Radial Artery as the Second Choice Conduit: Some Unsolved Problems

To the Editor:

Zacharias and colleagues1 deserve credit for publishing the first ever propensity-matched 6-year outcomes comparison of radial artery (RA) and venous conduits in coronary bypass surgery with left internal thoracic artery to left anterior descending artery grafting (CABG-LITA-LAD) patients. Their conclusion that using radial arteries as a second arterial conduit in CABG-LITA-LAD as opposed to vein grafting improves long-term outcomes as a result of decreased late deaths, especially after the third postoperative year, sounds exciting. However, there are still some unsolved problems that raise genuine concerns about using radial artery as the second choice conduit instead of the right internal thoracic artery (RITA).

In the modern era of total arterial myocardial revascularization, the radial artery has been reevaluated and rediscovered as an alternative arterial conduit. Its revival became possible because of the availability of antispastic agents and the improvement in the harvesting technique.2 Nevertheless, the 2 major problems of hyperspasticity and intimal hyperplasia are still unsolved entirely. Anatomically, the RA is a muscular artery.3 Therefore, there has been a functional problem about hyperreactivity to various external stimuli, which not only could result in vasospasm with a possible fatal deterioration in the postoperative hemodynamics but also could influence the graft patency.

Fibrous intimal hyperplasia is another major problem of the RA because of focal damage to the intima.4 In addition, intimal hyperplasia is likely to develop, especially when the RA is anastomosed directly to the ascending aorta.3 Furthermore, in a recently published study, Ikeda et al5 showed that the G/N ratio (ratio of the luminal diameter of the graft to that of the revascularized native coronary artery) of the RA significantly increased over a period of time postoperatively. This statistically significant increase in the G/N ratio of the RA may cause deterioration of the long-term patency because excessive luminal enlargement of the graft diameter could lead to deterioration in the graft patency through the decrease in the shear stress.3

Undoubtedly, there are many potential advantages of using the RA instead of the RITA graft. The RA is larger and easier to work with than the RITA, its preparation is straightforward and can be accomplished during the left internal thoracic artery (LITA) dissection, and using the RA instead of the RITA avoids any increase in sternal wound complications associated with bilateral internal thoracic artery (BITA) grafting. However, with the skeletonization of BITA, total arterial myocardial revascularization can be achieved purely with ITAs without increased risk of sternal wound complications and with the avoidance of extra incisions for conduit harvesting. Hence, at present, the above mentioned concerns definitely raise the question: Should radial artery be the second choice conduit?

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Response

We thank Dr Raja for his comments regarding our Circulation article.1 In response, we wish to emphasize that our study was focused on the question of whether radial artery versus vein conduit use positively affects survival and was not designed to compare use of radial versus right internal thoracic artery (RITA). We explicitly stated that the latter should be addressed in future studies.1 However, it is noteworthy that the survival benefit we report with radial versus vein in coronary bypass surgery with left internal thoracic artery to left anterior descending artery grafting (CABG-LITA-LAD) up to 6 years is at least comparable to the corresponding benefit reported for 2 versus 1 ITA (with additional vein grafts).2 We hope that long-term results will confirm the reported 0- to 6-year data. As for graft patency, we found that radial graft failure was intermediate to that of LITA and vein. Because of the limited RITA use in this study group, a meaningful comparison of RITA and radial grafts was not possible.

Arterial graft remodeling has been amply studied in the past. Dr Raja pointed to the interesting work of Ikeda et al3 regarding the potential implications of the changes in the G/N (graft/native vessel) ratio on the shear stress effects and eventually on long-term radial patency. However, arterial grafts seem to adjust their caliber to increase flow to a revascularized coronary bed, which promotes balancing of shear effects on the endothelium and increased flow through stenosed graft vessels.4 Moreover, varying radial patency with target location and quality has been elegantly demonstrated.5 These characteristics should be carefully considered when selecting target coronary vessels.

Certainly, intimal hyperplasia of radial cannot be dismissed. Here, however, surgical practice may be particularly important, including harvesting and implantation techniques. Radials are not as “forgiving” as saphenous vein grafts, and a learning curve is definitely present. We have observed a significant improvement in radial patency data within our service in recent compared with earlier years. When the aorta is of “good quality,” we have no reservations utilizing aortocoronary grafting and prefer it to the T-grafts. This practice is supported by a recent study that showed similar radial results for both grafting strategies.5 Also, the latter argues against the contention that radial hyperplasia at the proximal anastomosis site could be responsible for a significant number of graft occlusions.5

The potential hyperreactivity of radial seems to be a point of less concern since the advent of calcium-blocking agents, but we would tend to agree that a consensus opinion is lacking at the present time. We have not observed what Dr Raja described as a potential “fatal deterioration in postoperative hemodynamics” that could be related to vasospasm. The low operative mortality in our patients (1.2%) certainly would not support this contention.3

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