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Rotational Atherectomy and Intravascular Lithotripsy (RotaTripsy) in a massive heavily calcified coronary aneurysm in a young woman

Short title: RotaTripsy in coronary aneurysm

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The management of calcified coronary lesions remains a complex challenge in percutaneous coronary interventions (PCI). Intracoronary calcification has been linked to less favorable outcomes after PCI, mostly attributed to inadequate stent expansion and/or malapposition — often resulting in elevated occurrence of stent thrombosis or restenosis [1]. Traditionally balloon-focused techniques, characterized by lesion pre-dilatation to high pressures using non-compliant or cutting balloons were considered the first-step interventional approach [2]. Nonetheless, obstructive calcification may impede the successful delivery and optimal expansion of balloons [2]. Rotational atherectomy stands as the fundamental approach, facilitating the passage of balloons or stents through highly calcified lesions. Nevertheless, in cases where extensive calcified plaques are present, its efficacy might prove insufficient for

achieving optimal expansion. Employing a combined strategy involving both intravascular lithotripsy (IVL) and rotational atherectomy (RotaTripsy) could enhance stent expansion [3].

A 37-year-old woman presented to the hospital with ST-segment elevation acute myocardial infarction of anterior wall. She had no history of cardiovascular risk factors, however, she disclosed an episode of hospitalization due to prolonged fever of unknown etiology in childhood. Immediate coronary angiography was performed. Fluoroscopy alone revealed massive calcifications in medial segment of left anterior descending artery (LAD). Contrast injection showed total occlusion of LAD in the medial segment (**Figure 1A**; Supplementary material, *Figure S1A–B*). Other coronary arteries did not show any atherosclerotic lesions. After advancement of guidewire into the distal part of LAD, blood flow was restored and massively calcified aneurysm in LAD with critical stenoses at the entry and at the exit with diagonal branch originating from the aneurysm was revealed (Supplementary material, *Figure S1C–D*). Multiple predilatations with noncompliant balloons 2.5, 3.0 and 2.5 mm cutting balloon were performed (Supplementary material, *Figure S1E*) without achievement of full vessel expansion (**Figure 1B–C**; Supplementary material, *Figure S1F*) but with TIMI 2 flow into distal LAD. The patient was transferred to the referral center and, after Heart Team consultation, coronary angiography with optical coherence tomography was performed (**Figure 1D**; Supplementary material, *Figure S1G–I*). Successful rotational atherectomy using 1.5 mm bur was made, nevertheless, the adequate expansion of the balloons was not achieved (Supplementary material, *Figure S1J*). Intravascular lithotripsy (Shockwave Medical Inc., Santa Clara, CA, US) with 80 ultrasonic pulses of 3.5 × 12 mm IVL balloon was applied (Supplementary material, *Figure S1K–L*), following the pre-dilatation with the 3.5 mm NC balloon, the everolimus-eluting stent was implanted with excellent angiographic result (**Figure 1E–F**; Supplementary material, *Figure S1M–P*).

Calcified coronary arteries lesions are a common finding during routine practice, with an frequency influenced by the group characteristics and diagnostic criteria [4]. Heavily calcified coronary lesions remain a therapeutic challenge and in some cases, the rotational atherectomy alone may be not sufficient to achieve proper balloon expansion [5]. The utilization of a

combined strategy involving both IVL and rotational atherectomy (RotaTripsy) could enhance stent expansion [3]. We present the first documented successful case of “RotaTripsy” in a massive heavily calcified coronary aneurysm in a young woman without cardiovascular risk factors. The etiology of this calcified aneurysm has not been established. We believe that a local inflammatory process was the leading contributing factor.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

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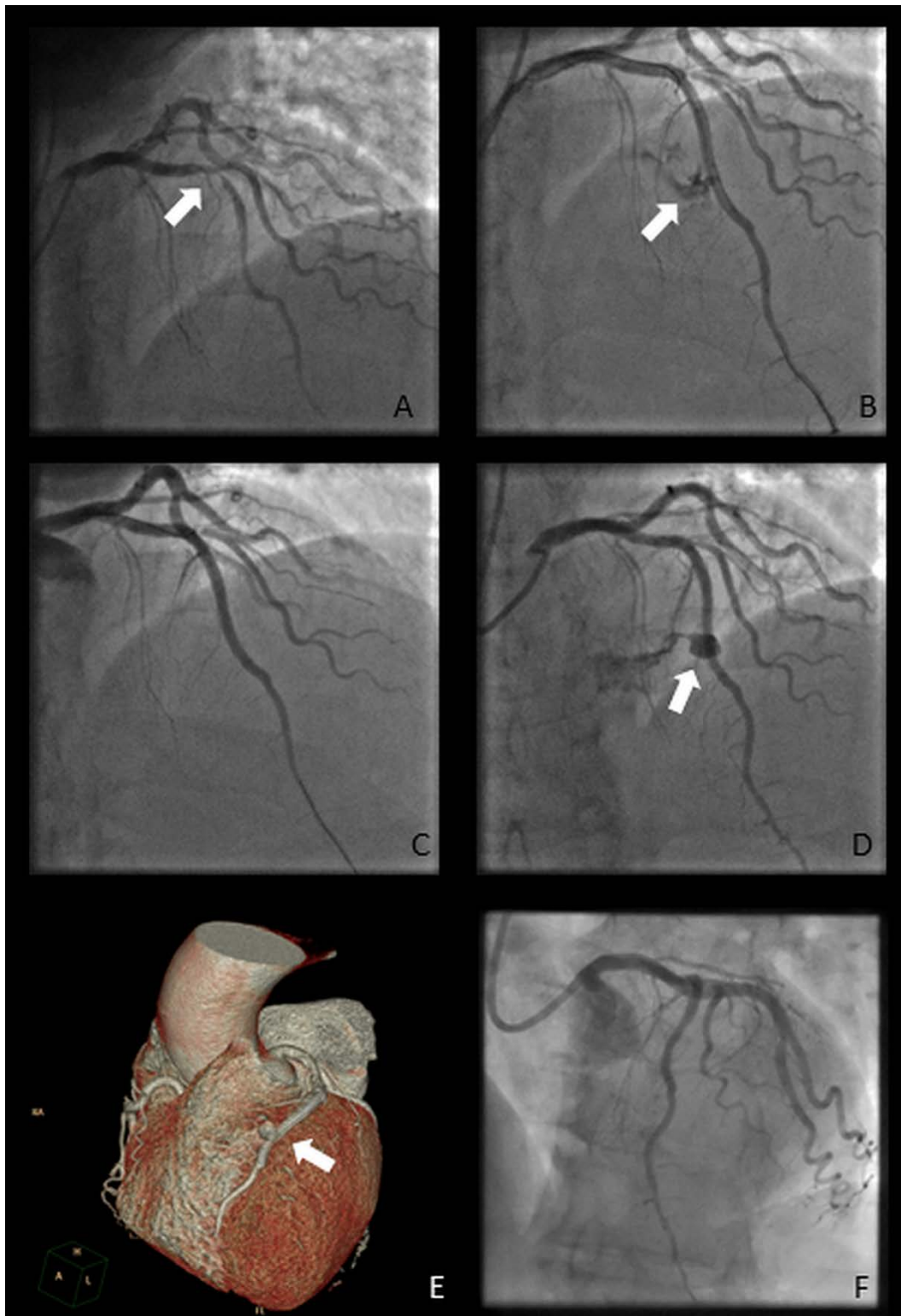


Figure 1. A. Total occlusion in left anterior descending artery. B. Balloon underexpansion. C. LAD blood flow restored, without full vessel expansion. D. Optical coherence tomography. E. Stent boost imaging. F. Final result