Make sternotomy great again

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Our specialty’s history is decorated with brave individuals who could develop and apply innovations to boldly explore the frontiers of cardiac surgery. The conventional sternotomy has facilitated many of these advances. Curiously, we have not substantially innovated the technique of sternal closure since its introduction at the dawn of cardiac surgery. We continue to split the sternum and secure it with traditional wire cerclage. We wait and hope for bony fusion. Patients’ discomfort, respiratory mechanics, and functional physical recovery are tightly associated with this slow healing process. In an effort to accelerate recovery and improve patient satisfaction, talented surgeons have minimized or even avoided the sternotomy. With competing advances in wire-based interventions, the urgency and frequency of minimally invasive and sternal-sparing procedures has accelerated. The reliable, safe, and steadfast sternotomy is now perceived as obsolete—sometimes even a disappointment when required.

In this issue of the Journal, Nair and colleagues1 present the results of a pragmatic randomized, controlled trial comparing patient recovery and costs between conventional sternotomy and a minimally invasive approach that divides only the upper half of the sternum. The study convincingly shows that there is no significant cost saving or benefit to patient recovery provided by a minimal sternal incision. This study is well designed and executed. It reflects the best evidence to date on the effects of “ministernotomy” relative to conventional full sternotomy. This study design should be acknowledged as a criterion standard for future studies. Clinical studies to assess surgical approaches and effects on recovery must include qualitative patient-centric metrics. Such data will be critical to maintain open-chest cardiac surgery as relevant in the current era. We must temper our enthusiasm until we have rigorously validated our minimally invasive innovations.

The response in our surgical community to the article of Nair and colleagues1 will be intriguing. Enthusiasts will argue that substantial differences would have been shown by more experienced surgeons or newer minimally invasive approaches (limited thoracotomy). Accordingly, use of expertise based randomized clinical trials may mitigate such concerns for future studies.2 Expertise-based trials are well suited to validating surgical innovations. Surgeons perform only the procedure for which they have expertise in each arm of the trial.

More conventional surgeons will be reassured by the data of to the article of Nair and colleagues.1 Full sternotomy still provides excellent outcomes. I predict that the vast majority of surgeons will not change their approach for access to the aortic valve. Both approaches are shown to be safe and effective. These data should inform us, however, and, in so doing, substantially shape the conversations that we have with both patients and referring physicians.

Perhaps more effort needs to be focused on improving the technique of sternal closure, rather than on minimizing or avoiding it. Improved early bone fixation with external mechanical devices can accelerate sternal bone healing and improve outcomes.3 Similarly, my translational research team has developed an approach with novel biocompatible adhesives4,5 that improved early bone fixation, reduced pain, and accelerated recovery. We are validating a new iteration that is promising (NCT03365843).6 Sternotomy can be made great again. Robust study designs will be required.

Central Message
Minimally invasive approaches must be rigorously validated by well-designed randomized clinical trials. Innovations for sternal closure may also enhance patient recovery and should be explored.

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References

