

Lesion preparation: an essential component of percutaneous coronary intervention in calcified lesions

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By failing to prepare, you are preparing to fail.
Benjamin Franklin

Successful percutaneous coronary intervention (PCI) historically has been described as the ability to deliver a stent with less than 50% residual stenosis without in-hospital adverse events.¹ With enhanced stent design and device technology, the ability to deliver a stent has improved at the cost of necessary and adequate lesion preparation for calcified lesions to facilitate stent implantation. With modern PCI, lesion preparation is critical not only to enable stent delivery, but to ensure that optimal stent expansion can be achieved.

Comparative analyses of available atherectomy modalities have been limited by small sample sizes and short-term follow-up. The study by Zieliński et al² published in this issue of *Kardiologia Polska (Kardiologia Pol)* is a meta-analysis of 6 observational studies comparing orbital and rotational atherectomy for the treatment of calcified lesions. While there are technical differences with each device that offer advantages and limitations in specific subsets of lesions and patients, both are associated with a favorable safety profile. Importantly, serious complications, such as coronary perforation, occurred in less than 1% of cases regardless of the device used.³⁻⁵ A large-scale randomized study comparing these devices with long-term follow-up would be desirable and would help to identify which lesions may benefit from a specific device. Long-term outcomes are central as the goal of atherectomy in modern PCI is not simply to deliver a stent but also to reduce target vessel failure. Nonetheless, in the absence of a large randomized trial, this meta-analysis serves to

support the expanded use of atherectomy for severely calcified lesions.

The best way to prevent in-stent restenosis involves high quality stent implantation at the time of the index procedure with a goal of maximal stent expansion.⁶ This involves comprehensive lesion preparation in the case of calcified lesions.⁷ With contemporary PCI, stent optimization is the key to reduce future in-stent restenosis. Routine use of intravascular imaging is necessary to recognize and sufficiently characterize calcified plaque.⁸ Angiography is an insufficient tool for assessing the presence of calcification.^{9,10} Furthermore, angiography fails to delineate whether coronary artery calcification is superficial or deep, which can influence the choice of optimal modality for lesion preparation.¹¹ Calcium thickness, an important prognostic factor, is only appreciated in vivo by intravascular imaging with optical coherence tomography and is a vital factor in determining appropriate indications for atherectomy.^{12,13}

Novel devices including intravascular lithotripsy and specialized high-pressure balloons further expand the toolbox in the combat with calcified lesions. Ongoing studies, including the randomized ECLIPSE trial (Evaluation of Treatment Strategies for Severe Calcific Coronary Arteries: Orbital Atherectomy vs Conventional Angioplasty Technique Prior to Implantation of Drug-Eluting; clinicaltrials.gov identifier: NCT03108456), which will evaluate the impact of orbital atherectomy compared with conventional angioplasty, will provide important insight on the effect of routine lesion preparation on long-term outcomes. This and other ongoing studies, including the Disrupt CAD III

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with the Shockwave Coronary IVL System trial (NCT03595176), will influence future PCI guidelines, which currently caution against the use of routine lesion preparation with rotational atherectomy for de novo lesions.^{14,15} The liberal use of lesion preparation in calcified lesions treated with PCI is a fundamental component of contemporary treatment. Adequate lesion preparation, when indicated, can not only ensure the ability to successfully deliver a stent in a calcified lesion but also minimize the likelihood of future target lesion failure.

ARTICLE INFORMATION

DISCLAIMER The opinions expressed by the author are not necessarily those of the journal editors, Polish Cardiac Society, or publisher.

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