

Overcoming Extreme Coronary Calcification in a Donor Vessel Supplying CTO Collaterals: Sequential Rotational Atherectomy and Cutting Balloon Angioplasty in NSTEMI-ACS

Dwiki F Athallah¹

Adhitia B. Prakoso¹

¹ Department of Cardiology and Vascular Intervention, Sultan Agung Islamic Hospital, Indonesia

[Target Lesion]

A 65-year-old woman with hypertension, dyslipidemia, and postmenopausal status presented with NSTEMI-ACS (CCS III chest pain, dyspnea on exertion), inferior ischemic ECG changes, and LVEF 45% with regional wall motion abnormality. Coronary angiography demonstrated a right coronary artery (RCA) chronic total occlusion (CTO) collateralized exclusively via the left anterior descending artery (LAD), with a severely calcified culprit lesion in the mid-LAD. This lesion therefore served simultaneously as the acute culprit and as the sole donor of collateral flow to the RCA-CTO territory.

[Strategy]

Non-compliant scoring balloon (2.0/10 mm, 20 atm) and semi-compliant balloon (1.5/15 mm, 16 atm) preparation failed to achieve adequate plaque compliance. An IVUS catheter could not cross the lesion, confirming severe, flow-limiting calcification. Rotational atherectomy was performed with a 2.0 mm burr (burr-to-artery ratio 0.50; 190-205 rpm, 10-12 second passes, 20 total passes), sized conservatively to balance calcium fracture against the risk of compromising collateral flow to the RCA-CTO territory. A guide-extension catheter (Guidezilla 6F) was then used to support a sequential focal-force balloon strategy: cutting balloon (3.0/10 mm, 12 atm), semi-compliant balloon (2.5/15 mm, 14 atm), scoring balloon (2.0/10 mm, 20 atm), and semi-compliant balloon (1.5/15 mm, 16 atm), achieving adequate lesion compliance. A 4.0/24 mm drug-eluting stent was then implanted at 12 atm.

[Final Result]

Final angiography demonstrated a widely patent LAD with brisk antegrade flow to the distal vessel and preserved collateral perfusion to the RCA-CTO territory throughout the procedure. Repeat IVUS was performed to assess stent expansion and apposition. No procedural complications occurred. This staged strategy - balloon assessment, conservatively sized atherectomy, and sequential focal-force balloon optimization - achieved a favorable result while protecting flow to a collateral-dependent myocardial territory.