

## EDITORIAL COMMENT

# Tip Detection–Antegrade Dissection and Re-Entry



## Is This the Beginning of a New Era?\*

Kenichi Sakakura, MD

Percutaneous coronary intervention (PCI) to chronic total occlusion (CTO) has been a hot topic since the emergence of drug-eluting stent.<sup>1,2</sup> In fact, several techniques and concepts have been developed, and the treatment algorithms have been established.<sup>3–6</sup> In the global CTO crossing algorithm, antegrade dissection and re-entry using Stingray (Boston Scientific) is one of options after the failure of antegrade wiring.<sup>5</sup> However, because Stingray-antegrade dissection and re-entry (ADR) has several limitations, a large multicenter CTO PCI registry including 12,841 CTO PCIs has shown the significant decrease of Stingray-ADR from 37.9% in 2012 to 18.6% in 2022.<sup>7</sup> The retrograde approach is a promising option for CTO under the presence of interventional collateral channels, but the large multicenter CTO PCI registry has revealed 5.8% clinical perforation and 3.5% periprocedural major adverse cardiac events,<sup>8</sup> which suggests the potential fatal risk in retrograde approach. Therefore, a new approach with a high success rate and low complication rate has been expected in the field of PCI to CTO.

In this issue of *JACC: Asia*, Tanaka et al<sup>9</sup> compared the procedural outcomes between tip detection (TD)-ADR with Conquest Pro 12 Sharpened Tip wire (CP12ST) (Ashahi Intec) and Stingray-ADR based on retrospective analysis of 54 CTO cases, which were recruited from 4 facilities in Japan. The authors'

group has recently established TD-ADR with CP12ST after the development of intravascular ultrasound (IVUS)-based 3D wiring using the tip detection method for CTO intervention.<sup>10,11</sup> The success rate of the ADR procedure was 100% in 27 TD-ADR with CP12ST cases, whereas it was 67% in 27 Stingray-ADR cases.<sup>9</sup> The median procedure time was also significantly shorter in the TD-ADR with CP12ST cases than in the Stingray-ADR cases.<sup>9</sup> There were few in-hospital major adverse events or no complications in either group.<sup>9</sup> Although the study sample size is small, these results have clearly shown the superiority of TD-ADR with CP12ST over Stingray-ADR.

The main difference between TD-ADR with CP12ST and Stingray-ADR is the guidance for puncture. TD-ADR with CP12ST is IVUS-guided, whereas Stingray-ADR is angio-guided. Puncture under IVUS guidance is possible once an IVUS catheter is placed within subintimal space, whereas puncture under angio guidance is possible only when the distal true lumen can be visualized by contrast medium. Moreover, puncture under angio guidance is very difficult once the distal true lumen is collapsed and the distal pseudo lumen is expanded. On the other hand, TD-ADR with CP12ST may be possible by experts even when the distal true lumen is collapsed.<sup>12</sup>

In the Asia Pacific CTO algorithm and most interventional cardiologists in Japan, IVUS-guided wiring has been considered to be the last resort after the failure of parallel wiring, retrograde approach, and Stingray-ADR (if available),<sup>6</sup> partly because IVUS-guided wiring is not completely controlled by operators. IVUS-guided wiring often requires balloon dilatation within subintimal space to bring an IVUS catheter into the subintimal space. Furthermore, re-entry from subintimal space to intimal space is difficult in most cases even if the stiff guidewires are applied. Therefore, unlike the retrograde approach, IVUS-guided wiring has not been highly

\*Editorials published in *JACC: Asia* reflect the views of the authors and do not necessarily represent the views of *JACC: Asia* or the American College of Cardiology.

From the Division of Cardiovascular Medicine, Saitama Medical Center, Jichi Medical University, Saitama City, Japan.

The author attests they are in compliance with human studies committees and animal welfare regulations of the author's institution and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

recommended in European and U.S. CTO algorithms. Compared with this classic IVUS-guided wiring, TD-ADR with CP12ST has several advantages. First, the AnteOwl WR-IVUS (Terumo Corp, Japan) does not require large balloon dilatation within subintimal space. Second, TD methods can visualize the puncture point clearly in the vertical direction under IVUS observation. Third, CP12ST, which is a dedicated ADR wire with the strongest penetration force, helps operators to make re-entry from subintimal space to intimal space possible. Therefore, TD-ADR with CP12ST has a great potential as new promising approach in CTO PCI. It is reasonable to replace Stingray-AD with TD-ADR with CP12ST in the future CTO algorithm.

A significant limitation of TD-ADR is that AnteOwl WR-IVUS is not commercially available in any areas except Japan as of December 2023. It may be difficult for interventional cardiologists outside of Japan to fully understand the usefulness of TD-ADR with CP12ST until the AnteOwl WR-IVUS is available in

their countries. If TD-ADR with CP12ST can be possible with conventional IVUS systems, the spread of this technique is expected to accelerate around the world.

In summary, Tanaka et al<sup>9</sup> have opened the door for a new era of CTO PCI. Although several issues including IVUS modalities need to be resolved, TD-ADR with CP12ST is a promising new approach, and should be included in future CTO PCI algorithms.

## FUNDING SUPPORT AND AUTHOR DISCLOSURES

Dr Sakakura has received speaking honoraria from Boston Scientific, Terumo, and Asahi Intec.

**ADDRESS FOR CORRESPONDENCE:** Dr Kenichi Sakakura, Division of Cardiovascular Medicine, Saitama Medical Center, Jichi Medical University, 1-847 Amanuma, Omiya, Saitama City 330-8503, Japan. E-mail: [ksakakura@jichi.ac.jp](mailto:ksakakura@jichi.ac.jp).

## REFERENCES

- Migliorini A, Moschi G, Vergara R, Parodi G, Carrabba N, Antoniucci D. Drug-eluting stent-supported percutaneous coronary intervention for chronic total coronary occlusion. *Catheter Cardiovasc Interv*. 2006;67:344-348.
- Valenti R, Vergara R, Migliorini A, et al. Predictors of reocclusion after successful drug-eluting stent-supported percutaneous coronary intervention of chronic total occlusion. *J Am Coll Cardiol*. 2013;61:545-550.
- Rathore S, Katoh O, Tsuchikane E, Oida A, Suzuki T, Takase S. A novel modification of the retrograde approach for the recanalization of chronic total occlusion of the coronary arteries intravascular ultrasound-guided reverse controlled antegrade and retrograde tracking. *J Am Coll Cardiol Interv*. 2010;3:155-164.
- Tanaka H, Tsuchikane E, Muramatsu T, et al. A novel algorithm for treating chronic total coronary artery occlusion. *J Am Coll Cardiol*. 2019;74:2392-2404.
- Wu EB, Brilakis ES, Mashayekhi K, et al. Global chronic total occlusion crossing algorithm: JACC state-of-the-art review. *J Am Coll Cardiol*. 2021;78:840-853.
- Harding SA, Wu EB, Lo S, et al. A new algorithm for crossing chronic total occlusions from the asia pacific chronic total occlusion club. *J Am Coll Cardiol Interv*. 2017;10:2135-2143.
- Rempakos A, Alexandrou M, Simsek B, et al. Trends and outcomes of antegrade dissection and re-entry in chronic total occlusion percutaneous coronary intervention. *J Am Coll Cardiol Interv*. 2023;16:2736-2747.
- Allana SS, Kostantinis S, Rempakos A, et al. The retrograde approach to chronic total occlusion percutaneous coronary interventions: technical analysis and procedural outcomes. *J Am Coll Cardiol Interv*. 2023;16:2748-2762.
- Tanaka K, Okamura A, Yoshikawa R, et al. Tip detection-antegrade dissection and re-entry with new puncture wire in CTO intervention: revolution through 3D-wiring. *JACC: Asia*. 2024;4(5):359-372.
- Suzuki S, Okamura A, Nagai H, et al. Efficacy of intravascular ultrasound-based 3d wiring using the tip detection method for CTO intervention. *JACC: Asia*. 2023;3:526-530.
- Tanaka K, Okamura A, Tsuchikane E, et al. New antegrade dissection re-entry technique with tip detection method and new puncture wire in CTO-PCI. *J Am Coll Cardiol Interv*. 2023;16:1546-1548.
- Kitani S, Tsuchikane E, Yamaki M, Igarashi Y. First successful implementation of subintimal transcatheter withdrawal technique in intravascular ultrasound-guided tip detection antegrade dissection and reentry: a case report. *Eur Heart J Case Rep*. 2023;7:ytad580.

**KEY WORDS** antegrade dissection re-entry, chronic total occlusion, coronary intervention, IVUS-based 3D wiring, tip detection method