EDITORIAL

Percutaneous coronary intervention in coronary total occlusions: In which patients?

Intervencionismo coronary percutáneo en oclusiones coronarias totales: ¿en cuáles pacientes?

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The treatment of a coronary chronic total occlusion is one of the main challenges of interventional cardiology. Based on angiographs, the prevalence is 15 to 20\%. Revascularization is indicated less frequently due to a greater failure rate, greater exposure to radiation, high cost, and a greater frequency of complications. Therefore, only 35\% of coronary chronic total occlusions are reportedly referred for revascularization, in which cases success is close to 80\%.

Uncertainties remain regarding the benefits of treatment, according to information obtained from observational studies\textsuperscript{1}. Patients are referred due to their symptoms, or because of significant ischemia on non-invasive tests. The proportion of asymptomatic individuals is close to 10\%. Finding a chronic total occlusion is one of the main reasons for referring a patient to coronary surgery.

Table 1  Potential benefits of revascularization of coronary chronic total occlusions\textsuperscript{1}

<table>
<thead>
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<th>Potential benefit</th>
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<tr>
<td>Improved symptoms</td>
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<td>Decreased need for myocardial revascularization surgery</td>
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<td>Decreased need for antianginal medications</td>
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<td>Reduced mortality</td>
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<td>Optimization of left ventricular function</td>
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<td>Improved tolerance of acute coronary syndromes that might occur in the future</td>
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Fundamentals

The indication for revascularization of a coronary chronic total occlusion is based on the severity of the symptoms, the ischemic territory, and ventricular viability and function\textsuperscript{4}. The operator’s experience versus the angiographic complexity of the occlusion (objectifiable using clinical-angiographic scores such as the J-CTO score), should be analyzed\textsuperscript{3}. Treatment is begun with optimal medical management and risk stratification. The greater the risk (e.g. a greater area of ischemia), the greater the benefit of angioplasty, and the more appropriate its indication.

Table 1 shows the benefits of percutaneous intervention. In Joyal’s meta-analysis\textsuperscript{4} of 13 observational studies, mortality at six years was lower in the group with
successful rechanneling of the coronary chronic total occlusion, compared with the group that was not rechanelled (14.3% vs. 17.5%; OR 0.56).

**Approach to the patient with coronary chronic total occlusion**

When coronary chronic total occlusion is found, the following factors are considered relevant.

**Presence and degree of ischemia**

Revascularization will be appropriate in patients with significant ischemia, even if they are asymptomatic, and/or have regional dysfunction of the left ventricle. Most cases of coronary chronic total occlusion will have significant ischemia, and it has been shown that angioplasty of a coronary chronic total occlusion significantly reduces ischemia, with a cut-off point of 12.5% ischemic burden as a predictor of benefit, and, lacking this, in ischamiyas lower than 6.25%.

Typically, patients with coronary chronic total occlusion have collaterals to the distal segment, but these do not provide sufficient flow to the myocardium. Sachdeva et al., using FFR, showed that each coronary chronic total occlusion was hemodynamically significant, even with important collaterals. A recent study comparing medical management of coronary chronic total occlusion with collaterals (Rentrop III) vs. percutaneous treatment, showed a lower incidence of cardiac death (HR:0.29; p < 0.01) and MACE (HR:0.32) in the revascularization group (Fig. 1).

**Presence of symptoms**

Successful revascularization of a coronary chronic total occlusion is associated with an improvement in symptoms. Benefits include decreased limitation of physical activity, fewer episodes of angina, and a better quality of life. A meta-analysis showed that successful rechanneling of a coronary chronic total occlusion produced greater symptom relief in long-term follow up, compared with the group where vessel rechanneling was unsuccessful. In the FACTOR study, Grantham reported significant improvement at one month using the Seattle Angina Questionnaire in treated symptomatic patients.

**Possibility of success**

The success rate in coronary chronic total occlusion ranged from 50% to 75%. Advances in techniques, new dedicated guide wires, microcatheters and greater operator experience have increased the success rate. The Euro CTO Club reports 83% success, and in Japan and groups in the USA with hybrid confrontation, rates close to 90% are reported. Against these figures, however, there is a greater rate of complications, especially coronary perforation (3%), periprocedural infarction (2.4%) and contrast-induced nephropathy (3%). Mortality is between 0.2 and 1.3%. The operator’s learning curve and experience is a factor that should be considered.

**Coronary chronic total occlusion in the presence of multivessel disease**

Coronary chronic total occlusion is common in multivessel disease and determines the option of revascularization. In the Canadian Registry of coronary chronic occlusions, multivessel disease was present in 3/4 of patients, a finding associated with greater referral for surgery.

Furthermore, if percutaneous treatment is selected in this context and there is a chronic total occlusion, failed revascularization is frequent. There is current evidence to show that incomplete revascularization in multivessel disease treatment is a determining factor in a worse prognosis.

**Viability and ventricular dysfunction**

Patients with multivessel disease frequently present a history of infarction and left ventricular dysfunction with potentially recoverable territory. The diagnostic tools for seeking viability are crucial for evaluating the potential benefit of revascularization. In our experience, nuclear magnetic resonance is the method of choice since in its delayed
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coronary chronic total occlusion procedures/year, as well as referral networks, in order to optimize patient selection, maximize success, and decrease possible complications.

References