

Left main bifurcation coronary intervention with provisional stenting: the role of invasive functional evaluation and intracoronary imaging to guide stenting technique

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We describe a remarkable case of a patient presenting with left main bifurcation stenosis involving the origins of both the left circumflex and the first acute marginal arteries which was successfully treated using single-stent provisional technique. Intracoronary imaging and invasive functional evaluation were used to assess the anatomical and functional complexity of this case, to guide the stenting technique, and to evaluate the final result.

Key words: percutaneous coronary intervention, left main artery bifurcation, intracoronary optical coherence tomography, invasive functional coronary evaluation.

Koronární intervence stenózy ve větvení levé věnčité tepny za použití „provisional stenting“ – význam invazivního funkčního hodnocení a intrakoronárního zobrazení pro techniku zavedení stentu

Popisujeme pozoruhodný případ pacienta se stenózou ve větvení kmene levé věnčité tepny, postihující jak odstup ramus circumflexus, tak první marginální větev, která byla úspěšně léčena provizorním zavedením jednoho stentu. Intrakoronární zobrazení a invazivní funkční hodnocení bylo použito k posouzení anatomické a funkční složitosti tohoto případu, pro vlastní techniku zavedení stentu a ke zhodnocení konečného výsledku.

Klíčová slova: perkutánní koronární intervence, větvení kmene levé věnčité tepny, intrakoronární optická koherentní tomografie, invazivní funkční hodnocení koronárního průtoku.

Case Presentation

A 64-year-old male, with a history of non-ST elevation myocardial infarction six years earlier, presented with a new onset of heart failure and left ventricular systolic dysfunction associated with viability of the inferolateral wall. The patient had been submitted to a total of five percutaneous coronary interventions (PCI) with five drug-eluting stents: proximal left anterior descending artery (LAD); proximal left circumflex artery (LCX); first marginal branch (M1); proximal

and distal right coronary artery (RCA). A new angiogram was obtained showing distal left main artery (LMA) stenosis (Medina 1,0,1) of 50% involving the origins of both the LCX and the M1 with maximal severity of 99% (*Panel A*); all the stents implanted previously showed no signs of restenosis.

Management

In this case, contemporary recommendations indicate that both surgery and PCI

are equally good revascularization options [1]. Although both surgical risk and SYNTAX (=21) scores were low, the Heart Team decision was to attempt PCI considering the absence of proximal LAD involvement, the possibility of complete revascularization, and the good results from the previous PCI. The procedure started by introducing guidewires into the LAD, LCX, and M1, followed by LMA-LCX predilation with non-compliant balloon (NCB) 2.5/15 mm. In order to evaluate the need for concomitant

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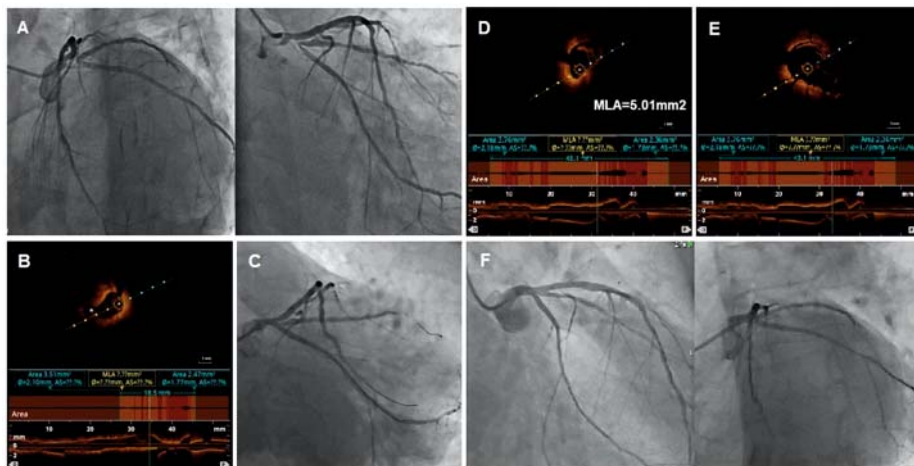
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Fig. 1. (A) Spider and caudal views showing LMA stenosis (Medina 1,0,1) of 50% involving the origins of both the LCX and the M1 with maximal severity of 99%; (B) iOCT of the LCX showing no significant involvement of the side branch (M1; asterisk); (C) Angiographic result (caudal view) after provisional stenting of the LMA to LCX stenosis; (D) iOCT of the proximal left descending anterior artery showing good luminal area (5.01 mm²), swirling artefact due to suboptimal cannulation during contrast injection, and no signs of edge dissection; (E) iOCT of the LMA bifurcation showing proper stent apposition, some swirling artefact, and no edge dissection; (F) Final angiographic result (caudal and spider views). LMA, left main artery; LCX, left circumflex artery; M1, first acute marginal artery; iOCT, intracoronary optical coherence tomography



M1 stenting, we performed both intracoronary optical coherence tomography (iOCT) that showed no significant ostial involvement (Panel B) and resting full-cycle ratio (RFR) which was 0.97 (normal >0.89). Based on this information and the absence of angiographic involvement of the proximal LAD, we decided

to perform provisional stenting of the LMA to LCX stenosis using one everolimus-eluting stent 3.0/23 mm, followed by proximal optimization technique (POT) with NCB 4.0/8 mm. The final angiographic result was good (Panel C). Due to potential plaque displacement into the M1 ostium, RFR was repeated and was normal

(= 1.00). Subsequently, we performed kissing balloon for strut opening to the LAD using two NCB 3.0/15 mm and POT with NCB 4.5/6 mm. In order to assess the need for proximal LAD stenting and to exclude dissection, iOCT was performed and was able to show proper minimum luminal area and absence of edge dissection (Panel D–E). The final angiographic result was considered good (Panel F). The patient reported functional capacity improvement six months after the procedure.

Discussion

LMA disease involving solely the LCX represents a challenging scenario that can be managed with PCI whenever the SYNTAX score is low (1). There is some consensus favouring double-kissing crush technique for true LMA bifurcation lesions (1); however, a recent subanalysis of the EXCEL trial showed worse three-year adverse outcomes with planned two-stent strategy compared with a provisional one-stent approach in LMA lesions without involvement of both side branch vessels (2). Additionally, intracoronary imaging modalities and invasive functional evaluation of the side branch are warranted to guide the procedure and stent technique (1).

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