

# Impella-assisted intracoronary lithotripsy of heavily calcified left main lesion in a patient with severely impaired ejection fraction and the last remaining patent vessel

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A 56-year-old man with the last remaining patent vessel, heavily calcified significant left main (LM) stenosis (Fig. 1A) and chronic total occlusion of both right coronary artery and circumflex branch was referred to our institution for revascularization of the LM lesion. Patient was turned down from surgery due to severely impaired left ventricular ejection fraction (LVEF) of 12% and multiple comorbidities. Due to high surgical risk (EuroScore II of 23.05%), the decision to proceed with Impella-assisted revascularization was made. Calcified LM lesion was predilated with multiple non-compliant balloons (NCBs) (up to 4.0 mm) (Fig. 1B), however the full balloon expansion was not achieved with 50% residual stenosis. The intravascular lithotripsy (IVL) with a 4.0 × 12 mm Shock-wave balloon (80 pulses) was done (Fig. 1C, D), followed by dilatation with 4.5 NCB (Fig. 1E). After obtaining full balloon expansion a 4.0 × 15 mm drug eluting stent was implanted into LM/left anterior descending (LAD) with subsequent proximal optimization technique (POT) using 4.5 mm NCB and final kissing balloon of the LAD and intermediate artery bifurcation with 4.0 mm

and 2.5 mm NCBs, respectively. During IVL pulses administration and balloon inflations, a flattening of the aortic pressure waveform was observed. Intravascular ultrasound (IVUS) imaging revealed only 60% stent expansion (Fig. 1F). Therefore, re-POT using 5.0 × 12 mm NCB was performed (Fig. 1G) with favorable final angiographic result (Fig. 1H). Repeated IVUS showed acceptable stent expansion (> 80%) with minimal stent area of 12.5 mm<sup>2</sup> (Fig. 1I). The Impella device was removed directly after the procedure and the patient was discharged after 48 hours without any complications.

Severely calcified lesions are challenging especially in the setting of complex coronary atherosclerosis and severely impaired LVEF. Use of percutaneous mechanical circulatory support with Impella CP provides a better safety margin for complex percutaneous coronary intervention, especially with the prospect of an uncontrolled interruption of flow due to challenging stent delivery. It diminishes the ischemic stress during the procedure while providing coronary perfusion which was especially important in the case of this patient with the last remaining patent vessel.

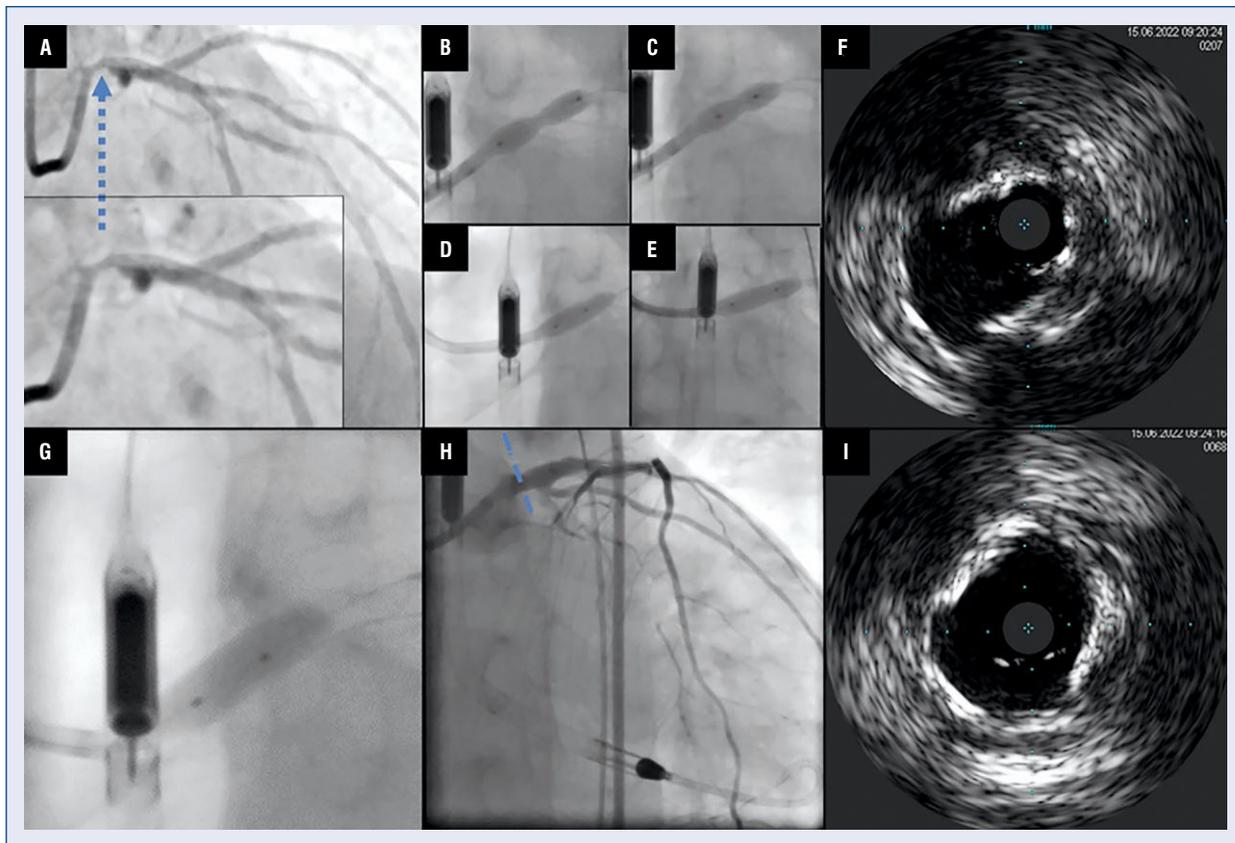
**Conflict of interest:** None declared

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**Figure 1.** A. Baseline angiography revealed significant calcified stenosis in the left main (dotted line); B. Dog-bone shape of non-compliant-balloon (NCB) on the resistant calcified lesion; C. Intravascular lithotripsy (IVL) balloon during initial pulses application; D. Effect of IVL after 80 pulses; E. Repeated predilatation with NCB; F. Intravascular ultrasound (IVUS) following stent implantation revealed suboptimal 60% expansion; G. Optimal expansion was achieved with final proximal optimization technique using 5.0 mm NCB; H. Final angiographic effect — the dotted line indicates minimal stent area (MSA) on IVUS; I. Final intravascular ultrasound at the MSA level.