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Burr Meets Boom: A High-Risk Left Main Adventure

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A 50-year-old female with long-standing poorly controlled diabetes mellitus presented with non-ST-elevation myocardial infarction (NSTEMI) and heart failure with reduced ejection fraction (HFrEF) of 30%. Coronary angiography revealed diffuse, severe triple vessel disease. The left main stem (LMS) had a heavily calcified 80% stenosis with a calcium nodule. The left anterior descending artery (LAD) had 80–90% calcified stenosis from the ostium to the mid segment. The left circumflex (LCx) had 80% proximal stenosis extending into the obtuse marginal (OM) branch. The right coronary artery (RCA) was also severely diseased with 80% stenosis at the ostium, 99% at the mid segment, and 80% distally.

Due to the diffuse nature of the disease and poor distal targets, she was deemed unsuitable for coronary artery bypass grafting (CABG) by the cardiothoracic surgical team. Given her recurrent episodes of acute coronary syndrome (ACS) and failure of medical therapy, the patient consented to undergo complex high-risk percutaneous coronary intervention (PCI).

The RCA was treated first using a hybrid approach. A drug-eluting stent (DES) was deployed from the ostium to the mid RCA, followed by treatment of the mid-to-distal RCA with two drug-eluting balloons (DEB). The procedure was uneventful, and the patient remained stable.

She was re-admitted later for stage PCI of the left coronaries. Given the complexity of the lesions and poor ejection fraction, up front mechanical circulatory support with an intra-aortic balloon pump (IABP) and low-dose noradrenaline infusion was initiated. The procedure began with cautious engagement of an EBU 3.0/7Fr guide catheter, as engagement of the left main led to hypotension. The LM was initially wired using Runthrough Floppy in CARAVEL microcatheter and then exchanged to a ROTAWIRE Extra Floppy for rotational atherectomy.

Rotational atherectomy (RA) was performed using a 1.5 mm ROTOAPRO burr with five passes at 180,000 rpm and two additional runs at 150,000 rpm, targeting the calcified LM-LAD segment. Intravascular ultrasound (IVUS) showed calcium reverberation at LAD and a calcium nodule at ostium LM. LM-LAD was further prepared with 2.5 mm scoring balloon at 16-26 atm then 3.0 mm non-compliant (NC) balloon at 12-22 atm at LM to proximal LAD. Given the severity of the calcium and inadequate balloon expansion during high-pressure 3.0 mm NC balloon inflation, intravascular lithotripsy (IVL) with a 3.5 mm balloon was performed, delivering 80 pulses at 4–8 atm from ostium LM to ostium LAD. This successfully expanded the balloon and modified the calcium.

The LCx-OM branch was addressed using a DEB 2.0/30 mm balloon, accepting a non-flow limiting dissection. The LAD was treated with sequential DES 2.75/24 mm to the mid LAD and a 3.5/20 mm DES from the ostial LM to proximal LAD. Additional high-pressure post-dilation with 3.0 mm NC and 3.5 mm NC balloons was performed to optimize expansion. Proximal optimization technique (POT) and flaring of LM was done using 4.0 mm NC balloon.

Final IVUS imaging showed excellent stent expansion and apposition. Ostial LAD minimal stent area (MSA) improved from 2.62 mm^2 post-RA to 6.40 mm^2 post-IVL and post-dilation. Ostial LM MSA improved from 4.77 mm^2 post-RA to 8.36 mm^2. TIMI III flow was achieved. The patient was successfully weaned off vasopressors, and the IABP was removed at the end of procedure. Bilateral femoral access sites were closed with Prostyle without complications. She was discharged well.