Graft patency in diabetic patients and the discomfort of thought

Paul Kurlansky, MD

From the Division of Cardiac Surgery, Columbia University, New York, NY.

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Address for reprints: Paul Kurlansky, MD, Black Building 210, 650 West 168th St, New York, NY 10032 (E-mail: Pk2245@cumc.columbia.edu).

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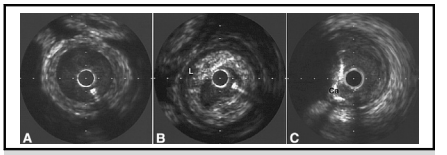

A, SV neointimal hyperplasia; B, lipid-rich SV atheroma; C, calcified coronary atheroma.

Central Message

Despite theory that diabetes influences vein graft patency, evidence is contradictory. Careful review of theory as well as data emphasize the importance of arterial conduits for diabetic patients.

See Editorial Commentary page 2322.

Editor's Note—*The August 2017 publication in the* Journal of the American College of Cardiology *from Cleveland Clinic stunned the* JTCVS *Editors. We discussed the findings and wondered whether diabetics could really have as good graft patency as nondiabetics. We immediately recognized the sophisticated statistical analysis characteristic of our Statistical Editor. The* JTCVS *Editors unanimously agreed that we should publish a commentary on the* JACC *article. We were very pleased when our Associate Statistical Editor, Paul Kurlansky, agreed to prepare this Expert Opinion. We believe that all readers of our* Journal *will appreciate this outstanding editorial. The data from Cleveland Clinic are important, but just as compelling is the interpretation of these results provided by Dr Kurlansky. We hope that you enjoy this outstanding Feature Expert Opinion.*

Richard Weisel, MD
Editor-in-Chief

"Too often we…enjoy the comfort of opinion without the discomfort of thought."

—John F. Kennedy
Commencement Address at
Yale University, June 11, 1962

The art of medicine might be described as the ability to make correct decisions on the basis of incomplete information. From a purely objective perspective, the "definitive" study on any given topic has never—nor ever will be—performed. The most comprehensive ones actually tend to raise more questions than they answer. However, occasionally we are confronted with the daunting challenge of ostensibly solid evidence that appears to contradict well founded (and perhaps even cherished) theoretical assumptions. It is just this puzzling circumstance that is presented by Raza and his colleagues from the Cleveland Clinic in their recent report on the "Influence of diabetes on long-term coronary artery bypass graft patency."[1] Drawing on the incredibly rich data resource of 57,961 patients who underwent primary isolated coronary artery bypass grafting (CABG) between 1972 and 2011 at their institution, the authors were able to identify 11,519 patients, of whom 1372 were diabetic, who had interpretable coronary angiograms anywhere from <1 year up to 20 years after surgery, leaving them with a total of 28,460 individual bypass grafts (3796; 13.3% in diabetic patients) for study. Following thorough and sophisticated statistical modeling, the authors reported that, regarding 7903 internal thoracic artery (ITA) grafts (27.8% of the total number of grafts, of which 1132 or 14.3% were in diabetic patients), graft patency was stable over time with no difference between diabetic and nondiabetic patients (93% vs 96% patency, respectively, at 20 years; $P = .30$). So far so good—encouraging, but not surprising. However, for saphenous vein (SV) grafts, patency declined over time: 78%, 70%, 57%, and 42% in diabetic patients at 1, 5, 10, and 20 years, and 82%, 72%, 58%, and 41% in nondiabetic patients, respectively ($P < .002$ early [up to 4 years], and $P = .60$ late [>4 years]). Also not terribly surprising. But here is where things get interesting: after careful adjustment for potentially confounding risk factors, diabetes was actually associated with higher early (≤1 year) ITA patency (odds ratio, 0.63; 95% confidence interval, 0.43-0.91; $P = .013$) but similar late patency ($P = .80$). However, early as well as late patency of SV grafts was similar between diabetic and nondiabetic patients ($P = .90$ early, and .80 late). Leaving aside the potentially odd finding of increased early ITA patency which, at 97% versus 96% is of marginal clinical

TABLE 1. Studies comparing diabetic and nondiabetic SV graft patency

Reference	Year	Site	Patients studied, n	Diabetic	SV grafts, n	Diabetic	Length of follow-up	Indication for angiography	Study patients with angiographic follow-up	Finding
Campeau et al[17]	1984	Single center	82	Unclear	132		10 years compared with 1 year	Mixed clinical/ prospective study	55%	In multivariable analysis, diabetes not associated with disease progression; definition of diabetes variable between 2 time points
Lytle et al[18]	1985	Single center	501	18%	786	18%	5-12 years compared with <5 years	Mixed clinical	Not reported	In multivariable analysis, diabetes associated with progression of vein graft stenosis/ occlusion between early (<5 y) and late (>5 y) angiography study
Van der Meer et al[19]	1994	Multicenter	786	10%	2486		1 y	RCT (CABADAS); protocol or clinical if <1 y	86%	12.7% SV occlusion; diabetes risk factor in multivariable analysis; OR, 2.07 (1.13-3.80)
Hoogwerf et al[20]	1999	Multicenter	1351	9%	Not reported		Baseline and 4 years from study entry: baseline 1-11 years post-CABG	RCT (post-CABG); protocol	Not reported	Progression of graft disease not different in adjusted model (% arterial grafting not reported; time since CABG not factored)
Schwartz et al[21]	2002	Multicenter	568	19%	2993	20%	3.9 ± 1.8 years	RCT (BARI); protocol or clinical	37%; 77% and 79% at 1 and 5 y at prespecified sites	71% vs 75% patency with/without diabetes ($P = .40$); in multivariable analysis diabetes not associated with stenosis; OR, 0.87 (0.58-1.32)
Goldman et al[22]	2004	Multicenter	1079	6%	Not reported		1 week to 10 years	VA cooperative; protocol or clinical	86%	Diabetes not a predictor of graft patency
Yilmaz et al[23]	2005	Single center	314	19%	Not reported		Up to 5 years	Clinical	Only patients with angiography included	Diabetes a predictor in multivariable analysis; OR, 1.36 (1.01-3.44)
Singh et al[24]	2008	Multicenter	440	26%	440	26%	1 y	RCT (RAPS); protocol	78%	Diabetes a predictor in multivariable analysis; RR, 1.45 (1.03-2.05)

(Continued)