


# Shockwave intracoronary lithotripsy for the treatment of calcium-mediated undilatable in-stent restenosis

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Stent underexpansion due to calcifications is a predictor of stent failure and adverse clinical outcomes. Intravascular lithotripsy (IVL) has proved to be effective in dilating calcified de novo coronary lesions, but indications for the technique are expanding.

A 56-year-old man was scheduled for percutaneous coronary intervention due to severely calcified in-stent restenosis (ISR) in a bifurcation dedicated drug-eluting stent (DES) BiossLimC 3.5/4.25/24 mm which had been implanted 2 years prior into the left main/left anterior descending artery (LM/LAD) with a suboptimal result (residual stenosis of 50% in the proxLAD due to calcifications). As confirmed during the present admission, the lesion progressed (90% calcified ISR) (Fig. 1A) and was unsuccessfully dilated with non-compliant balloon (NCB) inflations (Fig. 1B). Advancement of intravascular ultrasound catheter to interrogate the lesion was unsuccessful. Considering the pre-

sence of severe calcifications, calcium deposits covered by the previously implanted stent and angiographically visible calcifications in the outer layers of the vessel, we elected to use IVL. IVL balloon (Shockwave 3.5/12 mm) was positioned and inflated within the lesion in the proxLAD (4 atm). Then, 80 shockwave pulses were delivered with a subsequent pressure increase (6 atm). The “dog-boning” effect (Fig. 1B) which had been observed during NCB inflations disappeared (Fig. 1C) and the lesion was re-dilated with NCBs (NC Emerge 3.5/12 mm, Pantera Leo 3.75/12 mm). Subsequently, DES (Orsiro 3.5/13 mm) was implanted (Fig. 1D) and post-dilated with a NCB (Pantera Leo 3.75/12 mm). A satisfactory angiographic result was achieved (Fig. 1E) with good expansion/apposition of the stent, and achievement of Kang’s criteria (Fig. 1F).

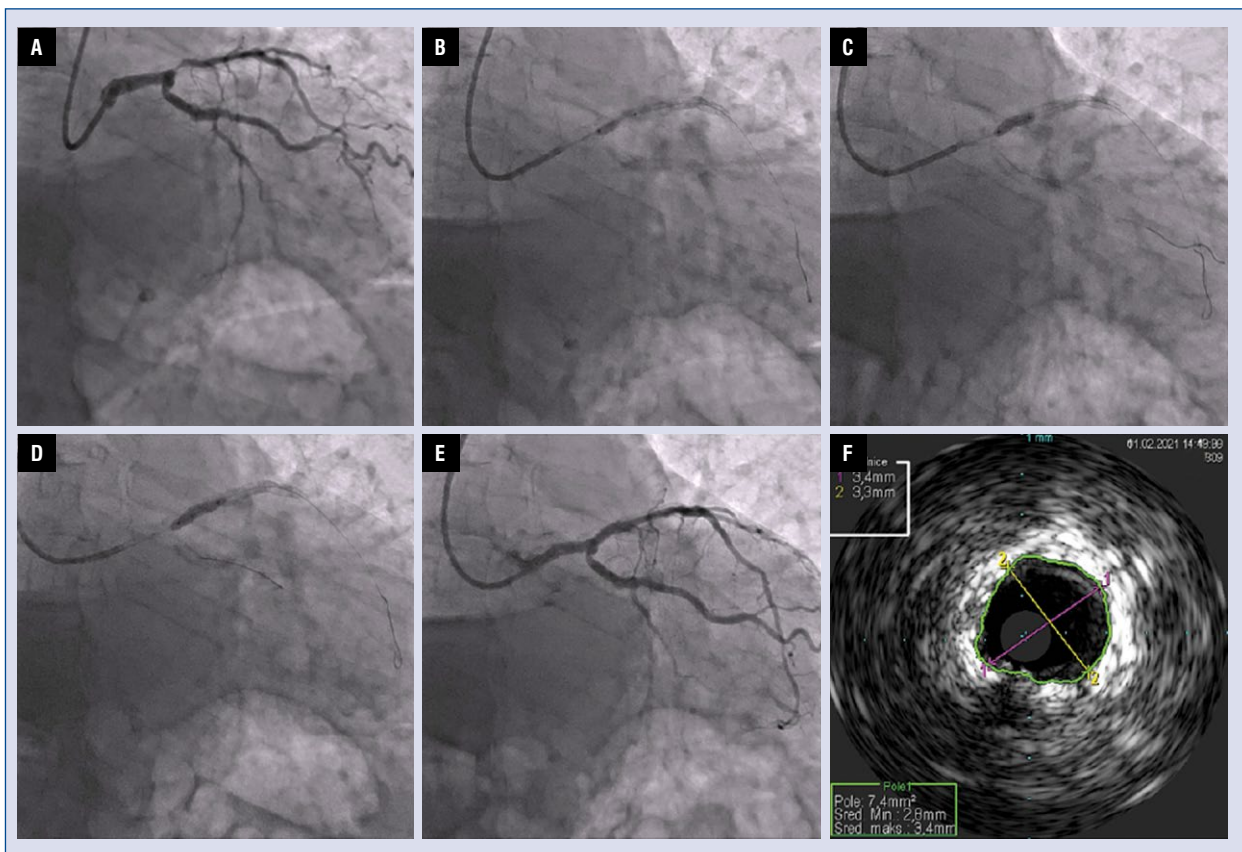
The present case implies that IVL is an effective modality for undilatable ISR caused by stent underexpansion secondary to calcifications.

**Conflict of interest:** None declared

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Received: 27.09.2021      Accepted: 6.02.2022

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**Figure 1.** Procedural steps of the procedure; **A.** A baseline left coronary angiography demonstrating calcified in-stent restenosis in the ostium of the left anterior descending artery (LAD); **B.** Predilatation of the target lesion with a non-compliant balloon with a “dog-boning” effect; **C.** An inflated intravascular lithotripsy balloon demonstrating lack of “dog-boning” effect following 80 shockwave pulses; **D.** Stent implantation in the proxLAD; **E.** Final angiographic result; **F.** Final intravascular ultrasound assessment (lumen area 7.4 mm<sup>2</sup>).