



**Figure 2:** Postoperative angiographic control showing normal functioning left (A) and right (B) ITA grafts.

The postoperative course was uneventful. Blood pressure control was troublesome, requiring the concurrent administration of  $\beta$ -blockers, calcium channel blockers,  $\alpha_1$ -receptor antagonists and angiotensin-converting-enzyme inhibitors. Pre-discharge ECG and echocardiogram were normal. The patient was discharged on postoperative day 8, in good condition.

Histopathological evaluation of the discarded ITA segments using haematoxylin–eosin and Masson trichrome staining revealed normal medial and adventitial layers and a markedly thickened endothelium. There was no cellular disarray, focal atherosclerosis or hyperplastic degeneration. Immunostaining with anti-factor VIII and anti-endothelial nitric oxide synthase type III (anti-eNOS) antibodies was performed according to described methods [4] in order to evaluate endothelial integrity and vascular wall function. Anti-factor VIII reaction revealed an intact endothelial layer and anti-eNOS immunostaining demonstrated normal expression of eNOS in the endothelium and in the media (Fig. 1B).

An angiographic control performed for study purposes 2 months after the operation showed that both the LITA and RITA grafts were patent, although they had minor luminal irregularities (Fig. 2).

## COMMENT

The atherosclerotic changes occurring in the ITAs of aortic coarctation patients have not been extensively investigated in the literature. A relatively small number of reports have been published regarding the use of ITAs as conduits for revascularization in this special subset of patients. In most of cases, ITAs were rejected due to the evidence of poor flow once the arteries were transected after harvesting. In a smaller number of reports, the ITA was used, though abnormally dilated: in all but one case, the operation and the immediate postoperative course were uneventful [3]. This has led to contrasting opinions on the subject, with some authors even advising against the use of internal thoracic arteries, despite the evidence of a good flow [5].

Our patient is the first reported case in which both of the ITAs have been used. Intraoperative flowmetry and follow-up angiographic control demonstrated normal function of both grafts (although the potential impact of the described endoluminal irregularities on long-term graft patency is not known at present). Moreover, histopathological and immunohistochemical evaluation revealed an artery that, although abnormal, showed preserved architecture and vascular function.

We support the hypothesis that a history of aortic coarctation (whether concomitant or already repaired in adulthood) in a surgical candidate for coronary artery bypass graft does not necessarily rule out the possibility of grafting the coronaries using the ITAs. Besides intraoperative evaluation (qualitative and eventually quantitative, with the aid of transit-time flow measurement), a targeted preoperative evaluation by the means of transthoracic colour Doppler ultrasound and selective LITA and RITA catheterization at the time of the coronary angiography can be helpful for optimal preoperative planning.

**Conflict of interest:** none declared.

## REFERENCES

- [1] Cohen M, Fuster V, Steele PM, Driscoll D, McGoon DC. Coarctation of the aorta. Long-term follow-up and prediction of outcome after surgical correction. *Circulation* 1989;80:840–5.
- [2] Lawrie GM, DeBakey ME, Morris GC Jr, Crawford ES, Wagner WF, Glaeser DH. Late repair of coarctation of the descending thoracic aorta in 190 patients. Results up to 30 years after operation. *Arch Surg* 1981;116:1557–60.
- [3] Gaudino M, Farina P, Toesca A, Bonalumi G, Tsiopoulos V, Bruno P *et al.* The use of internal thoracic artery grafts in patients with aortic coarctation. *Eur J Cardiothorac Surg* 2013;44:415–8.
- [4] Gaudino M, Toesca A, Maggiano N, Pragliola C, Possati G. Localization of nitric oxide synthase type III in the internal thoracic and radial arteries and the great saphenous vein: a comparative immunohistochemical study. *J Thorac Cardiovasc Surg* 2003;125:1510–5.
- [5] Darwazah AK, Shehadeh SM, BSharabati B, Abu Sham'a RA. Left internal mammary artery atherosclerosis: twenty-three years after repair of aortic coarctation. *Ann Thorac Surg* 2008;86:1991–4.

**eComment. Evidence-based selection of conduits in coronary artery bypass grafting**

**Authors:** Arda Ozyuksel, Cihangir Ersoy, Ekin Kayan and Atif Akcevin  
Department of Cardiovascular Surgery, Medipol University, Istanbul, Turkey  
doi: 10.1093/icvts/ivv420

© The Author 2015. Published by Oxford University Press on behalf of the European Association for Cardio-Thoracic Surgery. All rights reserved.

We read with great interest the article by Gaudino *et al.* [1]. They have performed coronary artery bypass grafting (CABG) with both internal thoracic arteries (ITA) in a 68-year old patient with a surgical history of aortic coarctation repair. However, there

are some issues we would like to discuss regarding the surgical strategy of the graft selection in this patient. The patient was reported to be hypertensive, both at admission and during the postoperative period. The authors performed a histopathological evaluation of the discarded ITA segments and markedly thickened endothelium was encountered. We wondered how they had decided that the discarded distal segment of the ITA with markedly thickened endothelium guaranteed an intact proximal arterial wall. The atherosclerotic involvement of the ITA may be segmental, hence distal ITA sampling may not accurately predict the degree of atherosclerosis at the proximal part of the graft [2]. Moreover, the same authors had published a review on the use of ITAs in patients with aortic coarctation recently [3]. In that paper, they reviewed 13 reports related to this topic and only one of them included an angiographic control at the long-term follow-up. The authors concluded that, 'a careful evaluation of the conduit is obviously paramount in the context that preoperative transthoracic Doppler ultrasound and selective LITA and RITA catheterization at the time of cardiac catheterization will provide with optimal preoperative planning'.

In the current paper, we could not get any information as to whether preoperative transthoracic Doppler ultrasound and/or selective LITA and RITA catheterization had been performed in the patient or not. The authors did not state how they had evaluated the ITA grafts in terms of atherosclerosis at the time of operation. Secondly, although bilateral ITA grafting in patients <70 years of age is a class IIa indication (level of evidence B) according to the recent guidelines (2014 ESC/EACTS Guidelines on Myocardial Revascularization) [4], we do not believe that this patient with a history of aortic coarctation repair and significant hypertension is an ideal candidate for

bilateral ITA harvesting. When compared with the greater saphenous vein conduit, the superiority of the RITA graft for the anastomosis to RCA is debated in such a patient.

In our opinion, the surgical strategy for the conduit selection is far from evidence-based in the case presented by the authors.

**Conflict of Interest:** None declared.

#### References

- [1] Gaudino M, Farina P, Cammertoni F, Massetti M. Myocardial revascularization with both internal thoracic arteries 25 years after delayed repair for aortic coarctation. *Interact CardioVasc Thorac Surg* 2015;20:278–80.
- [2] Abad C, Santana C, Diaz J, Feijoo J. Arteriosclerotic histologic evaluation of the internal mammary artery in patients undergoing coronary artery bypass grafting. *Eur J Cardiothorac Surg* 1995;9:198–201.
- [3] Gaudino M, Farina P, Toesca A, Bonalumi G, Tsiopoulos V, Bruno P *et al.* The use of internal thoracic artery grafts in patients with aortic coarctation. *Eur J Cardiothorac Surg* 2013;44:415–418.
- [4] Kolh P, Windecker S, Alfonso F, Collet JP, Cremer J, Falk V *et al.* 2014 ESC/EACTS Guidelines on myocardial revascularization. *Eur J Cardiothorac Surg* 2014;46:517–92.