

## CABG in Left Main Disease: Congratulations and Cautions

*Cirugía de revascularización en el tronco de la coronaria izquierda: Alabanzas y reservas*

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The presence of significant (>50%) stenosis in the Left Main (LM) coronary artery has long been a strong indication for revascularization because of its ominous prognosis when untreated or managed conservatively on medical therapy. In 2008 a review of outcomes of coronary artery bypass grafting (CABG), in comparison to percutaneous coronary intervention (PCI), strongly favoured surgical revascularization (1). This was compellingly linked to the fact that up to 90% of LM disease involved the bifurcation (known to be at higher risk of re-stenosis) and up to 90% of patients also had concomitant multi-vessel coronary artery disease where CABG already offered a survival benefit independent of the presence of LM disease (1).

It should also be noted, however, that it was also recognized that outcomes with PCI could be very favourable in patients with isolated ostial or mid-shaft LM disease (1) reflecting the ease of deployment and superior flow through these larger calibre stents. And the results of bypass grafts in these patients could be problematic because of the risk of increased competitive flow in the absence of additional proximal coronary artery disease and especially for arterial grafts.

However, the conventional wisdom of the superiority of CABG for most patients with LM disease was then significantly challenged with the publication of outcomes of the SYNTAX trial in the sub-group of 705 patients with LM disease (2). In these patients, those with SYNTAX scores <33 had very similar outcomes between CABG and PCI at 5 years, whereas CABG was clearly superior, including for survival, in patients with SYNTAX scores >32. Indeed, the appearance of equipoise in patients with lower SYNTAX scores was the rationale for the EXCEL trial (3) and scores >32 were used as an exclusion criterion.

The EXCEL trial is the largest and most definitive trial of PCI vs CABG in LM disease, even although randomization was stopped early with 1900 rather than 2600 patients. The 5-year outcomes of the EXCEL trial

reported no difference in the primary composite endpoint of death, myocardial infarction and stroke at 5 years (4). However, the published results and interpretation of the EXCEL trial attracted considerable controversy because of a 38% increase in the death rate in the PCI group (and that, at 5 years, was still rapidly diverging) (5). The controversy was compounded by failure to publish the protocol specified Universal definition of MI but only a new biochemical definition that was untried and untested and that disadvantaged CABG (5). Indeed, the author of this current editorial, who was the Chairman of the surgical committee of the EXCEL trial and whose centre of both cardiologists and surgeons were the second largest recruiting centre worldwide, with 100 patients, withdrew his authorship from the 5-year publication (5).

Around the same time The NOBLE trial recruited 1200 patients with even lower SYNTAX scores than EXCEL and at 5 years showed a non-significant increase in mortality in the PCI group (12% vs 9%) and, as in EXCEL, considerably reduced myocardial infarction and repeat revascularization in the CABG group (6).

Taken together, these results re-enforce the class IA indication for CABG in most LM disease (7) and will continue to guide practice for the foreseeable future. Consequently, anything that can improve the outcomes for CABG in LM disease will have important implications for the long-term outcomes of these patients.

In the previous issue of the Journal, Vaccarino and colleagues report 30-day outcomes in a consecutive series of 458 CABG patients operated over an 10-year period between 2011-2020. (8) Of this cohort, around 40% of patients had additional LM disease in comparison to those without. Although the LM patients had slightly higher-risk baseline clinical features, there was no statistically significant difference in death, myocardial infarction or stroke at 30-days.

In addition to their excellent outcomes the authors

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need to be strongly congratulated on the very high quality of their CABG operations. The mean number of grafts in both groups was 3, of which 2.8 were arterial. Total arterial grafting (TAG) was used in 80% of patients, bilateral ITA (BITA) grafts in 50%-60% of patients and radial arteries in over 30% of all patients. Furthermore, 88% of all operations were performed as off-pump procedures.

This demonstrates a particularly high quality of surgical revascularization and far superior to that reported in most surgical trials or databases. In most of Europe and the USA the use of more than a single arterial graft is respectively < 20% and < 10%, in contrast to Asia where up to 60% of patients receive more than a single arterial graft. This is also a far higher number of total arterial grafts than used in the BITA arm of the ART trial (9) as well as a far higher proportion of off-pump CABG (10).

However, and finally, there is also a word of caution. Despite the overall excellent results reported by Vaccarino and colleagues it is notable that, although not reaching conventional statistical significance, mortality was higher in the LM group (3.2% vs 1.1%). (8) And, for MACE it was significantly higher in patients with LM disease (6.4% vs 2.2%;  $p=0.02$ ). This is an important warning, as Benedetto and colleagues already reported an increased mortality in patients with LM disease undergoing off-pump CABG, almost certainly due to a higher incidence of incomplete revascularization (11). So while the quality of the surgery was very high in Vaccarino and colleagues' hands, it still raises a question of whether off-pump TAG is the best surgical strategy in all LM disease unless there is significant additional proximal coronary artery disease. Following the patients to 5 years might provide further assurance of the efficacy and safety of this surgical strategy.

#### Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material)

#### Ethical considerations

Not applicable.

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