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Editorial

"Everything Should be Made as Simple as Possible but Not Simpler"

«Todo debe hacerse tan simple como sea posible, pero no más simple»

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"Everything should be made as simple as possible but not simpler"

–A. Einstein

Coronary bifurcation disease is a frequent occurrence accounting for 20% to 30% of all coronary lesions treated by angioplasty. It is not surprising, therefore, that bifurcations are often encountered on the path of chronic total coronary occlusions (CTO), mostly at the entry or exit point of the occluded vessel. In addition to the well-known technical issues associated with bifurcation treatment, the presence of a CTO considerably increases procedural complexity. Ojeda et al.[1] should, therefore, be commended for addressing these difficulties in their recent article published in *Revista Española de Cardiología* in a multicenter study involving almost 1000 patients who underwent successful CTO treatment in 4 internationally-renowned centers.

In the absence of CTOs, the bifurcation treatment strategy recommended by the European Bifurcation Club[2,3] is main branch (MB) stenting with provisional side branch (SB) stenting when technically feasible and dual stenting (eg, double kissing crush, culotte, T-stenting) in instances when access to the SB proves difficult.

The first interesting point was the incidence of bifurcation lesions in CTO all-comers. In this study, almost one-third of patients had a coronary bifurcation with a $\geq$ 2 mm SB. We observed a similar rate of 33% in our prospective CTO database of 1726 patients. A 47% incidence was reported in the study by Chen et al.[4] and an even higher rate of more than 50% in the study by Baystrukov et al.[5] This frequent problem further complicates the approach to CTO treatment. Moreover, access to the SB proved impossible in more than 10% of cases (20% in the study by Baystrukov et al.). This, however, implies that a nonnegligible, albeit partial, recanalization CTO success was achieved; it also underlines the importance of clearly redefining CTO treatment success in the presence of bifurcations, as well as of developing technical strategies enabling access to the lost branches before stent implantation in the recanalized branch (eg, parallel wire technique, double lumen microcatheter, intravascular ultrasound guided penetration, venture, retrograde access of the SB or MB).

The position of the bifurcation in relation to the CTO has been thoroughly analyzed in another recently published study by Ojeda et al.[6] The bifurcation was located at the entry point of the CTO in 52% of patients, inside the CTO in 22% of patients and at the exit point in 26%. These are again very interesting data showing that the final success rate was higher when the bifurcation was just proximal to the CTO. Compared to bifurcations located within the body or at the exit point of a CTO, Ojeda et al.[6] observed that major adverse cardiac event-free survival at 3 years was higher in patients with successful bifurcation treatment (P = .004) and that the predictive factors of bifurcation treatment failure by multivariate analysis were the absence of baseline wiring of the SB ($P < .01$), the occurrence of dissection in the MB in front of the SB ($P < .01$), and the presence of a true bifurcation ($P < .05$).

The main purpose of this study was to retrospectively identify the best technical strategy in the setting of CTO with coronary bifurcations. The results of a nonrandomized study may be difficult to interpret, but they provide answers to real life issues. Each bifurcation lesion is different and its treatment may vary according to individual operator experience. To shed additional light on this issue, propensity matching was carried out in this study. After adjustment, no benefits were associated with dual-stenting techniques in terms of technical or procedural success. However, implantation of 2 stents resulted in a 20% increase in contrast volume, as well as additional fluoroscopy time and X ray doses of 40% and 30%, respectively.

Major adverse cardiac event-free survival at 3 years was comparable in provisional stenting vs dual stenting (78% vs 70%; P = 0.28). In the study by Baystrukov et al.,[5] patients were randomly assigned to provisional stenting vs dual stenting starting with the SB (mini-crush technique). At first, the higher success rate associated with the 2-stent technique seemed to stand in contrast to previous observations. However, careful analysis of the results confirmed the same trends: procedural time was increased with the 2-stent technique (94 $\pm$ 61 vs 79 $\pm$ 34 minutes; P = .03), as were fluoroscopy time (45 $\pm$ 26 vs 34 $\pm$ 20 minutes; P = .02) and contrast load (233 $\pm$ 90 vs 209 $\pm$ 72 mL; P = .04), whereas angiographic and clinical success rates were similar in the provisional and mini-crush groups (92 vs 97%; P = .27 and 92 vs 95%; P = .67, respectively). At 1 year, the major adverse cardiovascular and cerebral events rate was higher in the provisional stenting group (27 vs 12%; P = .023) but

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this was driven solely by the target vessel revascularization rate (26 vs 11%; P = .019), probably resulting from the systematic angiographic follow-up of the study patients.

As stated above, Ojeda et al.[1] should be praised for allowing us to better comprehend the problems posed by bifurcations in the setting of CTO. Indeed, coronary bifurcations are a frequent occurrence involving 1 in 3 CTO patients. The general principles of bifurcation treatment can be applied to the setting of CTO with bifurcations. The main issue is access to the SB, which is much more difficult than in simple bifurcations, especially when the bifurcation originates inside the body of the CTO. The bifurcation treatment failure rate is around 10% to 20% with nonnegligible short- and mid-term clinical consequences. Appropriate technical strategies should be implemented to successfully access the SB as early as possible and to protect the SB using a wire. In instances when access to the SB proves difficult, the SB should be stented first (culotte or double kissing crush with systematic final kissing inflation). In other less difficult cases, provisional SB stenting should be the standard strategy, using a limited number of stents while respecting the vessel size and the functional anatomy of the bifurcation.

CONFLICTS OF INTEREST

None declared.

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