Different Healing Responses in CTO PCI

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A 67-year-old man, ex-smoker with stable coronary artery disease, was found to have three-vessel disease on coronary CT angiography. Invasive coronary angiogram confirmed a proximal LAD chronic total occlusion (CTO), side branch diagonal with short segment occlusion, severe LCx stenosis, and diffuse 80?90% stenosis in the RCA. Despite being offered coronary artery bypass grafting (CABG), the patient opted for percutaneous revascularization.

A staged PCI strategy was adopted. RCA PCI was performed first. In the second stage, LAD CTO PCI was attempted via a 7Fr EBU 3.5 guide with contralateral RCA injection. Initial attempts using Fielder XTA and Gaia Next 2 failed to cross the CTO. The lesion was eventually crossed using Gaia Next 3. IVUS revealed severe negative remodeling and myocardial bridging in the mid-LAD, while the proximal LAD was predilated and stented with a 2.5 × 19 mm BioFreedom DES. Given the small caliber and unfavorable vessel characteristics of the mid-LAD, it was left untreated for deferred assessment.

The occluded diagonal was crossed with a Fielder XTA; however, the wire entered the subintimal space. Flow was successfully restored using the STAR (Subintimal Tracking and Re-entry) technique.

Three months later, the patient returned for staged PCI to the LCx and reassessment of the LAD. Follow-up angiography and IVUS revealed positive remodeling and increased vessel caliber with good flow in the previously untreated mid-LAD segment, while the previously recanalized diagonal had reoccluded with poor flow.

This case illustrates how natural vessel remodeling may occur in small-caliber CTO segments when intervention is deferred or limited to balloon angioplasty. In contrast, the use of the STAR technique, while effective for initial recanalization, may be associated with higher risk of reocclusion, especially in side branches where true lumen re-entry is uncertain. It highlights that procedural success does not guarantee long-term patency, emphasizing the importance of individualized strategy based on vessel characteristics and long-term goals.