

Aminian

## **Are Radial-Artery Bypass Grafts Better Than Saphenous-Vein Grafts?**

The following is the data summary regarding the second conduit to the left internal thoracic artery for patients undergoing CABG. Ten-year results from a pooled analysis of five randomized trials suggest important clinical benefits.

The use of multiple arterial grafts for CABG surgery is recommended by current guidelines and the position papers of professional societies. For example, the Society of Thoracic Surgeons (STS) recommends LIMA graft to LAD and Then, as an adjunct to the left internal thoracic artery, a second arterial graft (either the right internal

thoracic artery or RA) should be considered in appropriate patients.

Despite these recommendations, most patients currently receive SVGs in addition to an internal thoracic artery graft to the LAD.

Why there is the gap between guidelines and clinical practice? It is an important question, given that arterial grafts are usually considered better

than venous conduits. Plus, some evidence suggests that the radial artery develops less disease than venous grafts, is better able to withstand aortic pressure, and is easier to harvest.

There are reasons why the use of multiple arterial grafts for CABG has not been widely adopted by the surgical community, one is the lack of strong, unequivocal evidence

supporting their use; until recently, most of the evidence was based on observational studies.

## **The Radial Artery Database International Alliance (RADIAL)**

conducted a patient-level combined analysis of five randomized trials, comparing RA grafts and SVGs as the second conduit for CABG. The use of

RA grafts resulted in a significantly lower rate of MACE and a better patency rate at postoperative follow-up of 5 years, but it did not improve survival.

Specifically, the **RADIAL analysis** showed that the risk of graft occlusion was significantly lower with the RA graft than the SVG. Higher patency translated into lower MACE rates,

including the composite outcome of death from any cause, myocardial infarction, or repeat revascularization. Individually, there was a nominally lower incidence of myocardial infarction (hazard ratio [HR]: 0.72;  $p = 0.04$ ) and a lower incidence of repeat revascularization (HR: 0.50;  $p < 0.001$ ), but not a lower incidence of

death from any cause (HR: 0.90;  $p = 0.68$ ).

One important issue:

the 5-year analysis was likely underpowered and possibly driven by revascularization following protocol-mandated angiography. Still, based on just the 5-year data in the presence of a suitable coronary anatomy the radial artery should be strongly considered as

the preferred second conduit to the left internal thoracic artery, particularly in **younger patients, female patients, and patients without renal insufficiency**, along with RA should also be considered as the second arterial graft of choice in patients with diabetes, obesity, or chronic obstructive pulmonary disease, for whom the risk of deep sternal

wound infection associated with the use of both internal thoracic arteries that may outweigh the benefits.

## **Survival Benefit**

Given that the median follow-up duration was shorter than the time of anticipated decline in vein graft patency, clinical follow-up to 10 years or to the maximal possible follow up for

each participating patient was conducted.

Consequently, at the virtual ACC.20 meeting the 10-year median follow-up data presented. For 91% of patients, median follow-up was *at least* 10 years, permitting some 15-year follow-up data. With longer follow-up, the use of the RA graft compared with SVGs in patients undergoing CABG was still associated

with a lower risk of MACE but, unlike the earlier data, the difference in survival achieved statistical significance. At 10-year follow-up, radial-artery grafts were associated with significantly lower rates of the primary composite endpoint of all-cause death, myocardial infarction (MI), or repeat revascularization (31.0% vs. 41.6%) and in the composite of death or MI (25.4% vs. 33.0%). In a

post hoc exploratory analysis, radial-artery grafts were associated with significantly lower all-cause mortality as well (10-year cumulative incidence, 14.0% vs. 19.8%). Differences in death and MI outcomes emerged predominantly between 5- and 10-year follow-ups – the period in which vein graft failure generally occurs.

Results in 10 and 15 years (**Table**).

# RADIAL: Main Outcomes

	RA Graft Group  (n = 534)	SVG Group  (n = 502)	Treatment  Effect*
	Cumulative Incidence at 10 and 15 Years		
Primary endpoint: death, MI, or repeat revascularization	10 years 31.0%	10 years 41.6%	HR: 0.73  (p < 0.001)
	15 years 52.5%	15 years 61.5%	
Secondary endpoint: death or MI	10 years 25.4%	10 years 33.0%	HR: 0.77  (p = 0.01)
	15 years 47.8%	15 years 57.1%	

Death <sup>†</sup>	10 years 14,0%	10 years 19.8%	HR: 0.73  (p = 0.01)
	15 years 34.6%	15 years 47.1%	
MI	10 years 12.0%	10 years 15.6%	HR: 0.74  ---
	15 years 15.2%	15 years 19.3%	
Repeat revascularization	10 years 11.3%	10 years 16.4%	HR: 0.62  (p = 0.004)
	15 years 11.8%	15 years 18.2%	

**\* Results from mixed effect Cox regression model with individual trials included as a random effect. (Saphenous Vein Graft Group is the reference group.)**

**† Death was not a prespecified outcome and was analyzed post hoc.**

## **In summary**

**the RADIAL cohort trial , consisted of 1036 patients undergoing CABG who were randomized to receive either a radial-artery graft or a saphenous-vein graft to a coronary artery other than the left anterior descending artery.**

**At 10-year follow-up (the median duration available), radial-artery grafts were associated with significantly lower**

rates of the primary composite endpoint of all-cause death, myocardial infarction (MI), or repeat revascularization (31.0% vs. 41.6%) and in the composite of death or MI (25.4% vs. 33.0%). In a post hoc exploratory analysis, radial-artery grafts were associated with significantly lower all-cause mortality as well (10-year cumulative incidence, 14.0% vs. 19.8%). Differences in death

and MI outcomes emerged predominantly between 5- and 10-year follow-ups – the period in which vein graft failure generally occurs.

## **Take-home Messages:**

- In a pooled analysis of randomized, controlled trials comparing radial artery (RA) grafts to saphenous vein grafts (SVGs) as the second conduit

for coronary artery bypass graft (CABG) surgery, the use of RA grafts resulted in a significantly lower rate of major adverse cardiac events (MACE) at 5 years.

- Now, the 10-year follow-up data of RADIAL provide the first report of a survival benefit for CABG using multiple arterial conduits based on randomized data.

- In the presence of a suitable coronary anatomy, the radial artery should be strongly considered as the preferred second conduit to the left internal thoracic artery.

1. **Gaudio M, Benedetto U, Femes S, et al.** Radial-Artery or Saphenous-Vein Grafts in Coronary-

Artery Bypass Surgery. *N Engl J Med* 2018;378:2069-77.

- 2. Shapira OM.** Radial Artery as the Preferred Second Conduit for Coronary Bypass. *N Engl J Med* 2018;378:2134-5.