

Changing Mentality in the Approach of Percutaneous Coronary Intervention of Chronic Total Occlusion: The Minimalistic Hybrid Approach

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Coronary Chronic total occlusions (CTOs) are detected in 15 - 25% of patients undergoing coronary angiography [1]. Percutaneous Coronary Interventions (PCIs) of CTOs present some of the most complex subsets for interventional cardiologist. In the last years the success rate of CTO-PCIs has rapidly improved, not only because of the evolution in materials (e.g. microcatheters, dedicated guidewires) and techniques (including retrograde approaches and sub-intimal strategies) but also thanks to the development of dedicated programs and shared strategies for operators approaching these very complex procedures. Giving the variety of them a Hybrid algorithm has been introduced by Brilakis and colleagues in 2012 with the aim of optimizing success, time and radiation exposure for patients and operators, by switching rapidly among the different techniques and selecting the right technique for the specific CTO. This new algorithm has been developed in alternative to the Japanese School that traditionally favours a true lumen-true lumen technique (Figure 1) [2]. Most of the CTO operators drive the choice of the vascular access with the aim to achieve a high procedural success. For this reason, large bore catheters, with trans-femoral approach are often adopted. The concept that CTO-PCI necessarily requires the use of large bore catheters to obtain an acceptable procedural success has been questioned after the introduction of the also called minimalistic hybrid algorithm introduced by Zivelonghi, *et al.* in 2018 [3]. The purpose of the algorithm is to minimize the use of double access (mandatory in the hybrid algorithm), large bore catheters and femoral approach. In this context, in order to give priority to a less invasive approach, the order in which the 4 different techniques are attempted is different. According to the available complexity scores and the expertise of the operator, lesions with lower complexity scores and non-ambiguous/tapered cap can be approached with a single trans radial/transulnar 6 F catheter, without contralateral injection, using antegrade wire escalation and a soft wire supported by a microcatheter. In case of unsuccessful procedure, the same access can be used converting the antegrade procedure in a retrograde one. In case of successful retrograde collateral crossing a second 6 F transradial or transulnar access is then performed in order to achieve a retrograde wire escalation (RWE) or a Reverse Controlled Antegrade Retrograde Technique (R-CART). The authors evaluated 100 patients approached with the algorithm. In 91% of them they obtained procedural success, with the use of a single access in 52

of them, in the 94.2% of them with a transradial access. All available techniques were successfully adopted. Overall procedural success in the minimalistic group was 89%, without the necessity to switch to "conventional approach". The authors conclude that these results confirm the validity of their algorithm that is feasible and it showed good procedural outcomes.

Figure 1: Hybrid Algorithm. Zivelonghi, *et al.* Vessel Plus 2019.

The study has important limitations: it is a single - center retrospective study, strongly related to the experience of the operator. Considering that the bilateral injection is not the first step for the CTO evaluation in the minimalistic algorithm, the use of the right strategy as well as the evaluation of the main CTO characteristics (length, proximal cap, landing zone, collaterals) is strictly related to the operator's experience. This can makes the minimalistic algorithm a valid alternative for experienced CTO operators, with high confidence in transradial PCI and in techniques/materials that give support during PCI (like anchoring balloon technique or catheter extensions) achieving an high success rate and a lower complication rates especially in terms of major bleedings correlated to the femoral access.

In a time when an aggressive percutaneous strategy for the treatment of coronary artery disease is open to question and a

medical strategy is frequently preferred in stable patients, offering an alternative in terms of invasiveness and comfort for patients, achieving a lower rate of complications as well, should be the best option. In this setting, indeed the minimalistic approach fulfilled the paradox less is more.

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