Elongation of right internal thoracic artery with radial artery for redo total arterial revascularization in patients with open left internal thoracic artery to left anterior descending artery graft

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Abstract

Total arterial revascularization in patients with three-vessel disease cannot usually be achieved by bilateral internal thoracic artery grafts alone due to limited length. In this report we describe a technique by which the right internal thoracic artery can be elongated with radial artery for sequential grafting in redo total arterial revascularization procedure.

Keywords: Total arterial revascularization; Right internal thoracic artery; Radial artery; Redo procedure

1. Introduction

Redo-CABG in progressive coronary artery disease or secondary graft failure, especially when lacking suitable venous graft material, still poses a major challenge to cardiothoracic surgeons. Total arterial revascularization (TAR) with right internal thoracic artery (RITA) grafting could be a promising approach for patients with patent left internal thoracic artery (LITA) to the left anterior descending artery (LAD) anastomosis. However, this approach is usually not feasible for patients with three-vessel disease due to limited length of RITA, unless it is employed as T or Y graft. Here, we describe a technique by which RITA can be elongated with radial artery (RA) for sequential grafting in redo TAR procedure.

2. Case report

A 70-year-old male was admitted due to progressive coronary artery disease to our institution. He underwent CABG with LITA to LAD bypass and single saphenous vein graft to the right coronary artery (RCA) 17 years ago. The current coronary angiography revealed an excellent long-term patency of the LITA to LAD bypass, 80% distal stenosis of left main coronary artery, and occlusion of the vein graft to RCA. Due to these findings and absence of suitable vein grafts, we opted for redo TAR of the posterior descending artery (PDA) and the obtuse marginal branch of the circumflex artery.

Secondary to redo complete median sternotomy, the RITA and non-dominant left RA were harvested in a pedicled fashion. After heparinization, the RITA was transected proximal to the bifurcation. The proximal stump of the free RA graft and the distal stump of RITA graft were then spatulated and anastomosed in an end-to-end fashion with a running 8/0 polypropylene suture. To prevent possible torsion, pedicles of the RITA and RA were attached with two 5/0 polypropylene sutures. Due to severe cicatrisation, the mediastinal dissection was performed after establishment of cardiopulmonary bypass. The LITA graft was dissected to its LAD-anastomosis. After aortic cross-clamping and administration of crystal cardioplegia in antegrade and retrograde fashion, myocardial revascularization was performed with a side-to-side anastomosis of the RITA-RA graft to PDA and an end-to-side anastomosis of the RITA-RA graft to the obtuse marginal branch.

After an uneventful postoperative course, the patient was discharged on POD 7 in good physical and psychological health. A postoperative 64-slice cardiac computed tomography demonstrated excellent patency of the new sequential arterial bypass grafts (Fig. 1).

3. Comment

In the past decade, total arterial myocardial revascularization has gained increasing popularity due to high
long-term patency and low atherosclerosis rate of LITA-LAD graft. As an alternative to composite arterial conduit as T or Y graft, TAR can also be achieved with bilateral ITA as in situ grafts with improved long-term clinical outcome in terms of death, reoperation, and angioplasty [1].

Due to limited length, TAR in patients with three-vessel disease cannot usually be achieved by bilateral ITA grafts alone. Thus various strategies have been developed. Tavilla and colleagues for instance used right gastroepiploic artery in addition to bilateral ITA grafts [2]. Furthermore, ITA elongation with various arterial grafts has been reported as feasible. Calafiore and colleagues reported left ITA elongation with inferior epigastric artery in minimally invasive coronary surgery [3]. Pitsis et al. employed a graft extension of the proximal third of the RITA with radial artery, in conjunction with the T-graft technique, by which the lower two-thirds of the free RITA was anastomosed to the side of the left ITA [4]. The elongation of RITA graft with radial artery has previously been reported only for primary TAR procedure [5].

In this case of redo TAR, we anastomosed a full length RA with the distal stump of pedicled RITA graft in an end-to-end pattern, thus creating a long composite arterial graft for sequential anastomosis. This approach avoids partial clamping and proximal anastomosis at the ascending aorta, which in redo-CABG can be particularly difficult and dangerous due to arteriosclerosis, cicatrisation or existing proximal saphenous vein grafts. Additionally, it provides two independent inflows for myocardial revascularization and the crucial end-to-end anastomosis can be performed comfortably between sternal edges and controlled by free flow measurement.

This approach has been performed in six patients with excellent postoperative outcome in our institution, including follow-up between 8 and 36 months (17.3 ± 9.9 months). We believe the elongation of the right ITA with radial artery in its full length is a safe and feasible approach for sequential anastomosis in redo TAR, especially in cases with open LITA—LAD graft. This approach should be considered more often in a selected patient population, since it provides the benefits of complete arterial revascularization at the time of reoperative coronary bypass surgery.

References