

A case of imaging guided reintervention after two stents bifurcation PCI using mini-crush technique

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Abstract

We present a case of a patient with previous history of primary PCI of the occluded RCA for a myocardial infarction of the inferior wall, who was treated for a significant Medina 1.1.1 coronary lesion of the LAD-D1 bifurcation with mini-crush technique. The patient was transferred to intensive care unit after primary PCI with a plan to treat bifurcation on the other occasion after discharge. However, the patient experienced persistent chest pain along with ECG changes showing ischemia of the anterior wall, and due to clinical unstable condition the patient was transferred to Cath lab for a PCI of LAD-D1 using two-stent mini crush technique with bare metal stents which were only available in adequate dimensions at the moment. The result of the intervention was satisfactory, with TIMI 3 flow in both side branch and main branch, and angiography follow-up was scheduled in 6 months. On control angiography, a significant in-stent restenosis was detected in both main branch and side branch, and an optical coherence tomography (OCT) - guided balloon dilatation of both main branch and side branch with final kissing was performed. In our case OCT was particularly beneficial as it clearly demonstrated that there was no under-expansion of the stents, with only formation of the new plaque that was most significant in the LAD just below the D1 branch, and not on the carina itself nor on the ostium of the side branch.

Kew words bifurcation, mini-crush

Introduction

It is by now well established that drug eluting stents (DES) have an advantage over bare metal stents (BMS) in terms of in-stent restenosis and should always be considered as a first choice, especially when treating bifurcation lesions^{1,2}. However, if DES are unavailable in cases of emergency, operators are forced to perform the intervention using BMS having in mind higher rate of restenosis³.

Case report

A 73-years old female patient was diagnosed with acute inferior ST elevation myocardial infarction (STEMI) and immediately transported directly to cath lab for primary percutaneous coronary intervention (PCI) of right coronary artery (RCA). Risk factors for cardiovascular disease (CVD) were: hypertension, hyperlipidemia, and type 2 diabetes. Echocardiography showed hypokinesia of the inferior wall with EF of 45%. Emergency coronarography showed occlusion of RCA and a 90% Medina 1.1.1 bifurcation lesion of left anterior descending (LAD) artery and the first diagonal branch (D1) with severe disease of the ostium of D1 (Figure 1). Primary PCI of RCA was successfully performed and the patient was transferred to ICU with intention of treating LAD-D1 lesion in the future hospitalization when DES become available. However, after primary PCI of RCA patient suffered severe chest pain with ECG changes

on anterior wall, so the decision was made to perform immediate PCI of LAD during actual hospitalization. Patient was transferred back to the cath lab for PCI of LAD, but due to lack of the DE stents of adequate dimensions, and considering the acuteness of the situation at hand, and the complexity of the lesion as well as the size of the main branch and diagonal branch, the decision has been made to perform the PCI with two - stent mini crush technique. A 7F EBU Launcher guiding catheter (Medtronic) was used for the intervention. The LAD and D1 were wired with Runthrough (Terumo) and BMW (Abbott) floppy wires respectively (Fig.2). Predilatation of both main branch and side branch was done with Sprinter Legend 2.0x15 mm (Medtronic) balloon at 16 atm (Fig. 3, Fig. 4). Pro Kinetic Energy 3.5 x 30mm (Biotronic) was placed into the LAD and Multi Link Vision 2.75x23mm (Abbott) was placed into the D1 simultaneously, with small protrusion to the LAD. (Fig. 5) The side branch stent was inflated at 12 atm and then crushed with the main branch stent at 12 atm after the wire and balloon removal. (Fig. 6, Fig. 7). Rewiring of the side branch was then performed and after the strut opening with a 1.5x15 mm Sprinter Legend balloon (Medtronic), the final kissing was done with NC Sprinter 3.0x20mm and NC Quantum Apex 2.5x21 mm, both at 16 atm. (Fig. 8). The final result was satisfactory with TIMI 3 flow in both LAD and D1. The patient was discharged from the hospital, no chest pain and further ECG changes present, and a control angiography with OCT evaluation was planned in 6 months.

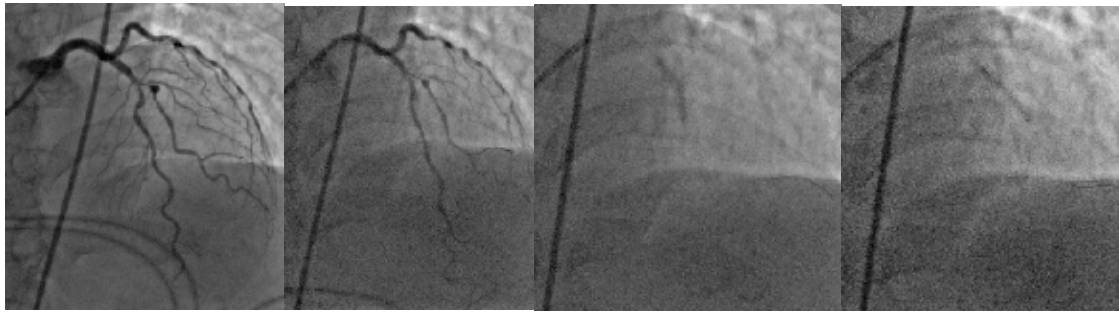


Figure 1

Figure 2

Figure 3

Figure 4

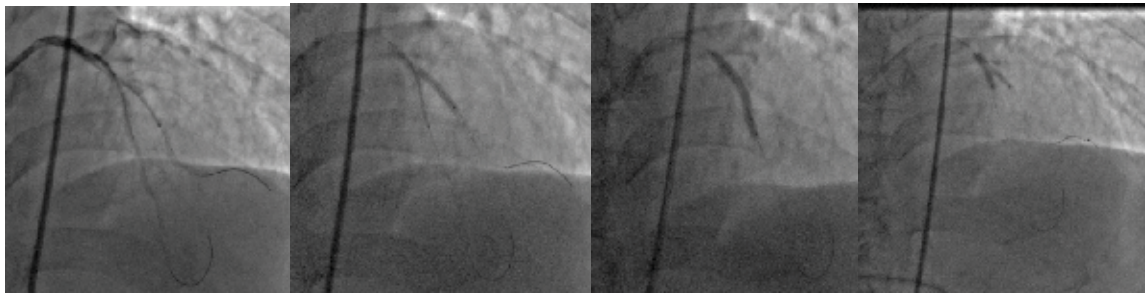


Figure 5

Figure 6

Figure 7

Figure 8

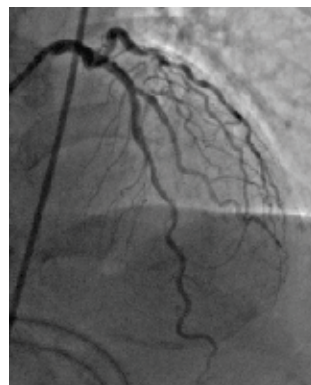


Figure 9

After 6 months the patient was admitted to the hospital for control angiography as planned, and presented with stable CAD symptoms (CCS I-II). Coronarography showed significant in-stent restenosis in both LAD and D1 with TIMI 3 flow (Figure 10). OCT confirmed restenosis, but with good stent expansion and strut apposition (Figure 15). The operators decided to perform dilatation of both branches separately with final kissing at the end of the procedure. The 7F EBU Launcher (Medtronic) guiding catheter was once again used, with the same wire setup as in the first intervention. NC Quantum Apex 3.5x21 mm (Boston Scientific) was used for the dilatation of the LAD (Figure 11) and NC Quantum Apex 3.0x20mm was used for the D1 (Figure 12), both at high pressure. Final kissing was then performed with two NC Quantum Apex 3.0x20mm (16 atm for the main branch and 12 atm for the side branch) (Figure 13). The final result was satisfying with significant reduction of in-stent restenosis in both branches confirmed by OCT, and TIMI 3 flow (Figure 14 and 15). The patient was once again discharged from hospital and a new 6 months-after control angiography was scheduled. The evaluation will be made by coronarography as well as by OCT again, and then the

final decision concerning this particular artery will be made.

Discussion

It is unanimous consensus today backed up by many studies that the DES are the gold standard for almost all coronary lesions, and especially for complex and bifurcational ones⁴. In some situations however, due to different impediments, such as in our case the urgency of the patient's state combined with unavailability of appropriate DES in the cath lab, operator may still chose BMS, but with the obligation to rigorously follow the clinical outcome for a longer period of time, with all diagnostic procedures and imaging techniques available. We opted for plain NC balloons dilatation this time the drug eluting balloons (DEB) of adequate dimensions were not available to us at the time of intervention, with intention to see the outcome in 3 months and then bring the definite decision about this patient's further treatment. If the restenosis occurs once again there are several options available: balloon kissing technique with DEB, stenting of the LAD with a DES inside the BMS⁵ and

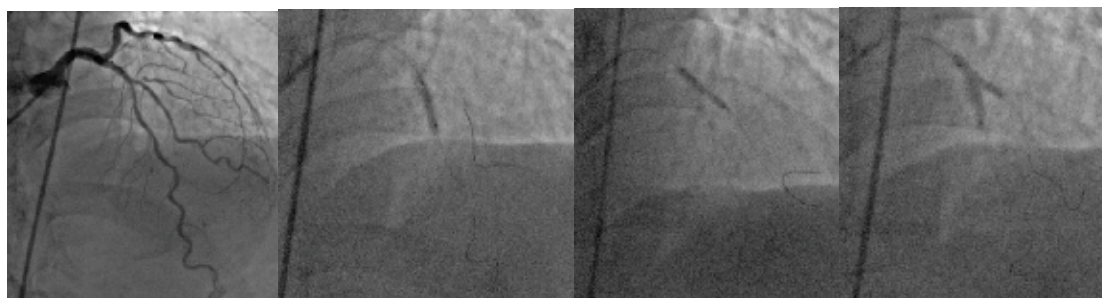


Figure 10

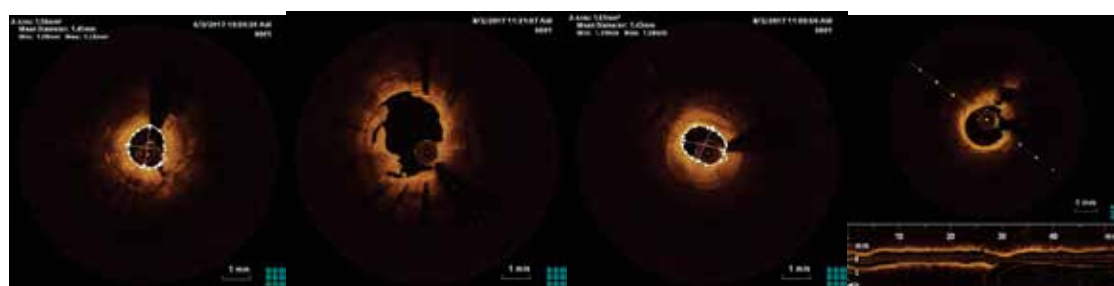
Figure 11

Figure 12

Figure 13



Figure 14



LAD before

LAD after

D1 before

D1 after

Figure 15. OCT image of LAD and D1 in stent restenosis, before and after the procedure

cardiac bypass surgery as a final, most invasive, but dependable and reliable solution⁶. There are some studies that indicate that DEB might have a slight edge over DES in a first time restenosis⁵ as there are less metal layers involved inside the artery, but the matter itself is still not investigated enough. OCT will once again be performed with the idea to guide the procedure⁷ and help choose the best strategy for this particular patient and with possibility to compare the previous and current OCT findings for better understanding of the lesion. In the end, it is left to say that although the bare metal stents are by no means first choice for treating bifurcation lesions, it still gave us some comfort that they helped us buy time in urgent situation and as an only available solution at that moment served purpose of preserving myocardial function while we take a step by step approach toward definite solution of the problem.

Conclusions

In case of unplanned placement of BMS in complex coronary lesions, the operator should always keep in mind higher rate of restenosis in the follow-up that require careful follow-up of the patients. In addition, on

repeated angiography disclosing restenosis following treatment of bifurcation with tw stents technique, OCT was of particularly benefit to disclose pathophysiologic mechanism of restenosis with adequate treatment.

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Sažetak

Prikaz slučaja “imaging” vođene re-intervencije posle perkutane koronarne intervencije bifurkacije sa dva stenta korišćenjem “mini crush” tehnike

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Predstavljamo slučaj pacijenta sa prethodnom istorijom primarne PCI okludirane RCA zbog infarkta miokarda donjeg zida, koji je lečen zbog značajne Medina 1.1.1 bifurkacije LAD-D1 tehnikom “mini-crush-a”. Pacijent je prebačen u jedinicu intenzivne nege nakon primarne PCI sa planom lečenja bifurkacije drugom prilikom nakon otpusta. Međutim, zbog ponovnog bola u grudima, zajedno sa EKG promenama koje pokazuju ishemiju prednjeg zida, a zbog klinički nestabilnog stanja pacijent je prebačen u Salu za kateterizaciju radi PCI LAD-D1 tehnikom “mini-crush-a” sa ugradnjom dva metalna stenta koji su jedino bili dostupni tada u adekvatnim veličinama. Rezultat intervencije bio je zadovoljavajući, protok TIMI 3 je uspostavljen i u bočnoj i u glavnoj grani, a kontrolna angiografija je zakazana za 6 meseci. Na kontrolnoj angiografiji otkrivena je značajna restenoza u stentu i u glavnoj i u bočnoj grani, koja je lečena putem optički koherentne tomografije (OCT) - vođene balon dilatacija glavne i bočne grane sa završnim “kissingom”. U našem slučaju OCT je bio posebno koristan jer je jasno pokazao da mehanizam nije bio nedovoljna ekspanzija stenta, već stvaranja restenoze unutar stenta koja je bila najznačajnija u LAD-u odmah ispod grane D1, a ne ni na samoj karini ni na ostijumu bočne grane.

Ključne reči: bifurkacija, “mini-crush”, OCT