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Commentary: Microvesicles, personalized surgery, and tailored medical therapy to improve coronary artery bypass grafting outcomes

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When it comes to graft patency in coronary artery bypass grafting (CABG), there are likely myriad factors, such as patient baseline characteristics, coronary anatomy, and procedure-related aspects, that are associated with outcomes.^{1,2} It is up to a surgeon to weigh all these different considerations when it comes to deciding what operation to offer his or her patient. In coronary surgery, the key procedure-related questions include off-pump or on-pump, multiple arterial grafts versus supplemental vein grafts, conduit harvesting techniques (eg, skeletonization, no touch,

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CENTRAL MESSAGE

Future advancement in understanding microvesicle signature can help to tailor both surgical and medical therapy in patients undergoing coronary artery bypass grafting.

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or endoscopic), and which conduits should be anastomosed to which diseased vessels.³⁻⁵ These considerations are carefully weighed based on the patient's baseline level of health, comorbidities, conduit quality and availability, and the anatomy of the diseased coronary vessels. Moore and Harken⁶ review an article that looked at microvesicles; that is, circulating molecules in the blood that when analyzed, provide a unique signature to describe an individual's coagulation profile (eg, whether he or she is in a prothrombotic state or not). Moore and Harken⁶ argue that perhaps surgeons have been too hard on themselves when it comes to graft failure and that some of the blame can instead be explained by a hypercoagulable profile. As Moore and Harken⁶ point out,

a surprising finding in this study is the similar rate of late occlusion in the venous and arterial grafts. Arterial grafts are believed to fail in the face of competitive flow, whereas saphenous veins initially fail with thrombosis and intimal hyperplasia. One would expect that a prothrombotic microvesicle signature would differentially lead to venous rather than arterial graft occlusion. Both types of grafts were harvested in a no-touch fashion—a concept that has been extended to veins and championed by many institutions,⁷ with long-term results out of South Korea suggesting similar patency of no-touch veins to arterial grafts.⁸ In addition, the rate of graft occlusion was overall quite high in this study. This could be explained, at least in part, by the case-control study design. We agree that further research into the possible differential thrombosis-related factors for venous versus arterial grafts would be informative.

Overall, the novel work by Camera and colleagues⁹ could be leveraged to help personalize treatment for patients after CABG by analyzing circulating microvesicles. One could predict those at high risk for graft thrombosis and consider intensive antithrombotic therapy in the form of dual antiplatelet therapy, which is evidence based.⁹⁻¹¹ Less is known about the efficacy of vitamin K antagonists or direct Xa inhibitors to prevent graft thrombosis; recent subgroup analyses from a large trial comparing low-dose rivaroxaban with aspirin to aspirin alone suggests that the addition of a direct Xa inhibitor may not be beneficial.¹¹ Furthermore, several studies have examined pharmacological treatment resistance to antiplatelet therapy in those with recent acute coronary syndrome events and found an association between treatment resistance and worse adverse events.^{12,13} Although not addressed in this study, other important data include whether an individual patient is a responder to antiplatelet medications and the patient's overall risk of bleeding—the use of microvesicle signature to understand a patient's response to antiplatelet therapy would be a natural extension of the current work.

We wholeheartedly agree with Moore and Harken⁶ that further work in this area should be undertaken by cardiac

surgeons with larger cohorts to corroborate the findings by Camera and colleagues⁹ and better understand the potential of using microvesicle signature to personalize both perioperative and postoperative treatment of patients undergoing CABG.

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