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Commentary: Improving outcomes in diabetic coronary artery bypass grafting recipients: More arterial conduits, but even more medicine

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CENTRAL MESSAGE

Outcomes in diabetic coronary artery bypass grafting recipients can be improved by using more arterial grafts but even more so by adhering to guideline-directed medical therapy.

In their Invited Expert Opinion, Drs Akhrass and Bakaeen¹ review the evidence supporting the superiority of coronary artery bypass grafting (CABG) surgery over percutaneous coronary interventions (PCI) in patients with diabetes mellitus (DM) and multivessel disease (MVD). CABG is now a class I recommendation for DM patients with complex MVD and proximal LAD disease in both the American Heart Association/American College of Cardiology² and European³ guidelines. In view of this data, why is there still debate regarding the role of CABG versus PCI in DM patients with MVD? Two concerns have been raised that have limited more widespread use of CABG versus PCI in DM patients with MVD: (1) CABG in DM patients is associated with increased short-term morbidity and mortality, especially deep sternal wound infection (DSWI) when internal mammary artery (IMA) grafts are used^{4,5}; and (2) compared with non-DM CABG recipients, DM patients have decreased long-term survival and freedom from major adverse cardiovascular events (MACE) owing to an increased incidence of such comorbidities as hypertension, peripheral vascular disease, chronic renal failure, and hyperlipidemia, all of which predispose to the progression of distal coronary artery disease and decreased graft patency.^{6,7} Previous studies have demonstrated that long-term survival and freedom from MACE is improved in

CABG recipients with DM receiving an IMA graft to the left anterior descending artery.⁸ Akhrass and Bakaeen now advocate for the increased and “judicious” use of multiple arterial grafting (MAG) in CABG recipients with DM. But is more arterial grafting the only solution for improving outcomes following CABG in DM patients?

The choice of which types and how many arterial conduits should be used in DM CABG patients remains controversial. Bilateral IMA (BIMA) grafting is associated with an increased incidence of DSWI in both DM and non-DM patients.⁹⁻¹¹ Older patients (>70 years), patients with an ejection fraction <40%, heavy smokers with chronic obstructive pulmonary disease (COPD), and patients with chronic renal failure, peripheral vascular disease, or type 1 DM are subgroups of DM patients in whom long-term survival has not been prolonged with BIMA grafting.^{6,7,12-15} Obese, frail, diabetic females who are heavy smokers with COPD are at extremely high risk for DSWI and postoperative sternal dehiscence, and BIMA grafting should be avoided in these patients.¹² The radial artery is a better choice for a second arterial conduit in these DM patients. Raza and colleagues¹⁰ found no difference in long-term survival in DM patients who received a single IMA plus radial artery graft versus those who underwent BIMA grafting. The Radial Artery Patency Study showed that the radial artery had superior patency compared with saphenous grafts in DM CABG recipients.¹¹ The ART trial, involving both DM and non-DM CABG recipients, revealed that when

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Disclosures: The author reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Jan 14, 2021; revisions received Jan 14, 2021; accepted for publication Jan 15, 2021; available ahead of print Jan 29, 2021.

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J Thorac Cardiovasc Surg 2022;164:125-7

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2021.01.062>

radial artery grafting and guideline-directed medical therapy (GDMT) were performed in addition to single IMA grafts, long-term survival and MACE were similar to that seen in patients receiving BIMA grafts, without the increased risk of DSWI (1.9% vs 3.5%; $P = .005$).¹⁶ The increased incidence of DSWI with BIMA grafting is especially detrimental to high-risk DM patients with multiple comorbidities and decreased ejection fraction. Although skeletonization of IMAs may help decrease the incidence of DSWI in DM patients, the factors responsible for DSWI following IMA harvesting are multifactorial and not always related to the harvesting technique.¹⁷ Skeletonization alone will not eliminate DSWI, which requires multiple therapeutic interventions, as outlined in the American Association for Thoracic Surgery's guidelines on the prevention of sternal wound infections, which include the avoidance of bone wax, the use of topical vancomycin and appropriate perioperative antibiotics, and tight glycemic control.¹⁸⁻²² Finally, MAG might not improve long-term survival in DM patients with diffuse small-vessel disease supplying areas of nonviable myocardium, in whom complete revascularization is not possible.

Despite the increased use of MAG, DM patients are still susceptible to decreased long-term survival and increased MACE due to the progression of atherosclerotic disease in both native and distal grafted coronary arteries and cerebral and renal vasculature. GDMT is also necessary to control hyperglycemia, hypertension, hyperlipidemia, and hypercoagulability to improve long-term survival and decrease MACE in DM CABG patients. Unfortunately, GDMT is underused in CABG patients, and noncompliance with GDMT following CABG has been found to decrease long-term survival, increase MACE, and increase the need for repeat revascularization procedures.^{23,24} All DM CABG patients, irrespective of the type and number of arterial conduits used, should receive lifelong therapy with aspirin, angiotensin-converting enzyme inhibitors, statins to maintain a low-density lipoprotein level <100 mg/dL, and insulin or noninsulin antiglycemic agents to achieve a hemoglobin A1c <7%.²⁵⁻²⁷ Glycemic control using intravenous insulin infusions is especially important in the perioperative period and has been shown to decrease DSWI, atrial fibrillation, the need for inotropic support, and mortality.^{19,20,22,28,29} GDMT should be instituted by surgeons in the postoperative period and continued following discharge by physicians who are knowledgeable with the most recent secondary prevention guidelines.³⁰ In addition, all DM CABG patients should undergo counseling to stop smoking.²⁵

In summary, short- and long-term outcomes in all DM CABG patients can be improved by more judicious use of arterial conduits, but even more so by adherence to GDMT.

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