Multivessel coronary artery disease and poor left ventricle function: It is consistent and clear, coronary artery bypass grafting wins again

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Central Message

Coronary artery bypass grafting remains the mainstay of treatment in patients with poor ventricular function. More detailed preoperative patient optimization may reduce high perioperative morbidity.

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Superiority of coronary artery bypass grafting (CABG) to medical therapy in patients with impaired ventricular function (ie, ejection fraction $\leq 35\%$) has been shown in clinical trials.^{1,2} Observational studies have also demonstrated greater survival in patients with an impaired left ventricle undergoing CABG compared with those that are treated with percutaneous coronary intervention (PCI).^{3,4} Although these studies unanimously demonstrated that the incidence of early stroke, renal failure, and other complications were higher in the CABG group, having a better survival rate favors CABG over PCI in the treatment of patients with coronary artery disease and poor ventricular function.

Iribarne and colleagues⁵ conducted an extensive multicenter observational analysis of more than 70,000 patients with ejection fraction $\leq 35\%$ with 2- or 3-vessel disease who underwent either CABG or PCI between 2004 and 2014 in the Northern New England Cardiovascular Disease Study Group. The authors showed a lower incidence of long-term all-cause and cardiac mortality with CABG, but demonstrated more complications at 30 days compared with PCI.⁵ These results are consistent with previous data comparing CABG and PCI in this patient population.^{3,4} In addition, patients in the PCI group had similar survival rates as those undergoing CABG at 30 days but a higher rate of reintervention.

What makes this study unique is the large sample size and long-term follow-up. This permitted robust subgroup analyses in patients with ejection fraction $< 25\%$, women, and age ≥ 65 years, all with similar findings noting improved survival with CABG. Thus, the question is: Should all patients with 2- or 3-vessel disease and a poorly functioning ventricle be referred for CABG despite the 30-day mortality rate of 3.5%, acute kidney injury rate of just under 40%, and stroke rate of 3%? The authors should be congratulated on such an eloquent analysis.

Despite the improved survival in patients undergoing CABG, we as surgeons should reassess our pre-, peri-, and postoperative management of these patients. We may require strategies to specifically decrease early renal failure with more enhanced preoperative optimization and stroke by encouraging intraoperative epiaortic ultrasound for the assessment of ascending aortic calcification.

A multitude of questions arise from the current submission from Iribarne and colleagues.⁵ A critical factor not reported in their study is the granularity of the type of bypasses used; for instance, was 1 or more arterial grafts used? What was the level of completeness of revascularization in each group? In those with a large amount of scar, were the outcomes similar to PCI or CABG? Another important clinical question unanswered by Iribarne and colleagues⁵ is the level of preoperative assessment of myocardial viability before deciding on the best treatment option for this high-risk patient cohort. Was a positron emission tomography or magnetic resonance imaging scan performed to ensure perfusion-guided therapy? In this patient population, additional assessment for an automated implantable cardioverter defibrillator placement after CABG or PCI between 30 and 90 days postoperatively was not mentioned, but may have significant implications on longer-term outcomes.

The authors were careful to point out that this was an observational study and that there may well be

unmeasured confounders that could account for the different outcomes in the 2 groups.⁵ It is possible that those patients undergoing PCI were turned down by a cardiac surgeon; information not easily gleaned by demographic characteristics and matching. Such confounders could be frailty or details of the coronary anatomy. Thus, the authors were careful to present these results as an association, not a causal relationship. Although we agree that the comparison of PCI versus CABG for patients with a poorly functioning left ventricle should be addressed in a randomized trial, this may be too expensive and the logistic difficulties of such a trial could be formidable. For any single patient, the issue of PCI versus CABG may not be in equipoise, which would lead to recruitment difficulties.

Current data show a strong association between CABG and improved long-term survival compared with PCI in patients with poor ventricular function. Nonetheless, careful

patient selection and optimal pre- and postoperative management are required to limit complications.

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