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Commentary: To stent or graft complex multivessel coronary artery disease is not the question anymore. It is, rather, how to?

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A repeat argument in the years-long debate regarding the optimal revascularization procedure for patients with stable multivessel coronary artery disease, either percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG), is that procedural techniques and technologies used during clinical trials lag behind, and are inferior compared with contemporary practice.

Rocha and colleagues¹ directly address this argument. In a large, retrospective, multicenter study, the authors compare the outcomes of what are, at present, considered to be the 2 best revascularization procedures: CABG with multiple arterial grafts (C-MAG) and PCI with second-generation drug-eluting stents (P-DES). Using sophisticated statistical analyses, the authors demonstrate that compared with P-DES, C-MAG was associated with superior long-term survival and freedom from major adverse cardiac and cerebrovascular events.¹

The results of this study are in line with those reported in numerous prior publications and stem from fundamental physiological and anatomical differences between CABG and PCI.

First, although both CABG and PCI effectively treat critical, flow-limiting proximal coronary artery stenoses, only CABG affords additional surgical collateralization.² By anastomosing the conduit to the distal segment of the native

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coronary artery, beyond nonflow-limiting but vulnerable plaques (Figure 1), CABG is more protective than PCI against myocardial infarction and death.² In the current study, the cumulative incidence of myocardial infarction was 3 to 5 times greater after P-DES compared with C-MAG, with a progressively increasing gap over time.

Second, secretion of vasoactive agents by DES and arterial grafts. DESs slowly release drugs aimed at decreasing in-stent thrombosis and scar-related stenosis. In contrast, the endothelium of the most frequently used arterial conduits secrete nitric oxide and other vasoactive substances.³ Intraluminal downstream flow of these antithrombotic and antiatherosclerotic substances enhances long-term graft patency and decreases the progression of native coronary disease in the grafted vessel (Figure 1). The use of C-MAG magnifies this effect and may explain the bigger influence of CABG on outcomes observed in the current study compared with previous comparisons of PCI versus CABG with a single arterial graft.¹⁻⁴

Third, there are different rates of complete revascularization. Similar to previous reports, compared with PCI, the number of vessels treated (CABG: 3.5 ± 1.0 grafts vs PCI: -2.6 ± 1.7 DES) and the rate of complete revascularization (CABG: 97% vs PCI 65.7%) were significantly higher after CABG.¹ The huge difference in revascularization rates might be the sole and most

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FIGURE 1. Physiological differences between percutaneous coronary intervention (PCI) with drug-eluting stent (DES) and coronary artery bypass grafting (CABG) with multiple arterial grafts (MAG). NO, Nitric oxide.

important cause of difference in outcomes between the 2 revascularization modalities in the current study.^{4,5} However, this finding must be interpreted with caution. Being a retrospective study that lacks precise coronary anatomic details and granular procedure data, the rate of complete revascularization might be under- or overestimated. Having such data would also enhance the

insight in regard to specific patient subsets (eg, isolated left main disease) and practical issues, such as the second arterial conduit of choice (eg, a second internal thoracic artery or the radial artery). Lack of data regarding postprocedure optimal medical therapy and adherence to secondary prevention that might have had a profound influence on long-term outcomes is another important limitation of the current study.

The data provided by the authors strongly support that CABG should remain the preferred revascularization modality for complex left main and multivessel disease. The question now becomes how to do it, rather than what to do. Prospective randomized trials are indicated to solidify this conclusion and specifically establish the influence of MAG on outcomes.

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