Multiple arterial grafting: Please don't confuse me with the facts

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With the wealth of data from decades of research—both prospective, randomized, controlled trials¹⁻³ and large registry studies^{4,5}—comparing the coronary artery bypass grafting (CABG) operation with percutaneous coronary interventions (PCI), as well as a substantial body of retrospective reviews of single arterial grafting versus multiple arterial grafting (MAG),^{6,7} one might reasonably wonder what new information could be gleaned from yet another retrospective single-center experience. The data presented by Locker and colleagues⁸ in this issue of *The Journal*, however, are both unique and compelling.⁸ In their review of late mortality data of a large cohort of consecutive patients (12,615) undergoing coronary revascularization in a single institution during a 16-year period (1993-2009) who were carefully followed up for as long as 20 years (mean, 7.9 years; median, 7.8 years), Locker and colleagues⁸ compare CABG with various forms of PCI and further study the effect of MAG compared with the use of a single internal thoracic artery (ITA) with supplemental vein grafts (left ITA/SV) on the comparative outcomes. Both the analysis of the impact of MAG on comparative CABG versus PCI outcomes and the length of follow-up within a single institution are welcome additions to the literature. Findings are both predictable and somewhat alarming. The improved long-term survival of patients with MAG relative to those with left ITA/SV grafting in both unmatched and matched cohorts is no surprise and corroborates a wealth of historical data. The appearance of MAG as an independent predictor of survival on Cox analysis is similarly expected. The finding that, among propensity-matched patients, survival was equivalent between patients receiving drug-eluting stents and patients receiving left ITA/SV grafts as late as 8 years is a bit more provocative. Perhaps even more perturbing for surgical community is the finding that the survival benefit for left ITA/SV relative to both balloon angioplasty and bare metal stents appears to reverse after 7 to 10 years, with the advantage shifting from CABG to PCI. In matched patients, only the MAG group appears to

Surgical response to the evidence for arterial grafting.

Central Message

Increased use of multiple arterial grafting is essential to provide patients with an optimal revascularization strategy in an environment of increasingly effective percutaneous coronary intervention.

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have a survival benefit for CABG relative to PCI, albeit not a significant one ($P = .09$).

As with all studies, certain caveats must be observed. Despite the apparent institutional endorsement of MAG, the incidence in this cohort was only 14%. Propensity matching therefore reveals little about potential outcomes if this strategy were to be more broadly applied, although other longitudinal studies with similarly long-term follow-up in which MAG was more liberally applied do suggest a survival benefit that persists across all but the most single ITA-weighted quintiles of propensity.⁹ Moreover, mortality, although an extremely relevant and readily definable end point, does not distinguish the cause of death. In an increasingly aging population, with multiple comorbidities, death may be driven more by age-associated diseases than by choice of intervention. Finally, data are absent regarding other relevant outcomes, such as stroke, myocardial infarction, and the need for repeat revascularization. Perhaps the late mortality benefit noted in the PCI population is due to an aggressive program of repeat intervention, or to a more careful regimen of evidence-based medical therapy.

Limitations notwithstanding, the message for the surgical community is clear—if we wish to have the opportunity to treat patients with advanced, multivessel coronary artery disease, we will need to more fully embrace a strategy of

MAG. The message is not new—indeed, multiple previous editorials in *The Journal* have advocated just that.¹⁰⁻¹³ The barriers have been well described.^{14,15} The concern regarding the absence of prospective, randomized, controlled data is somewhat curious in view of the virtually universal acceptance of left ITA grafting as a quality measure despite the fact that the level of evidence for both is the same (B).^{16,17} Concerns regarding sternal wound infection have been extensively addressed with the use of a skeletonized approach to ITA harvest.¹⁸ Benefit has been demonstrated in patients with diabetes,^{19,20} as well as in patients with moderately reduced ejection fraction.²¹ Contention that survival must exceed 10 years to derive benefit is not supported by Locker and colleagues⁸ or by other investigators²² and may be related more to patient selection. The inertia of learning new techniques seems strange for a profession with a rich history of surgical innovation. Increasingly rigorous focus on perioperative outcomes, which might favor a less tedious procedure with fewer concerns regarding bleeding, infection, pulmonary complication, or hemodynamic stability, as an important measure of quality, ironically may have discouraged adoption of the most valuable therapeutic procedure that surgeons can offer the patient with extensive coronary artery disease. Early evidence is already accumulating that the benefit for CABG relative to PCI may be ameliorated by the introduction of second-generation drug-eluting stents.²³ Professional politics and financial concerns aside, any serious physician must ask himself or herself, in the face of a critically blocked coronary artery, would he or she really choose to incur the risks and discomforts of perioperative recovery, along with an increased short-term risk of stroke, to receive a saphenous vein bypass graft in preference to a second-generation (or third-generation) drug-eluting stent? Perhaps our answer is not really that relevant—the decision will be made for us, by the patients. It is to be hoped that we will begin to choose to offer them a better option.

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