Review of: "Intravascular Lithotripsy in Calcified Coronary Lesions: A Single-Center Experience in “Real-World” Patients"

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This is a retrospective and observational study aiming to describe the outcome of intravascular lithotripsy (IVL) used in different settings of percutaneous coronary intervention (PCI). 105 patients with 110 calcified coronary lesions were included and three different IVL approaches were identified: Primary IVL (P-IVL), Secondary IVL (S-IVL), and Bailout IVL (B-IVL) after stent implantation.

Lesion calcification was stratified into moderate or severe using an angiographic method based on the use of apparent densities noted within the vascular wall at the stenosis level. Mattesini et al. instead used the Fujino OCT score (https://pubmed.ncbi.nlm.nih.gov/29400655/) with a cut-off of 3 points to identify lesions deserving IVL preparation (https://pubmed.ncbi.nlm.nih.gov/32471713/).

Only 47.8% lesions underwent imaging-guided procedures: characterization of the longitudinal and circumferential calcium distribution with both intra-vascular ultrasound (IVUS) and optical coherence tomography (OCT) played a pivotal role in the identification of calcified lesions requiring dedicated treatment devices. In the prospective registry of Mattesini et al. lesions treated with IVL followed by IVUS/OCT-guided stent implantation delivered good procedural results and short-term patient-reported outcome, both in concentric or eccentric calcifications (https://pubmed.ncbi.nlm.nih.gov/32471713/).

This study did not consider the use of atherectomy even if the use of the combination of both IVL and orbitational atherectomy (https://pubmed.ncbi.nlm.nih.gov/35192504/) or IVL and rotational atherectomy (the so called "RotaTripsy")for a superior preparation of severely calcified coronary stenoses (https://pubmed.ncbi.nlm.nih.gov/33903037/) has been reported.

The use of IVL for in-stent restenosis (ISR), during the index or a previous procedure, is correctly remarked by the authors as off-label even if the IVL-Dragon Registry (https://pubmed.ncbi.nlm.nih.gov/32580881/) and the SMILE Registry (https://pubmed.ncbi.nlm.nih.gov/32580881/) addressed the safety and efficacy of IVL in patients with coronary stent under-expansion but using imaging in about 74% of cases in the former registry.

Drug-coated balloon (DCB) was only used in 10.9% of the cases and only in the ISR-IVL group. We have to consider that in case of acute stent under-expansion due to impaired lesion preparation and subsequent use of IVL (bailout-IVL) there is a theoretical risk of coating/polymer damage. Therefore, if this therapy is used just after stent implantation, there is a hypothetical increased risk in stent thrombosis and restenosis with this off-label use of the therapy. The use of DCB after IVL could instead be an alternative option especially if lesion preparation is not perfect, and further studies on this application are needed.

Three definitions of periprocedural myocardial infarction (MI) were used in this study: (1) creatinine kinase (CK)-based definition [post-PCI CK-MB peak > 3x the upper limit of normal (ULN)], (2) Fourth Universal Definition, and (3) The Society for Cardiac Angiography and Interventions (SCAI) definition. A higher risk of periprocedural MI as compared to Disrupt III trial was reported using two of the proposed definitions, but as the authors correctly report, this may be justified by the higher complexity of the coronary lesions treated in their patients, some of which fulfilled Disrupt CAD III exclusion criteria.

All data (clinical and procedural) were recorded and the primary effectiveness endpoint was achieved in 83.8% patients and 84.6% lesions.

A higher number of balloons was used in the secondary-IVL group: this has to be read in the light of the lack of imaging and the possibility of underestimation of the vessel dimensions and the severity of calcium extension. Another recent observational European multicenter study including 200 lesions treated with IVL and adjuvant rotational atherectomy in 17% of cases, with a median follow-up of 222 days, reported a procedural success achieved in 99% of cases with a complication rate of 3%. In this study, the upfront use of IVL as the primary calcium modification technique was discouraged unless angiographic and intravascular imaging demonstrated extensive concentric layer of calcium (https://pubmed.ncbi.nlm.nih.gov/32936532/).

We would like to underline how this study clearly remarked the low rate of procedural complications using IVL in different complex PCI settings, allowing an improved stent deliverability. The feasibility and effectiveness of IVL has already been reported and is, again, confirmed by this study. We also would like to stress on the necessity of using a shared flow-chart for the management of calcific coronary lesions, where IVL is only an (important) piece of treatment before DES or DCB use (final destination).