2. Gaudino M, Benedetto U, Fremes S, Biondi-Zoccai G, Sedrakyan A, Puskas JD, et al; RADIAL Investigators. Radial-artery or saphenous-vein grafts in coronary-artery bypass surgery. *N Engl J Med*. 2018;378:2069-77.
3. Dreifaldt M, Mannion JD, Bodin L, Olsson H, Zagodzón L, Souza D. The no touch saphenous vein as the preferred second conduit for coronary artery bypass grafting. *Ann Thorac Surg*. 2013;96:105-11.
4. Kopjar T, Dashwood MR, Dreifaldt M, de Souza DR. No-touch saphenous vein as an important conduit of choice in coronary bypass surgery. *J Thorac Dis*. 2018; 10(Suppl 26):S3292-6.
5. Dreifaldt M, Mannion JD, Geijer H, Lidén M, Bodin L, Souza D. The no-touch saphenous vein is an excellent alternative conduit to the radial artery 8 years after coronary artery bypass grafting: a randomized trial. *J Thorac Cardiovasc Surg*. October 26, 2019 [Epub ahead of print].
6. Kopjar T, Dashwood MR. Endoscopic versus "no-touch" saphenous vein harvesting for coronary artery bypass grafting: a trade-off between wound healing and graft patency. *Angiology*. 2016;67:121-32.
7. Hayashi I, Kashima I, Yoshikawa E. Use of the no-touch saphenous vein harvesting technique via small incisions. *Innovations (Phila)*. December 26, 2019 [Epub ahead of print].

<https://doi.org/10.1016/j.jtcvs.2020.01.076>

REPLY: WINNERS: WHERE, WHEN, AND WHY

Reply to the Editor:

We read with interest the letter by Dashwood and colleagues¹ on minimally invasive no-touch (MINT) saphenous vein graft (SVG) harvesting as a preferred second conduit of choice in coronary artery bypass grafting (CABG) procedures. We note that the title of the letter suggests a head-to-head competition with a clear winner and loser. We applaud their enthusiasm for continuing efforts to explore and improve CABG patency, but their optimism regarding widespread MINT SVG adoption deserves prudent review.

First, the published experience with no-touch (NT) SVG appears to be quite limited. As far as we know, only 3 single-center studies comparing the radial artery with NT SVG method have been published, of which 1 was a later-term follow-up on previous results. The sample size and follow-up from these 2 centers is as follows: 60 patients at 1 year,² 99 patients at 3 years,³ and 84 patients at 8 years.⁴ Whether results can be generalized from these small studies to all patients undergoing CABG procedure is a question—Song and colleagues² excluded patients aged <70 years and had a higher than average proportion of female patients (48%), whereas Dreifaldt and colleagues³ excluded patients aged >65 years, those with left ventricular ejection fraction <40% and chronic kidney disease, plus only 19% of patients had diabetes. This precludes subgroup analysis as was done in the Radial Artery Database International Alliance (RADIAL) project.⁵ Further, the study by Dreifaldt and colleagues⁴ was designed as a noninferiority trial. Therefore, any post hoc analysis claiming superiority is less methodologically sound. Dreifaldt and colleagues⁴ also did not adhere to contemporary management of radial artery grafts, with

only 24% of patients undergoing radial artery grafts receiving calcium-channel blockers.⁴

Samano and colleagues⁶ compare NT to conventional SVG harvest. That article was held out by Kopjar and colleagues⁷ as supporting long-term NT SVG patency out to 16 years. Notable to this study is that the authors excluded 1 of the 3 randomization groups from the last 2 follow-ups. The reported 16-year follow-up included only 34% of the initial cohort.

Dashwood and colleagues¹ also cite Kopjar and colleagues,⁷ noting that if the angiographic patency data of the 5 trials with protocol-driven angiography were supplemented with data from the Örebro group, the difference in risk of graft occlusion between the radial artery and SVG dissipates. We are unclear why Kopjar and colleagues⁷ chose to include data from Dreifaldt and colleagues³ but not Song and colleagues² in their post hoc analysis. It also raises the issue of selective outcome analysis. Angiographic patency is only 1 outcome. Major adverse cardiovascular events, cardiovascular mortality, and long-term mortality were the main end points of the RADIAL project. To insert 1 small, single-center study into 1 subanalysis of the RADIAL project is not our preferred method of analysis. As we have seen, the 10-year Arterial Revascularization Trial results have not shown translation of improved patency with the most important patient outcomes.⁸ Until they do, the pendulum will not swing rapidly.

Finally, there are no studies comparing MINT SVG to other conduits. A number of questions specific to the endovascular harvesting aspect of MINT SVG remain unanswered. What is the feasibility of training assistants in this technique? Will widespread dissemination lead to diluted results in real-world practice, when compared with the excellent results thus far obtained in the 2 small studies? Dashwood and colleagues¹ state that “many centers worldwide have adopted the NT technique with MINT harvesting methods being developed.” If this is the case, then there should be adequate data (quantitatively speaking) to examine both angiographic and clinical outcomes. In addition, qualitative scientific rigor and follow-up need to be applied. There are nuances that need to be considered in the study design. Dreifaldt and colleagues³ confirmed that “the patency rate for [radial artery] grafts depended mostly on the degree of stenosis of the target vessels,” and this needs to be accounted for in study design, as well as the territory grafted, and the use of calcium-channel blockers for radial artery grafts. Such studies should be conducted in the spirit of collaboration and not competition. Ultimately, the question may not be whether to use MINT SVG or radial artery graft, but which to use, when, and where.

Dawn S. Hui, MD^a

Richard Lee, MD, MBA^b

^aDivision of Cardiac Surgery

Authors have nothing to disclose with regard to commercial support.

Department of Cardiothoracic Surgery
University of Texas Health, Science Center at San Antonio
San Antonio, Tex
^bDivision of Cardiothoracic Surgery
Department of Surgery
Medical College of Georgia
Augusta University
Augusta, Ga

References

1. Dashwood MR, Silva HSM, Lima ML. Endoscopic harvesting will secure a silver medal for the no-touch saphenous vein and bronze for the radial artery. *J Thorac Cardiovasc Surg.* 2020;159:e335-6.
2. Song SW, Sul SY, Lee HJ, Yoo KJ. Comparison of the radial artery and saphenous vein as composite grafts in off-pump coronary artery bypass grafting in elderly patients: a randomized controlled trial. *Korean Circ J.* 2012; 42:107-12.
3. Dreifaldt M, Mannion JD, Bodin L, Olsson H, Zagodzón L, Souza D. The no-touch saphenous vein as the preferred second conduit for coronary artery bypass grafting. *Ann Thorac Surg.* 2013;96:105-11.
4. Dreifaldt M, Mannion JD, Geijer H, Liden M, Bodin L, Souza D. The no-touch saphenous vein is an excellent alternative conduit to the radial artery 8 years after coronary artery bypass grafting: a randomized trial. *J Thorac Cardiovasc Surg.* October 26, 2019 [Epub ahead of print].
5. Gaudino M, Benedetto U, Fremes S, Biodni-Zoccai G, Sedrakyan A, Puskas JD, et al. Radial-artery or saphenous-vein grafts in coronary-artery bypass surgery. *N Engl J Med.* 2018;378:2069-77.
6. Samano N, Geijer H, Liden M, Fremes S, Bodin L, Souza D. The no-touch saphenous vein for coronary artery bypass grafting maintains a patency, after 16 years, comparable to the left internal thoracic artery: a randomized trial. *J Thorac Cardiovasc Surg.* 2015;150:880-8.
7. Kopjar T, Dashwood MR, de Souza DR. No-touch saphenous vein as an important conduit of choice in coronary bypass surgery. *J Thorac Dis.* 2018;10(Suppl 26): S3292-6.
8. Taggart DP, Benedetto U, Gerry S, Altman DG, Gray AM, Lees B, et al. Bilateral versus single internal-thoracic-artery grafts at 10 years. *N Engl J Med.* 2019;280: 437-46.

<https://doi.org/10.1016/j.jtcvs.2020.02.014>

REPLY: NO-TOUCH SAPHENOUS VEINS AND RADIAL ARTERIES SHOULD QUALIFY FOR THE SAME CORONARY

ARTERY BYPASS GRAFTING TEAM

Reply to the Editor:

Dashwood and colleagues¹ discuss the controversy regarding the best second conduit of choice for coronary artery bypass grafting (CABG). We believe it is more important to raise the question: what are the best principles and practice in CABG?

The key message of Dreifaldt and colleagues² in 2019 is that both the no-touch (NT) saphenous vein (SV) and the radial artery (RA) are excellent conduits and have similar

advantages. They should be seen as complementary, and not competitive, to each other. The RA may be used if it is of good quality, the target vessel is large, and it has a stenosis of >90%. Alternatively, if the RA is small or has moderate atherosclerosis, or the target vessel has a stenosis of <90%, an NT SV graft may be preferred.

Another aspect is that clinical factors may also suggest that prolonged conduit longevity is not always the primary concern. Older age, female sex, left ventricular dysfunction, smoking, obesity, and diabetes are some of the factors that negatively impact on survival.³ Consequently, the benefits of extensive arterial revascularization in CABG can be short-lived in these patients. This concept is even more important, given that the age and comorbidities of the CABG population are increasing.⁴

Our intention is not to compete with arterial conduits. The exclusive use of arterial grafts can be an excellent alternative when used reasonably. It's known that the great advances in percutaneous coronary intervention are due to the poor outcome of CABG and in particular the SV grafts. Indeed, our intention is to improve the results of CABG together with arterial conduits.

The SV is still used in the majority of CABG surgeries; therefore, every effort should be made to improve the results of this graft. The NT SV harvesting is just one attempt to do so.^{5,6} Our humble message to surgeons accustomed with arterial conduits is to wisely choose the target vessels suitable for arterial grafts, and, if necessary, use a NT SV for the remaining targets to reach complete revascularization⁷ (Figure 1).

Dashwood and colleagues¹ have legitimate concerns in raising the issue of a short-term increase in leg wound complications with the NT harvesting technique. These concerns may be an obstacle in embracing the technique despite considerable evidence of improving the results of CABG. An ideal situation would be to have a superior conduit combined with minimal risk of harvesting site complications. Hence, it is crucial to develop a minimally invasive or endoscopic technique to harvest the NT veins rendering it more acceptance, particularly in the United States.

The left internal thoracic artery, the NT SV, and the RA will conquer the podium in the coming CABG Olympics. Which stands higher will most likely vary depending on the characteristics of each individual patient.

Domingos Souza, MD, PhD^a

Ninos Samano, MD, PhD^{a,b}

^aFaculty of Medicine and Health

Department of Cardiothoracic and Vascular Surgery

^bUniversity Health Care Research Center

Örebro University

Örebro, Sweden