CLINICAL VIGNETTE

Intravascular ultrasound–guided coronary intravascular lithotripsy in the treatment of a severely under-expanded stent due to heavy underlying calcification. To re-stent or not?

George Kassimis[1,2], Matthaios Didagelos[2], Antonios Kouparanis[2], Antonios Ziakas[2]

1 2nd Department of Cardiology, Hippokration Hospital, Medical School, Aristotle University of Thessaloniki, Thessaloniki, Greece
2 1st Department of Cardiology, AHEPA University Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece

Coronary intravascular lithotripsy (IVL) offers a novel option for lesion preparation of severely calcified lesions in native coronary arteries before stenting.[1] Until now, undilatable lesions in previous stented segments have been courageously approached with debulking devices such as cutting or scoring balloons and atherectomy, with increased risk of procedural complications.[1,2] The circumferential sonic waves of IVL have the advantage of extending beyond strut layers and fracturing deeper calcium deposits.[1] Some reports have supported the use of this technology for optimizing stent expansion without complications.[3-5] However, its efficacy in segments with multiple layers of stents has not been demonstrated and its impact on stent backbone / polymer integrity and drug-elution is still unknown. We present our initial experience with this technology in a challenging clinical scenario.

A 53-year-old man with a history of type 2 diabetes mellitus underwent primary percutaneous coronary intervention because of an inferior ST-segment elevation myocardial infarction (STEMI). Four zotarolimus eluting Resolute Integrity (Medtronic CardioVascular, Santa Rosa, California, United States) stents (2.75 × 30 mm, 3.0 × 34 mm, 4.0 × 15 mm, and 4.0 × 12 mm) were implanted in his dominant right coronary artery. Despite post-dilatation with a noncompliant Apollo NC (Brosmed, Dongguan, China) 4.0 × 10 mm balloon at 20 atm, full expansion of the distal stent could not be achieved because of severe calcification (FIGURE 1A and 1B). Another significant lesion in the mid left anterior descending (LAD) artery was not treated in the index procedure. After a month, through transradial access and a 6 Fr Amplatz 1 guiding catheter with side holes, the right coronary artery intravascular ultrasound confirmed an underexpanded stent with heavy circumferential calcification and IVL treatment was decided (FIGURE 1C; Supplementary material, *Figure S1*). A total of eight 10-second cycles was applied via a 4.0 × 12 mm shockwave-specific balloon (Shockwave Medical Inc., Santa Clara, California, United States) (FIGURE 1D). Repeated intravascular ultrasound showed calcium disruption and a noncompliant Apollo NC (Brosmed) 4.0 × 10 mm balloon at 20 atm sufficiently expanded the stent (FIGURE 1E and 1F; Supplementary material, *Figure S1*). No new stent-in-stent implantation was deemed necessary. Finally, percutaneous coronary intervention of the lesion in the LAD with a 3.0 × 22 mm Resolute Integrity (Medtronic) stent was performed. The patient was discharged the next day after an uneventful hospitalization.

Intravascular lithotripsy appeared as a promising and effective technique for treating undilatable lesions in previously stented segments without complications. Only few reports exist on its use. Should a new stent-in-stent be implanted or not? Hopefully, experience accumulating with time will provide answers to this question.

Correspondence to:
Prof. George Kassimis, MD, MSc, PhD, FESC, FRCP, 2nd Department of Cardiology, Hippokration Hospital, 49 Konstantinoupoleos road, 54 642, Thessaloniki, Greece, phone: +302 310 994 830, email: gkasimis@auth.gr
Received: December 31, 2019.
Revision accepted: January 27, 2020.
Published online: February 5, 2020.
Kardiol Pol. 2020; 78 (4): 346-347
doi:10.33963/KP.15173

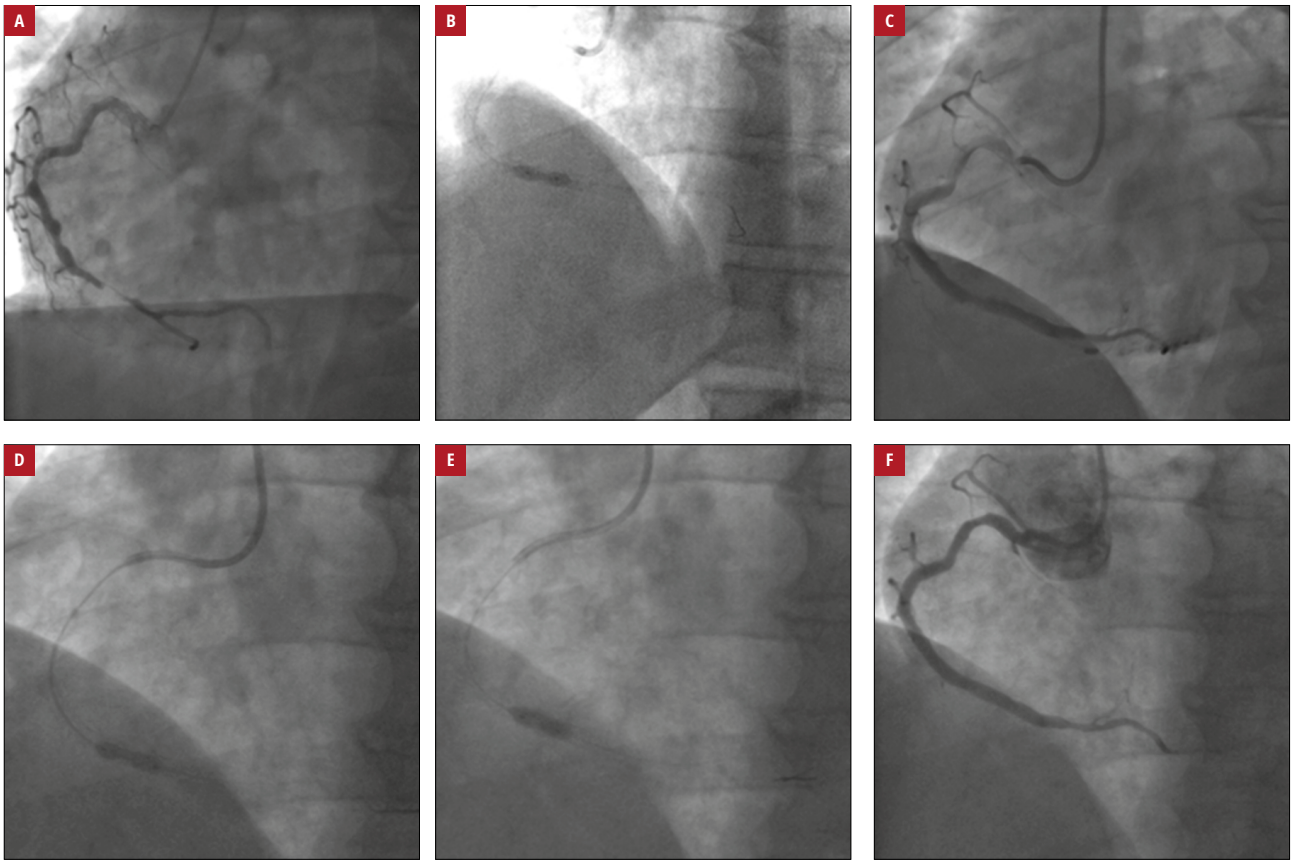

FIGURE 1 **A** – right coronary artery (RCA) angiogram during the inferior ST-segment elevation myocardial infarction; **B** – dog-bone effect of the noncompliant balloon during post-dilatation after RCA stenting; **C** – residual in-stent stenosis of the RCA at the beginning of the second procedure; **D** – in-stent shockwave intravascular lithotripsy (S-IVL) balloon during the second procedure; **E** – in-stent post-dilatation after S-IVL with complete expansion of the noncompliant balloon; **F** – final result of the second procedure with no residual RCA in-stent stenosis

SUPPLEMENTARY MATERIAL

Supplementary material is available at www.mp.pl/kardiologiapolska.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

HOW TO CITE Kassimis G, Didagelos M, Kouparanis A, Ziakas A. Intravascular ultrasound-guided coronary intravascular lithotripsy in the treatment of a severely under-expanded stent due to heavy underlying calcification. To re-stent or not? Kardiol Pol. 2020; 78: 346-347. doi:10.33963/KP.15173

REFERENCES

1 Kassimis G, Raina T, Kontogiannis N, et al. How should we treat heavily calcified coronary artery disease in contemporary practice? From Atherectomy to intravascular lithotripsy. Cardiovasc Revasc Med. 2019; 20: 1172-1183.

2 Kassimis G, Raina T. Double-vessel very late stent thrombosis following Resolute Onyx zotarolimus eluting stents implantation in an octogenarian. J Geriatr Cardiol. 2018; 15: 639-643.

3 Alfonso F, Bastante T, Antuña P, et al. Coronary lithoplasty for the treatment of undilatable calcified de novo and in-stent restenosis lesions. JACC Cardiovasc Interv. 2019; 12: 497-499.

4 Watkins S, Good R, Hill J, et al. Intravascular lithotripsy to treat a severely underexpanded coronary stent. EuroIntervention. 2019; 15: 124-125.

5 Legutko J, Niewiara Ł, Tomala M. Successful shockwave intravascular lithotripsy for a severely calcified and undilatable left anterior descending coronary artery lesion in a patient with recurrent myocardial infarction. Kardiol Pol. 2019; 77: 723-725.