

When should we re-cycle internal mammary artery in redo coronary artery bypass graft surgery?

Anıl Özen, Ertekin Utku Ünal, Emre Kubat, Sercan Tak, Başak Soran Türkcan, Ufuk Tütün, Cemal Levent Birincioglu

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ABSTRACT

A 56-year-old male patient was admitted to our hospital with unstable angina pectoris lasting for six hours. He underwent left internal mammary artery to left anterior descending artery bypass grafting two years ago. Coronary angiography revealed significant stenosis of the LIMA-LAD bypass. The LIMA was re-cycled and anastomosed to the first diagonal branch and the right internal mammary artery was harvested and anastomosed to the distal part of the stenotic region. The advantage of this operation is re-using the previous arterial graft which is essential for this young patient with a longer life expectancy.

Keywords: Coronary artery bypass graft; internal thoracic artery; surgery.

Stenosis of the graft bypassed to the left anterior descending artery (LAD) is associated with an increased risk of morbidity and mortality. The major problem in re-do coronary artery bypass graft (CABG) surgery is the lack of an appropriate graft with a good long-term patency. Herein, we describe a patient reoperated for the significant stenosis distal to left internal mammary artery to left anterior descending artery (LIMA-LAD) anastomosis site. The LIMA was re-used having anastomosed to the distal part of the stenotic diagonal branch of the LAD and the right internal mammary artery (RIMA) was anastomosed to the distal part of the LAD stenosis.

CASE REPORT

A 56-year-old hypertensive male patient with hyperlipidemia who underwent LIMA-LAD CABG two years ago was admitted to the cardiology intensive care unit for unstable chest pain lasting for six hours. Coronary angiography revealed a significant stenosis of the anastomosis of the LIMA-LAD bypass. Physical examination and blood test results were normal. The decision for re-do CABG was made. The patient underwent re-do surgery the next day.

The right femoral artery and vein were encircled by tapes for possibility of an urgent cardiopulmonary bypass (CPB). Sternotomy was made from the previous incision. Adhesions surrounding the heart were

dissected carefully. Following heparinization, aorto-atrial cannulation was performed. Cardiopulmonary bypass was initiated and the X-clamp was placed. A bulldog clamp (Stoelting Co, Illinois, USA) was placed onto the patent LIMA. Cardiac arrest was established after introducing cardioplegia via the antegrade route. The LIMA was freed from the proximal part so to extend enough to bypass the distal part of the previous anastomosis. Even so, the LIMA did not reach the desired area. Hence, it was anastomosed to the stenotic first diagonal branch. The RIMA was harvested and anastomosed to the desired area (1.5 cm distal to the previous anastomosis). Following this, warm cardioplegia was introduced. The X-clamp was removed and the bulldog clamp on the LIMA was removed. The heart, then, started beating spontaneously. Weaning from CPB was challenging. Following decannulation, the thorax was closed in layers.

The patient was extubated at the eighth postoperative hour and transferred to the ward. He was discharged at the fourth postoperative day. He was seen at the outpatient clinic at two months and two years following surgery. He had no complaint of chest

Department of Cardiovascular Surgery, Türkiye Yüksek İhtisas Hospital, Ankara, Turkey

Corresponding author: Anıl Özen, M.D. Türkiye Yüksek İhtisas Hastanesi Kalp ve Damar Cerrahisi Kliniği, 06230 Sıhhiye, Ankara, Turkey.
Tel: +90 533 - 736 43 43 e-mail: ozenanil@hotmail.com

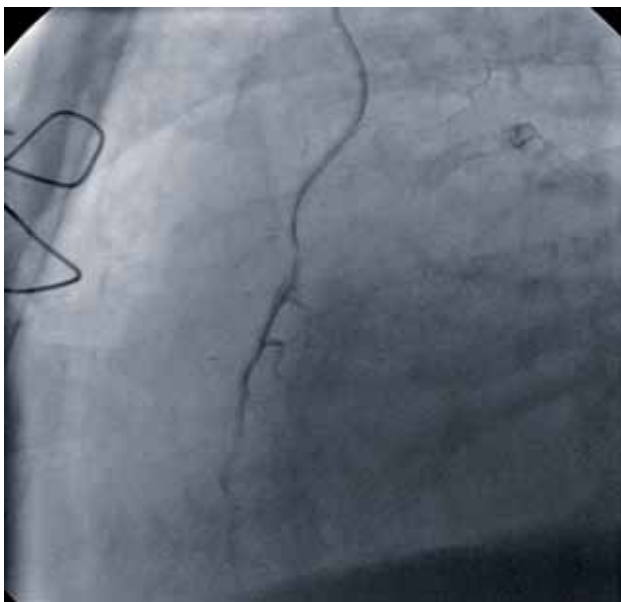


Figure 1. Significant stenosis of the left internal mammary artery to left anterior descending artery bypass seen in the postoperative coronary angiography.

pain. Doppler ultrasound revealed patent LIMA and RIMA grafts with a good flow.

DISCUSSION

In the recent years, the incidence of re-do CABG surgery has declined due to the increased use of multiple arterial grafts. Patients initially undergoing CABG with arterial grafts frequently have shortage of arterial grafts for their second revascularization procedure.^[1] Hence, the re-cycling techniques may help optimizing arterial revascularization in young patients, in particular, with a longer life expectancy.

One possibility of re-cycling is to use the patent internal thoracic arteries (ITAs) as an inflow for the new Y composite configuration. This represents the most commonly applied technique in some practices like Barra et al.^[2] and Tector et al.^[3] The second possibility is the re-implantation of the distal ITA anastomosis on the same coronary vessel (15%). The main objective is to bypass a stenosis in the coronary artery distal to the anastomosis or due to a peri-anastomotic lesion. This technique obliges an adequate length of the preexisting left ITA. Pasic et al.^[4] demonstrated excellent mid-term patency (2.6 years) for ITA re-implantation of 12 patients.

During re-do CABG, Dohi et al.^[5] dissected the LIMA, re-used it *in situ* for the circumflex artery, and used the RIMA to the LAD. This possibility was the appropriate choice for our patient with a slight modification made by anastomosing the LIMA to the first diagonal branch and the RIMA to the LAD.

Although Antona et al.^[6] were able to obtain an IMA pedicle long enough to reach the heart. In certain cases, the anastomosis of the salvaged graft on the same coronary artery may cause excessive tension on the anastomosis itself. For such cases, the “short” IMA can be re-routed to a more accessible coronary artery which needs revascularization or it can be elongated with an interposition of great saphenous vein or with other arterial conduits.

Another method may be skeletonizing the LIMA. At a re-do operation, Uwabe et al.^[7] skeletonized the LIMA and re-used it *in situ* to the LAD. Using the skeletonized method for re-harvesting LIMA made the graft reach to a more distal portion without tension.

Re-cycling is generally performed on a highly selected group of re-do CABG patients. Certain factors are mandatory for the re-cycling process such as a well-developed ITA with a minimal diameter >2.5 mm as confirmed by coronary angiography, patent IMA grafts without significant stenosis and sufficient LIMA length. Re-sternotomy has to be done very carefully to avoid any damage to the ITA graft. Young patients (<60 years) with a longer life expectancy, presenting for re-do CABG surgery with patent ITA may benefit from salvage and re-use of the ITA grafts.^[8] As our patient met the necessary criteria mentioned above, LIMA was successfully re-cycled and used. Another point to attract attention is the possibility of follow-up using Doppler ultrasound.

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