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Commentary: Insights in in situ investigation

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The move toward greater use of arterial conduits for coronary artery bypass grafting (CABG) surgery is well ingrained in the field. The ways in which arterial grafts are used continues to evolve. At the Quebec Heart and Lung Institute, 2600 patients underwent internal mammary artery (IMA) grafting in which bilateral internal mammary artery (BIMA) was used.¹ From this cohort, 134 patients who had the second IMA used as a free graft were compared with 2464 patients who had in situ BIMA conduits. The former group fared worse in survival, with the divergence becoming more prominent over time. Survival at 15 years was 79% in the in situ group and 69% in the second free-IMA graft group.

Is the worse outcome due to inherent inferiority of the second free graft or to other causes? Since choice of the second IMA conduit configuration, target vessel, and whom to graft with arteries was left to the surgeon and not to chance, it may be that the reasons for these choices impact survival more so than inherent deficiency in the free graft per se. For instance, in 23 of the 134 patients, injury of the conduit was the reason that it was used as a free graft. The most frequent reason not to use it as an in situ conduit was inadequacy of length ($n = 95$, 71%). Toward addressing the inability to establish causality, the study performed subgroup analyses excluding those with conduit injury, comparing the target territories of the second arterial conduit, and use of the T-configuration for the proximal origin. The secondary analyses did not identify any of these as potential causes for discrepant outcomes between in situ BIMA and a free BIMA, but these numbers become increasingly small as these patients get excluded from an already-small sample of 134.

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One iteration of a composite in situ arterial graft.

CENTRAL MESSAGE

In situ internal mammary artery (IMA) patients fare better than those with a free IMA, even though we are uncertain of the underlying reason.

As techniques evolve in how arterial conduits are used, various strategies and preferences have developed. This study identified that the most frequent reason they used the second IMA as a free graft was inadequate length. Not uncommonly, with more arterial grafting a radial artery is used along with BIMA. In most cases, the entire length of radial is not required to reach the left-sided targets, leaving a length that can be used to extend an in situ right IMA. This composite arterial conduit can then reach any right- or left-sided target, especially if other strategies are used to extend its length, such as skeletonization, fasciotomies, sequential grafting, or routing through the transverse sinus for left-sided targets and a low right pericardial window for right-sided targets.

Preserving the conduit as an in situ vessel might preserve an inherent ability of the conduit to maintain its patency. Vasoactive substances, neurovascular supply of the conduit, or some other factor could mediate this. Although this study did not have angiographic data available to permit commenting on patency rates of conduits or to comment on whether patency correlated directly to the outcomes measured, the use of in situ IMA should be encouraged but a free IMA should not be discouraged if the next best option is a vein graft.

Reference

1. Marzouk M, Kalavrouziotis D, Grazioli V, Meneas C, Nader J, Simard S, et al. Long-term outcome of the in-situ versus free internal thoracic artery as the second arterial graft. *J Thorac Cardiovasc Surg*. 2021;162:1744-52.e7.