

Coronary Bifurcations Techniques: Tackling the Interventional Cardiology Frontiers

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DESCRIPTION

Coronary bifurcation stenosis represents a common finding during diagnostic coronary angiography, with an estimated incidence of about 20% [1]. The unfavorable location of these lesions makes their percutaneous treatment complex and challenging, potentially leading to early and late adverse events [2]. Indeed, suboptimal angioplasty results, such as in case of stent malapposition or under expansion, as well as the inability to cross the side branch once deployed the first stent, may compromise blood flow and increase the risk of both stent thrombosis and restenosis [3,4].

Although current guidelines recommend the provisional approach (i.e., implanting one stent in the main branch, with deployment of a second stent in the side branch only if considered necessary), multiple two stent bifurcation techniques have been developed in order to restore a more physiological anatomy and to prevent acute and late side branch occlusion [5].

In fact, two stent techniques may be selected beforehand and be advantageous in those situations in which the side branch is big enough to generate hemodynamic or electric instability if flow is compromised (i.e., >2.5 mm vessel diameter, severely calcified disease, >10 mm lesion extension into side branch) [6].

Generally, the choice of the stenting strategy is based on the operator preference and the anatomical features of the coronary tree. Multiple observational and randomized controlled trials have been conducted in order to elucidate which stenting technique has a better long-term profile in terms of clinical outcomes such as death, myocardial infarction, target lesion and vessel revascularization or stent thrombosis. However, a clear benefit of a bifurcation stenting technique over the other had not been demonstrated.

Hence, our group performed a systematic review and network meta-analysis in order to assess which bifurcation technique (including

Provisional Stenting, Double Kissing (DK) crush, Mini-crush, Culotte, Crush and T-stenting and Protrusion (TAP)) provides best long-term outcomes [7]. Interestingly, results of the study, including a total of 4285 patients with bifurcation lesions, showed that DK crush and Mini-crush outperformed the other techniques by reducing the rate of major cardiovascular events such as death, myocardial infarction and stroke, as well as the incidence of target lesion and target vessel revascularization and stent thrombosis. Furthermore, we found an increased risk of stent thrombosis with Crush and Culotte technique. Our results were in line with the results by other 2 groups providing similar, suggesting a superiority of DK crush over other techniques [8,9]. Interestingly, our study was the only one to find also superiority with the mini-crush technique.

DK crush technique, although more complex because requiring more steps to properly place the two stents in the main and side branch has the advantage to reduce the risk of carina distortion and to facilitate an easier crossing of the side branch, increasing the chance of properly developing the final kissing balloon. Additionally, the fact that the technique supports maintaining the guidewire in the main branch throughout the procedure might protect against losing the main branch

Moreover, our work also showed benefit with mini-crush technique. Although this was supported by only one randomized controlled trial, we think that the less metal protruding into the main vessel may be related to these results. Further studies should be done regarding this bifurcation technique [10].

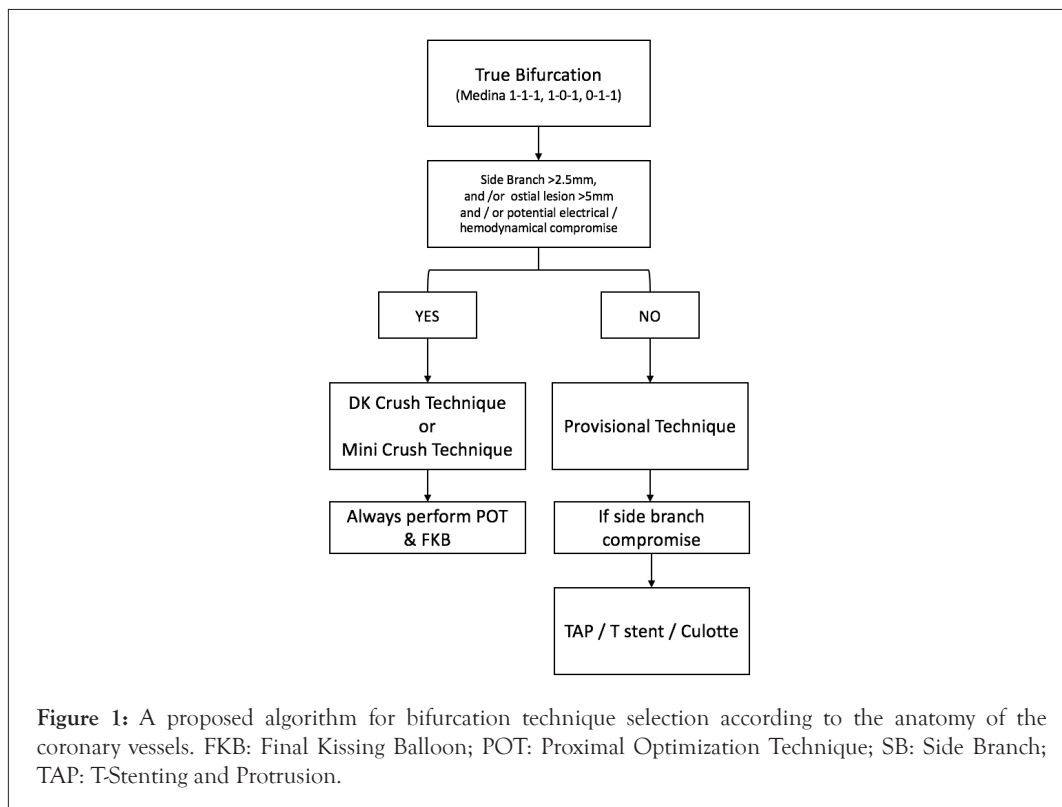
Although we adhere to the concept of performing simpler PCI with a Provisional approach, in certain clinical scenarios, a more complex strategy could be safer and deriving into better long-term results. Finally, we propose an algorithm in order to tackle coronary bifurcations according to the results found in our network meta-analysis (Figure 1).

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