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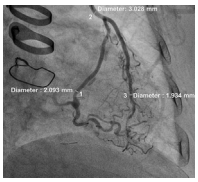

COMPOSITE GRAFT AND REMODELING OF THE SAPHENOUS VEIN IN CORONARY ARTERY BYPASS GRAFT

To the Editor:

As a complement to arterial grafts, especially to the internal thoracic arteries (ITAs), the saphenous vein (SV) has been widely used in coronary artery bypass graft (CABG) surgery. Implanting a vein as an arterial substitute causes the venous vascular wall to adapt to compensate for elevated hemodynamic forces. Due to increased shear stress, a remodeling is initiated, with functional endothelial modifications, reducing nitric oxide synthesis and stimulating intimal hyperplasia. These alterations are deleterious, contributing to the failure of the venous grafts.[1,2]

The development of external stents emerges as an approach to limit the hyperdistention of venous grafts, therefore minimizing the pathologic changes resulting from "venous remodeling."[1,2] Taggart and colleagues,[1] in their relevant multicenter and randomized study, presented similar patency between SV grafts with or without application of external stents, illustrating a reduced degree of parietal irregularities and intimal hyperplasia in venous grafts in which an external stent was used, in 2 years of follow-up.

This approach illustrated by these authors, despite the benefits described, has limitations extending from the uncertainty regarding the long-term effectiveness of the application of external stents, to the economic limitations for widespread use of these devices. Moreover, an inflammatory response resulting from the contact of the stent with the venous adventitious layer is described in the literature, with production of prostacyclin and reactive oxygen species, macrophage migration, and stimuli to the proliferation of the intimal layer.[2,3]

For these reasons, more physiological approaches can be adopted to avoid or mitigate the pathologic remodeling of the SV that results from the arterialization of venous grafts. The use of arteriovenous composite grafts with the ITA is a technique used systematically by several groups in CABG, especially to avoid handling of the ascending aorta.[3,4] Benefits of this technique exceed the decreased incidence of neurological adverse events, with mounting evidence indicating that, in this configuration, the SV would be subjected to less shear stress, thus reducing pathological distention, resulting in reduced intimal hyperplasia in short and medium-term.[4,5]

Our group analyzed the angiographic studies of 14 patients who underwent CABG with a specific graft configuration: an aortocoronary SV graft to the right coronary system, and a composite arteriovenous graft

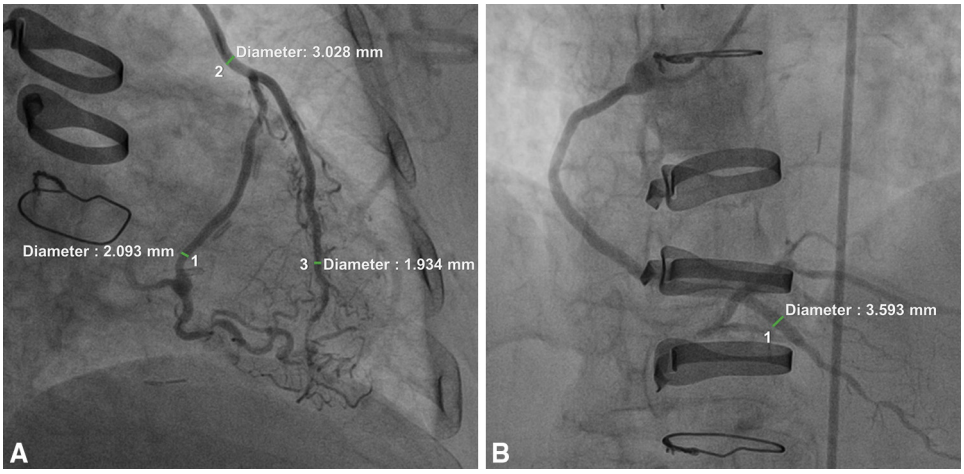

FIGURE 1. Comparison of the diameter of the saphenous vein as a secondary graft in a composite graft, and as an aortocoronary graft. Angiographic view: (A) Arteriovenous composite graft with the left internal thoracic artery (LITA) and saphenous vein (SV). Diameter of SV (1), proximal LITA (2), and distal LITA (3) is highlighted. (B) Aortocoronary saphenous vein graft in the same patient. Diameter of the venous graft is also indicated.

with the left ITA revascularizing the anterior descending artery, while an SV anastomosed to the ITA revascularized another artery of the left coronary system. At 94.42 ± 49.2 months after surgery, SV segments revascularizing the right coronary system had a mean diameter of 3.39 ± 0.66 mm, whereas SV from the ITA measured 2.31 ± 0.55 mm ($P < .001$). Figure 1 illustrates these findings, which were similarly reported by Hwang and colleagues in 2015 and 2017.[4,5]

In summary, we congratulate Taggart and colleagues[1] for the valuable article, and for the effort to improve the results obtained with the venous grafts. We emphasize, however, that the adoption of other technical approaches, such as composite grafts, might be more economically feasible and considerably more physiological to improve CABG results.

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References

1. Taggart DP, Gavrilov Y, Krasopoulos G, Rajakaruna C, Zacharias J, De Silva R, et al. External stenting and disease progression in saphenous vein grafts two years after coronary artery bypass grafting: a multicenter randomized trial. *J Thorac Cardiovasc Surg*. April 21, 2021 [Epub ahead of print].
2. Girão-Silva T, Fonseca-Alaniz MH, Ribeiro-Silva JC, Lee J, Patil NP, Dallan LA, et al. High stretch induces endothelial dysfunction accompanied by oxidative stress and actin remodeling in human saphenous vein endothelial cells. *Sci Rep*. 2021;11:13493.
3. Samano N, Souza D, Dashwood MR. Saphenous veins in coronary artery bypass grafting need external support. *Asian Cardiovasc Thorac Ann*. 2021;29:457-67.
4. Hwang HY, Koo B, Yeom SY, Kim TK, Kim K. Endothelial shear stress of the saphenous vein composite graft based on the internal thoracic artery. *Ann Thorac Surg*. 2018;105:564-71.
5. Hwang HY, Koo BK, Oh SJ, Kim KB. Morphologic changes of the saphenous vein Y-composite graft based on the left internal thoracic artery: 1-year intravascular ultrasound study. *J Thorac Cardiovasc Surg*. 2015;149:487-93.

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