

Rotablation-assisted percutaneous coronary intervention and deferred intravascular lithotripsy: Facilitated stenting in a young STEMI patient with familial hypercholesterolemia

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A 38-year-old male who was a current smoker with definite heterozygous familial hypercholesterolemia based on the Dutch Lipid Clinic diagnostic criteria (premature coronary artery disease and low-density lipoprotein (LDL) cholesterol, 330 mg/dl) [1] was admitted with anterior ST-segment elevation myocardial infarction (STEMI).

A coronary angiogram revealed a subacute occlusion of the proximal severely calcified left anterior descending (LAD) artery with TIMI 1 flow grade and further atherosclerotic disease at the mid and distal vessel (Supplementary material, *Figure S1* and *Videos S1* and *S2*).

Primary percutaneous coronary intervention (PPCI) of the LAD was performed by right-femoral artery access. Initial high-pressure (22 atm) pre-dilation with a non-compliant balloon (NCB) 2.5 × 15 mm Solarice (Medtronic, Santa Rosa, CA, US) was performed. Due to incomplete balloon expansion, inflations of a 3.0 × 10 mm Wolverine (Boston Scientific, Marlborough, MA, US) cutting balloon at nominal pressure were still unable to successfully “modify” the lesion (*Figure 1A*). Therefore, we performed two runs of rotational atherectomy (RA) with a Rotablator (Boston Scientific) burr size 1.5 mm, with RA speed set at 150 000 rotations/min, trying to minimize platelet activation and prevent slow flow (*Figure 1B*). Subsequently, high-pressure (22 atm) inflation of a 3.0 × 12 mm NCB Solarice (Medtronic) was performed, but despite lesion preparation with RA, a significant “dog-bone effect” was still observed (*Figure 1C*). TIMI

3 flow grade was achieved, with the presence of a mild non-flow limiting dissection at mid-vessel (*Figure 1D*, Supplementary material, *Video S3*), and stenting was deferred to avoid under-expansion in this emergency setting.

Hence, 3 months later, following healing of the LAD dissection (*Figure 1E*), we performed Shockwave Intravascular Lithotripsy (S-IVL) using a 3.5 × 12 mm catheter (Shockwave Medical, Inc.; Santa Clara, CA, US). After application of 40 ultrasonic pulses, full balloon expansion was obtained. A NCB 3.5 × 15 mm was successfully used, and a 3.5 × 38 mm drug-eluting stent Promus Premier (Boston Scientific) was implanted, followed by a Quantum Apex (Boston Scientific) 4.0 × 20 mm (20 atm) NCB post-dilation (*Figure 1F*). A good final angiographic result was achieved (Supplementary material, *Video S4*).

We described a successful staged implementation of a complex advanced plaque-modifying strategy (Primary Rota-CUT atherectomy and S-IVL deferred PCI) in a young STEMI patient. Similar combined treatment modalities have been described [2]. It is increasingly apparent that despite increasing the lumen size with RA and allowing catheter passage, there may still be extensive unaltered restrictive calcific plates within the intima and media, even after balloon dilation. This deeper calcium is not impacted by RA but can usually be modified by subsequent IVL. Intravascular imaging gives significant additional insights in addition to angiography into the distribution, concentricity, and severity of calcific disease. These data can then direct our initial therapeutic approach.

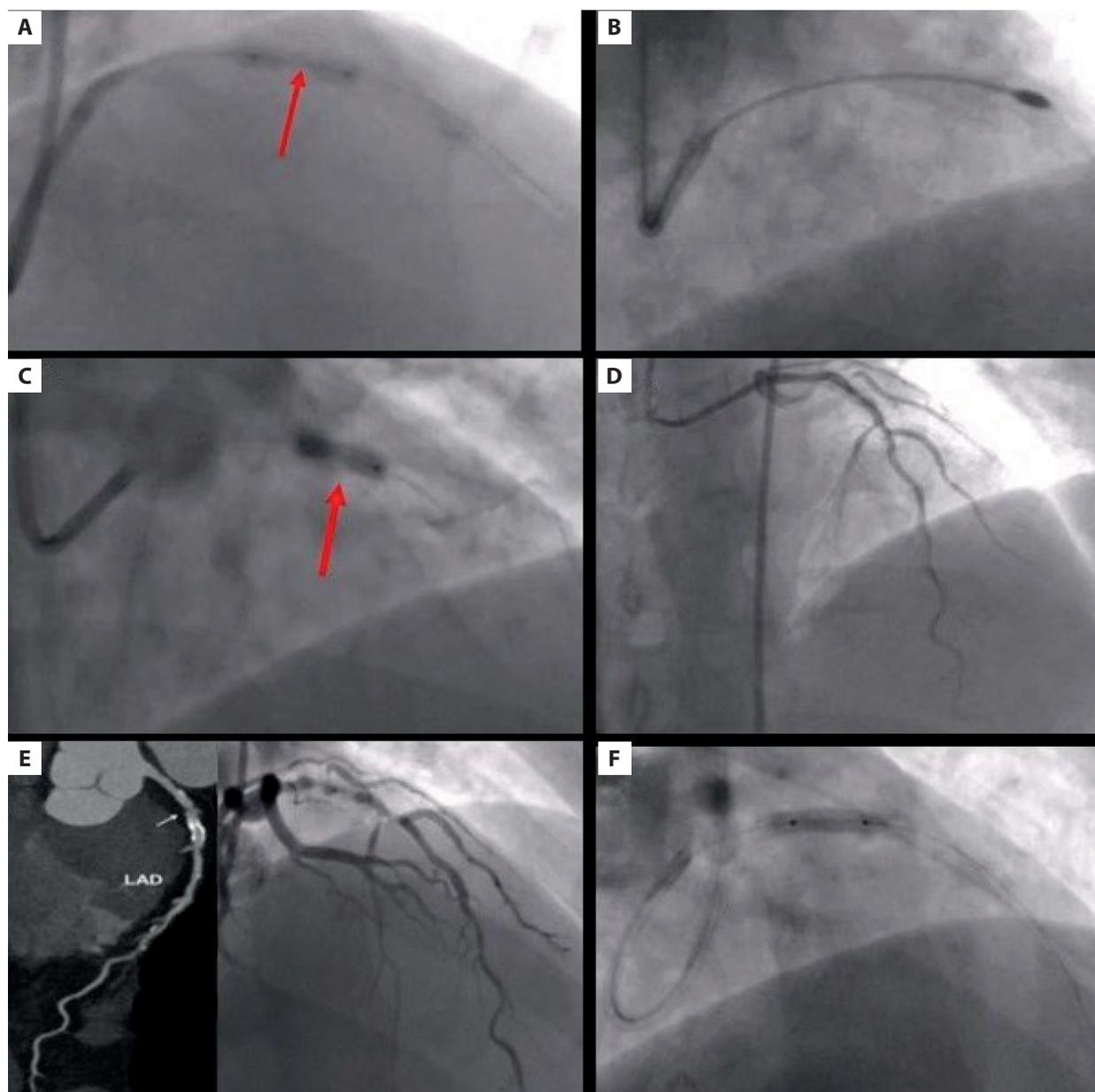


Figure 1. **A.** Pre-dilation with a cutting balloon still having a waist (red arrow). **B.** Successful RA. **C.** High-pressure (22 atm) inflation of an NCB post-RA was performed — a significant “dog-bone effect” was still observed (red arrow). **D.** Final angiographic result with TIMI 3 flow. Stenting was deferred while a mild non-flow limiting dissection can be noted just after a large diagonal branch.

E. CTCA (left panel) and angiographic PA cranial view (right panel) demonstrating distal LAD dissection healing (white arrow). **F.** Post-stent deployment dilatation with an NCB — there is no waist anymore

Abbreviations: CTCA, computed tomography coronary angiography; LAD, left anterior descending; NCB, non-compliant balloon; PA, postero-anterior; RA, rotational atherectomy

Moderate/severe calcification, present in approximately 30% of culprit lesions in acute coronary syndromes, adversely affects the safety/efficacy of primary PCI and suggests worse post-PCI outcomes [3]. Although RA is applied only in selected STEMI patients [4], IVL may mitigate adverse consequences of severe calcification [5]. The DISRUPT-CAD trials, however, have excluded patients with STEMI [6]. The safety of IVL in thrombus-laden lesions is unknown, and its “off-label” use in acute STEMI is not currently

recommended till further data shed light on this high-risk scenario. However, IVL could be used in a staged fashion in STEMI patients to facilitate stenting at a time when there is less thrombus burden and myocardial electrical instability as in our case.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

Article information

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