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Heavily calcified coronary lesion treated by Shockwave Intravascular Lithotripsy.

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We present a case of a 72-year old male, admitted to our centre to perform a percutaneous coronary intervention (PCI) of highly calcified left anterior descending (LAD) artery. The patient’s comorbidities involved arterial hypertension (ESC class III), moderate aortic valve regurgitation with no haemodynamic consequences, he was also a current smoker. Due to CCS II stable angina a coronary angiography was done in the remote centre followed by physiological assessment (fractional flow reserve, FFR) of the borderline lesion in medial LAD. The FFR (ACIST Medical Systems, USA) value was 0.63, and the PCI was deferred due to complexity of highly calcified lesion and need for plaque modification methods [1].

On admission the patient was stable, with no symptoms of decompensated heart failure or unstable angina. The ECG revealed normal heart axis, sinus bradycardia (50/min), negative T waves in I, aVL, V5-V6 leads. 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 dilatation. Syntax score was assessed as 11. Laboratory tests showed no significant abnormalities.

Coronary angiography via right radial access, followed by intravascular ultrasound (IVUS, Philips Volcano, USA) assessment demonstrated a heavily calcified proximal and medial left anterior descending branch (LAD) lesions with almost circumferential calcium deposits with minimal lumen diameter 1,5 mm, and minimal lumen area 2,4 mm². Plaque modification with use of rotational atherectomy (Boston Scientific, USA) was considered [2], but given the proximal LAD diameter >4.0 mm, a decision to use an intravascular lithotripsy catheter (Shockwave Medical, Inc., USA) was made.

The left main coronary artery was intubated with an EBU 3.75 6-Fr (Medtronic, USA) guiding catheter and Cruiser ES-HF (Biotronic, Germany) and BMU II (Abbott, USA) guidewires were introduced to distal LAD and 2nd diagonal branch (Dg), respectively. An initial predilatation with non-compliant Solarice balloon catheter (Medtronic, USA) 2.0 x 15
mm, up to 8 atm., was made, then the Shockwave® 4.0 x 12 mm balloon lithotripsy catheter was introduced. Ten high-energy applications were made in order to achieve proper plaque modification. Each time the catheter was inflated to 4-6 atm. to facilitate energy transfer. The Shockwave® device generates sonic pressure waves that selectively crack calcium deposits without any damage to soft vascular tissue.

After the applications a IVUS check was performed, revealing calcium crack and no intimal dissection. A non-compliant Solarice balloon catheter was used to predilate the lesion (3.5 x 15 mm, 25 atm.) and one drug-eluting Orsiro (Biotronic, Germany) 4.0 x 40 mm stent was placed. Postdilatation with non-compliant balloons were made to ensure proper stent apposition. Final IVUS confirmed optimal stent placement and apposition with minimal lumen area of 9.9 mm$^2$.

The patient was free from any symptoms and was discharged home two days after the procedure. A standard pharmacotherapy recommended by the ESC guidelines was prescribed.

This case shows that a complex, heavily calcified coronary lesions always require thoughtful approach and often more than one plaque modification technique must be considered. An intravascular lithotripsy using Shockwave® device proved efficient and safe.

To our knowledge, this paper is the first description of intravascular lithotripsy usage available in the Polish cardiovascular literature.
References:


Figure 1.

A - Heavily calcified coronary lesion in proximal LAD;

B- Final angiographic result;

C- First application;

D- Last application.