Toward improved coronary artery revascularization: Is this as good as it gets?

Editorial

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Even if you are on the right track you will get run over if you just sit there.

Will Rogers

For those of us entrusted with the care of cardiac patients, surgical revascularization of the coronary circulation has been a key defining development in the last half of the 20th century. Over 50 years ago in *CMAJ*, the Canadian pioneer Arthur Vineberg first described his visionary concept of diverting the internal mammary artery through an intramyocardial tunnel to achieve revascularization.[1] Although Vineberg first applied this technique to humans in 1950, it was René Favaloro at the Cleveland Clinic who, 2 decades later, popularized direct coronary revascularization using coronary artery bypass grafting (CABG).[2,3] Although it was initially recognized that this procedure dramatically improved the symptoms of ischemia, it is now appreciated that improved *survival* can also be achieved in certain high-risk patient groups, such as those with triple-vessel coronary disease and left ventricular dysfunction as well as those with stenosis of the left main coronary artery.[3]

In this issue (page 221), Dr. Jack V. Tu and Keyi Wu report on temporal trends in death rates among 67 784 patients who underwent CABG in any of the 9 cardiac surgical programs in Ontario between fiscal year 1981 and fiscal year 1995. Remarkably, both raw and adjusted rates of death decreased in that 15-year period, particularly from 1986 to 1995, when the rates declined from 5.0% to 2.4% and from 5.5% to 1.9% respectively. The authors suggest that the provision of annual surgical report cards on case-mix and risk-adjusted outcomes to each institution beginning in 1993 (comprising data from the Cardiac Care Network of Ontario) may have been responsible for the steeper annual decline of approximately 9.0% seen in 1993 through 1995, as opposed to the decline of about 6.0% seen between 1987 and 1992. However, one could choose other 3-year periods between 1981 and 1993 and show an even greater decline, as occurred, for example, between 1986 and 1988. Moveover, it would be useful to know how reporting was incorporated and promoted within the quality improvement initiatives of individual institutions before we accept the authors' premise.

The development of the Cardiac Care Network of Ontario and the careful analysis of its data by the group at the Institute for Clinical Evaluative Sciences led by David Naylor has made a significant contribution to our understanding of risk stratification of patients undergoing cardiac surgery, appropriate triage of patients on waiting lists, variation in rates of bypass surgery and even resource-intensity adjustments that influence funding of cardiac surgical services in Ontario.[4-6] This group has also underscored differences in practice styles that are associated with substantial variability between centres.[7] Hence, assigning an appropriateness score to indications for CABG, they found that whereas 96% of procedures were deemed clinically appropriate on the basis of severe anatomic disease or moderate to severe angina, there was an inverse relation between rates of bypass surgery and appropriateness of case selection.[7]

Improvements in anti-ischemic medical therapy and in cardiac anesthesia, enhanced myocardial protection and greater use of the internal mammary conduit, together with process-of-care developments emphasizing a team approach, have unquestionably contributed to the remarkable survival benefit reported by Tu and Wu. Even before the use of surgical report cards the knowledge that data were being collected from all centres may have given rise to a Hawthorne effect that contributed positively to internal quality control.[8] Ghali and colleagues[9] have emphasized that a decrease in in-hospital death after CABG occurred in Massachusetts despite the absence of state-wide reporting such as that implemented in New York State. During the period examined by Tu and Wu, length of hospital stay undoubtedly shortened. Hence, an undisclosed proportion of postoperative deaths may have occurred between the earlier discharge from hospital and day 30 (when surgical death rates are commonly assessed), thereby contributing to an apparently lower in-hospital death rate. In sum, although the impressive decline in rates of death observed is commendable, it is also likely multifactorial.

Tu and Wu do not address the impact of individual surgical performance on outcomes. This factor has been recognized as a key modulator of success and may also be subtly linked to the use of internal mammary grafts: it has been noted that surgeons who prefer this type of graft may also employ other technical advances that result in better quality of care overall.[10] Improved outcomes for CABG in New York State from 1989 to 1992 have been related in part to changes that influenced surgical practice, such as hiring new surgeons with a commensurate reduction in death rates, referring high-risk cases to specific surgeons within an institution or to other institutions with better results in high-risk patients, and reorganizing surgical programs with withdrawal of surgical privileges from surgeons with persistently poor performance.[11]

Unquestionably, the acquisition and tracking of pertinent data allow for the best traditions of continuous quality improvement to prevail. We should exercise caution, however, in assuming that the welcome reduction in the rate of death is associated with a commensurate improvement in other markers of improved care, such as functional status, perioperative complications, readmission rates and long-term survival. Others have observed a poor correlation between death rates after CABG and complications.[12] Hence, tracking these indices — along with patient satisfaction — while ensuring that expensive resources are used prudently is a worthy but complex mandate.

These improvements notwithstanding, CABG remains a palliative procedure. In the future, we will face a growing cohort of patients who have had multiple revascularizations and who may have neither native vessels amenable to revascularization nor arterial or saphenous conduits available to deploy. Innovations are appearing on the horizon that hold hope for such patients; these include a return to Vineberg's original vision of enhanced collaterization of the heart — this time, however, through advances in molecular biology such as the introduction of growth factors to induce neoangiogenesis in the ischemic myocardium.[13] Finally, any encounter with a patient who has undergone or needs CABG is a signal to the practitioner to search for previously neglected or recently discovered risk factors. Powerful new lipid-lowering therapies that not only stabilize coronary plaque but lead to regression and improved outcomes as well as exciting new antithrombotic and antiplatelet therapies promise to enlarge the physician's armamentarium and make further contributions to the health of patients with atherosclerotic disease. Although Tu and Wu signal that CABG is on the right track in Ontario, this is hardly reason for complacency since, as Will Rogers suggests, there is good reason to move forward.

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