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EDITORIAL COMMENT

Orbital atherectomy: An expanded toolbox for coronary calcium management

Aterectomia orbital: aumento das opções terapêuticas para o tratamento de cálcio coronário

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Percutaneous coronary intervention (PCI) of calcified coronary artery disease (CAD) is associated with lower procedural success, higher risk of dissection, perforation, stent delivery failure, and stent underexpansion. This impacts both the acute and the long-term results, with a higher risk of stent thrombosis or restenosis.[1] The combination of intravascular imaging and new dedicated therapeutic technologies has revolutionized the treatment of these complex lesions.

The technologies can be categorized into two groups: balloon-based and ablation techniques. Balloons are used to create fractures in calcium and to increase plaque elasticity; the most used are cutting balloons, a non-compliant balloon with three microblades mounted longitudinally to crease incisions within the calcium, and lithotripsy balloons, in which pulsatile energy is delivered via miniaturized emitters placed along a semi-compliant balloon, disrupting superficial and deep calcium. Atherectomy aims to ablate calcified plaque into fine particulate debris, to modify plaque, and is indispensable for uncrossable lesions.[2]

Currently, two different atherectomy technologies are available: rotational and orbital atherectomy. Both operate on a similar mechanistic principle of differential cutting in which hard calcific plaque is ablated while sparing adjacent tissue. Rotational atherectomy (RA) has been used for almost 40 years and the main component is a rapidly rotating olive-shaped metallic burr coated with small diamond crystals on its distal end. The orbital atherectomy (OA) system has a diamond-coated crown that is eccentrically mounted 6.0 mm from the tip of the device, creating elliptical orbits that change the compliance of calcified vessels.[3] The unique 1.25 mm OA crown can be used in a large range of vessel diameters and allows bidirectional ablation, which reduces the risk of device entrapment and could be more effective in angulated lesions. OA, in comparison with RA, is associated with a lower rate of hemodynamic compromise or bradycardia, due to lower rotational speeds and to a greater flow rate of the lubrication solution with less distal embolization and microvascular obstruction.[2–4] Despite having some theoretical advantages, no head-to-head comparisons with RA have been conducted to evaluate clinical outcomes.[5]

In this context, the study by Faria et al. published in this issue of the Journal[6] takes on particular importance as it is the first series of consecutive patients with severely calcified CAD who underwent OA-facilitated PCI in Portugal. A total of 37 patients and 53 coronary arteries were included in this prospective single-center registry. The use of intravascular imaging is crucial to define the calcification pattern and the best therapeutic strategy.[4] In the present study, intravascular ultrasound (IVUS) was used in all cases, prior to the intervention, after OA to define the debulking suc-

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cess, and after stent implantation to determine procedural success defined using the optimal IVUS-guided PCI criteria.[7] Calcium debulking success was achieved in 90.5% of the lesions, although additional calcium debulking techniques (cutting balloon or intravascular lithotripsy) were needed in 49.1% of the lesions, an example of the synergistic benefits of combining multiple devices. The reported initial experience of this center demonstrated high procedural success and overall favorable clinical outcomes.

The data on the safety and efficacy of OA are promising, but this is not indicative of a superiority over RA, and it was not the aim of the reported study.[6] The first prospective randomized trial to compare RA and OA was published last year.[8] The tissue modification and stent expansion assessed by optical coherence tomography were greater after RA than after OA. The safety outcomes, such as slow/no-flow, coronary perforations, and periprocedural myocardial infarction, were comparable. Further randomized studies are needed to compare the long-term outcomes of both available atherectomy devices and to define the preferred plaque modification technique for most patients with calcified CAD.

The expanding toolbox of techniques for treating coronary calcium has significantly improved the results of PCI and is transforming the treatment of these complex patients. Although further research is needed to compare the outcomes of alternative devices, the concept of personalized medicine is probably the best approach. The information derived from intravascular imaging allows the operator to determine the different calcium patterns for each lesion, requiring a different ''optimal'' technique, or a combination of multiple devices. This tailored approach will lead to greater procedural success with a lower risk of complications.

Conflicts of interest

The author has no conflicts of interest to declare.

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