

Intravascular ultrasound-guided reconstruction of chronic total occlusion true lumen after failed subintimal tracking and re-entry

Maksymilian P Opolski, Rafał Wolny, Artur Dębski, Adam Witkowski

Department of Interventional Cardiology and Angiology, National Institute of Cardiology, Warszawa, Poland

Correspondence to:

Maksymilian P Opolski, MD, PhD,
Department of Interventional
Cardiology and Angiology,
National Institute of Cardiology,
Alpejska 42, 04–628 Warszawa,
Poland,
phone: +48 501 444 303,
e-mail: mopolski@ikard.pl

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Subintimal plaque modification (SPM) (also termed as an “investment procedure”) by subintimal tracking and re-entry (STAR) with subsequent balloon dilatation is a bailout strategy in failed chronic total occlusion (CTO) percutaneous coronary intervention (PCI) [1]. Little is known about the treatment of long-tract dissections resulting from unsuccessful SPM at follow-up.

A 74-year-old female with a history of diabetes mellitus presented with Canadian Cardiovascular Society class III angina. Transthoracic echocardiography showed preserved left ventricular ejection fraction. Coronary angiography demonstrated CTO of the proximal right coronary artery (RCA) with a blunt proximal cap and high tortuosity (J-CTO score 2) (Figure 1A, Supplementary material, Video S1). After failed CTO recanalization using antegrade wiring, controlled antegrade dissection and re-entry, and futile retrograde collateral crossing, the STAR technique was attempted in the distal RCA. Since the knuckle wire failed to re-enter into the true RCA lumen and went into the extraplaque position along the posterolateral artery, SPM was performed using a semi-compliant 3.0 mm balloon in the mid-to-distal RCA (Figure 1B, C, Supplementary material, Videos S2, S3). Angiography after 3 months showed a long-tract double-barrel dissection with obstructive residual stenosis in the distal RCA (Figure 1D, Supplementary material, Video S4). Based on the patient's

persisting symptoms, the decision to reconstruct the RCA true lumen was undertaken. To this end, intravascular ultrasound (IVUS) was used for localization of the true lumen entry, and puncture using the Gaia Third guidewire (Asahi Intecc, Nagoya, Japan) was performed (Figure 1E, Supplementary material, Videos S5, S6). After IVUS confirmation of Gaia Third's intraluminal position, a double-lumen microcatheter was advanced through the entry site, and the posterior descending artery was successfully wired using the Sion Blue guidewire (Asahi Intecc, Nagoya, Japan) (Figure 1F, G, Supplementary material, Video S7). Following true-to-true lumen dilatation, repeated angiography and IVUS performed after 2 months showed complete resolution of RCA false lumen with Thrombolysis in Myocardial Infarction (TIMI) 3 flow (Figure 1H, I, Supplementary material, Video S8). The patient remained asymptomatic at 6-month follow-up.

The presence of false lumen dissections compromising distal coronary flow is not a benign complication of SPM at follow-up. Herein, we introduce the IVUS-guided antegrade wiring as a novel CTO PCI strategy for staged reconstruction of CTO true lumen after failed SPM in lesions with limited retrograde access.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska

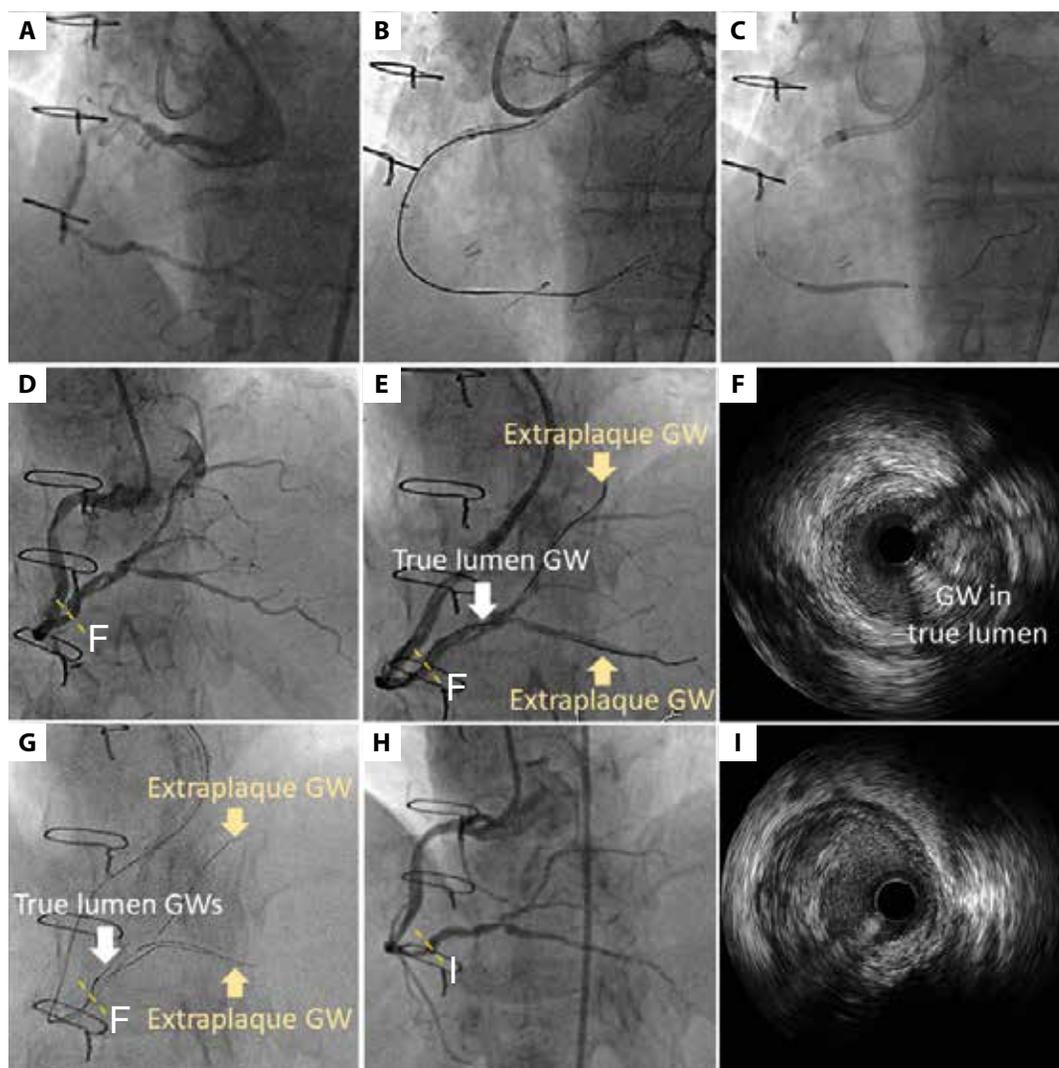


Figure 1. IVUS-guided antegrade wiring of the RCA true lumen after failed SPM. **A.** Baseline angiography showing CTO RCA. **B, C.** Failed subintimal tracking and re-entry with subsequent SPM in the distal RCA. **D.** Double-barrel RCA on control angiography. **E–G.** IVUS-guided puncture of the RCA true lumen using the Gaia Third guidewire and double-lumen microcatheter. **H, I.** Final angiographic and IVUS result with reconstitution of the RCA true lumen after 2 months

Abbreviations: CTO, chronic total occlusion; IVUS, intravascular ultrasound; GW, guidewire; RCA, right coronary artery; SPM, subintimal plaque modification

Article information

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REFERENCES

1. Xenogiannis I, Choi JW, Alaswad K, et al. Outcomes of subintimal plaque modification in chronic total occlusion percutaneous coronary intervention. *Catheter Cardiovasc Interv.* 2020; 96(5): 1029–1035, doi: 10.1002/ccd.28614, indexed in Pubmed: 31797507.