The days of future past

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Nambiar and colleagues¹ are to be commended for their large clinical series of minimally invasive off pump coronary artery bypass grafting (CABG) procedures with bilateral internal thoracic arteries (ITAs), with excellent short-term outcomes, published in this issue of the *Journal*. This approach clearly required a great deal of innovation and technical expertise, and such innovation has played a critical role in the history of cardiac surgery. Nambiar and colleagues¹ are addressing a question that has been asked for more than 20 years: Is there a viable, minimally invasive CABG technique that is scalable and adds value? In the 1990s, Calafiore and associates² and Subramanian and colleagues³ described an off-pump left ITA to left anterior descending coronary artery grafting through a small left anterior thoracotomy. Similarly, our group and others⁴ investigated single and multivessel CABG through a minithoracotomy with cardiopulmonary bypass with an endoaortic balloon occluder. Although these approaches were innovative, like the approach described in this article, they were not widely adopted during the next 20 years. Why?

In the classic book *The Innovator's Dilemma*, Christensen⁵ asserts that when innovation is plotted against value, the curve is S-shaped. To add value, the innovation (or technique) must ultimately be scalable and reproducible (in this case by other surgeons and institutions). Then, assuming the technique is reproducible, long-term clinical outcome studies are necessary to assess the techniques against the standard of care.

CABG has remained the standard of care for coronary revascularization primarily because of the durability and long-term patency of the bypass grafts, which decrease the incidence of late cardiac events relative to other treatments. For example, the 5-year results of the SYNTAX (Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery) trial⁶ demonstrated that the rates of myocardial infarction and repeat revascularization were significantly lower for patients undergoing CABG than for those undergoing percutaneous coronary interventions in a population with complex multivessel disease.

Another issue related to value is the use of single versus bilateral internal thoracic artery or radial artery grafts.

Neel K. Ranganath, MD (left), and Aubrey C. Galloway, MD (right)

Central Message

For minimally invasive CABG to be more widely applicable in the future, the technique must be reproducible by others, and long-term outcomes must be equivalent to those of open surgery.

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American College of Cardiology and American Heart Association evidence-based guidelines recommend single ITA grafting as a class I indication, with the use of a second ITA as class IIA and radial artery use as class IIb. Even this issue, however, is still being studied. Taggart and associates⁷ recently demonstrated no significant difference in mortality or rates of cardiovascular events between single ITA and bilateral ITA grafts at 5 years, although sternal wound complications were more common in the bilateral ITA group. Further evaluation will likely help guide future recommendations, but at present the use of a second arterial graft is likely beneficial in suitable patients. Finally, although the off-pump versus on-pump issue is still debated, the positive results in most of the randomized trials have been in patients operated on through a sternotomy with the use of cardiopulmonary bypass, and this approach should still be considered the gold standard.

For the innovative approach of Nambiar and colleagues¹ to be compared with the current standard of care, the technique would need to be scalable to other surgeons, and long-term outcomes would need to be equivalent. Certainly, Nambiar and colleagues¹ are to be applauded for their innovation. But the question, “Is this the future?” remains very premature.

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