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Commentary: Functional coronary artery stenosis—How can we functionally apply this to the operating room?

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CENTRAL MESSAGE

Graft patency is better at 5 years in functionally significant and severe stenosis but how should this guide our operative decision-making and how does it affect long-term survival for these patients?

In this edition of the *Journal*, Hwang and colleagues¹ studied graft patency rates at 1 and 5 years after coronary artery bypass grafting (CABG). Preoperatively, the functional significance of coronary artery stenosis was evaluated using single-photon emission computed tomography and the degree of coronary stenosis was classified as either intermediate (70%-90%) or severe ($\geq 90\%$). At 1 and 5 years, graft occlusion rates were greater in functionally insignificant stenosis compared with functionally significant and in intermediate stenosis as compared with severe stenosis.

It should be noted that all of the patients in this study underwent off-pump CABG with a Y composite graft using a left internal mammary artery (IMA) and right IMA (14%) or left IMA and saphenous vein graft (86%). The average Society of Thoracic Surgeons risk score was 1.2, and the average ejection fraction was 57%. Although this limits the broad applicability of the study's findings, it does provide fewer confounding variables for graft failure due to the limited grafting strategies and a low-risk patient population.

In this manuscript, the authors fail to address the significant effect coronary artery territory has on graft failure. There was an odds ratio of occlusion of 6.11 and 14.88 for the left circumflex and right coronary artery, respectively, as compared with the left anterior descending. Was there a difference in the type of graft used or a difference in the degree or significance of stenosis that would cause such a difference in the odds ratio of occlusion for these 2

territories? In addition, in that same model, the type of conduit did not have an effect on graft occlusion. While the authors cite the SAVE RITA (Saphenous Vein Versus Right Internal Thoracic Artery as a Y-Composite Graft) trial² in support of that finding, there are numerous other studies demonstrating improved patency of bilateral IMAs over saphenous vein grafts.³⁻⁶

The authors conclude that in a difficult CABG, surgeons may consider skipping lesions of moderate, functionally insignificant stenosis because of the 14% graft failure rate. We would caution the authors with that statement and propose the opposite—with an 86% 5-year patency rate, even a moderate, functionally insignificant stenosis should be attempted. Forgoing a graft at potentially greater risk of occlusion risks a bigger problem of under-revascularizing the patient. After all, CABG provides the patient with the best chance complete revascularization and improved survival.

In this study, Hwan and colleagues assessed graft failure rate 5 years after CABG and demonstrate that failure rates are greater when the target vessel is moderately stenotic as compared with severely stenotic and a functionally insignificant stenosis as compared with functionally significant. The one glaring omission with these findings is the effect of graft failure on survival. If we are to change practice in regards to which coronary anastomoses we perform and which we skip due to poor graft patency, there needs to be a demonstrated survival benefit. We commend the authors on this study and encourage them to look at long-term survival in addition to graft patency in this cohort of patients.

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Commentary: Y bother?

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In this edition of the *Journal*, Hwang and colleagues¹ explored the impact of severity and significance of coronary artery stenosis on graft patency following coronary artery bypass grafting. Specifically, they sought to determine the impact of functional significance of the stenosis compared with the angiographically determined degree of stenosis. To determine functional significance, they used myocardial single-photon emission computed tomography (SPECT).

During the 5-year study period, 295 patients underwent off-pump coronary artery bypass grafting with composite y-grafts (42 right internal thoracic artery and 253 saphenous vein) based off an in situ left internal thoracic artery for an average of 3.5 distal anastomoses per patient. A total of 1031 anastomoses were then surveilled at 1 and 5 years via either standard or multidetector computed tomography angiography. The authors found that lack of functional ischemia, particularly in arteries with less than severe (90%) stenosis, was a risk factor for graft occlusion.¹

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Will it stay open?

CENTRAL MESSAGE

Understanding the severity and significance of coronary artery stenosis may eventually help guide surgical revascularization strategies.

Advancing technologies, such as fractional flow reserve, are now helping guide coronary interventions. Understanding the importance of not only the anatomic degree of coronary stenosis but also the physiologic degree of stenosis has made a large impact on the decision-making process of percutaneous coronary intervention.^{2,3} How this information translates to bypass graft patency is not entirely clear, as the concept of competitive flow is an issue solely limited to surgical revascularization.

Composite configurations and use of sequential grafts have not clearly been shown to be inferior with regards to patency rates.⁴ However, use of such grafts complicates the issue of competitive flow and factors that may lead to graft occlusion. This limits what useful information can be extracted from this study, as these configurations may introduce the potential for competition in flow not only