

## Editorial

# Prognostic Impact of Revascularization of Chronic Total Coronary Occlusion. Indispensable Prerequisite or a Case of Cognitive Dissonance?



## Impacto pronóstico de la revascularización de las oclusiones coronarias crónicas: ¿un requisito clave o un caso particular de disonancia cognitiva?

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While chronic total coronary occlusions (TCO) make up a high percentage of obstructive coronary lesions in patients with stable coronary disease, less than 10% of all percutaneous coronary interventions (PCI) are performed in TCOs.<sup>1</sup> One of the most frequently-suggested explanations for this low rate of intervention is the lack of studies demonstrating increased survival with TCO revascularization.

So far, the most robust evidence on this subject has come from a meta-analysis of individual studies,<sup>2</sup> although the analysis of subgroups in randomized studies has also highlighted the prognostic significance of revascularizing vessels with TCO in patients with extensive coronary disease.<sup>3</sup> In this issue of *Revista Española de Cardiología*, Ahn et al.<sup>4</sup> discuss an interesting study on the impact of percutaneous revascularization of TCO on long-term patient survival. The study is based on a registry of patients with TCO, created at the Samsung Medical Center in Seoul, South Korea. The authors performed a clinical follow-up of a series of 1547 patients with at least 1 TCO, treated with PCI followed by optimal medical therapy (OMT) or OMT alone. The success rate of PCI performed in 883 TCOs was close to 80%, a very acceptable rate considering that patients were enrolled between 2003 and 2012. The primary outcome of the study was death during a median clinical follow-up of 46 months. What differentiates this study from others is that the analysis took into account the anatomical location of the TCO. The comparison between PCI + OMT and OMT alone was performed separately for patients with TCO in the proximal or mid segments of the left anterior descending artery (LAD) (52% of the study population) and those in other segments of the coronary tree. This is an important distinction, as the LAD supplies a large myocardial mass that is functionally very important.

Let us put into context some of the features of the study by Ahn et al.<sup>4</sup> A common methodological problem in nonrandomized trials of the prognostic significance of TCO revascularization is selection bias. For example, if a study compares the clinical outcomes of certain patient groups according to the success or failure of TCO revascularization, the conclusions will be limited by the fact that some of the reasons for PCI failure (such as extensive calcification, length of the occlusion, or diffuse disease in the treated vessel) are more prevalent in patients with a high risk profile. This applies to the study by Ahn et al.,<sup>4</sup> in which the patients assigned to OMT alone

had less favorable clinical and anatomical characteristics than those treated with PCI; this difference in risk profile was also observed in patients with TCO in the LAD. Therefore, the results of the per-protocol analysis of their patient series have some limitations.

To reduce bias, the authors performed propensity score matching between the PCI + OMT and OMT alone groups. The main finding in these matched cohorts was that, among patients with TCO in the proximal and mid segments of the LAD, long-term cardiac mortality was significantly lower with PCI + OMT (6.9%) than with OMT alone (12.3%). However, no difference was found in cardiac mortality associated with the treatment modality (PCI or OMT) in patients with occlusions in other coronary segments.

Two important considerations are that the authors of the study did not clearly specify the criteria for performing OMT vs PCI, and that, as a result of the propensity score matching, the size of the cohorts used to draw conclusions was markedly lower than in the initial population. Equally, they did not describe other important aspects, such as evaluation of viability in the myocardium underlying the vessel with TCO. Bearing in mind these limitations, the findings are congruent with previous studies carried out in stable patients without TCO who were treated with PCI, which established that, when the coronary stenosis results in an at-risk area of > 10% of the left ventricular mass (as would be expected in patients with TCO in the proximal or mid segments of the LAD), PCI is associated with a significant benefit, compared with OMT, in terms of long-term mortality.<sup>5</sup>

The study by Ahn et al.<sup>4</sup> has undeniable value since it involved a prospective longitudinal series from a hospital with specialists in the percutaneous treatment of TCO. Naturally, further randomized studies will be required to confirm the prognostic impact of TCO revascularization. If such studies were to confirm the findings of the present study, for this evidence to have a positive effect in patients, the current low rate of intervention for TCO would need to increase dramatically. A key question therefore arises: Will the current number of PCIs for TCO increase once revascularization has been demonstrated to reduce patient mortality?

### IS LACK OF EVIDENCE THE REASON FOR THE LOW RATE OF PERCUTANEOUS INTERVENTION IN TOTAL CORONARY OCCLUSIONS?

It is interesting that, as mentioned at the beginning of this editorial, the most frequently-argued reason for not performing percutaneous revascularization of TCO is the lack of studies

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demonstrating its prognostic impact.<sup>1</sup> However, within the context of stable ischemic heart disease, TCO aside, it is clear that millions of PCIs are performed worldwide every year with no clear evidence of the prognostic impact. A group of notable studies, beginning with the COURAGE trial,<sup>6</sup> have questioned the value of coronary revascularization in reducing mortality in stable patients. The recent and highly-debated ORBITA trial,<sup>7</sup> which did not include patients with TCO, actually led the lead writers to recommend a moratorium on coronary revascularization in patients with stable angina.<sup>8</sup> The highly-anticipated ISCHEMIA trial<sup>9</sup> will soon provide new evidence on the prognostic impact of myocardial revascularization vs medical treatment in patients with stable coronary disease.

### SHOULD WE BE THINKING OF ALTERNATIVE EXPLANATIONS FOR THE LOW RATE OF PCI IN THIS COMMON SUBGROUP OF LESIONS?

If we think about cognitive factors that can affect medical practice, we might ask ourselves whether the lack of percutaneous interventions for TCO relates to the technical difficulty of the procedure or, to put it another way, with the frustration that comes from a success rate of around 50% for PCI of TCOs in leading studies,<sup>3</sup> in contrast to rates of higher than 95% for revascularization of nonocclusive stenosis. Situations like this—an apparent failure that calls into question a professional's beliefs—can result in the psychological response termed cognitive dissonance.<sup>10</sup> In cognitive dissonance, which can occur in everyday situations but also in scientific reasoning,<sup>11</sup> we automatically and unconsciously look for ways to reduce this discomfort and re-establish our previous internal coherence. Typically, the justifications that could resolve this dissonance are in conflict with the clear facts: In the case in question here, there is a selective demand for evidence on PCI in TCO, when in reality, such evidence, being nonexistent, is not demanded for all the other PCIs performed every day in stable patients.

However, times are different now. Progress over the past 10 years has made the treatment of TCO much more favorable, with a success rate for PCI procedures (many of which were inconceivably complex in earlier decades) of over 90% when performed by specially-trained professionals.<sup>12</sup> Key to this progress have been the standardization of the technique in TCOs, the specialization of interventional cardiologists, and the access to equipment specifically designed for TCOs.<sup>1,12</sup> It is important that PCT has been established as being beneficial to TCO patients similarly to those with other lesions, with better control of angina

and better quality of life than with OMT as a revascularization alternative.<sup>13</sup> The study by Ahn et al.<sup>4</sup> indicates a higher prognostic impact of revascularization of TCOs in cases in which, as generally accepted in myocardial revascularization, there is a large area of myocardium at risk. We may therefore anticipate an increase in the number of patients with TCO treated percutaneously in the coming years, with interventional cardiologists playing a greater role in the treatment of this type of coronary lesion.

### CONFLICTS OF INTEREST

None declared.

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