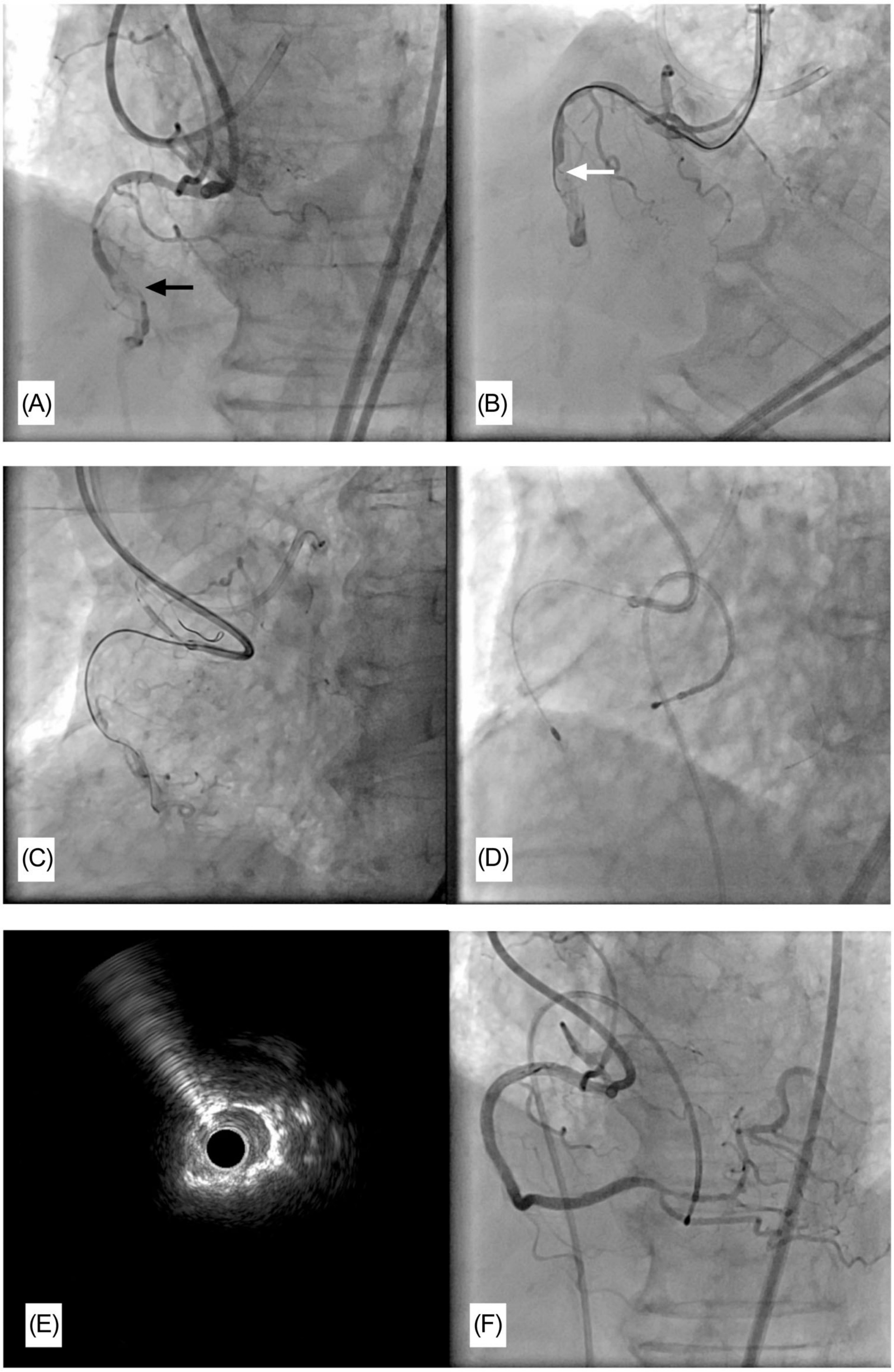


FIGURE 8 Case 3. (A) Initial CAG LAO view before PCI. (B) Parallel wire technique to penetrate the center of the calcified nodule with the CP8-20 (arrow). (C) Successful penetration with the CP12ST for true-lumen confirmed by angiography. (D) Rotational atherectomy under temporary pacing. (E) IVUS image after the rotational atherectomy. (F) Final CAG LAO/CRA view. CAG, coronary angiography; CP12ST, Conquest Pro 12 Sharpened Tip; CRA, cranial view; LAO, left anterior oblique; RAO, right anterior oblique; PCI, percutaneous coronary intervention.

3 | DISCUSSION

We have experienced ADR penetration failure that often occurred when using the original ADR guidewire, but the use of CP12ST for ADR might contribute to the higher success rate as shown in Case 1. In the antegrade approach except for ADR, the IVUS-guide tip-detection 3D wiring with the CP12ST would be the most effective and safe method because correctly visualizing the target of CTO exit.[4] However, if the PCI system could not be allowed to it by the compatibility as shown in Case 2, the prior checking IVUS would increase safety and certainty for the procedure.

The main CTO-failure factor is severe calcium that any guidewire cannot penetrate.[3] The CP12ST might allow this and advance next step for our CTO procedure. Also, it might affect deflection that the CP12 or CP8-20 can not create as shown in Case 3. The cause would be considered as the tip length of the CP12ST by an original deflection test with ETOSS (Movie 2). It demonstrates that the original CP12 (the tip length = 1.0 mm) would not make any deflection effect, meanwhile, the CP12 (the tip length = 1.3 mm) and CP12ST have enough of it.

Finally, we do not recommend the CP12ST use in a retrograde approach. It has the strongest penetration force and a thick core producing 12 g tip load so that it can not control a correct direction retrogradely, which might increase the risk of perforation.

4 | CONCLUSION

The CP12ST has the strongest penetration force in all the CTO guidewires and deflection effect so that might enable to use in several CTO cases, but it should not be used for retrograde wiring due to a high risk of perforation.

AUTHOR CONTRIBUTIONS

Hiroaki Matsuda: Conceptualization; data curation. **Etsuo Tsuchikane**: Conceptualization; project administration. **Ryohei Yoshikawa**: Data curation. **Atsunori Okamura**: Data curation.

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CONFLICT OF INTEREST STATEMENT

The authors except Etsuo Tsuchikane have nothing to disclose. He is a consultant for Asahi Intecc, Boston Scientific, and Kaneka.

DATA AVAILABILITY STATEMENT

All the authors have read and approved the final version of the manuscript. Corresponding author had full access to all of the data in this study and takes complete responsibility for the integrity of the data.

ETHICS STATEMENT

This paper did not use biological data or clinical data. Therefore, there was no ethical approval. Nagoya Heart Center Ethics Committee has confirmed that no ethical approval is required.

TRANSPARENCY STATEMENT

The lead author Etsuo Tsuchikane affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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