ity, liberalism, and pluralism be maintained while health care costs are kept under control and the cherished features of the present system are sustained? The birth of state-led managed care in France has clarified the challenge ahead: Can France adapt the NHI system to the exigencies of technological and economic change without provoking insurmountable opposition from the medical profession? In other words, can the Douste-Blazy reform actually be implemented, or will it provide support for that well-worn aphorism — *plus ça change, plus c'est la même chose*?

From the Wagner School, New York University, and the World Cities Project, International Longevity Center–USA, New York (V.G.R.); and the University of Paris–Dauphine, Paris (C.L.P.).

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Prolonging Patency — Choosing Coronary Bypass Grafts

Bruce W. Lytle, M.D.

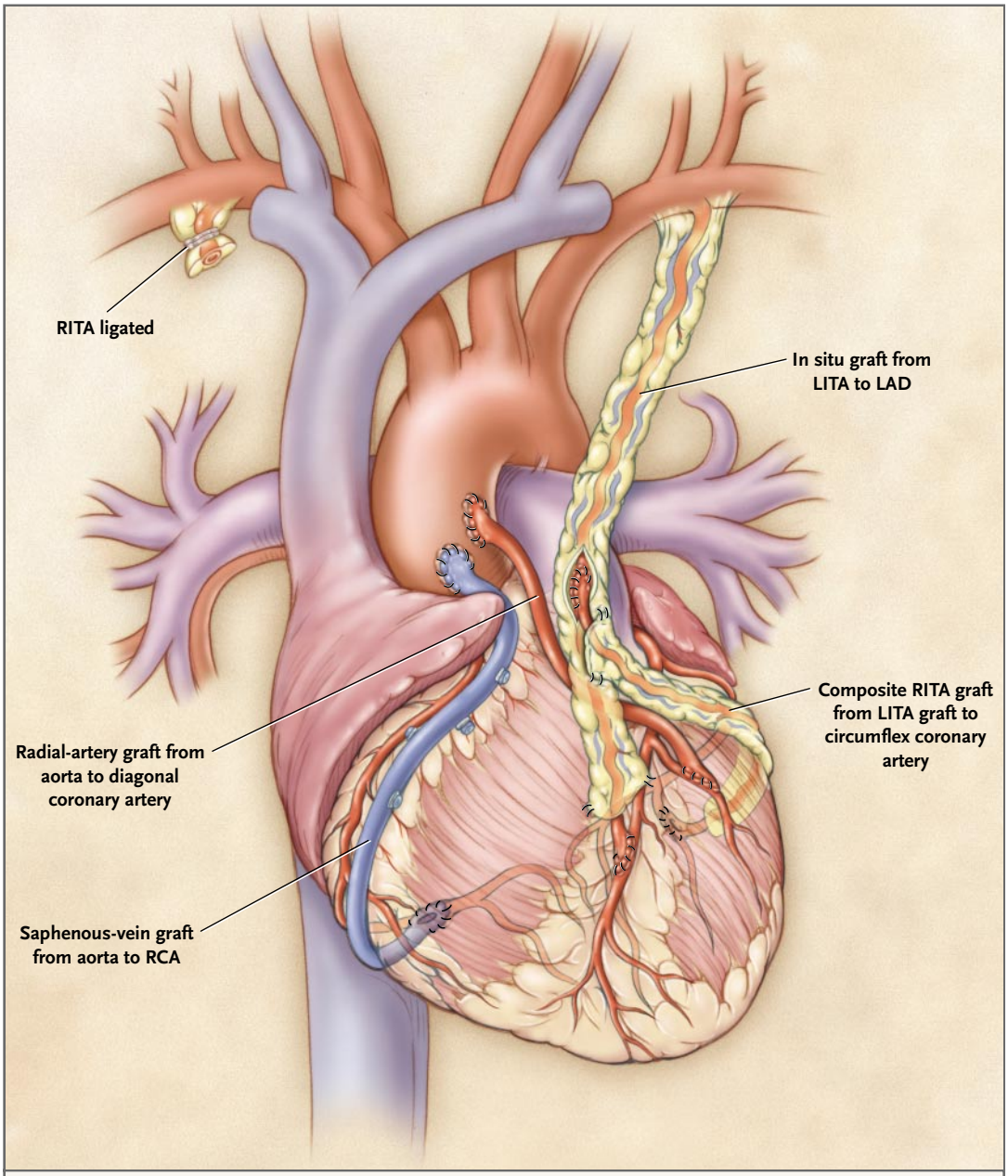
Related article, page 2302

The benefits of coronary bypass surgery last only as long as the grafts continue to function. Aorta-to-coronary saphenous-vein grafts (see diagram), the most widely used type of bypass graft, have historically had an occlusion rate of 10 to 15 percent within a year after surgery. Beyond 5 years after surgery, graft atherosclerosis develops in substantial numbers of saphenous-vein grafts, and progressive graft failure occurs so that by 10 years after placement, 60 to 70 percent of grafts are patent and half of those have angiographic evidence of atherosclerosis. By 20 years after placement, the rate of graft patency appears to be only 20 to 25 percent. Late attrition is influenced by coronary risk factors, and it is now clear that treatment with platelet inhibitors and statins has improved outcomes, although long-term data regarding these strategies are not yet available. Because the saphenous veins are long, bilateral, and easy to prepare and have characteristics that make them favorable to handling, saphenous-vein grafts continue to be widely used despite their imperfect patency.

The most common use of internal thoracic (mammary) artery grafts is as a left internal thoracic-artery (LITA) in situ graft to the left anterior descending coronary artery (LAD) (see diagram). The patency rate of LITA–LAD grafts is greater than 90 percent at one year after surgery, and because late atherosclerosis is rare, there is little late graft attrition. At 20 years after surgery, more than 90 percent of such grafts are still functioning. The LITA–LAD graft is the most reliable anatomical treatment for coronary disease that is yet known, and the standard bypass operation now involves this type of graft combined with vein grafts to the other coronary vessels. For years, surgeons have been trying to find other grafts that act more like LITA grafts and less like saphenous-vein grafts. The prime candidates are the right internal thoracic artery (RITA) and the radial artery, and there is still disagreement concerning their relative merits.

Prospective studies of the patency of bypass grafts are difficult to fund and perform. No one manufactures these bypass grafts, and therefore industry rarely funds investigations of bypass grafting. The important differences among these grafts become apparent after long follow-up, and long-term angiographic follow-up studies are expensive and difficult to conduct because asymptomatic patients rarely wish to undergo repeated angiography. Therefore, most of the data regarding the rates of late patency of bypass grafts come from imperfect sources — retrospective, nonrandomized studies involving patients with grafts in whom angiography was performed for clinical indications.

RITA grafts have been used in a few centers for many years, either as in situ grafts or as free grafts originating from the aorta or the LITA (see diagram). Most often the RITA is used as a graft to the circumflex or right coronary-artery system. There



Completed Coronary Bypass Operation.

The surgery depicted involves a saphenous-vein graft from the aorta to the right coronary artery (RCA), an in situ graft from the left internal thoracic artery (LITA) to the left anterior descending coronary artery (LAD), a composite right-internal-thoracic-artery (RITA) graft from the LITA graft to the circumflex coronary artery, and a radial-artery graft from the aorta to the diagonal coronary artery.

are no prospective studies of the patency of such grafts over the long term (>5 years), but shorter-term patency rates have not been quite as good as those for LITA grafts. However, patency rates of all types of grafts to the circumflex and right coronary-artery systems are inferior to those for grafts to the LAD, and the patency rate for RITA–LAD grafts has approached that of LITA grafts. We also know that once a RITA graft has been patent for a few years, the risk of late graft failure is low, and these grafts

may last beyond 20 years after surgery. Finally, there is clinical evidence that adding a RITA graft as a second arterial graft in cases in which a LITA–LAD strategy is already being applied improves long-term survival rates.

There are some problems with using a RITA graft in combination with a LITA graft: the operation is more difficult to perform, takes longer, and in some patients may increase the risk of wound-related complications. Therefore, despite its apparent advantage over saphenous-vein grafts in terms of long-term patency, use of the RITA graft has not been widespread, and surgeons have turned their attention to the radial artery for possible use as a graft that might have better patency than saphenous-vein grafts and be easier to use than RITA grafts.

In comparison with the RITA, the radial artery is larger and easier to prepare. It may be used either as an aorta-to-coronary-artery graft (see diagram) or as a composite graft from the LITA or RITA to the coronary artery. The radial artery is a muscular artery and is often used in combination with systemic vasodilators to decrease the risk of graft spasm and failure.

There have been multiple prospective studies of the short-term patency of radial-artery grafts, including the well-designed prospective, randomized trial comparing the patency of saphenous-vein grafts with that of radial-artery grafts reported by Desai et al. in this issue of the *Journal* (pages 2302–2309). The angiographic study performed one year after surgery in this trial demonstrated an occlusion rate of 8.2 percent for radial-artery grafts and 13.6 percent for saphenous-vein grafts; all grafting was to either the circumflex or the right coronary-artery system. In addition, however, 7.0 percent of radial-artery grafts had diffuse angiographic narrowing (the "string sign"), resulting in a total "bad-graft" rate of 15.2 percent — a figure no different from the failure rate of saphenous-vein grafts and slightly lower than those in some other reports of radial-artery patency during the first year after surgery. Radial-artery grafts — and, in fact, all arterial grafts — are more likely to become occluded or have diffuse spasm when grafted to a coronary artery that is not severely stenotic — a finding noted by Desai et al. It is not clear that all radial-artery grafts that have diffuse spasm will become totally occluded. Some do, however, and five-year prospective studies of the patency of radial-artery grafts show patency rates of 80 to 85 percent.

The most important information is still to come. If angiographic studies between 5 and 15 years after surgery show that radial-artery grafts are not subject to late graft failure, they will represent an improvement over saphenous-vein grafts and will replace these grafts in many standard bypass operations. Today, it is reasonable to substitute radial-artery grafts for saphenous-vein grafts, although we do not yet know whether they have better rates of long-term patency. In experienced hands, RITA patency is almost as good as LITA patency, and there is good clinical evidence that the use of a RITA graft in addition to a LITA graft offers an incremental survival benefit. Because of the increased technical difficulty of operation with bilateral internal-thoracic-artery grafting, if the long-term patency of radial-artery grafts is shown to approach the patency rates of RITA grafts, radial-artery grafts are likely to be substituted for RITA grafts as well as for saphenous-vein grafts in the future.

From the Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic Foundation, Cleveland.