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REFERENCES


Editorial Comment

The right internal thoracic artery: how much do we know?

James Tatoulis a,b,*

a Department of Cardiothoracic Surgery, Royal Melbourne Hospital, Melbourne, Victoria, Australia

b University of Melbourne, Melbourne, Victoria, Australia

* Corresponding author. Department of Cardiothoracic Surgery, Suite 28, Medical Centre, Royal Melbourne Hospital, Melbourne, Victoria 3050, Australia. Tel: +61-3-93481838; fax: +61-3-93475258; e-mail: james.tatoulis@mh.org.au (J. Tatoulis).

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Over 60 years have elapsed since the left internal thoracic artery (LITA) was first used in (indirect) coronary revascularization, 50 years since its introduction to create a direct coronary anastomosis and 40 years since the use of bilateral internal thoracic arteries (BITA) in coronary artery bypass graft (CABG) surgery [1]. Although most cardiac surgeons are very comfortable with harvesting and using the LITA, most of us have scant knowledge of the histomorphology and biological function of the internal thoracic artery (and other conduits). The past 25 years have seen the LITA firmly established, unani-

nesiously acknowledged and used as the best conduit for coronary revascularization (current rate of use >95%); almost universally to

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revascularize the left anterior descending artery (LAD). So why is it that the right internal thoracic artery (RITA) remains forgotten: used in <5% of CABG in the USA and in 10–15% of CABGs in the UK and Australia? Indeed, in some hospitals, the RITA is never used, and the majority of US hospitals (STS database) use RITA/BITA in <2% of CABG [2]. The evidence (albeit largely from observational reports) over the past 15 years, for the use of RITA/BITA, is compelling. Not only is patency of both ITA grafts superior to any other, [3] but also further cardiac events including recurrent angina, myocardial infarction and especially reoperation were reduced. Superior prognosis has also been observed in all age groups, including the elderly, and in specific sub-groups including those with renal dysfunction and diabetes, while the perioperative risk is for BITA including acute myocardial infarction, aternal infection and mediastinitis is comparable with LITA saphenous vein (SVG), as noted in recent randomized trials [2, 4, 5].

In this context, the report by Kinoshita et al. [6] regarding the histomorphology of the internal thoracic arteries, particularly comparing the RITA with the LITA, is important and timely. It addresses concerns that cardiac surgeons may have regarding the RITA, its biological characteristics and its potential use. The authors predominantly address the fundamental structure of these conduits. They have performed detailed histomorphological and quantitative assessments on the discarded distal segments of the right and left ITAs from 72 patients (all patients had BITA). They describe the basic structure of which many of us only have a passing knowledge. They describe the intimal and media thickness, the number of elastic laminae, fibrosis, presence or absence of atheromatous plaque and calcification, and compare the RITA with the LITA.

They found the intima to be a thin layer, and the media layer to contain a median of five elastic laminae, in keeping with prior publications. It is postulated that the multiple elastic laminae may be protective of atheroma and fragmentation in the elastic laminae or relative paucity, to be associated with a higher chance of intimal hyperplasia and the possibility of subsequent atheroma [7].

The authors also document the cross-sectional area of the distal ITA and by back calculation, the ITA diameter at this point is 1.5 mm, with a trend towards the RITA being larger—often observed in the majority of patients who are also right-handed.

They reaffirm what we intuitively suspect—the RITA is histologically and morphologically identical to the LITA. Nevertheless, the extremely low use of the RITA prompted such a study.

Some intimal thickening (stringent definition) was noted in 80% of the studied ITAs, which correlated with age and renal dysfunction—but this did not translate into atheromatous lesions. In fact, another key finding was the absence of any atheroma or calcification in the ITAs of the 72 patients studied, despite a 53% incidence of smoking, 68% diabetes and 26% incidence of peripheral vascular disease—immensely reassuring findings.

The authors used a harmonic scalpel to harvest the ITA in a skeletonized fashion, which minimizes chest wall trauma and enhances length. These techniques did not translate into any observable histological injuries, abnormalities or problems, verifying their excellent status and further consolidating the evidence for their use, as some controversy has surrounded this, especially regarding potential damage by the skeletonized harvest of the ITA. Moreover, the lack of vasa vasorum in the wall of the ITA sets this apart from radial arteries (RAs) and SVG. It can be inferred that the nutrition of the ITA wall is entirely from the lumen, whereas the RA and SVG may be dependent on both luminal and extrinsic (by vasa vasorum) sources of nutrition to maintain vessel wall integrity, and this may be a factor in protecting the ITA from fibrosis, degenerative changes in the wall and subsequent plaque formation [8].

The authors are confident in the RITA and use it exclusively to bypass the LAD, while using the LITA to the circumflex. Their confidence in this strategy and surgical expertise is highlighted in that 241 of 242 ITA anastomoses studied were patent. This provides further evidence that the RITA and the LITA are identical not only structurally, but also functionally, and may be used interchangeably. The lack of vasa vasorum in the ITA wall, and their obvious non-requirement, may explain why skeletonization of the ITA does not compromise its patency.

An additional benefit that may contribute to enhanced long-term patient prognosis is that ITA grafting has a strong, protective effect against progression of native coronary disease downstream in the previously grafted coronary vessels [9]. Hence, multiple arterial grafting may enhance long-term survival. A possible explanation is that the ITAs (and other arterial grafts) remain metabolically and physiologically active, grafts producing vasoactive substances such as prostacyclin, endothelial relaxing factor and nitric oxide, all of which may engender a beneficial effect both on the conduit and on the downstream coronary artery [10].

To conclude, the RITA is identical to the LITA, neither is vulnerable to atheroma nor calcification, both have excellent identical patencies, irrespective of whether to the LAD or the circumflex, and this is true when harvested by a harmonic scalpel and skeletonized. These findings should remove uncertainty regarding its use and reassure cardiac surgeons in adopting the RITA in a greater proportion of CABG surgeries. The challenge for us is to use this excellent conduit in such a manner and at such a frequency that it is of maximum benefit to our patients.

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