Commentary: If RITA did not exist, it would be necessary to invent it so if you can’t beat them join them

Chaim Locker, MD

In this issue of The Journal of Thoracic and Cardiovascular Surgery, Gaudino and colleagues present their tremendous work on a large and comprehensive meta-analysis conducted to compare the effect on clinical outcomes of using the radial artery (RA) versus saphenous vein graft (SVG) as the second conduit for coronary artery bypass grafting (CABG) after the regular use of the left internal mammary artery to the left anterior descending coronary artery. A total of 14 studies were included, 7 observational and 7 randomized, including 20,931 patients to represent the “best” evidence available. The authors report that there were no differences found in the rates of perioperative myocardial infarction (MI), stroke, and mortality. With a mean follow-up of 6.6 years, no differences were found in the rates of MI and repeat revascularization, but mortality was lower by 26% with the use of the RA.

The search for the “ideal” second conduit after the left internal mammary artery was ground for numerous observational and randomized studies, but the authors should be commended for their persistency to further explore and analyze the existing data on this debated subject. Importantly, in a very recent previous patient-level combined analysis of 6 randomized controlled trials, comparing RA grafts versus SVGs, Gaudino and colleagues found somehow conflicting results with the current ones. In that report of the Radial Artery Database International Alliance project, mortality rates were not different between the RA and SVG groups at 5 years, but the rates of MI and repeat revascularization were significantly lower (hazard ratio, 0.72 and 0.50, respectively) in the RA group. In addition, a higher patency rate for the RA grafts was discovered by angiography studies performed on many of the patients included in those trials.

The question raised after the current study is how we could explain lower mortality rates in the RA group at 6.6 years, in the absence of significant differences in the rates of repeat revascularization and MIs. This might definitely stem from unidentified biases in treatment and/or patient selection, and in addition, although repeat revascularization and late MI rates were important goals for the current study, the analyses on those outcomes might have been statistically underpowered. Furthermore, and as the authors stated, these differences might have resulted from the different inclusion criteria; mainly, the inclusion in the current meta-analysis of the important randomized trial conducted by Goldman and colleagues among 757 patients who underwent CABG at 11 Veterans Affairs centers, which did not show any differences in angiographic graft patency between the SVG and RA at 1 year. It would be imperative to follow-up on the longer-term angiographic studies of this trial.

Having said this, there are some additional important considerations in the debate for the “second best” arterial conduit. First, there is a big elephant in the room, namely,
the right internal thoracic artery (RITA). It is acceptable for many surgeons, that the RA has superior patency and long-term survival rates compared with the SVG. However, it has also been shown that the RITA is superior to the RA in clinical outcomes. It is also agreeable that the left internal thoracic artery (LITA) and RITA are identical arteries, with the same biological qualities. Raja and colleagues reported that using the RITA instead of LITA to bypass the left anterior descending artery has not increased the long-term risk for late death or repeat revascularization. Hence, if one argues that the RA is superior or at least equal with the RITA, and should be used as the "second best conduit," why is it only the second best, and not the best? No surgeon would suggest using the RA to the left anterior descending artery as the first option. Tatoulis and colleagues showed that the RA is inferior to the LITA and the RITA as a bypass conduit for any coronary target.

After the mounting data on the long-term survival benefits of bilateral internal thoracic artery (BITA) usage, it was only expected that the use of RITA would be skyrocketing. Unfortunately, this has not happened. According to the recent Society of Thoracic Surgeons database report, there was no change in the past decade in the rates of BITA usage. Instead, cardiac surgeons are incentivized to care more about the short-term outcomes. This might be the same background for promoting the use of the RA. The fact that the RA can be harvested at the same time with the LITA is appealing to many surgeons, even despite the fact that the transradial artery approach for coronary angiography and percutaneous coronary intervention has been shown to be associated with significantly reduced all-cause mortality and reduced complications of major bleeding and vascular complications compared with the transfemoral approach, but also with significant intimal damage and reduced patency compared with noncatheterized RA grafts. If time is the concern with RITA harvest, it has been shown that CABG with BITA increases overall incision time by no more than 30 minutes. If sternal infection rates are the concern, the skeletonized technique has been shown to diminish those as well.

The RA and the RITA are 2 very different arteries. Histological and functional studies by He have revealed that there are major differences between those grafts in terms of structure of smooth muscle, contractility, and endothelial function. He reported that the internal thoracic artery (ITA) releases significantly more nitric oxide and other important factors than the RA, and the expression and function of endothelial nitric oxide synthase messenger RNAs are much higher in the ITA than in the RA. Hence, the observation of many surgeons that ITA is almost always and exclusively free of atheromas whereas the RA is not, might be explained by those findings. Additionally, genomic analysis of both ITAs suggest that the pathways associated with atherosclerosis and inflammation are downregulated in these conduits and might also affect progression of disease in the conduit as well as in the bypassed coronary artery.

There is a tendency to include those 2 different arterial conduits under the same umbrella of multiarterial grafting. Clear definition should be made between the two. It was also required in the current report, to further extend on the main concerns with the use of the RA. The RA is prone to severe spasm (string sign) and to catastrophic consequences as a result. The caliber of the coronary vessel bypassed, the degree of stenosis in the coronary compared with the diameter of the vessel and the conduit, the competitive flow in the coronary artery, the number of targets bypassed with the RA, the use of it as free graft or as composite-T from the side of the LITA, the distance between sequential anastomoses, the lie of the conduit in between, and the size and configuration of the anastomosis (side to side vs diamond shaped)—all are crucial considerations to consider before and during the decision if and how to use the RA. The recent trend of promoting the RA as the "second best conduit" without carefully describing its limitations in detail is worrisome.

There is still an important role for the RA. In many recent studies, it has been shown that total arterial revascularization is associated with a significant survival benefit compared with non-total arterial revascularization. Hence, if you can’t beat them join them. Finally, because coronary surgery demands a higher level of surgical skills and expertise, and with the results of centers of excellence (Video 1) and experience in multiarterial grafting being superior than those without it, the leadership of the cardiothoracic surgery societies ought to take explicit action,
and define the use of BITA grafting as a quality metric, and coronary surgery as a subspecialty in cardiac surgery, so specific training programs could be established soon.

References