

## One-Stent Double-Kissing Nano Crush— Osdokina Crush—Technique Could be a Game- Changer in the Treatment of Medina 0.0.1 Lesion

### INTRODUCTION

In terms of percutaneous coronary interventions (PCI) performed in coronary bifurcation lesions, one of the most interesting lesions is Medina 0.0.1 lesions or isolated ostial side branch lesions.<sup>1-4</sup> There are 5 important problems that should be answered with regard to PCI of Medina 0.0.1 lesion: (1) is ostial side branch stenosis serious enough to cause ischemia? (2) will possible complications develop in the main branch (such as dissection, plaque or carina shift-induced stenosis, and thrombus formation)? (3) if it is to be intervened, which technique? (4) how do we prepare the lesion? (5) if we are going to place a stent on the ostial lesion, will we be able to cover this lesion completely without overflowing into the main branch?<sup>5-10</sup> In the literature, PCI techniques for Medina 0.0.1 lesions are roughly discussed under 2 main headings: those based on stenting of the ostial lesion and those based on the balloon angioplasty with atherectomy on the ostial lesion. The most important criticism of balloon-based therapies is that not placing a “stent-scaffold” on ostial lesions with a high potential to dissect and recoil may increase the risk of target lesion revascularisation (TLR) and target vessel revascularisation (TVR).<sup>10</sup> In this case report, we shared a new stent-based PCI technique that we applied to a Medina 0.0.1 lesion that we encountered in one of our patients. The name of our technique is “One-Stent Double-Kissing NANO CRUSH—Osdokina Crush.” We have described the technique in Figure 1.

### CASE REPORT

A 67-year-old male patient was admitted to the outpatient clinic with chest pain for 3 months after exertion and after eating. The patient had type 2 diabetes mellitus, hypertension, hyperlipidemia, and smoking. In 2019, a drug-eluting stent (DES) was implanted proximal to the left anterior descending artery (LAD) with unstable angina pectoris. Exercise stress imaging using Tc-99m Sesta single-photon emission computed tomography (SPECT) was requested to evaluate ischemia. Moderate-to-severe ischemia (8%) was reported in the inferolateral wall in SPECT. Thereupon, coronary angiography (CAG) was planned considering the risk factors of the patient. In CAG, it was observed that the stent in the proximal LAD was open, and there were non-critical plaques in the right coronary artery, but it was 98% occluded in the ostium of the obtuse marginalis 2 (OM2) (Figure 2A). There was 30% stenosis in the circumflex artery. Optimal medical treatment (OMT) was primarily targeted for the 0.0.1 lesion in the Medina located in OM2. The patient stated that his complaints did not regress in the first month of OMT. The PCI in OM2 ostial stenosis was planned. After obtaining his informed consent, the patient was loaded with 600 mg of clopidogrel and 300 mg of acetylsalicylic acid. A 7F femoral sheath was placed through the right common femoral artery. The left main coronary artery was engaged with a 7F Extra Back-Up 4.0-guiding catheter. The main branch was wired with a 0.014-inch floppy wire. The OM2 ostial lesion was crossed with a 0.014-inch tapered hydrophilic guidewire supported by a 1.25 × 8 mm balloon (Figure 2B). The ostial lesion was dilated at 14 atm with this balloon (Figure 2C). Afterward, the lesion was predilated at 18 atm with a 2.5 ×

### CASE REPORT

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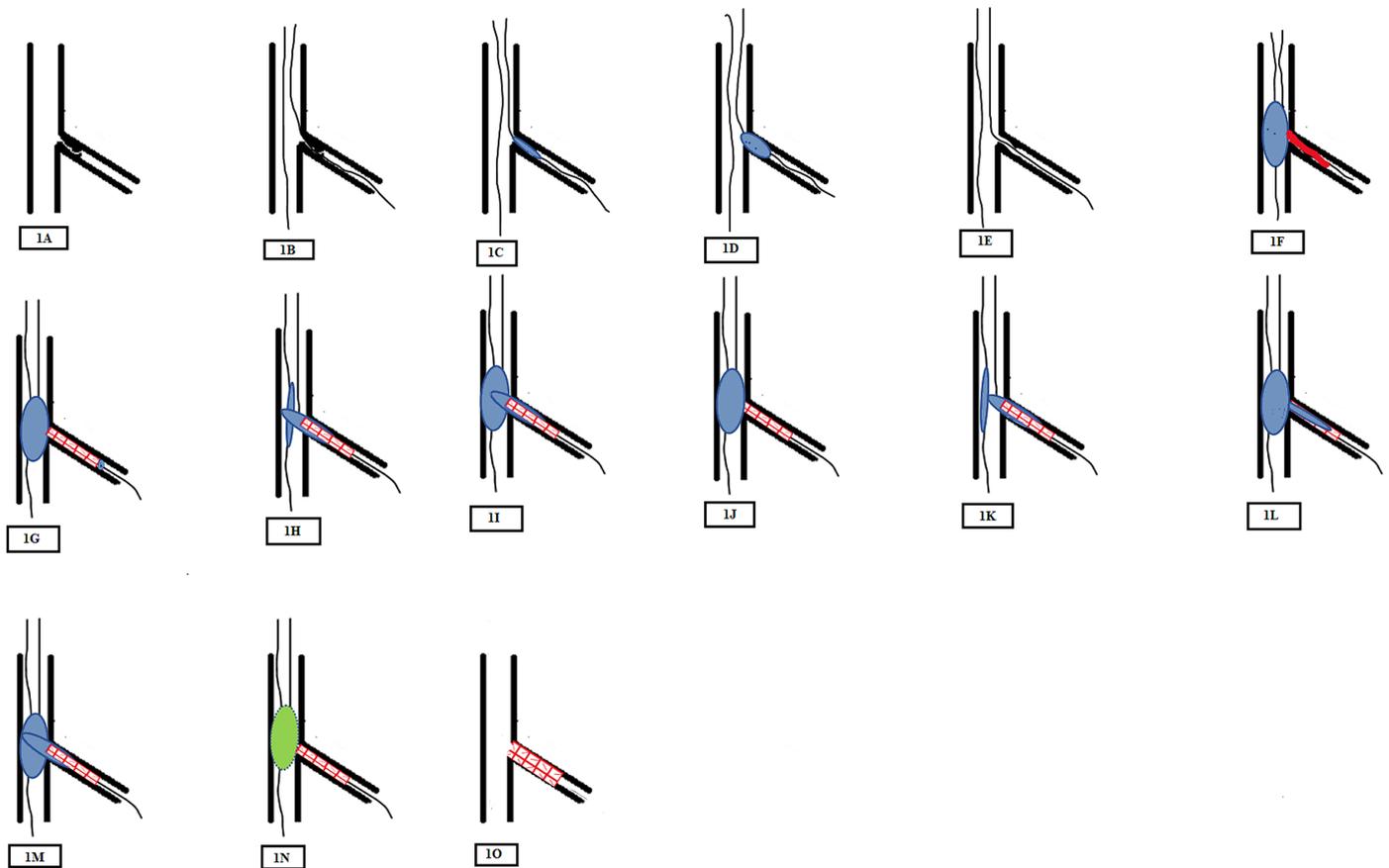
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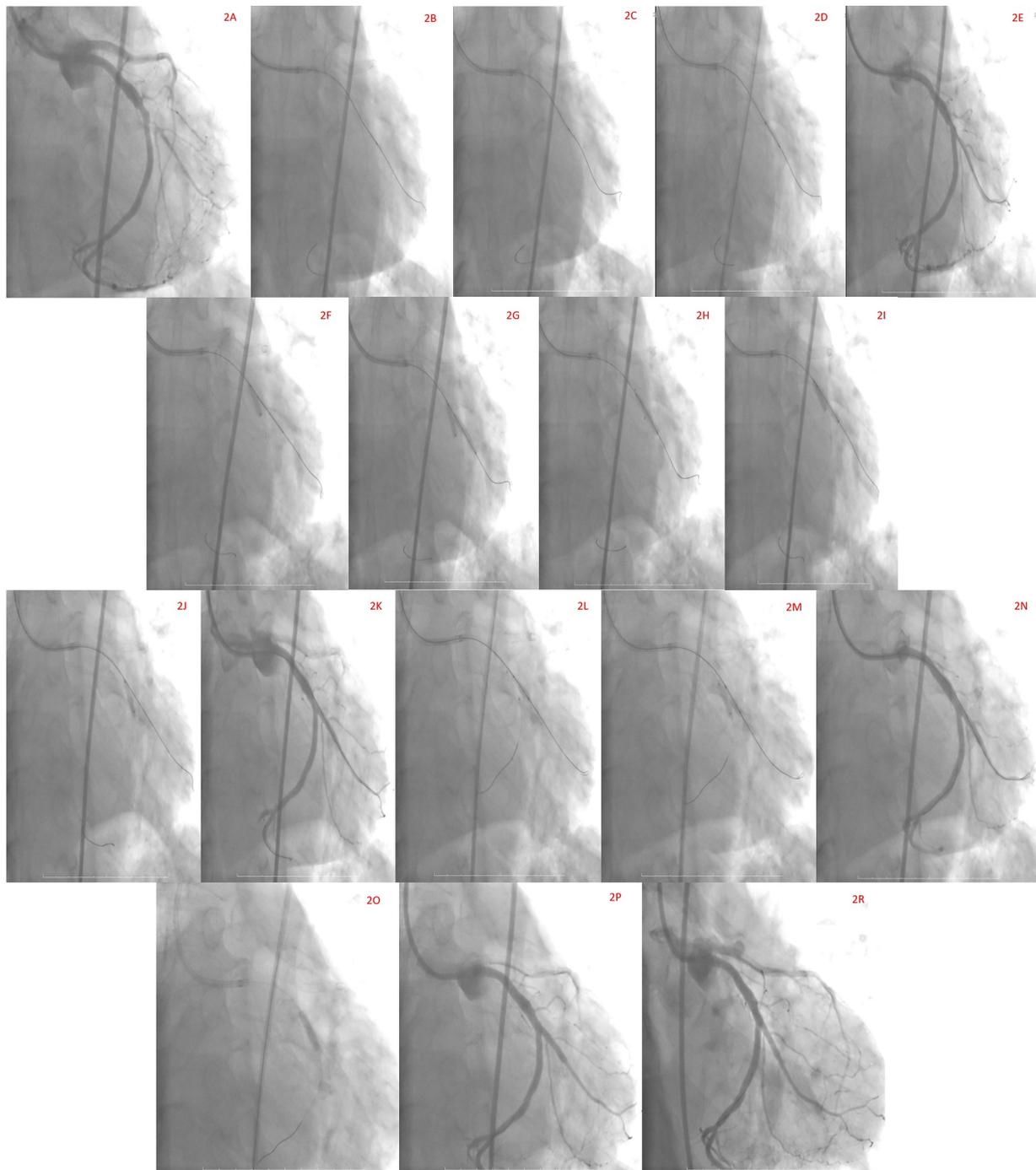
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**Figure 1. The steps of the OSDOKINA CRUSH technique. After both vessels are wired and the side branch ostial lesion is prepared with balloon dilatations (A-E), the side branch stent (1 : 1 size) is retracted and aligned until an indentation is formed in an inflated balloon (1 : 1 size at nominal pressure) in the main branch, and the stent is implanted (F-G). The stent proximal optimization is performed so that the side branch stent balloon is half in the stent and the other half in the main branch at a +4 atm above the nominal pressure (H). The first KBI is performed by inflating the balloon in the main branch and the stent balloon in the side branch at nominal pressures (I). The side branch stent balloon is withdrawn and the balloon in the main branch is inflated at +4 atm above the nominal pressure and the stent ostium in the side branch is crushed (nano-crush) (J). The side branch stent is rewired. An NC balloon of 1 : 1 diameter with vessel diameter to the main branch and an NC balloon compatible with a 1 : 1 stent size to the side branch stent are brought. Both balloons are inflated and deflated to +4 atm above the nominal pressure, first as the side branch and then as the main branch balloon (K and L). Then, a second CBI is performed with both balloons inflated and deflated at nominal pressure simultaneously (M). Both balloons are withdrawn and a drug-eluting balloon with the diameter of the main branch is inflated at 14 atm for 90 seconds in the main branch (N). Then, the check for optimal results is questioned with the images taken angiographically. If there is no major dissection, <TIMI-3 flow, thrombus formation, and plaque/carina shift in the major branch, the procedure is considered successful and terminated (O).**

12 mm non-compliant (NC) balloon (Figure 2D). After the predilatations, it was observed that the lesion was well prepared (Figure 2E). A  $3.5 \times 12$  mm NC balloon was parked in the circumflex artery (CX) and a  $2.75 \times 16$  mm DES was brought to the OM2. The  $3.5 \times 12$  mm NC balloon in CX was inflated at 12 atm, and the stent in OM2 was retracted and aligned to create an indentation in the balloon (Figure 2F). While the balloon in the main branch was inflated and indented, the OM2 stent was implanted at the nominal pressure of 12 atm (Figure 2G). The proximal stent part was optimized by re-inflating the OM2 stent balloon halfway in the main branch and half in the OM2 stent, at 16 atm, while the balloon in the main branch was deflated (Figure 2H). Kissing balloon inflation (KBI) was performed with the NC balloon in the main branch and the stent balloon on the side branch at 12

atm (first KBI) (Figure 2I). The side branch stent balloon was removed. The NC balloon in the main branch was inflated at 14 atm and the OM2 stent was nano-crushed (Figure 2J). The OM2 stent was rewired (Figure 2K). To perform stepped KBI, the side branch stent was dilated at 18 atm with a  $2.75 \times 15$  mm NC balloon and deflated (Figure 2L), in the next step, the  $3.5 \times 2$  mm NC balloon in the main branch was inflated at 12 atm, and finally, both balloons were inflated at 12 atm (second CBI) (Figure 2M). Both balloons were removed and an angiographic view was taken (Figure 2N). A  $4.0 \times 16$  mm drug-eluted balloon (DEB) was inflated at 14 atm for 90 seconds to prevent restenosis that may develop secondary to barotrauma in the main branch (Figure 2O). Major dissection, thrombus, and barotrauma in the main branch were not observed in the last images (Figure 2P and R), and the



**Figure 2.** It was 98% occluded in the ostium of the obtuse marginalis 2 (OM2) (A). The OM2 ostial lesion was crossed with a 0.014-inch tapered hydrophilic guidewire (B). The ostial lesion was dilated at 14 atm with a 1.25 × 8 mm balloon (C). The lesion was predilated at 18 atm with a 2.5 × 12 mm NC balloon (D). After the predilations, it was observed that the lesion was well prepared (E). The 3.5 × 12 mm NC balloon in CX was inflated at 12 atm, and the stent in OM2 was retracted and aligned to create an indentation in the balloon (F). While the balloon in the main branch was inflated and indented, the OM2 stent was implanted at the nominal pressure of 12 atm (G). The proximal stent part was optimized by reinflating the OM2 stent balloon halfway in the main branch and half in the OM2 stent, at 16 atm while the balloon in the main branch was deflated (H). Kissing balloon inflation (KBI) was performed with the NC balloon in the main branch and the stent balloon on the side branch at 12 atm (first KBI) (I). The NC balloon in the main branch was inflated at 14 atm and the OM2 stent was nano-crushed (J). The OM2 stent was rewired (K). To perform stepped CBI, the side branch stent was dilated at 18 atm with a 2.75 × 15 mm NC balloon and deflated (L), in the next step, the 3.5 × 12 mm NC balloon in the main branch was inflated at 12 atm, and finally, both balloons were inflated at 12 atm (second CBI) (M) done. Both balloons were removed and an angiographic view was taken (N). A 4.0 × 16 mm drug-eluted balloon (DEB) was inflated at 14 atm for 90 seconds to prevent restenosis that may develop secondary to barotrauma in the main branch (O). Major dissection, thrombus, and barotrauma in the main branch were not observed in the last images (P and R)

procedure was terminated assuming the optimal result. The patient remained stable in the service follow-ups, did not describe chest pain, no ST segment changes on ECG were observed in the electrocardiography follow-ups, and myocardial enzymes were followed within normal limits. The patient was discharged 1 day after the procedure after drug treatment was arranged. The patient stated that he did not have any complaints in the follow-ups after 2 weeks and 1 month.

## DISCUSSION

In this case report, we shared a new stent-based PCI technique that we applied to a Medina 0.0.1 lesion that we encountered in one of our patients. The name of our technique is "One-Stent Double-Kissing NANO CRUSH—Osdokina Crush." We described the technique in Figure 1. After both vessels were wired and the side branch ostial lesion was prepared with balloon dilatations (Figure 1A-E), the side branch stent (1 : 1 size) was retracted and aligned until an indentation was formed in an inflated balloon (1 : 1 size at nominal pressure) in the main branch, and the stent was implanted (Figure 1F-G). The stent proximal optimization was performed so that the side branch stent balloon was half in the stent and the other half in the main branch was +4 atm above the nominal pressure (Figure 1H). The first KBI was performed by inflating the balloon in the main branch and the stent balloon in the side branch at nominal pressures (Figure 1I). The side branch stent balloon was withdrawn and the balloon in the main branch was inflated +4 atm above the nominal pressure and the stent ostium in the side branch was crushed (nano-crush) (Figure 1J). The side branch stent was rewired. An NC balloon of 1 : 1 diameter with vessel diameter to the main branch and an NC balloon compatible with a 1 : 1 stent size to the side branch stent were brought. Both balloons were inflated and deflated to +4 atm above the nominal pressure, first as the side branch and then as the main branch balloon (Figure 1K and L). Then, a second CBI was performed with both balloons inflated and deflated at nominal pressure simultaneously (Figure 1M). Both balloons were withdrawn and a DEB with the diameter of the main branch was inflated at 14 atm for 90 seconds in the main branch (Figure 1N). Then, the check for optimal result was questioned with the images taken angiographically. If there is no major dissection, <the thrombolysis in myocardial infarction (TIMI)-3 flow, thrombus formation, and plaque/carina shift in the major branch, the procedure was considered successful and terminated (Figure 1O). In our described technique, there are several potential advantages. First, the ostial lesion is fully covered with a stent. Second, there is nano-protrusion of the side branch stent to the main branch.<sup>10</sup> Third, nano-protruded stent parts are crushed with a NC balloon in the main branch. Fourth, there are 2 KBI to overcome the carina and plaque shift. Lastly, a 1 : 1 sized DEB is inflated at the main branch for 90 seconds at 14 atm for preventing the main branch restenosis derived from balloon-induced barotrauma.<sup>10</sup> However, Osdokina Crush technique has also limitations. The most important

one is the barotrauma to the main branch and the occurrence of acute (such as dissection and thrombus formation) and chronic (such as intimal hyperplasia) consequences. These drawbacks could be ameliorated with DEB. Another thing is that Osdokina Crush technique is a stent-based PCI and restenosis may occur from stent metal and polymer. The last point is that Osdokina Crush is a novel procedure, and so there is a need for the success and long-term results of the technique with randomized controlled studies to be conducted in larger patient groups.

## CONCLUSION

Osdokina Crush technique is a novel procedure based on side branch stenting and main branch DEB application that can be applied in Medina 0.0.1 lesion types. With future studies, it will be possible to understand whether it can be a game-changing method in Medina 0.0.1 lesions.

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**Informed Consent:** Informed consent was obtained from patient.

## REFERENCES

- van Veelen A, van der Sangen NMR, Delewi R, Beijk MAM, Henriques JPS, Claessen BEPM. Detection of vulnerable coronary plaques using invasive and non-invasive imaging modalities. *J Clin Med.* 2022;11(5):1361. [\[CrossRef\]](#)
- Schwarz JCV, van Lier MGJTB, van den Wijngaard JPHM, Siebes M, VanBavel E. Topologic and hemodynamic characteristics of the human coronary arterial circulation. *Front Physiol.* 2019;10:1611. [\[CrossRef\]](#)
- Louvard Y, Medina A. Definitions and classifications of bifurcation lesions and treatment. *EuroIntervention.* 2015;11(suppl V):V23-V26. [\[CrossRef\]](#)
- Burzotta F, Lassen JF, Lefèvre T, et al. Percutaneous coronary intervention for bifurcation coronary lesions: the 15th consensus document from the European Bifurcation Club. *EuroIntervention.* 2021;16(16):1307-1317. [\[CrossRef\]](#)
- Königstein M, Redfors B, Zhang Z, et al. Utility of the ACC/AHA Lesion classification to predict outcomes after contemporary DES treatment: individual patient data pooled analysis from 7 randomized trials. *J Am Heart Assoc.* 2022;11(24):e025275. [\[CrossRef\]](#)
- Tan L, Wang X, Yuan K, et al. Structural and temporal dynamics analysis on drug-eluting stents: history, research hotspots and emerging trends. *Bioact Mater.* 2023;23:170-186. [\[CrossRef\]](#)
- Kang J, Bruno F, Rhee TM, et al. Impact of clinical and lesion features on outcomes after percutaneous coronary intervention in bifurcation lesions. *JACC Asia.* 2022;2(5):607-618. [\[CrossRef\]](#)
- Gijzen F, Katagiri Y, Barlis P, et al. Expert recommendations on the assessment of wall shear stress in human coronary arteries: existing methodologies, technical considerations, and clinical applications. *Eur Heart J.* 2019;40(41):3421-3433. [\[CrossRef\]](#)
- Medina A, Martín P, Suárez de Lezo J, et al. Ultrasound study of the prevalence of plaque at the carina in lesions that affect the coronary bifurcation. Implications for treatment with provisional stent. *Rev Esp Cardiol.* 2011;64(1):43-50. [\[CrossRef\]](#)
- Suleiman S, Coughlan JJ, Touma G, Szirt R. Contemporary management of isolated ostial side branch disease: an evidence-based approach to Medina 001 bifurcations. *Interv Cardiol.* 2021;16:e06. [\[CrossRef\]](#)