

# Heavily calcified coronary lesion treated by shockwave intravascular lithotripsy

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We present a case of a 72-year-old man admitted to our center for percutaneous coronary intervention (PCI) of a highly calcified left anterior descending artery (LAD). The patient had grade 3 hypertension (according to the European Society of Cardiology [ESC]) and moderate aortic valve regurgitation without hemodynamic significance. He was a current smoker. Due to stable angina (Canadian Cardiovascular Society class II), he underwent coronary angiography in a remote center, followed by a physiological assessment of a borderline lesion in the medial LAD. The fractional flow reserve was 0.63 (ACIST Medical Systems, Eden Prairie, Minnesota, United States), and the PCI was postponed owing to the complexity of a highly calcified lesion and a need for plaque modification.<sup>1</sup>

On admission, the patient was stable with no symptoms of decompensated heart failure or unstable angina. Electrocardiography revealed normal heart axis, sinus bradycardia (50 bpm), as well as negative T waves in leads I, aVL, and V<sub>5</sub>-V<sub>6</sub>. Transthoracic echocardiography showed preserved left ventricular ejection fraction, without any significant wall motion abnormalities and a moderate aortic valve regurgitation without signs of aortic root or ascending aorta dilation. The SYNTAX score was 11. Laboratory tests showed no significant abnormalities.

Coronary angiography via the right radial access, followed by intravascular ultrasound (IVUS, Philips Volcano, San Diego, California, United States), demonstrated heavily calcified lesions in the proximal and medial segments of the LAD (FIGURE 1A), with almost circumferential calcium deposits with a minimal lumen diameter of 1.5 mm and a minimal lumen area of 2.4 mm<sup>2</sup>. Plaque modification with rotational

atherectomy (Boston Scientific, Boston, Massachusetts, United States) was considered,<sup>2</sup> but given the proximal LAD diameter exceeding 4 mm, we decided to use an intravascular lithotripsy catheter (Shockwave Medical, Inc., Fremont, California, United States).

The left main coronary artery was intubated with an EBU 3.75 6F guiding catheter (Medtronic, Minneapolis, Minnesota, United States), and Cruiser ES-HF (Biotronic, Berlin, Germany) and BMU II (Abbott, Chicago, Illinois, United States) guidewires were introduced to the distal LAD and the second diagonal branch, respectively. An initial predilation with a noncompliant Solarice balloon catheter (Medtronic; 2.0 × 15 mm; up to 8 atm) was performed, and then a lithotripsy balloon catheter (Shockwave Medical, Inc.; 4.0 × 12 mm) was introduced. Ten high-energy applications were performed to achieve proper plaque modification (FIGURE 1B and 1C). Each time, the catheter was inflated to 4 to 6 atm in order to facilitate energy transfer. The Shockwave device generates sonic pressure waves that selectively crack calcium deposits without any damage to vascular soft tissue.

Follow-up IVUS revealed calcium crack and no intimal dissection. A noncompliant Solarice balloon catheter was used to predilate the lesion (3.5 × 15 mm, 25 atm) and 1 drug-eluting stent (Orsiro, 4.0 × 40 mm; Biotronic) was implanted. Postdilation with noncompliant balloons was performed to ensure proper stent apposition (FIGURE 1D). The final IVUS confirmed optimal stent placement and apposition, with a minimal lumen area of 9.9 mm<sup>2</sup>. The patient was free from any symptoms and was discharged home 2 days after the procedure on standard pharmacotherapy recommended by the ESC.

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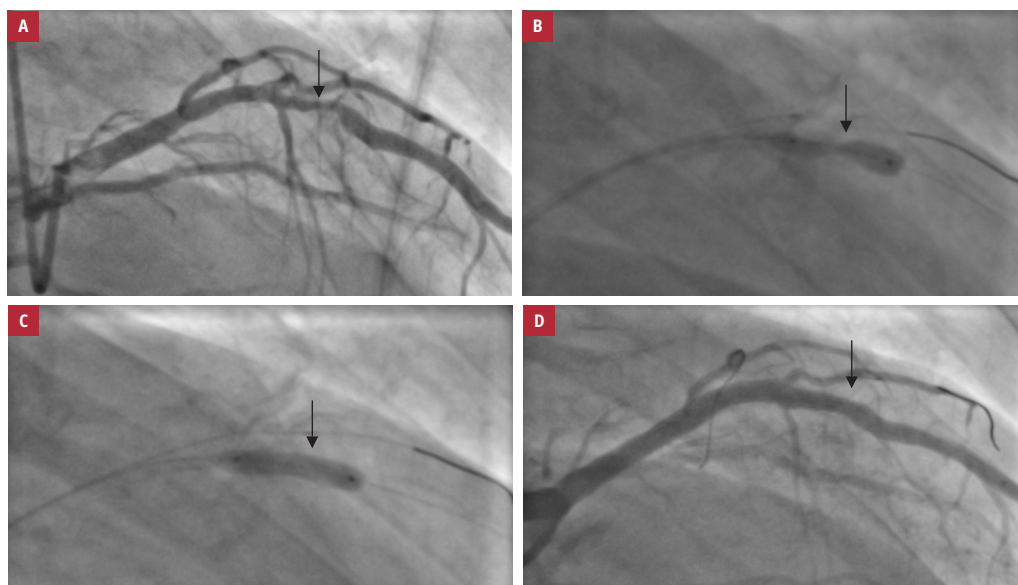
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**FIGURE 1** **A** – a heavily calcified coronary lesion in the proximal left anterior descending artery (arrow); **B** – first application of shockwave lithotripsy (arrow); **C** – last application of shockwave lithotripsy (arrow); **D** – final angiographic outcome (arrow)



This case shows that complex, heavily calcified coronary lesions always require a thoughtful approach, and often more than 1 plaque modification technique should be considered. Intravascular lithotripsy using the Shockwave device proved efficient and safe.

#### ARTICLE INFORMATION

**CONFLICT OF INTEREST** None declared.

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#### REFERENCES

- 1 Neumann FJ, Sousa-Uva M, Ahlsson A, et al. 2018 ESC/EACTS Guidelines on myocardial revascularization. *Eur Heart J.* 2018; 40: 87-165.
- 2 Dobrzycki S, Rezcuch K, Legutko J, et al. Rotational atherectomy in everyday clinical practice. Association of Cardiovascular Interventions of the Polish Society of Cardiology: expert opinion. *Kardiol Pol.* 2018; 76: 1576-1584.