

[Target Lesion]

Patient: 77-year-old male presenting with worsening postprandial angina, progressive exertional dyspnea, and palpitations. **Angiography:** Revealed complex, heavily calcified triple-vessel disease featuring a chronic total occlusion (CTO) of the proximal left circumflex (LCX) artery, a critical 95% calcified stenosis of the proximal left anterior descending (LAD) artery, and a 50-60% lesion in a dominant right coronary artery (RCA).

Ischemia Profile: ECG demonstrated significant ischemia with ST-segment depressions in V₄, V₆ and lead II, alongside T-wave inversions in leads I, aVL, and V₃. Echocardiography confirmed adequate left ventricular systolic function.

Clinical Dilemma: Surgical revascularisation (CABG) was indicated as the primary therapeutic approach, but the patient and family strictly declined surgery, prompting a high-risk, multi-modality percutaneous coronary intervention (PCI).

[Strategy]

Access & Engagement: Vascular access was secured via the right femoral artery using a 7F long sheath, and the left main (LM) coronary artery was engaged using a 7F EBU 3.0 guide catheter.

Plaque Modification: Due to severe, concentric calcification, a RotaWire Drive floppy wire was negotiated into the distal LAD. Rotational atherectomy was performed using a 1.75 mm burr via the pecking technique from the ostial to the mid-LAD, achieving safe plaque modification without complication.

Bifurcation Protection & Bed Preparation: A Runthrough wire was parked in the distal LAD, and a Fielder FC wire was jailed in the major diagonal branch ostium. Advanced lesion preparation was executed from the proximal to mid-LAD using a 3.0 x 10 mm Wolverine cutting balloon up to 16 atm, followed by pre-dilatation of the diagonal ostium with a 2.0 x 10 mm Apollo balloon.

Imaging Guidance: Pre-stenting Intravascular Ultrasound (IVUS) pull-back from the mid-LAD confirmed successful concentric fractures within a 360° calcified plaque (distal reference lumen area: 9.59 mm², proximal LM reference lumen area: 16.69 mm² with a 40% plaque burden and a lack of an ideal landing zone in the ostial LAD).

[Final Result]

Stenting & Optimisation: Guided by a Guideliner catheter, a 3.0 x 48 mm Xience Xpedition drug-eluting stent (DES) was deployed from the distal LM to the mid-LAD at 11 atm. Proximal Optimisation Technique (POT) was performed on the LM segment using a 4.5 x 6 mm Pipit NC balloon up to 14 atm, and the LAD was post-dilated up to 18 atm.

Intravascular Imaging Rectification: Post-stent IVUS pull-back revealed localized stent malapposition within the proximal LAD and LM segments. Corrective high-pressure re-POT and aggressive post-dilatation were executed up to 20 atm.

Bailout Strategy: Subsequent angiography revealed persistent haziness at the distal stent edge, which was promptly treated by deploying an overlapping 2.75 x 12 mm Xience Sierra DES at 11 atm, followed by final high-pressure post-dilatation up to 20 atm.

Conclusion: Final angiography and imaging confirmed complete stent expansion, optimal strut apposition, preserved diagonal branch flow, and TIMI-III flow without edge dissection, hematoma, or perforation. This case highlights the critical utility of combining rotational atherectomy, cutting balloons, and meticulous IVUS-guided optimization to safely achieve optimal long-term outcomes in complex, calcified LM bifurcation lesions when surgery is rejected.