

# Orbital-Tripsy — orbital atherectomy facilitated by Shockwave Intravascular Lithotripsy: Novel bailout strategy in percutaneous coronary intervention in heavily calcified coronary lesions

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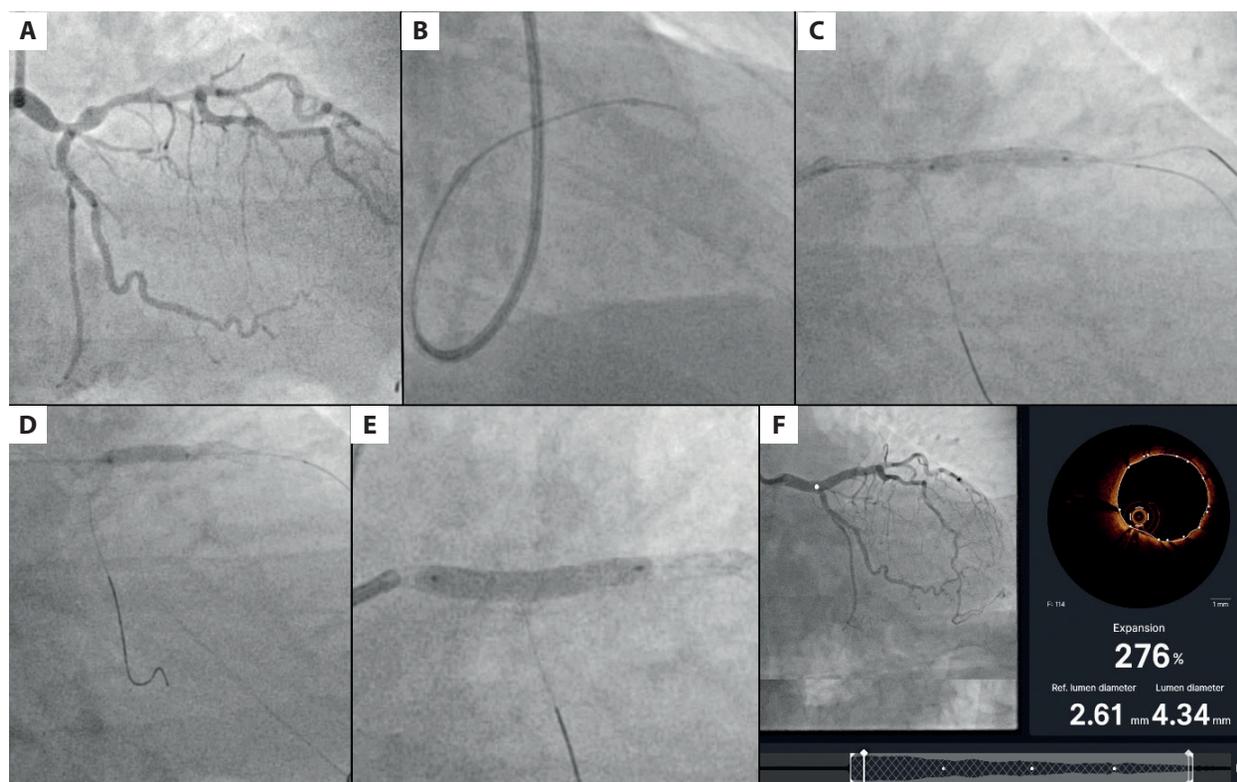
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A 59-year-old female with hyperlipidemia was admitted to the Department of Cardiology with a non-ST-segment elevation myocardial infarction (NSTEMI). Initial echocardiography showed mild hypokinesis of the anterior wall with preserved ejection fraction (LVEF, 50%). After pretreatment with loading doses of unfractionated heparin, aspirin, and ticagrelor, the patient was transferred to the cath lab.

An urgent coronary angiogram showed highly calcified significant stenosis of the left main (LM) and severely calcified critical stenosis of the proximal part of the left anterior descending artery (LAD) (Figure 1A). Due to ongoing ischemia (resting chest pain, electrocardiography showing significant ST-segment deviations in the anterior wall leads) and despite the high risk (SYNTAX score, 33), rescue percutaneous coronary intervention (PCI) was performed. By right radial access, an EBU 3.5-Guide-Catheter (6F; Medtronic Ireland, Galway, Ireland) was introduced to the left main. After wiring the LAD with Sion (Asahi-INTECC Co., Aichi, Japan), subsequent exchange of guidewire for ViperWire (Cardiovascular Systems Inc., Saint Paul, MN, US) via Corsair Pro XS microcatheter (Asahi-INTECC) was performed. Due to the high calcium burden, we decided to use a novel debulking device — the Diamondback 360° coronary

orbital atherectomy (OA) System (Cardiovascular Systems Inc.). Six successful low-speed (80 000 rpm) atherectomy runs followed by four high-speed (120 000 rpm) runs were performed (Figure 1B). All runs lasted for 25 seconds, and after each run, the operators provided at least a 20-second break. The summarized ablation time lasted 250 seconds. In the next step, we performed high-pressure (16 atm) inflation of a non-compliant (NC) 2.75 × 20 mm balloon catheter. Afterward, in the proximal segment of the LAD, DES-Cre8EVO (CiD S.p.A., Saluggia, Italy) 2.75 × 20 mm (15 atm) was implanted. However, despite initial aggressive lesion preparation, we observed a significant focal “dog bone effect” at the proximal edge of the stent. Additional postdilatation with a 3.0 mm (20 atm) NC catheter turned out to be ineffective (Figure 1C).

Therefore, we performed shockwave intravascular lithotripsy (S-IVL) using a 3.0 × 12 mm catheter (Shockwave Medical Medical Inc, Santa Clara, CA, US), and after 40 ultrasonic pulses, we achieved full stent expansion (Figure 1D). Then additional DES-Cre8EVO (CiD S.p.A) (3.5 × 16 mm — 16 atm) was implanted from the LM to the proximal part of the LAD (stent overlapping) (Figure 1E). Finally, the proximal optimization technique (POT) was performed with an NC 4.5 × 12 mm balloon (20 atm). The reasonable angiographic result



**Figure 1.** A. Coronary angiography of the left coronary artery system. B. Orbital coronary atherectomy, a 1.25 mm burr in the left anterior descending artery. C. Non-compliant balloon catheter inflation — “dog bone effect”. D. Full S-IVL catheter expansion after 40 sonic pulses. E. DES implantation in the LM and the proximal part of the left anterior descending artery. F. Final result confirmed on coronary angiography and optical coherence tomography

Abbreviations: DES, drug-eluting stent; LM, left main; S-IVL, shockwave intravascular lithotripsy

was confirmed by OCT imaging (Figure 1F). The patient was discharged after 5 days of hospitalization.

Despite the undeniable development of PCI armamentarium and technique, calcifications are still strong predictors of unfavorable outcomes. The vast majority of complications can be avoided by adequate lesion preparation, which allows for optimal stent expansion and directly translates to a reduction in the target lesion failure rate [1].

The recently introduced atherectomy device — Diamondback 360° Coronary orbital atherectomy (OA) System (Cardiovascular Systems Inc.) — has demonstrated good safety and efficiency, and unlike traditional rotational atherectomy is postulated to affect also inner deep parts of calcium [2]. However, in this challenging case, despite the use of an atherectomy device, optimal results were not achieved. Therefore, we were forced to use another novel clinical practice device — S-IVL [3]. Thanks to this approach we were able to modify the remaining calcium nodule and achieve full expansion of the previously implanted stent. To the best of our knowledge, this is one of the first presentations of the simultaneous use of OA plus S-IVL [4, 5].

### Article information

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