ONLINE SUPPLEMENTAL MATERIAL

Rotational Atherectomy System

On the advancer of the RotaPro, in fact, there is all what is needed to activate and deactivate RA. The burr knob control on the upper part of the advancer has a button that activates the burr spinning (Rotablation mode), while another button is placed on the side of the advancer to switch to a lower spinning regimen (60 to 90 K rpm) that is used to facilitate burr exchange (DynaGlide mode)(Figure S1). The console of the RotaPro system has been also significantly renewed as compared with the previous generation, and it appears more user-friendly, as it provides several feedback warning signals to the operator from the device operating within the coronary artery. The parts that did not change are the burr and the connection to the cylinder of air-nitrogen gas (enabling the turbine within the advancer to rotate the drive shaft) and to the saline infusion (reducing heat, friction, and spasm). The burr, mounted on the tip of RA shaft, has a nickel-plated eliptical shape structure coated with microscopic diamond crystals able to ablate the hardest fibro-calcific plaque. More details on the Rotablator system can be found on EAPCI-PCR Textbook and on PCRedu online (1-3).

Orbital Atherectomy System

The Orbital Atherectomy Diamondback 360° Cardiovascular System is 6Fr compatible, it is connected to an electric hand-controlled console to drive the movements of the crown and it is loaded on the dedicated guidewire (ViperWire) (Figure S2). Two rotation speeds are available (low or high speeds at 80.000 or 120.000 rpm, respectively) with a proprietary lubricant that flushes the system to reduce the friction while the crown ablates the calcium. The radius of the orbit drawn by the eccentric crown can increase by a slow forward movement of the OA knob, fracturing the calcified plaque (3). Several features differentiate OA from RA. First, the ablation is bi-directional: i.e. OA ablates either during the forward or the backward movement of the burr, which might potentially reduce the risk of burr entrapment. Second, despite using a single burr, OA can increase the ablation radius by modulating the speed and burr movements.

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Intravascular lithotripsy

The Shockwave balloon is inflated within the calcified coronary stenosis at low atmosphere (4-6 atm) and left inflated for 60 seconds during which a maximum of 80 pulses of sonic waves (8 cycles of 10 pulses each) are able to deliver a selective pressure of 50 atm on the calcified plaque (Figure S3). The Shockwave balloon for coronary interventions has a diameter range of 2.5 to 4.0 mm, and a single length of 12 mm.

References

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2. Eeckhout E, Serruys P, Wijns W, et al. Percutaneous interventional cardiovascular medicine: The pcr-eapci textbook. *Europa Ed*. 2012:785-826
3. Kini AS, Vengrenyuk Y, Pena J, et al. Optical coherence tomography assessment of the mechanistic effects of rotational and orbital atherectomy in severely calcified coronary lesions. *Catheter Cardiovasc Interv* 2015;86:1024-1032

Figure S1. ROTAPRO™ Rotational Atherectomy System (Boston Scientific).

(A) Console providing feedback to the operator on ablation speed, speed decelaration (triangle), total duration of rotablation and duration of each rotablation run; (B) Rotablator advancer: 1 indicates the advancer knob that activates the burr motion; 2 indicates the knob swtching from rotablation mode to dynaglide mode; 3 indicates the burr.

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Figure S2. Diamondback 360^0 Coronary Orbital Atherectomy System.

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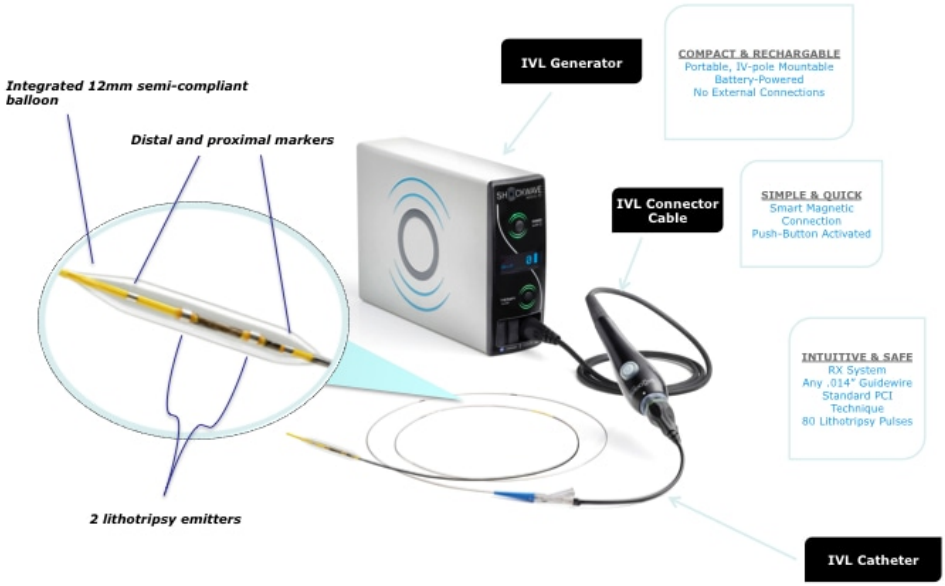
Figure S3. Shockwave Coronary Intravascular Lithotripsy System.



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