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Commentary: The saphenous vein in coronary artery bypass grafting: Optimizing our workhorse

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CENTRAL MESSAGE

Despite so much emphasis on multiple arterial grafts in coronary artery bypass grafting, the saphenous vein remains a common and reliable conduit, warranting continued clinical and research attention.

Coronary artery bypass grafting remains the gold standard therapy for the management of advanced multivessel coronary artery disease. Integral to the procedure remains the selection of appropriate graft conduits to maximize graft patency and longevity while minimizing complications such as surgical site infection, poor wound healing, and mediastinitis.

Vervoort and colleagues[1] review several aspects currently under different stages of investigation to improve saphenous vein graft (SVG) patency. By addressing different targets of saphenous graft failure, such as external stenting to reduce intimal hyperplasia, pharmacologic targets to suppress long-term vein graft atherosclerosis and thrombosis, saphenous vein storage solutions, and Y-grafting onto an arterial conduit to manipulate vein graft pressures and perfuse the vein graft with endogenous vasodilators, our specialty's research and clinical communities appear aligned on the importance of this issue.

The saphenous vein is considered by many as a fourth-rate conduit, after the left internal thoracic artery, right internal thoracic artery, and radial artery. Nevertheless, the saphenous vein remains the most commonly used conduit worldwide. This is due to its relative ease of harvest, freedom from vasospasm, freedom from manipulation during coronary angiography, length of conduit, and relatively fast recovery from harvest. Traditionally quoted patency rates included early graft failure rates of ~20% and long-term patency of SVGs of 50% at 10 years. However, as surgical and adjunctive medical therapies continue to improve, so do the outcomes of saphenous conduit. For example, in the recent Graft Patency Between no-touch Vein Harvesting Technique and Conventional Approach in Coronary Artery Bypass Graft Surgery (PATENCY) trial, Tian and colleagues[2] demonstrated early SVG failure rates of 2.8% with no-touch SVG harvest and 4.8% ($P < .001$) with conventional SVG harvesting. At 1 year, graft patency was 94.3% in the no-touch SVG group and 93.5% in the conventional harvest group ($P < .001$). Using the saphenous vein as a conduit for Y-grafting off of an in situ left internal thoracic artery has also shown great potential. In the recent Saphenous Vein versus Right Internal Thoracic Artery (SAVE-RITA) trial, Kim and colleagues[3] demonstrated that Y-grafts constructed using the SVG had no difference in patency compared with those constructed using the right internal thoracic artery at 10 years (93.1% vs 96.4%, respectively [$P = .21$]).

Achieving optimal outcomes is dependent on a number of preoperative, intraoperative, and postoperative factors. The first step in ensuring graft patency is the selection of appropriate targets for revascularization. Target vessel stenosis and distal vessel diameter have long been known to affect

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patency; however, we are beginning to better predict graft failure, as well. For example, the recent Impact of Preoperative FFR on Arterial Bypass Graft Function (IMPAG) trial demonstrated that a fractional flow reserve of target vessels < 0.78 significantly influences target patency at 6 months, albeit in arterial conduits.[4] Intraoperatively, transit-time flow measurement (TTFM) is the most commonly used method for to ensure graft patency following completion of an individual bypass graft. The Graft Imaging to Improve Patency trial demonstrated that TTFM was capable of predicting graft failure; however, its use did not improve overall graft patency.[5,6] Zhang and colleagues[7] confirmed these results, showing that an elevated pulsatility index (>3.4) on TTFM was associated with early graft failure. These developments have led to a recent consensus statement on the use of intraoperative TTFM to prevent the consequences of immediate postoperative graft dysfunction.[8] Finally, goal-directed medical therapy, as well as dual antiplatelet therapy postrevascularization is essential to improving graft patency. For example, Zhao and colleagues[9] demonstrated dual antiplatelet therapy with acetylsalicylic acid and ticagrelor significantly increased SVG patency versus either ticagrelor alone or acetylsalicylic acid alone at 1 year (89%, 83%, and 77%, respectively [$P < .001$]).

Inevitably, like with most things in medicine, developments to improve SVG patency will occur in tandem, not sequentially. With a multitude of these therapies used in combination, it is quite plausible that there may be a future role for SVGs in advanced surgical coronary revascularization.

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