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Percutaneous Coronary Intervention with the DK-Crush Technique for a Complex LAD-Diagonal Bifurcation Lesion in the Setting of Acute Anterior Myocardial Infarction

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Introduction and Aim: Coronary bifurcation lesions account for approximately 15–20% of all percutaneous coronary interventions (PCI). True bifurcation lesions of the left anterior descending artery (LAD) and a large diagonal branch are among the most technically demanding PCI scenarios in acute ST-elevation myocardial infarction (STEMI). Double kissing (DK) crush has been associated with superior outcomes compared with other two-stent techniques in complex bifurcation lesions; however, repeated wire crossings and kissing balloon steps may create technical difficulties in the time-constrained acute setting. We present an LAD-second diagonal (D2) true bifurcation lesion treated with DK-crush during primary PCI, complicated by three distinct technical challenges.

Case Report: A 66-year-old man with no known cardiac history presented with chest pain and ST elevation in the anterior leads on electrocardiography. Blood pressure was 141/93 mmHg, heart rate 78 bpm, oxygen saturation 97%. Echocardiography showed an ejection fraction of 40% with anterior wall and apical hypokinesia. Emergency angiography via a right femoral 7F sheath revealed a markedly elongated aorta and a superiorly originating left main coronary artery; a true bifurcation lesion with 90% calcific stenosis in the LAD proximal to the D2 origin and 90% stenosis in the proximal D2 was identified, and DK-crush was planned. Both branches were wired separately through an EBU 4.5 guiding catheter. During predilatation, refractory loss of flow developed in D2; as repeated prolonged balloon dilatations failed, 10 mg of intracoronary tissue plasminogen activator was administered within 10 minutes, and flow was restored after prolonged inflation with a 2.75×30 mm non-compliant (NC) balloon. A 2.75×22 mm drug-eluting stent was implanted in D2, followed by proximal optimization technique (POT) and the first kissing balloon. After the first crush, a 3.0×32 mm stent could not be advanced into the LAD; after exchange for a more supportive wire with microcatheter support and re-crushing of the side branch stent with a 4.0×8 mm NC balloon, the second kissing balloon was performed and the stent implanted successfully. Repeat POT and kissing balloon provided complete angiographic patency of the bifurcation. At the end of the procedure, 99% ostial stenosis (jailing) developed in a well-developed first diagonal branch (D1) arising proximal to the stent; this branch was rewired and opened with 2.0×10 mm balloon angioplasty without stent deformation. TIMI 3 flow was obtained in the LAD, D1 and D2. He was monitored in the coronary intensive care unit under inotropic support; apart from a self-terminating 10–15-second episode of non-sustained ventricular tachycardia, no complications occurred. He was discharged on acetylsalicylic acid, prasugrel, rosuvastatin, ramipril and metoprolol, with outpatient follow-up at 1 month.

Conclusion: LAD-diagonal true bifurcation lesions can be treated successfully with DK-crush in acute STEMI; however, difficult stent delivery in calcified and tortuous anatomy, refractory side branch no-reflow and jailing of an adjacent side branch should be anticipated. This case suggests that low-dose intracoronary thrombolysis added to prolonged balloon dilatation in refractory no-reflow, and wire exchange with a repeat crush maneuver when the stent cannot be advanced after the first crush, may be effective bailout strategies.

SS-04

Dual Plaque Modification Strategy in High-Risk Complex PCI

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Introduction and Aim: The success of percutaneous interventions in fragile patients with severely calcified and multivessel coronary artery disease depends on optimized lesion preparation. When the calcific burden is extremely high, a single device may not be sufficient. In this case report, we aim to present a complex percutaneous coronary intervention (PCI) procedure successfully managed by combining two different advanced plaque modification methods—rotablation and a cutting balloon—in the same session in a patient with active malignancy and end-stage renal failure who refused surgery.

Case Report: A 79-year-old female patient presented to the emergency department with shortness of breath. Her medical history included diabetes mellitus, hypertension, chronic kidney disease (stage 3/7 hemodialysis), and a history of breast cancer (right mastectomy in 2024). The patient, whose ECG showed normal sinus rhythm with no ST-segment elevation, was admitted with a diagnosis of non-ST-elevation acute coronary syndrome (NSTEMI-AKS). Transthoracic echocardiography showed normal left ventricular (LV) dimensions and systolic functions (ejection fraction of 55–60%) along with normal right-sided structures. While degenerative changes were observed in the valves, a gradient of 15/26 mmHg on the basis of calcific aortic degeneration, mild aortic regurgitation, mild-to-moderate mitral regurgitation, and mild tricuspid regurgitation were detected. Thorax CT revealed bilateral pleural effusion and cardiomegaly. Coronary angiography (CAG) revealed a severely calcified and thrombotic long lesion causing 50–60% stenosis in the left main coronary artery (LMCA), 60–70% stenosis in the left anterior descending (LAD) artery, and 80–90% stenosis in the circumflex (CX) artery. Coronary artery bypass grafting (CABG) was recommended by the Heart Team (Consensus); however, the patient and her relatives declined the surgical risk and provided informed refusal for CABG. Consequently, a high-risk complex PCI strategy was decided for the patient. To overcome the heavy calcific lesions, a dual plaque modification strategy was planned. First, rotational atherectomy (rotablation) was performed on the heavy calcific lesion in the LAD using a 2.0 mm burr. Following atherectomy, non-compliant (NC) balloon dilatations were performed, a 2.5×38 mm drug-eluting stent (DES) was implanted distally and a 3.0×28 mm DES proximally, and optimal luminal expansion was achieved by post-dilatations with intra-stent NC balloons. Subsequently, the procedure moved to the CX lesion; predilatation was performed on this lesion sequentially using 1.25, 1.5, 2.0, and 2.5 mm chronic total occlusion (CTO) balloons, followed by 2.5 and 3.0 mm NC balloons. To complete the calcific lesion modification, the second method—the cutting balloon strategy—was initiated. Dilatation was performed using a 4.0×15 mm cutting balloon. Following successful plaque modification, a 4.0×38 mm DES was successfully implanted in the CX artery, and high-pressure dilatation was performed with a 4.5 mm intrastent NC balloon. Complete luminal patency (TIMI-3 flow) was achieved at the end of the procedure, and the patient was discharged stably with a plan for medical follow-up.

Conclusion: In patients with heavily calcified multivessel disease, the sequential or combined use of plaque modification methods with different mechanisms, such as rotablation and cutting balloons, is life-saving for stent success and expansion.

Keywords: Rotational atherectomy, coronary artery calcification, multivessel coronary disease.

SS-05

A Case of Inferior Myocardial Infarction Due to Catheter-Induced Dissection During RCA FFR Assessment

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Introduction and Aim: Fractional flow reserve (FFR) is a widely used and reliable method for assessing the functional significance of coronary artery stenoses. However, rare but life-threatening complications such as coronary dissection, spasm, or acute thrombotic occlusion may occur