Should we give into temptation and attempt all chronic total occlusions?

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Keywords: chronic total occlusion • clinical indications • percutaneous coronary intervention

Chronic total occlusion (CTO) is defined as the presence of thrombolysis in myocardial infarction (TIMI) flow 0 within an occluded coronary segment of greater than 3 months standing [1]. It represents a frequent coronary lesion subset encountered in everyday catheterization laboratory practice. Indeed, CTOs were present in 18% of patients with significant coronary artery disease and no prior coronary artery bypass graft [2], and Christofferson et al. [8] reported a CTO prevalence as high as 52% in a Veteran’s Affairs population with significant coronary artery disease. Nowadays, clear evidence has been established regarding the benefits of CTO recanalization [4-6]. Although in the past decades coronary artery bypass graft was considered to be the gold standard for treating CTO lesions [3], recently, thanks to the significant improvements in equipment and techniques [7,8], CTO percutaneous coronary intervention (PCI) has become a more attractive and fashionable choice, as compared with surgery [2]. However, a question remains looking for an answer: should we give into temptation and attempt all CTO lesions in cath lab?

Proofs in literature
The decision-making process of whom to undergo CTO PCI, should pass through a rational analysis, taking into account clinical and anatomical factors and operator’s experience. In fact, current guidelines [9] carry a Class IIa for CTO PCI in “patients with appropriate clinical indications and suitable anatomy is reasonable when performed by operators with appropriate expertise”.

Symptom status, anti-ischemic medication, viability and ischemic burden are important factors which should be taken into consideration during the assessment of a patient candidate for a CTO revascularization. Indeed, Canadian Cardiovascular Society angina class >II, high-risk findings on non-invasive testing and/or optimal medical therapy in some combination are generally considered to be appropriate indications.

The key objectives of CTO recanalization include symptom relief (not only angina), increase in exercise capacity and improvement of quality of life. In a meta-analysis by Joyal et al. [10], patients with successful CTO recanalization had significant reduction in angina recurrence at 6-year follow-up, as compared with patients in whom the procedure failed (odds ratio 0.45). The FACTOR trial showed that procedural success was independently related to not only angina relief, but also improved physical function and enhanced quality of life as assessed by the Seattle Angina Questionnaire [11]. Notably, these reported benefits were only observed in symptomatic patients at baseline [11]. However, the low rate of anti-ischemic medication prescribed in the latter study (calcium channels inhibitors 13%, nitrates 38%, β-blockers 73%) could represent a bias favoring the difference observed between successfully and unsuccessfully recanalized patients [11]. Maximal anti-anginal medical therapy is defined as the use of at least two classes of therapies to reduce anginal symptoms [12]; for a CTO patient an assumption in anti-anginal medication prescription, according to patient tolerance,
could postpone the need for revascularization and even avoid it in some cases.

On the other hand, functional imaging tests are important tools, for making the decision to attempt or not a CTO. Indeed, CTO recanalization is indicated in the presence of objective evidence of viability/ischemia in the territory of the occluded artery of more than 10%, as shown by the current guidelines on myocardial revascularization [12]. In addition to scintigraphy prognostic value [13], the interest in cardiac MRI has increased in recent years. Baks et al. [14] correlated myocardial viability by cardiac MRI before and 5 months after PCI with improvements in left ventricular systolic function. Moreover, scar burden assessment by delayed-enhancement MRI was able to related myocardial viability by cardiac MRI before PCI without adversely impacting patient outcomes. However, experience should never mean unwisdom.

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The decision to revascularize a CTO lesion also passes through a careful analysis of anatomical features. Although right coronary artery is the most commonly involved vessel, Safley et al. [15] showed that 5-year survival rates were only significantly extended in the successful PCI of left anterior descending CTO (88.9 vs 80.2%; p < 0.001). In the presence of three-vessel disease and/or left main involvement (high SYNTAX score), surgical revascularization remains the reliable alternative able to ensure good outcome [12]. On the other hand, the presence of heavy calcifications, vessel tortuosity and collateral circulation may be important in determining not only who can benefit from recanalization but also the approach to adopt. In this respect, Morino et al. [16] described the so-called J-CTO for grading lesion difficulty; this latter was able to predict the probability of successful guidewire crossing within 30 min [16].

There is no doubt that operator’s experience impacts on the outcome. Indeed, Thompson and colleagues [17] have shown a clear added value of high-operator CTO-specific case volume, particularly in retrograde approach, improving technical success of CTO PCI without adversely impacting patient outcomes.

Conclusion
In conclusion, despite the recent advances in techniques and equipment and the importance of a complete revascularization [18], the answer of the title question is definitely no, even for experienced operators. Indeed, the decision making process for PCI of a CTO lesion should pass through a rational and wise balance between the expected benefits and the procedural risk. Moreover, we should not forget that optimal medical therapy and surgery still belong to the therapeutic armamentarium for CTO patients.

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References
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Editorial


