Successful Percutaneous Coronary Intervention for Chronic Total Occlusion in a Patient with Prior Myocardial Infarction and Heart Failure: A Case Report

K.M.Hambardzumyan*, Kh.M. Hambardzumyan, S.A. Manukyan
“Best LIfe” Medical Center, Armenia, Yerevan

The authors have no conflicts of interest

Patient Profile

Age: 62 years

Medical history:

- Hypertension
- Previous smoking
- Grade IV Lown Premature Ventricular Contraction (PVC)
- Myocardial infarction in 2013
- Stenting of the ramus intermedius in 2020

Presenting Symptoms and Findings

Stable angina II grade (CCS)

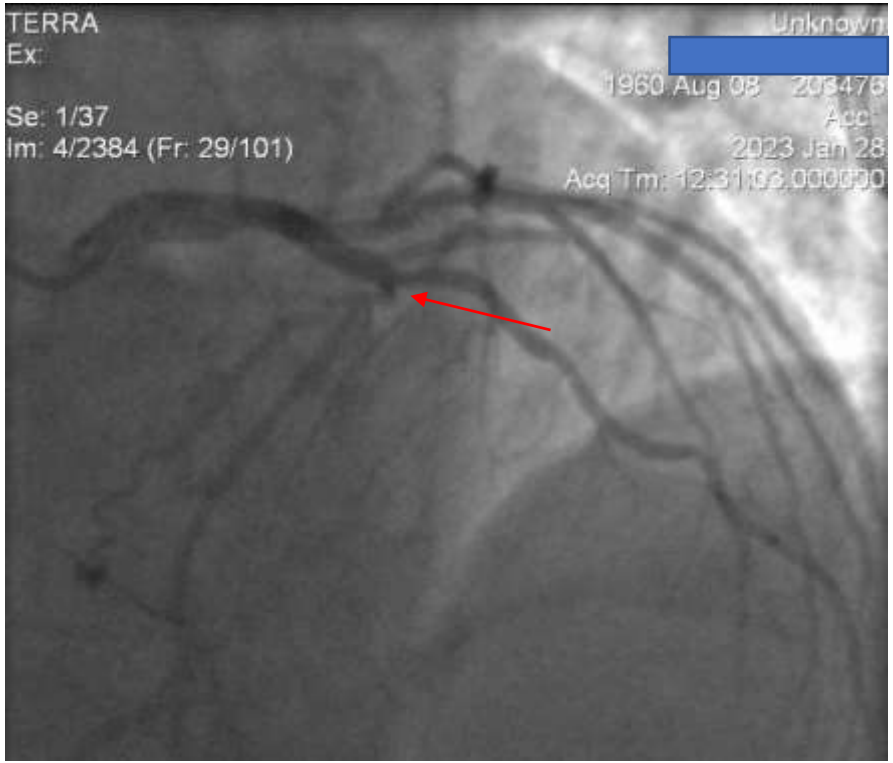
Chronic heart failure II (NYHA)

Left Ventricular Ejection Fraction (LVEF) of 25% on echocardiography with akinetic inferior wall and hypo-akinetic anterior walls

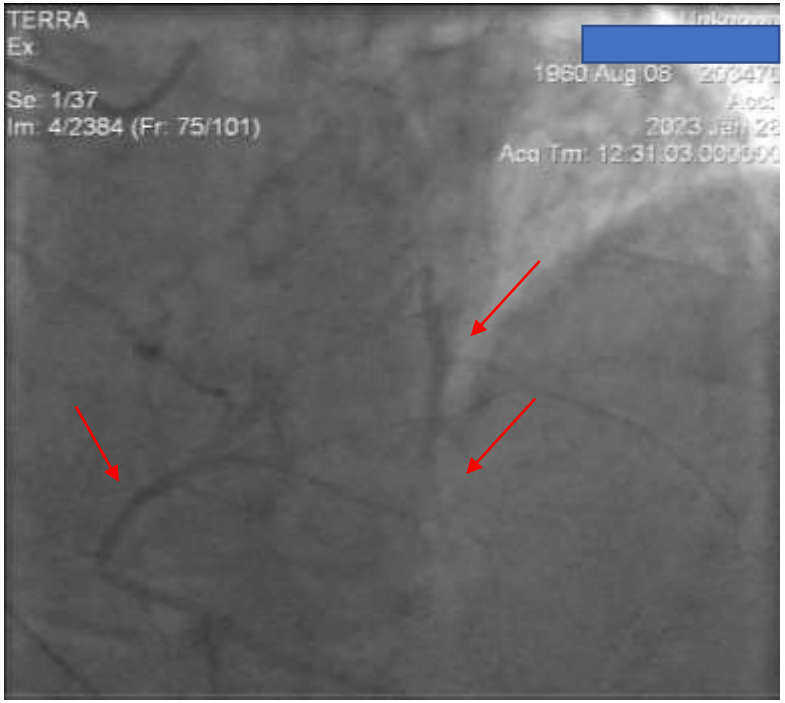
Coronary Angiography Findings

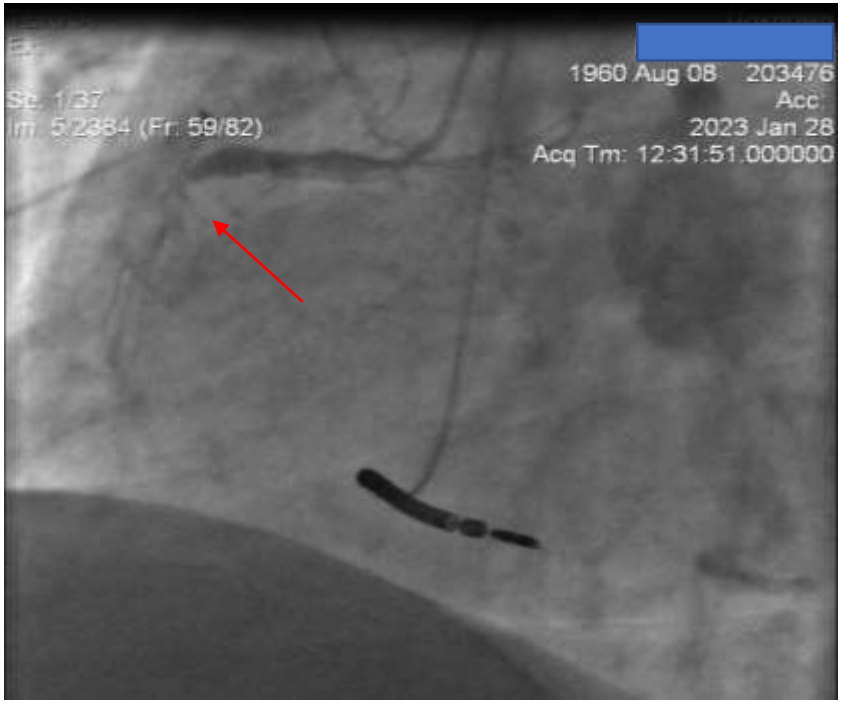
- Chronic total occlusion (CTO) in the proximal-middle left anterior descending (LAD) artery
- Antegrade good collaterals, but no retrograde collaterals from the right side
- Patent ramus intermediate (RI) stent
- Right coronary artery chronic occlusion with well-developed collaterals from the left side to the right coronary artery

Chronic total occlusion (CTO) in the proximal-middle left anterior descending (LAD) artery



Antegrade good collateral to the left side, but no retrograde collaterals from the right side





Treatment Decision

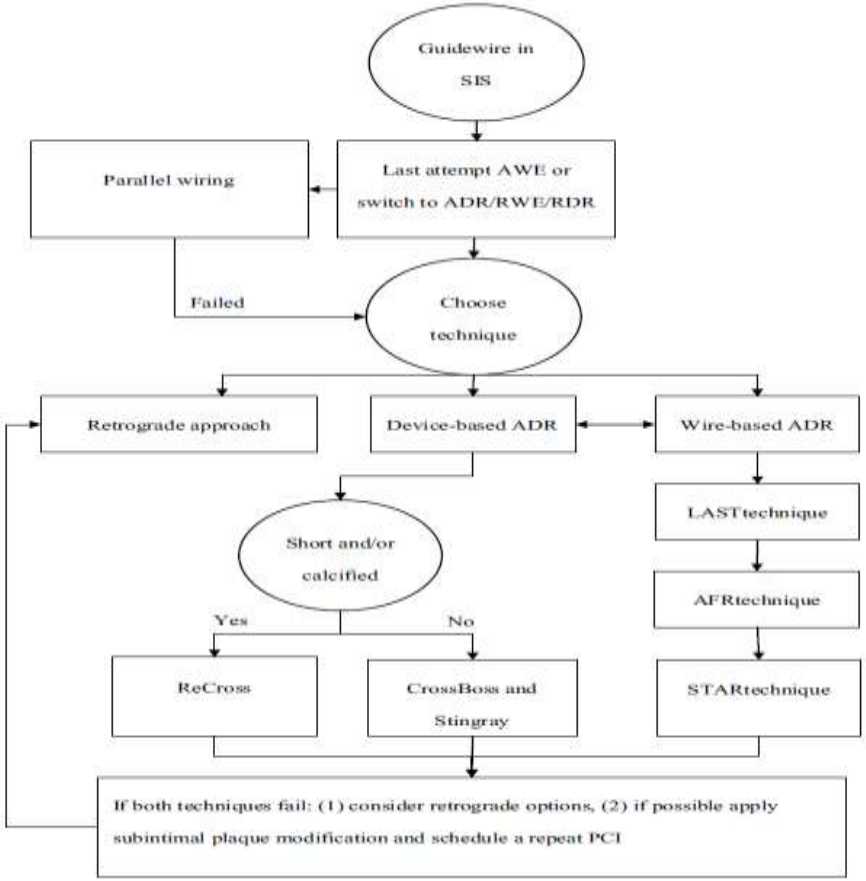
Decision to attempt the Antegrade Dissection and Re-entry Technique (ADRT) using the Caravel microcatheter followed by the Sasuke double lumen microcatheter

ADRT Procedure

Steps involved in the ADRT procedure:

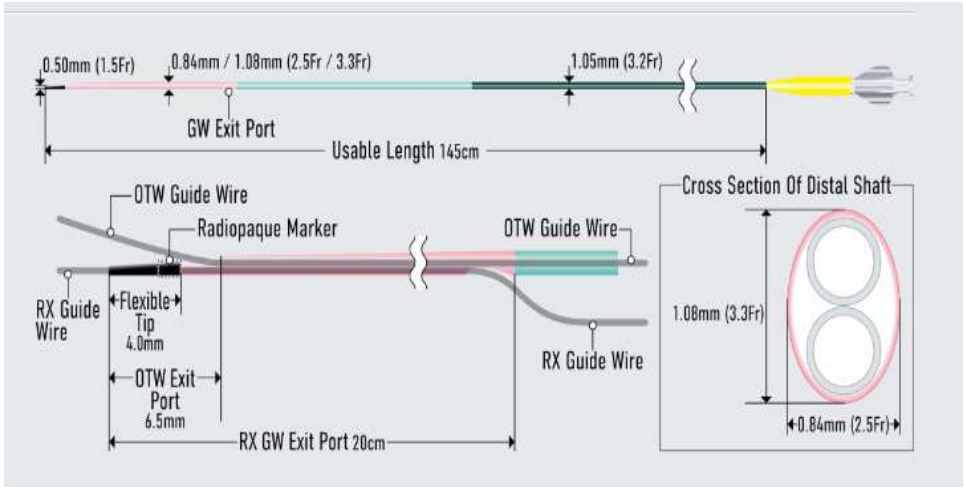
1. Use of Caravel microcatheter to advance Fielder XT-R guidewire
2. Switch to Sasuke double lumen microcatheter
3. Advancement of Sasuke catheter and Gaia second wire
4. Exchange of Sasuke catheter for Caravel
5. Balloon angioplasty and stent implantation

Updated algorithm for antegrade dissection and reentry

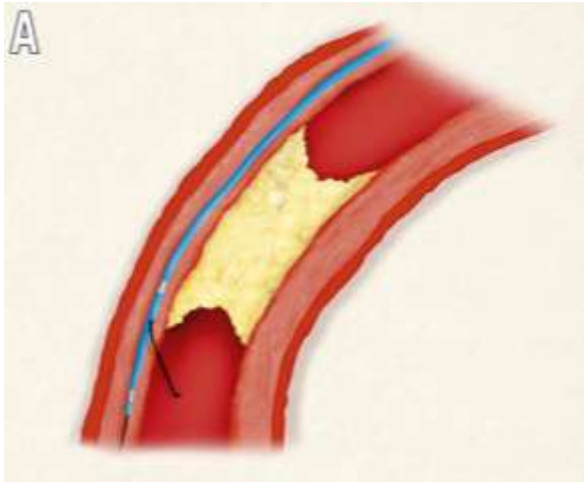


Berkhout T, Claessen BE, Dirksen MT. Advances in percutaneous coronary intervention for chronic total occlusions: current antegrade dissection and reentry techniques and updated algorithm. Neth Heart J. 2021 Jan;29(1):52-59. doi: 10.1007/s12471-020-01509-8. Epub 2020 Nov 6. PMID: 33156509; PMCID: PMC7782636.

Schematic representation of use of the dual lumen microcatheter, advanced over the monorail port, in the subintimal space, distally to the occlusion

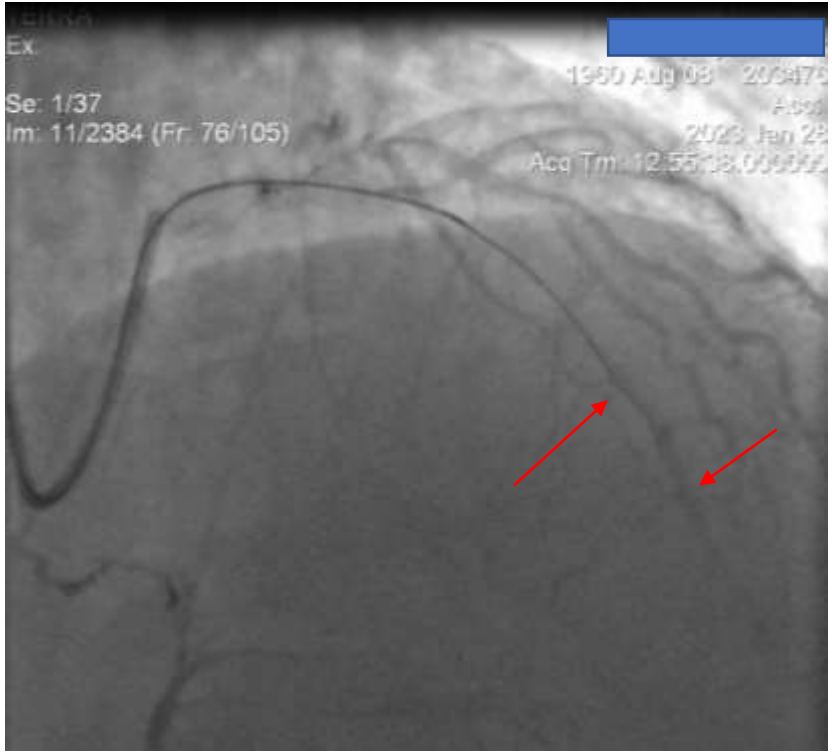


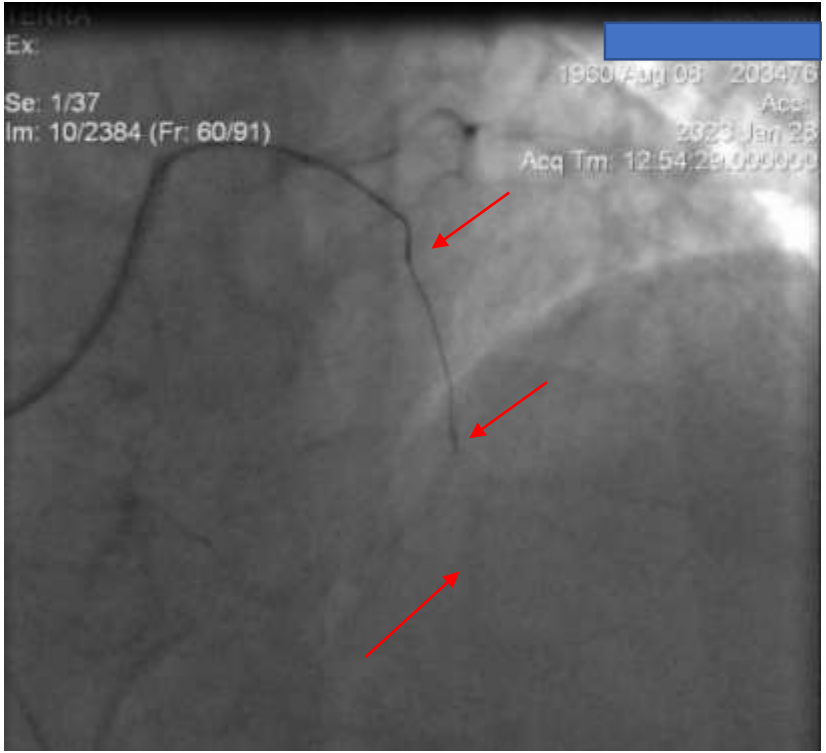
Asahi Intecc USA. (2022). Ichiyaku Structure SASUKE https://medical.asahi-intecc.com/sites/default/files/2022-12/Ichiyaku_Structure_SASAUKE_%E5%85%B1%E9%80%9A_221202_1.png



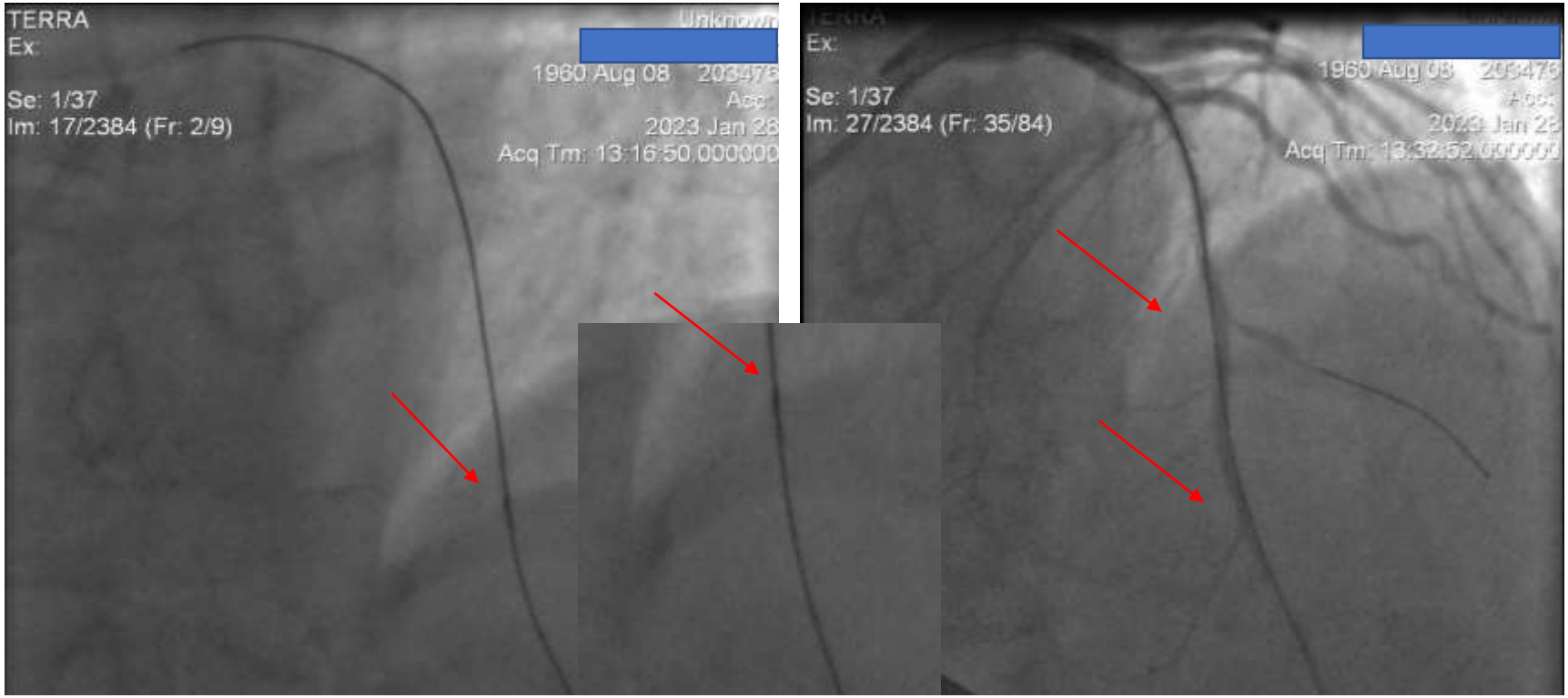
Di Mario, C. (2021). [Schematic representation of use of the dual lumen microcatheter] [image]. EuroIntervention, 17(18), e84. https://doi.org/10.4244/EIJ-D-21-01117

Caravel microcatheter on-site and subintimal position of the first antegrade guidewire

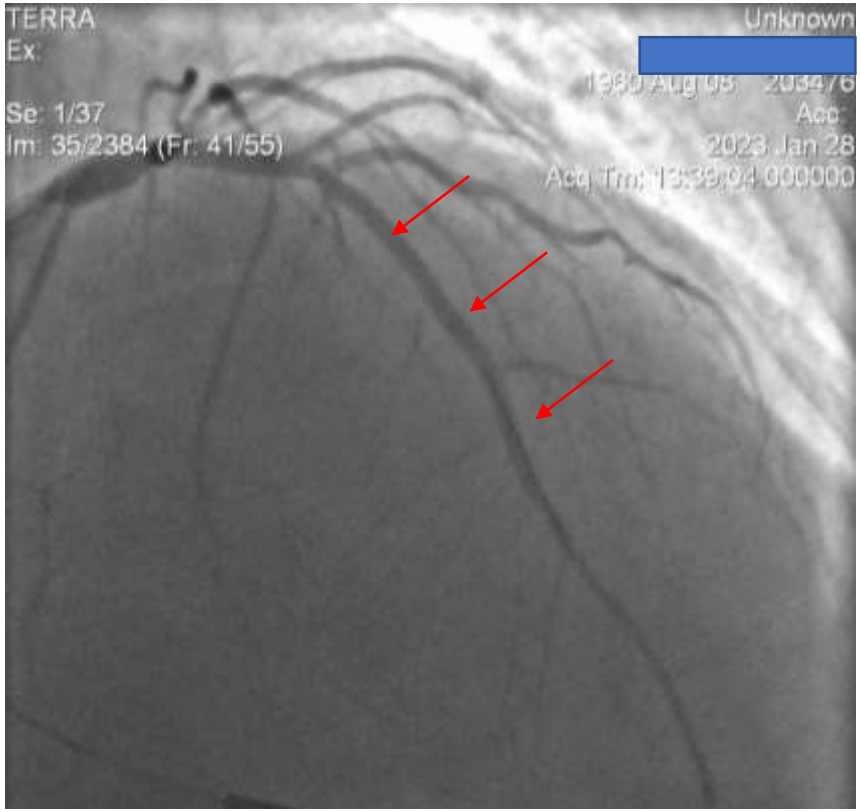




Sasuke microcatheter on-site and puncture through the proximal over-the-wire port towards the distal vessel lumen using a Gaia Second wire.



Final result of LAD recanalization



Follow-up and Outcome

3 months follow-up results:

Improved Left Ventricular Ejection Fraction (EFLV) to 35%

Improvement in akinetic anterior wall

Improved symptoms of stable angina to grade I (CCS)

Improved heart failure status to NYHA I

Resolution of Premature Ventricular Contractions (PVCs)

Discussion

- The Antegrade Dissection and Re-entry Technique (ADRT) is a novel approach to the revascularization of chronic total occlusions (CTOs) in coronary arteries.
- ADRT involves creating a dissection plane in the subintimal space and reentering the true lumen distally to the occlusion.
- This technique has shown promise in improving procedural success rates and reducing the need for coronary artery bypass surgery.
- By using the Sasuke double lumen microcatheter, which has a stiffer proximal shaft and a softer distal shaft, improved torque control and pushability can be achieved during the ADRT procedure.
- The Sasuke catheter facilitates the crossing of the occlusion and reduces the risk of complications.
- The improved maneuverability and control offered by the Sasuke catheter enhance the chances of successful recanalization in challenging cases like the one presented here.

Conclusion

- In this case report, we demonstrated the successful use of the Antegrade Dissection and Re-entry Technique (ADRT) with the Sasuke double lumen microcatheter for the recanalization of a chronic total occlusion (CTO) in the left anterior descending artery (LAD).
- The ADRT approach, combined with the use of the Sasuke catheter, provided improved torque control and pushability, enabling us to navigate the occlusion and achieve a successful percutaneous coronary intervention (PCI).
- This case highlights the potential of ADRT with the Sasuke microcatheter as a promising approach for the management of CTOs, offering improved procedural outcomes and potentially reducing the need for more invasive surgical interventions.
- Further research and larger studies are warranted to validate the effectiveness and safety of this technique in a broader patient population.
- The successful outcome in this case supports the use of ADRT with the Sasuke microcatheter as an important tool in the armamentarium of interventional cardiologists for CTO recanalization.

References

1. Asahi Intecc USA. (2022). Ichiyaku Structure SASUKE [image]. Retrieved from https://medical.asahi-intecc.com/sites/default/files/2022-12/Ichiyaku_Structure_SASAUKE_%E5%85%B1%E9%80%9A_221202_0.png
2. Bardají A, Rodriguez-López J, Torres-Sánchez M. Chronic total occlusion: To treat or not to treat. World J Cardiol. 2014 Jul 26;6(7):621-9. doi: 10.4330/wjc.v6.i7.621. PMID: 25068022; PMCID: PMC4110610.
3. Berkhout T, Claessen BE, Dirksen MT. Advances in percutaneous coronary intervention for chronic total occlusions: current antegrade dissection and reentry techniques and updated algorithm. Neth Heart J. 2021 Jan;29(1):52-59. doi: 10.1007/s12471-020-01509-8. Epub 2020 Nov 6. PMID: 33156509; PMCID: PMC7782636.
4. Di Mario, C. (2021). [Schematic representation of use of the dual lumen microcatheter] [image]. EuroIntervention, 17(18), e84. https://doi.org/10.4244/EIJ-D-21-01117
5. Galassi AR, Werner GS, Boukhris M, et al. Percutaneous recanalization of chronic total occlusions: 2019 consensus document from the EuroCTO Club. EuroIntervention. 2019;15:e659-e668. doi:10.4244/eij-d-19-00654
6. Kandzari DE, Rao SV. Coronary chronic total occlusions: the next frontier in interventional cardiology. Catheter Cardiovasc Interv. 2017;89(2):193-194. doi:10.1002/ccd.26714