Stent underexpansion due to heavy calcification in a patient with recent acute coronary syndrome successfully treated with lithotripsy

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Massively calcified lesions often hinder the percutaneous treatment of coronary atherosclerosis. Nowadays, we possess a wide armamentarium of percutaneous devices dedicated for lesion preparation of calcified stenoses: scoring catheter balloon (cb), non-compliant (NC) cb, orbital atherectomy, rotational atherectomy, or lithotripsy [1–3].

We present a case of an 84-year-old man with a history of off-pump coronary artery bypass of the left internal mammary artery to the left anterior descending artery in 2011, percutaneous coronary intervention (PCI) within the right coronary artery (RCA) in 1998 and 2011, diabetes mellitus, arterial hypertension, hyperlipidemia, prior acute myocardial infarction in 1998 and 2011, and chronic obstructive pulmonary disease. Before the current hospitalization, the patient was admitted to the tertiary catheterization ambulatory due to acute coronary syndrome. Coronary angiography (CA) of the RCA revealed an edge in-stent restenosis with heavy calcifications in the arterial wall (Supplementary material, *Figure S1A*). After crossing the lesion with a BMW II (Abbot Vascular, Santa Clara, CA, USA) guidewire to the distal segment of the RCA, due to the unsuccessful attempts of Ryujin Plus (Terumo Corporation, Tokyo, Japan) cb 2.0 × 20 mm and 1.5 × 15 mm delivery, the buddy wire technique was used (BHW [Abbot Vascular] and SION BLACK [Asahi INTECC Co., LTD., Aichi, Japan]). Then, sequential inflations were done with semi-compliant EMERGE (Boston Scientific, Marlborough, United States) 1.2 × 15 mm 16 atm, Ryujin Plus 2.0 × 20 mm 16 atm, TREK (Abbot Vascular) 2.5 × 20 mm 18 atm (perforation of the balloon), and ACCUFORCE (Terumo Corporation) cb 3.0 × 20 mm 24 atm. The residual stenosis remained at around 70%–80%. High-pressure OPN (SIS MEDICAL AG, Frauenfeld, Switzerland) cb 3.0 × 15 mm was then inflated up to 40 atm with no success. Despite the use of the buddy wire technique and the GUIDELINER 6F system (Vascular Solutions, MN, USA), the drug-eluting stent (DES) SYNERGY (Boston Scientific, Marlborough, MA, USA) 3.0 × 20 mm did not reach the distal segment of the artery. The patient was qualified initially for rotablation. However, because of the relatively high probability of stent displacement and damage to the vessel wall, or even the stent twisting around the burr, the patient was requalified for lithotripsy. Control CA and optical coherence tomography (OCT) revealed residual in-stent stenosis of more than 70%–80% (Figure 1A–B; Supplementary material, *Figure S1B–D*). Then lithotripsy with the Shockwave C2 system IVL (Shockwave Medical Inc., Santa Clara, CA, USA) and cb 3.0 × 12 mm (8 × 10 applications, 4–6 atm) was performed (Supplementary material, *Figure S1C–D*). This enabled the final optimization of stent expansion with Solarice NC (Medtronic Ireland, Galway, Ireland) cb 4.0 × 20 mm 22 atm (Supplementary material, *Figure S1E*). Because of the dissection of the coronary artery wall behind the stent (Figure 1C–D), DES Xience Pro (Boston Scientific) 3.5 × 18 mm 16 atm was implanted (Supplementary material, *Figure S1F*). Stent optimization was performed with a Solarice NC (Medtronic Ireland) cb 4.0 × 20 mm 8–20 atm Control CA and OCT showed an acceptable effect of the PCI within RCA (Figure 1 E–F).

The described case demonstrates the possible application of lithotripsy in the case of in-stent stenosis with massive calcifications in the vessel wall [4, 5].

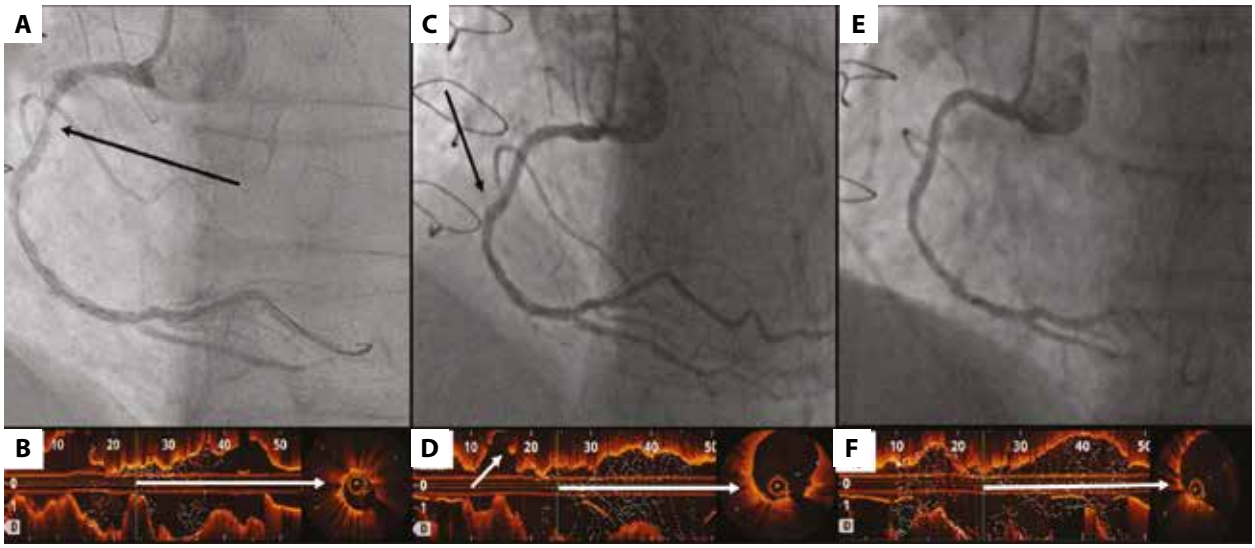

Figure 1. A. CA of the RCA after initial PCI with visible in-stent stenosis (black arrow). **B.** OCT of the RCA before lithotripsy. **C.** CA of the RCA with visible artery wall dissection behind the expanded stent (black arrow). **D.** Control OCT demonstrating artery wall dissection behind the expanded stent (white arrow). **E.** Final CA of the RCA after stent implantation. **F.** Final OCT view after stent implantation.

Abbreviations: CA, coronary angiography; OCT, optical coherence tomography; PCI, percutaneous coronary intervention; RCA, right coronary artery

Supplementary material

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

Article information

Conflict of interest: None declared.

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