Cardiovascular Revascularization Medicine 20 (2019) 181–182

Contents lists available at ScienceDirect

Cardiovascular Revascularization Medicine

In complex coronary bifurcations, should a dedicated stent be better than a dedicated approach?☆

Irene Pescetelli [a], Fabrizio Ricci [b,c], Marco Zimarino [a,d,*]

[a] Institute of Cardiology and Center of Excellence on Aging, "G. d'Annunzio" University – Chieti, Italy
[b] Institute for Advanced Biomedical Technologies, Department of Neuroscience, Imaging and Clinical Sciences, "G. d'Annunzio" University, Chieti, Italy
[c] Department of Clinical Sciences, Lund University, Clinical Research Center, Skåne University Hospital, Malmö 205-02, Sweden
[d] Interventional Cardiology Unit, SS. Annunziata Hospital, Chieti, Italy

ARTICLE INFO

Article history:
Received 2 January 2019
Accepted 3 January 2019

A bifurcation coronary lesion is defined as a lesion occurring at, or adjacent to, a significant division of a major epicardial coronary artery, being "significant" usually referred to a side branch (SB) of ≥2 mm in diameter, often arbitrarily defined based upon the subjective angiographic judgement of the operator [1]. Nonetheless in the evaluation of a SB significance other important elements need to be considered including the extent of disease, bifurcation angle and size of the myocardial mass supplied.

Percutaneous coronary intervention (PCI) of bifurcating lesions remains technically challenging despite advances in techniques and availability of new-generation drug-eluting stent (DES), with less favorable outcomes as compared with non-bifurcating lesions [2]. The presence of a coronary bifurcation is one of the main causes for not being able to achieve the benefit of a complete revascularization in patients with multivessel coronary artery disease [3].

Although the European Bifurcation Club (EBC) [1] emphasizes that provisional stenting remains the recommended strategy for majority of bifurcation lesions, double stenting may be required to guarantee the patency of both the main vessel (MV) and side branch (SB).

There is growing evidence suggesting that optimally performed two-stent techniques may provide similar and even better results than a single "provisional" stent strategy [4]. Reconciling the results of seemingly discordant results reinforces the role of careful procedure planning, as the deployment of a second "bail-out" stent in a patient planned to receive a single stent has been associated with an almost doubled risk of adverse events than when receiving two stents as planned [5].

However in complex anatomies neither the "simple" provisional strategy nor the "complex" multi-stent approach guarantee both SB access and optimal SB scaffolding, bringing either the risk of incomplete ostium coverage (such as in T-stenting technique) or resulting in a neocarina formation and multiple metallic stent layers overlapping (in the T-and-Protrusion, Culotte and Crush techniques). To overcome such issue, dedicated bifurcation stents have been developed in past years. Nevertheless, most of them failed to enter routine clinical practice mainly because of their use requires special operator skills.

In this issue of Cardiovascular Revascularization Medicine, Borgia et al. [6] report the successful use of a dedicated main branch stent, the Axxess stent, in a complex anatomy - a true double bifurcation lesion - further complicated by the setting of an acute coronary syndrome (ACS).

The Axxess stent is a 150 μm-thick strut, self-expanding nickel-titanium alloy (nitinol) stent, covered with Biolimus A9™ (Biosensors International), a drug released from an abluminal biodegradable polymer. Thanks to its conical with flared distal end structure the Axxess stent system offers the possibility to scaffold a bifurcation site keeping simple the access to both MV and SB avoiding both the remarkable effort to strut recrossing and the unnecessary metallic scaffolding of the carina, typically spared from atherosclerosis distribution thanks to high local shear stress [7], but potential source of subsequent stent failure. The case proposed by the authors easily demonstrates how the distinctive structure of the Axxess with its three distal markers permits to exactly deploy the stent spanning the carina; moreover the proximal gold reference permits to exactly localize proximal edge helping, in the reported case, to easily wire the SB through proximal struts.

Though the good premises of dedicated bifurcation stents and the achievement of larger lumen in both MV and SB [8], none of the clinical studies reported so far showed any benefit in terms of 1-year clinical outcome or stent thrombosis when compared with either single provisional or with double stent techniques.

Authors acknowledge that the interest of interventional cardiologists for dedicated bifurcation devices has been weakened during the years by practical difficulties to use them. Most of these devices have an asymmetrical design, implicating a complex placement that requires high operator skill; furthermore some require larger guiding catheters and have different torsion and rigidity properties. Therefore, their use is limited in high-risk clinical scenarios, when a rapid flow restoration is the priority. Authors properly highlight technical limitations of device, inherent to the composition of the stent: being the Axxess a self-expanding stent, with a sometime suboptimal radial force. When approaching a bifurcation, the presence of extensive calcification and the need for lesion

☆ The authors state that there are no commercial associations that may pose a conflict of interest in connection with the content of this manuscript.

* Corresponding author at: Institute of Cardiology, "G. d'Annunzio" University – Chieti, c/o Ospedale SS. Annunziata, Via dei Vestini, 66013 Chieti, Italy.
E-mail address: m.zimarino@unich.it (M. Zimarino).

https://doi.org/10.1016/j.carrev.2019.01.003

preparation has always been a major issue [9]; in the CARINAX registry, inaccurate Axxess stent position occurred in 21 (13%) patients, more often associated with moderate-to-severe calcifications and distal lesion site [10]. Axxess stent has been designed with the primary aim to guarantee both effective carina coverage and optimal SB access; in this view, CARINAX registry confirmed a lower occlusion and an easier SB rewiring rate after Axxess deployment, as compared with propensity-score matched patients who received traditional DES-PCI [10].

We have to acknowledge that randomized trials on dedicated stent often gave conflicting results, and this is mostly due to the inherent difficulty in matching bifurcation lesion complexity. On the other side, observational studies have inherent drawback in the arbitrary physician decision, not necessarily being such choice a limitation.

Therefore, while waiting for future studies that should shed light on the true role of such peculiar stents in the interventional cardiologist's hardware, Borgia and coworkers are anyway to be praised for technical skills proved in the present case and for the clear summary of available evidence about dedicated bifurcation stents.

References

[1] Lassen JF, Burzotta F, Banning AP, Lefevre T, Darremont O, Hildick-Smith D, et al. Percutaneous coronary intervention for the left main stem and other bifurcation lesions: 12th consensus document from the European Bifurcation Club. EuroIntervention 2018;13(13):1540–53.

[2] Maeng M, Holm NR, Erglis A, Kumsars I, Niemela M, Kervinen K, et al. Long-term results after simple versus complex stenting of coronary artery bifurcation lesions: Nordic Bifurcation Study 5-year follow-up results. J Am Coll Cardiol 2013;62(1):30–4.

[3] Zimarino M, Ricci F, Romanello M, Di Nicola M, Corazzini A, De Caterina R. Complete myocardial revascularization confers a larger clinical benefit when performed with state-of-the-art techniques in high-risk patients with multivessel coronary artery disease: a meta-analysis of randomized and observational studies. Catheter Cardiovasc Interv 2016;87(1):3–12.

[4] Chen SL, Zhang JJ, Han Y, Kan J, Chen L, Qiu C, et al. Double kissing crush versus provisional stenting for left Main distal bifurcation lesions: DKCRUSH-V randomized trial. J Am Coll Cardiol 2017;70(21):2605–17.

[5] Zimarino M, Briguori C, Amat-Santos IJ, Radico F, Barbato E, Chieffo A, et al. Mid-term outcomes after percutaneous interventions in coronary bifurcations. Int J Cardiol 2018 https://doi.org/10.1016/j.ijcard.2018.11.139. (in press).

[6] Borgia F, Niglio T, De Luca N, Di Serafino L, Esposito G, Trimarco B, Cirillo P. True double bifurcation lesions: new application of the self-expandable Axxess stent and review of literature with dedicated bifurcation devices. Cardiovasc Revasc Med 2019;20:254–60.

[7] Pescetelli I, Zimarino M, Ghirarduzzi A, De Caterina R. Localizing factors in atherosclerosis. J Cardiovasc Med (Hagerstown) 2015;16(12):824–30.

[8] Dubois C, Bennett J, Dens J, De Cock D, Desmet W, Belmans A, et al. COmplex coronary Bifurcation lesions: RAndomized comparison of a strategy using a dedicated self-expanding biolimus-eluting stent versus a culotte strategy using everolimus-eluting stents: primary results of the COBRA trial. EuroIntervention 2016;11(13):1457–67.

[9] Zimarino M, Corcos T, Favereau X, Commeau P, Tamburino C, Spaulding C, et al. Rotational coronary atherectomy with adjunctive balloon angioplasty for the treatment of ostial lesions. Catheter Cardiovasc Diagn 1994;33(1):22–7.

[10] Briguori C, Donahue M, Visconti G, Focaccio A, Pennacchi M, Lucisano L, et al. Coronary artery bifurcation narrowing treated by Axxess stent implantation: the CARINAX registry. Catheter Cardiovasc Interv 2017;89(4):E112–23.