In conclusion, I congratulate Navia and colleagues¹ on their excellent work. As we continue to promote and pursue improvements in surgical technique, a holistic, multipronged approach is the only way to ensure well-being for the masses.

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Commentary: Bilateral internal thoracic artery grafting in elderly patients? Elephant on a slippery slope

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The authors present their experience with coronary artery bypass grafting (CABG) in patients older than age 70 years using bilateral internal thoracic artery (BITA) grafting (n = 968) versus single ITA (SITA) (n = 332) during a period lasting from 2001 to 2018. They matched the 2 cohorts to 253 pairs of patients. Ten-year survival was significantly higher in the BITA cohort both in unmatched and propensity-matched groups, as well as in multivariable

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CENTRAL MESSAGE

Exclusive BITA grafting is feasible routinely in consecutive patients undergoing CABG. There is probably a volume/outcome relationship. Advanced age should not be a contraindication for BITA grafting.

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Cox proportional hazard analysis. In addition, postoperative outcomes were similar in both matched groups.¹

The authors should be applauded for searching, implementing, and adopting over the past 20 years a uniform and demanding coronary revascularization surgical technique based on the use of skeletonized BITA harvest with off-pump coronary artery bypass (OPCAB)-BITA composite-T sequential grafting in most of their patients undergoing CABG, based on their outcomes. In addition, the

well-written article includes a thorough statistical analysis, well-covered relevant literature, and frankly described study limitations. The subject of the current analysis is of vast importance because this topic is still controversial in literature: Do patients older than age 70 years benefit from BITA? Unfortunately, and not surprisingly, the informal consensus nowadays is that they do not. This affects many elderly patients who could benefit from the advantages of skeletonized BITA grafting.

Many surgeons, out of their comfort zone, will describe this study as simply another coming from a CABG center of excellence and based on niche technique that cannot be applied everywhere. I totally disagree. These assumptions have resulted in stagnation with regard to BITA use (<5%) in the United States² and in significant disservice to patients undergoing CABG.

The study period was long, and most of the SITA procedures were done in the earlier part presumably because of evolving experience in BITA grafting, which may have played a role in the final results. This group used SITA plus saphenous vein grafts on pump from 1996 until 1998 when radial artery grafts were introduced, and the OPCAB technique using this surgical strategy started in 2001. From 2003 until the present, they have performed OPCAB–skeletonized BITA grafting in a composite-T configuration as their regular and consecutive CABG surgical technique. This may explain why only 75% of SITA patients underwent operation with OPACB as opposed to 98% in the BITA group, and that in the prematched cohorts, SITA patients seemed to be somewhat sicker. But overall, that would be the expected evolution of treatment by a department striving to provide the best long-term survival for patients undergoing CABG.

One could argue that the survival advantage stems not from the BITA use only, but maybe also from the uniform OPCAB technique, the uniform composite-T sequential grafting, or both. Or from the fact that no other grafts were used in this BITA-only group.³ It has been previously shown, that if BITA is used, no matter the configuration, a patient's 10- and 15-year late survival will be increased.⁴ In many previous studies, the OPCAB technique seemed to have low perioperative morbidity with no effect on survival. In elderly patients, particularly, who tend to present with more calcific atherosclerotic aortas, no or less manipulation or crossclamping of the aorta might be important in preventing stroke even in on-pump BITA grafting.⁵ The main disadvantage of the OPCAB technique is higher incidence of incomplete revascularization, which may be an important factor for decreased long-term survival.⁶ The authors achieved a very good rate of complete revascularization—85%—probably as a result of their extensive OPCAB experience. As for controlling for significant large coronary vessels with <70% stenosis, or intraoperative competitive flows, this group adopted the use of

intravascular ultrasound and fractional flow reserve to identify significant coronary stenosis and the use of intraoperative transit-time flow measurements in all their BITA CABG cases, which probably should be adopted everywhere.⁷

Notably, all staff surgeons in this department have adopted these changes in the surgical approach over time. This is unique and not at all an obvious finding. Other cardiac surgery departments all over the world went through similar tracks.⁸ It is a remarkably difficult process with numerous objections and obstacles down the road. In contrast to the majority of surgeons adhering to the convenient conventional left ITA plus saphenous vein graft CABG, these surgeons should be commended for their constant and keen efforts to discover the most life-enhancing CABG techniques.

In a recent relevant study by Zhu and colleagues,⁹ more than 1 million Medicare patients underwent primary isolated CABG with SITA and more than 25,000 underwent operation with the use of BITA. After meticulous propensity matching, Medicare patients who received BITA demonstrated improved long-term survival and lower reoperative CABG rates than those who underwent SITA. One could argue that the same effects in observational studies of treatment allocation bias and hidden confounders apply to this study, no matter its numbers.¹⁰ On the other hand, the current study¹ may imply something different. There are surgeons who adopted BITA grafting technique and applied it almost routinely in their practice, no matter the age or risk factors (the exception is the left ITA plus saphenous vein graft strategy). It is hard to argue with the numbers and outcomes in the study by Zhu and colleagues⁹ in more than 1 million real-life Medicare patients undergoing CABG, even in the face of supposedly the best-designed randomized controlled trials with their own inherent problems.¹¹

The importance of the current study is the fact that BITA enhanced survival specifically in an elderly population. If one were to plan a randomized BITA versus SITA study nowadays, would it not be better to concentrate on patients older than age 70 years? Obviously, it would be easier to recruit participants because this is a real, controversial group of patients where equipoise of treatments in fact may exist, although there may be no logical reason to assume that the same biologic effect of BITA improving survival in patients aged 50 to 70 years should be different in patients older than age 70 years.¹² Part of the techniques applied in this current study should become routine practice. With our current evidence-based knowledge, are there any surgical arguments against routine use of the skeletonization technique with use of BITA?¹³ Are there pertinent realistic arguments against the notion that BITA grafting is increasing overall survival, or at least never decreasing it?^{14,15}

However, the elephant in the room is not the group of patients older than age 70 years. It is the other group of patients younger than age 70 years. Have surgeons in the United States followed the guidelines in regard to this lower-risk age group? Let's put aside the controversial issue of BITA in patients with diabetes (which by accumulating data with the skeletonized technique is virtually nonexistent anymore) to consider how many patients without diabetes younger than age 70 years are currently receiving BITA grafting (Class IIA)? In an important study by LaPar and colleagues,¹⁶ a total of 43,823 primary, isolated patients undergoing CABG in a regional Society of Thoracic Surgeons Database were evaluated. Patients were stratified by BITA versus SITA use, and 24% (n = 10,327) met criteria of low risk for BIMA use, including younger than age 70 years, no or mild chronic lung disease, body mass index <30, and absence of diabetes. The overall BIMA use was 3%, and in the low risk patients an astonishing 6% only.¹⁷ This outcome of so many eligible but underserved patients is unexplainable, and should resonate in every coronary surgeon's mind. The reasoning behind this slippery slope of BITA use, the age ceiling for BITA grafting, the limiting of the eligible groups, finding all kinds of alternative more comfortable conduits, and so on is unfortunately mostly related to financial constraints and lack of motivation. BIMA grafting is a novelty for most cardiac surgeons because of lack of exposure during training and practice and egotistic refusal to invest the time required to learn the teachable skeletonized BITA harvesting and grafting techniques.

Finally, let me reiterate the powerful words from a most excellent commentary: "There is the argument that, 'this patient will not live very long, so he or she will not benefit from BITA.' Who are we to judge the lifespan of our fellow beings? I have yet to meet any doctor with this ability to predict. Length of life is the purview of only 1 entity as far as we know. Performing arterial grafting treats all patients with the best conduits available, without preferentiality, without judgment."¹⁷ I add a prayer: "Cast me not off in the time of old age, when my strength fails do not forsake me." (Psalms 71:9).

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