

Radial artery harvesting technique without hemostatic clips and clinical experience

Técnica para retirada da artéria radial sem utilização de cliques hemostáticos e experiência clínica

João Bosco de OLIVEIRA¹, Roberto ROCHA E SILVA², Ricardo DE MOLA³, Roger Alain Pantoja RIBERA⁴

RBCCV 44205-958

Abstract

Objective: The various techniques of radial artery (RA) harvesting produce similar results. These techniques use electrocautery, ultrasonic scalpel or sharp scissors in different combinations, but usually involve the use of hemostatic clips. We describe a RA harvesting technique with the combination of sharp scissors and electrocautery without the use of hemostatic clips.

Methods: We describe a retrospective study of 107 patients between 28 and 78 years (mean age ranged from 53.3 ± 8 years). Bleeding, re-operation, infarct and death were analyzed.

Results: No bleeding was imputed to the RA, and no re-operations were required. There were three (2.8%) infarcts possibly related to the RA anastomosis territory. Mortality was 0.9%, but unrelated to cardiac complications.

Conclusion: RA electrocautery harvesting without hemostatic clips presented no bleeding and was an inexpensive procedure, requiring no investments in additional equipment.

Descriptors: Radial artery. Myocardial revascularization. Myocardial ischemia. Coronary disease.

1. PhD; Head of Cardiovascular Surgery Team – Hospital Paulo Sacramento.
2. PhD; Assistant Physician
3. Cardiovascular surgeon; Assistant Physician
4. Cardiovascular surgeon; Assistant Physician

This study was carried out at Hospital Paulo Sacramento, SP, Brazil.

Correspondence address:

Roberto Rocha e Silva. Rua Leonor Pinheiro da Silva, 133 - Pq. do Colégio – Jundiá – SP – Brasil - CEP 13209-130.
E-mail: rors@terra.com.br

Article received on Oct 8th, 2007
Article approved on Dec 30th, 2007

Resumo

Objetivo: As diferentes técnicas de dissecação de artéria radial (AR) obtêm resultados semelhantes. Estas técnicas utilizam eletrocautério, bisturi ultra-sônico ou tesouras em diferentes combinações, mas geralmente associadas ao uso de cliques hemostáticos. Este trabalho descreve uma técnica de dissecação de AR com a combinação de tesouras e eletrocautério sem o uso de cliques hemostáticos.

Métodos: O estudo apresenta um levantamento retrospectivo de 107 pacientes, entre 28 e 78 anos (média \pm desvio padrão $53,3 \pm 8$ anos), feito entre janeiro de 2000 e junho de 2005, no qual é relatada a incidência de sangramento, reoperação, infarto do miocárdio e mortalidade.

Resultados: Não ocorreram sangramentos relacionados à AR e não ocorreram reoperações. Ocorreram três (2,8%) infartos possivelmente relacionados ao território de anastomose de AR. A mortalidade foi de 0,9% não relacionada a causas cardiovasculares.

Conclusão: A dissecação de AR com eletrocautério sem cliques hemostáticos não apresentou sangramento, foi de baixo custo e dispensa investimentos em equipamentos adicionais.

Descritores: Artéria radial. Revascularização miocárdica. Isquemia miocárdica. Coronariopatia.

INTRODUCTION

The left internal thoracic artery (LITA) is the first option as graft in coronary artery bypass grafting (CABG), due to its increased patency, reduced number of cardiac events and increase of short- and long-term survival. Zacharias et. al. [1] demonstrated that the use of radial artery (RA) as second graft option for anterior descending artery associated to the ATIE decreases the long-term mortality, compared to the use of saphenous vein (SV). Tatoulis et. al. [2] demonstrated that the RA presents patency of 89% up to 15 years after surgery, suggesting that this graft is an excellent option for CABG. There are few reports approaching the use of arterial grafts in emergency surgeries. Our team demonstrated that the CABG, when exclusively performed with LITA and RA, presents good short- and mid-term clinical evolution, as much in elective surgeries as in emergency surgeries, with RA patency of 84% in 4 years [3,4]. Several studies have demonstrated that different RA resection techniques present similar outcomes. These techniques use the electrocautery, ultrasonic scalpel or sharp scissor in different combinations, but are commonly associated with the use of hemostatic clips [5-8].

Our team has been using a low-cost technique with the combination of electrocautery and sharp scissor without using of hemostatic clips for the LITA resection since 1983, when we initiated this experience with RA as an option for resection technique. In this study, we will describe this technique with the use of RA which we have used for over five years. We also performed a survey of the operated cases, observing the incidences of bleeding, reoperation, acute myocardial infarction (AMI) and mortality.

METHODS

Due to the fact that there is no Ethics Commission in our service, permission from the clinical Director of the hospital (who is responsible for ethics matters) was requested in order

to perform the study. In this retrospective study, all patients operated in our service who underwent CABG with the use of RA as graft were selected. Between January 2000 and June 2005, 107 patients were selected. The patient's age ranged from 28 to 78 years (mean \pm standard deviation 53.3 ± 8 years).

Operative technique

The skin incision was performed with cold scalpel from the antecubital fossa up to wrist. Dissection with electrocautery was performed up to the fascia brachioradialis. An autostatic retractor withdrew the brachioradialis muscle from the flexor carpi radialis, exposing the RA. The dissection of the anterior fascia of the RA was performed using a sharp scissor. All RA branches were cut using an electrocautery, preserving the tissue and the radial veins close to the graft. As a rule, none of the RA branches needed ligation. In the records, there are no reports about ligatures due to the fact that they were not relevant in the period of their description. However, ligatures in two or more larger branches were performed only occasionally. The RA dissection was performed during sternotomy, and, generally finished before initiation of LITA dissection.

During its dissection, the RA presented spasms (diagnosed due to a visible focal decrease of its caliber) which were treated with the topical and routine application of gauze soaked with papaverine. The RA was maintained *in situ*, involved with this gauze until the end of the dissection of the other grafts. After systemic administration of heparin, the RA was examined and generally did not present bleeding from its branches. At that moment, its caliber presented maximum dilatation, and mechanic expansion was not needed. The RA was ligated and sectioned in its extremities. Its proximal portion was cannulated, being prepared for implantation. At the end of implantation, its branches rarely bled and, in the case of bleeding, a simple cauterization solved the problem (again, there is no report in the patients' records about such occurrences).

The survey of the mentioned cases took into account the following criteria:

1. Bleeding volume exteriorized through drains within the first 5 hours (the reoperation was indicated when the bleeding volume was greater than or equal to 500ml, 400ml, 300ml in the first, second and third hour, respectively, or if the total bleeding volume exceeded 1000ml and 1200ml in the fourth and fifth hour, respectively, if the bleeding might not have been associated to coagulopathy [9]);
2. The need of reoperation due to bleeding;
3. Incidence of AMI defined as: a) appearance of Q-wave at minimum two contiguous derivations; b) elevation of creatine phosphokinase (CPK) MB fraction greater than three times of the normal value and between 10 to 20% of the respective CPK value [3]; and
4. Hospital mortality

Wherever possible, the grafts were used with sequential anastomosis.

RESULTS

Two hundred and nine distal anastomosis were performed with the use of RA. The mean was two distal anastomosis of RA per patient.

The bleeding volume through the drains in the first five hours was 285.3 ± 250.5 ml. In two (1.9%) cases, the bleeding volume met the reoperation criteria. However, both cases presented coagulopathy and were clinically treated with the resolution of bleeding. Echocardiographic study rejected signs of cardiac tamponade. Both were discharged from ICU on the second postoperative day. One of them was discharged from hospital on the fifth postoperative day, and the other, on the sixth.

There were no reoperations.

There were seven (6.5%) cases of AMI, and only one patient received vasopressor agents until the 3rd postoperative day. All patients were discharged from hospital. Among these seven patients, only three (2.8%) presented AMI, possibly related to RA anastomosis territory.

There was one (0.9%) death due to a septic shock secondary to pneumonia. The 70-year-old patient had already undergone previous CABG and did not present perioperative AMI.

Hemostatic clips were not used.

DISCUSSION

The bleeding volume observed in this study was expected for this procedure [9] in all cases except two. In these two cases, coagulopathy was considered as a cause

of excessive bleeding. Once the coagulopathy was corrected, the bleeding stopped and the patient presented uneventful evolution, and was discharged from ICU. If there had been bleeding from arterial branch, it would have probably developed into cardiac tamponade. Because there was no bleeding due to RA dissection technique and no reoperation was needed, the dissection with electrocautery is considered appropriate to avoid active bleeding from the arterial branches.

The incidence of perioperative AMI was expected for the procedure [1-3], and is even less if one considers only the cases in which this event was due to the RA. Additionally, the patients needed little or no vasopressor agent in the postoperative, suggesting that the dissection with electrocautery does not predispose to RA spasm or thrombosis.

The absence of reoperations associated to low incidence of perioperative AMI, low bleeding volume, and absence of deaths related to cardiovascular complications suggest the reliability of this procedure.

The exclusive use of sharp scissors and electrocautery is an inexpensive procedure, since no hemostatic clips are needed and no investment in ultrasonic scalpel is required. The technique demonstrated herein is quick and easy, and can be performed by even inexperienced surgeons.

CONCLUSION

The RA dissection with the use of electrocautery without hemostatic clips did not present bleeding, was a low-cost procedure, and does not require investment in additional equipments.

REFERENCES

1. Zacharias A, Habib RH, Schwann TA, Riordan CJ, Durham SJ, Shah A. Improved survival with radial artery versus vein conduits in coronary bypass surgery with left internal thoracic artery to left anterior descending artery grafting. *Circulation*. 2004;109(12):1489-96.
2. Tatoulis J, Buxton BF, Fuller JA. Patencies of 2127 arterial to coronary conduits over 15 years. *Ann Thorac Surg*. 2004;77(1):93-101.

-
3. Rocha-e-Silva R, Mansur AP, Fabri Junior J, Ramos RB, Cunha Filho CE, Dallan LAO, et al. Coronary revascularization with the left internal thoracic artery and radial artery: comparison of short-term clinical evolution between elective and emergency surgery. *Clinics*. 2005;60(3):227-32.
 4. Rocha-e-Silva R, Santos TSG, Rochite CE, Rocha-Filho JA, Mansur AP, Fabri Jr. J, et al. Elective vs non-elective radial artery grafts: comparing midterm results through 64-Slice computed tomography. *Clinics*. 2007;62(6):725-30.
 5. Isomura T, Suma H, Sato T, Horii T. Use of the harmonic scalpel for harvesting arterial conduits in coronary artery bypass. *Eur J Cardiothorac Surg*. 1998;14(1):101-3.
 6. Chukwuemeka AO, Deshpande R, Desai JB. Modified technique for rapid atraumatic radial artery harvesting. *J Card Surg*. 2003;18(6):562-3.
 7. Hata M, Shiono M, Sezai A, Iida M, Saitoh A, Hattori T, et al. Determining the best procedure for radial artery harvest: prospective randomized trial for early postharvest complications. *J Thorac Cardiovasc Surg*. 2005;129(4):885-9.
 8. Rukosujew A, Reichelt R, Fabricius AM, Drees G, Tjan TD, Rothenburger M, et al. Skeletonization versus pedicle preparation of the radial artery with and without the ultrasonic scalpel. *Ann Thorac Surg*. 2004;77(1):120-5.
 9. Kirklin JW, Barratt-Boyes BG. *Cardiac surgery*. 2nd ed. New York: Churchill Livingstone;1993. p. 224.