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MINI-FOCUS ISSUE: CORONARIES

EDITOR'S HIGHLIGHTS

Deferred Intravascular Lithotripsy-Facilitated Stenting in ACS

Novel Approach to Improve PCI Outcomes in Severe Calcification?

Sanjay Patel, MBBS, PHD,^{a,b} Mahesh V. Madhavan, MD,^{C,d} Roberto Spina, MBBS, MSc, MPH,^e Gemma A. Figtree, MBBS, DPHIL,^{b,f} Keyvan Karimi Galougahi, MD, PHD^{a,b}

ABSTRACT

Moderate/severe calcification, present in approximately one-third of culprit lesions in acute coronary syndromes (ACS), portends unfavorable procedural and post-primary percutaneous coronary intervention outcomes. Intravascular lithotripsy is a novel technique using shockwaves to fracture calcific plaques. Presenting a clinical case, we enumerate efficacy and safety parameters in using intravascular lithotripsy in ACS. (Level of Difficulty: Advanced.) (J Am Coll Cardiol Case Rep 2020;2:1700-1) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

oderate/severe calcification, present in approximately 30% of culprit lesions in acute coronary syndromes (ACS) (1), adversely affects safety/efficacy of primary percutaneous coronary intervention (PCI) and portends worse post-PCI outcomes (1). Although atherectomy is contraindicated in thrombotic coronary lesions, intravascular lithotripsy (IVL) may mitigate the adverse consequences of severe calcification (2). IVL, however, has not been tested in ACS and DISRUPT-CADIII trial (Disrupt CAD III With the Shockwave Coronary IVL System; NCT03595176), designed for premarketing approval of coronary IVL, has excluded patients with ACS.

An alternative approach for PCI on severely calcified culprit lesions was undertaken in a 65-year-old woman with inferior ST-segment elevation myocardial infarction (STEMI) (Figure 1). IVL use was approved by the institutional review board at our institution.

Safety of IVL in thrombus-laden lesions is unknown. Insonification of platelet/fibrin-rich thrombi by shockwaves may result in thrombus degradation/embolization. Shockwaves can induce myocardial depolarization (2). Although an R-on-T phenomenon inducing tachyarrhythmia has not been substantiated in

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^aFrom the Royal Prince Alfred Hospital, Sydney, New South Wales, Australia; ^bSydney Medical School, Faculty of Medicine and Health, The University of Sydney, Sydney, New South Wales, Australia; ^cColumbia University Irving Medical Center/New York Presbyterian Hospital, New York, New York; ^dCardiovascular Research Foundation, New York, New York; ^eGosford Hospital, Gosford, New South Wales, Australia; and the ^fRoyal North Shore Hospital, Sydney, New South Wales, Australia: Dr. Patel has received educational grants from Abbott Vascular and Novartis; and consultancy fees from Abbott Vascular, Novartis, and Aspen. Dr. Madhavan has received an institutional grant from the National Institutes of Health/National Heart, Lung, and Blood Institute to Columbia University Irving Medical Center (T32 HL007854). Dr. Figtree has received consultancy fees from Janssen and CSL. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose. The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the *JACC: Case Reports* author instructions page.

stable coronary lesions (2), such a risk in electrically excitable myocardium during early reperfusion is unknown. Thus, "off-label" IVL use in acute STEMI is not recommended.

We propose that IVL can be used in staged stenting procedure during which thrombus burden and myocardial electrical instability may be substantially less. This approach is supported by the DEFER-STEMI (Deferred Stent Trial in STEMI), in which deferring stent implantation in STEMI resulted in reduced no-reflow and increased myocardial salvage, with approximately 4% needing urgent PCI before the staged procedure (3).

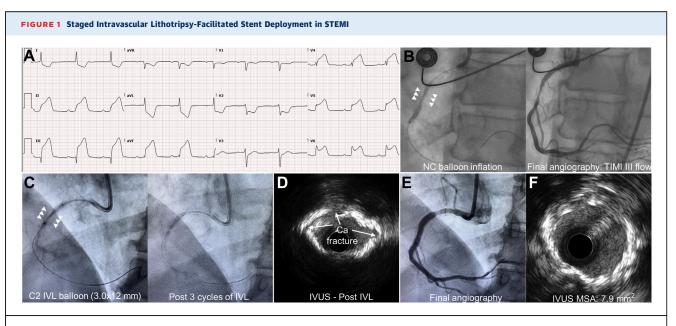
ABBREVIATIONS AND ACRONYMS

ACS = acute coronary syndromes

IVL = intravascular lithotripsy

PCI = percutaneous coronary intervention

STEMI = ST-segment elevation myocardial infarction



(A) A 65-year-old woman presented with inferior STEMI. Heart rate = 70 beats/min and blood pressure = 110/60 mm Hg. (B) High-pressure noncompliant balloon inflation failed to dilate the severely calcified culprit lesion (arrowheads). TIMI flow grade 3 was achieved, and stenting was deferred. (C) At a staged procedure, a 3×12 -mm IVL balloon was inflated (4 atm) and 3 cycles of IVL delivered. Post-IVL, full balloon inflation was noted. (D) Post-IVL IVUS revealed multiple fractures in the concentric calcification (arrows). (E) A 3×23 -mm drug-eluting stent was implanted and post-dilated with a 3.5×20 -mm noncompliant balloon (at 22 atm). Final angiography revealed optimal stent expansion and TIMI flow grade 3. (F) IVUS MSA = 7.9 mm². No slow-flow/no-reflow, arrhythmia, or hemodynamic compromise were noted during the staged procedure. Ca = calcium; IVL = intravascular lithotripsy; IVUS = intravascular ultrasound; MSA = minimal stent area; NC = noncompliant; TIMI = Thrombolysis In Myocardial Infarction.

ADDRESS FOR CORRESPONDENCE: Dr. Keyvan Karimi Galougahi, Department of Cardiology, Royal Prince Alfred Hospital, 75 Missenden Road, Camperdown, Sydney, NSW 2050, Australia. E-mail: keyvan.karimi@hri.org.au.

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