

Long Segmenter Reconstruction of Diffusely Diseased of the Left Anterior Descending Artery without Coronary Artery Bypass Grafting

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Abstract

A 58-year-old male patient with LAD diffuse had hyperlipidemia and hypertension. Preoperative angiography showed that he had triple-vessel disease with diffusely diseased LAD. In echocardiography, EF was detected as 60 % (52 - 70) and PAP 25 (12 - 25) mmHg and 2 degrees of tricuspid insufficiency. In this case report, we will present our LAD endarterectomy case. Surgical technique: after standard general anesthesia, cardiopulmonary bypass procedure and moderate hypothermia, cold cardioplegic arrest. Longitudinal long LAD endarterectomy was performed (approximately 10 cm long). A dissector was used to develop on the plane between media and atheroma. Gentle traction was made to light off the atheroplaque with the coronary artery branches, distal and proximal part of the LAD. We assumed that the distal part of the LAD was free from plaque. Then we made the same procedure to the proximal part of the LAD. Luckily, we observed that proximal atheroplaque was also harvested. After completing the endarterectomy, antegrade cardioplegia was administrated to wash and any debris is LAD; also we tried the distal part of the LAD. Via retrograde cardioplegia administrated, we did also observe the bolus return of cardioplegia via retrograde way. After making the same coronary end arteriotomy was successful, we used saphenous vein as a patch for LAD reconstruction. We made only patch plasty like a carotid endarterectomy. Postoperative follow-up period was 120 months. According to 8 years angiography result, LAD patch plasty was working relatively well. The patient did not have any complaints. We made coronary angiography 10 years after the operation and observed that our patch plasty was occluded but the patient has still class II symptoms with an EF value of 40%.

Keywords

Coronary Artery Disease, LAD Endarterectomy

1. Introduction

Coronary bypass grafting is a well-known surgical treatment method allowing restoring the coronary blood flow. Inadequate revascularization is the most important predictor factor for long-term outcomes in coronary bypass surgery [1]. The LAD revascularization is the most important one in coronary vascularization. Coronary endarterectomy was first described by Bailey *et al.* in 1950 [2]. Coronary endarterectomy was performed on all presence of discursively diseased coronary arteries that are not suited for distal grafting [3]. The development of thrombus from coronary endarterectomy due to deterioration of endothelial integrity in the early period is why surgeons often avoid it. Acceptable clinical and angiographic results have been published [4].

2. Case

A 58-year-old male patient with LAD diffuse patient had hyperlipidemia and hypertension. Preoperative angiography showed that he had triple-vessel disease with diffusely diseased LAD (**Figure 1**). In echocardiography, EF was detected as 60 % (52 - 70) and PAP 25 (12 - 25) mmHg and 2 degrees of tricuspid insufficiency.

In this case report, we will present our LAD endarterectomy case. Surgical technique: after standard general anesthesia, cardiopulmonary bypass procedure and moderate hypothermia, cold cardioplegic arrest. Longitudinal long LAD endarterectomy was performed (approximately 10 cm long) (**Figure 2**). A dissector was used to develop on plane between media and atheroma. Gentle traction was made to light off the atheroplaque with the coronary artery branches, distal and proximal part of the LAD. We assumed that distal part of the LAD was free from plaque. Then we made the same procedure to proximal part of the LAD. Luckily we observed than proximal atheroplaque was also harvested. After completing the

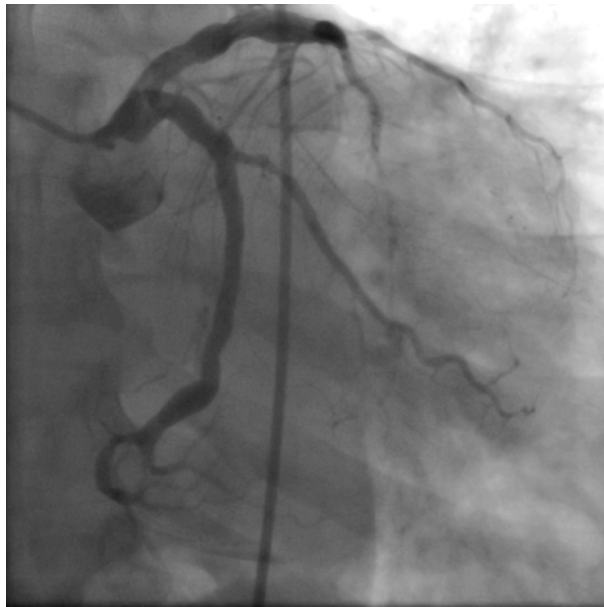


Figure 1. Preoperative angiography image.

endarterectomy, antegrade cardioplegia was administered to wash and the any debris is LAD and also we tried the distal part of the LAD. Via retrograde cardioplegia administered we did also observe the bolus return of cardioplegia via retrograde way. After making same that coronary end arteriotomy was successful we used saphenous vein as a patch for LAD reconstruction (**Figure 3**).

We intended to use proximal part of the saphenous vein for proximal aortic anastomoses. After completion of bypasses and patch plasty procedure cross clamping was released allow the heart before beginning to beat. After defibrilating the heart two times, normal sinus rhythm restored. Immediately before beginning the proximal anastomosis and mean arterial pressure was 60 mmHg on pump. Also we observed the pulsation of the LAD saphenous vein. Then we measured the saphenous vein pressure. This pressure was equal to aortic pressure. We made proximal anastomosis for right coronary artery. After these procedures we terminated to bypass but we didn't made the proximal anastomosis for LAD (with bulldog clamp) we allowed the heart to beat (**Figure 4**). It was observed that heart was contracting normally with a mean pressure 70 mmHg.



Figure 2. Material of endarterectomy.

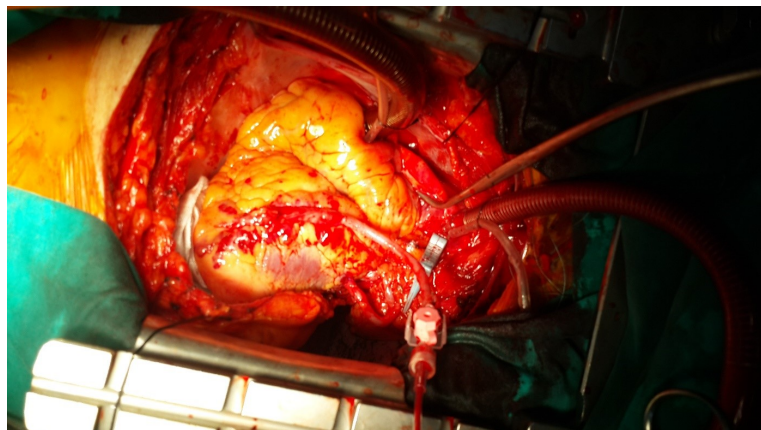


Figure 3. Saphenous vein as a patch for LAD reconstruction.

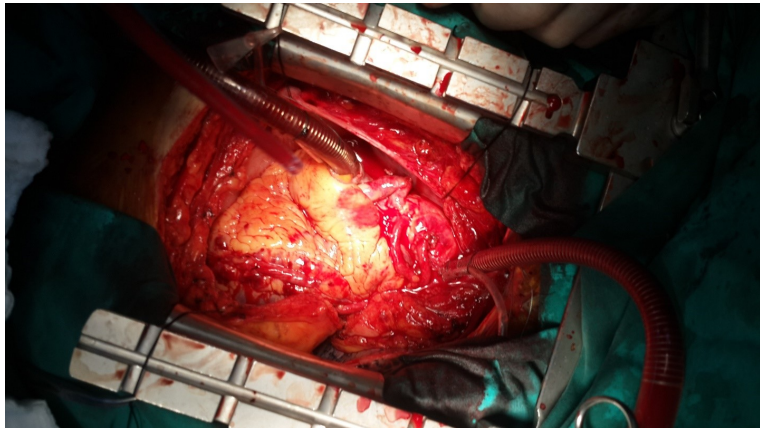


Figure 4. Terminated to bypass without proximal LAD bypass.

Before protamine administration we compared the pressures between LAD saphenous vein and aorta. All of them we measured equal. Then we applied the bulldog clamp to saphenous vein just above the patch. After protamine administration we did not observe any problem on heart beating with clamp we continue the bleeding control the heart was functionally well. Thus we decided to tie down the saphenous vein. We made only patch plasty like a carotid endarterectomy.

Total cardiopulmonary bypass time was 100 minute and an aortic cross-clamp time of 57 minute.

The patient was admitted to intensive care unit. The intensive care unit stay was 3 days. He was uneventful postoperative course. And the patient discharged from the hospital (7th Day).

It is recommended that the combination of postoperative heparin, antiplatelet and warfarin after coronary endarterectomy should be given for several months [3]. As thrombogenicity increases due to endothelial damage after coronary endarterectomy, we start routine anticoagulants and antiplatelets unless there is significant hemorrhage in the early postoperative hours. Postoperative follow up 120 month. This patient followed up coronary angiography was made 5 years after the operation (Figure 5). According to 8 years angiography result, LAD patch plasty was working relatively well. Patient did not have any complaints. We made coronary angiography 10 years after the operation and observed that our patch plasty was occluded but patient have still class II symptoms with EF 40% (Figure 6).

3. Discussion

If the patient with diffuse coronary atherosclerosis has no other choice, coronary endarterectomy can be applied. This coronary endarterectomy procedure is a challenging procedure [5] [6] because it increases the perioperative mortality, especially in LAD. For this reason, most surgeons perform endarterectomy if there are no other options for LAD [7].

Acceptable results of the coronary endarterectomy procedure have been reported

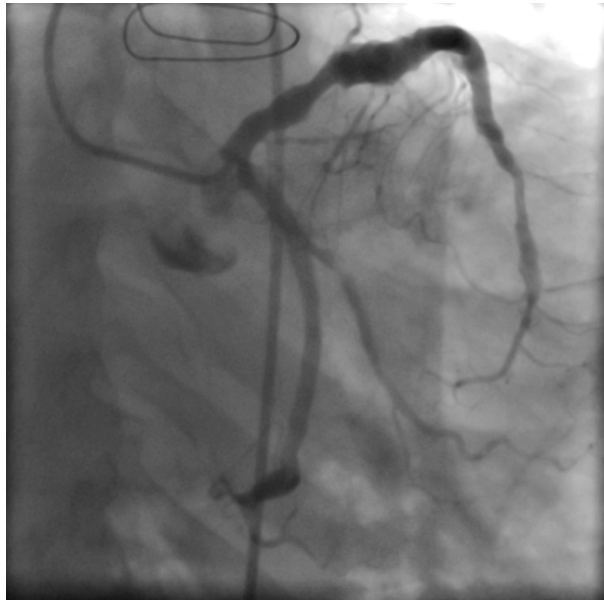


Figure 5. Coronary angiography image 5 years after the operation.

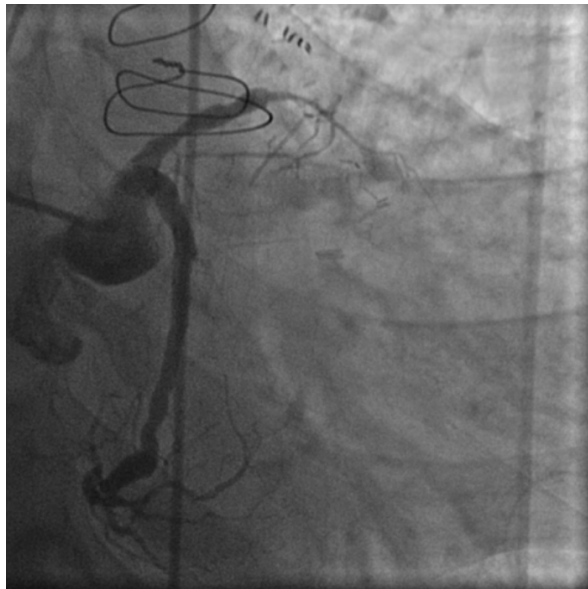


Figure 6. Coronary angiography image 10 years after the operation.

in recent literature [8].

Despite the adverse effects of coronary endarterectomy this procedure must be kept in mind in the occluded arteries. There are two techniques in coronary endarterectomy. In closed technique, shorter arteriotomy is performed and the plate is removed with traction. When performing endarterectomy with a closed technique, the plate may break and the diagonal and septal branches branching from the LAD may not open, and there is also a risk of disruption in the proximal and distal of the LAD.

Open technique requires long incision extending into the proximal and distal part of the artery. This technique allows lifting off the plaque under vision. The

incidence of intimal flap formation is low. The risk of residual obstruction, dissection, distal myocardial ischemia is low. The open technique allows the entire atheroplaque to be removed in full block. Open coronary endarterectomy technique: It should include the branch and the branch of the LAD, it involves all your removal including the most proximal and distal of the lesion in the LAD.

This technique is not only a time consuming procedure but also carries the risk of proximal obstruction due to the unnoticed flash and the catastrophic result.

This patient tolerated this technique and no problem. Although we found this technique useful, it can not be put into daily practice, especially in LAD endarterectomy.

4. Conclusion

This technique must be considered an adjunct to coronary artery bypass grafting-coronary endarterectomy and has a significant role in achieving optimal revascularization.

Informed Consent

Written informed consent was obtained from the patient for sharing their relevant medical history and laboratory results.

Ethics Approval and Consent to Participate Informed Consent Was Obtained

This work does not consist of studies in humans or animals.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Fukui, T., Takanashi, S. and Hosoda, Y. (2005) Coronary Endarterectomy and Stent Removal in Patients with In-Stent Restenosis. *The Annals of Thoracic Surgery*, **79**, 558-563. <https://doi.org/10.1016/j.athoracsur.2004.07.064>
- [2] Bailey, C.P., May, A. and Lewman, W.M. (1957) Surgical after Coronary Endarterectomy in Man. *Journal of the American Medical Association*, **164**, 641-646. <https://doi.org/10.1001/jama.1957.02980060017005>
- [3] Fukui, T., Tabata, M., Taguri, M., Manabe, S., Morita, S. and Takanashi, S. (2011) Extensive Reconstruction of the Left Anterior Descending Coronary Artery with an Internal Thoracic Artery Graft. *The Annals of Thoracic Surgery*, **91**, 445-451. <https://doi.org/10.1016/j.athoracsur.2010.10.002>
- [4] Asimakopoulos, G., Taylor, K.M. and Ratnatunga, C.P. (1999) Outcome of Coronary Endarterectomy: A Case-Control study. *The Annals of Thoracic Surgery*, **67**, 989-993. [https://doi.org/10.1016/S0003-4975\(99\)00094-6](https://doi.org/10.1016/S0003-4975(99)00094-6)
- [5] Livesay, J.J., Cooley, D.A., Hallman, G.L., Reul, G.J., Ott, D.A., Duncan, J.M., *et al* (1986) Early and Late Results of Coronary Endarterectomy. Analysis of 3,369 Patients.

The Journal of Thoracic and Cardiovascular Surgery, **92**, 649-660.

[https://doi.org/10.1016/S0022-5223\(19\)35867-2](https://doi.org/10.1016/S0022-5223(19)35867-2)

- [6] Uchimuro, T., Fukui, T., Mihara, W. and Takanashi, S. (2009) Acute Thrombosis after Endarterectomy of Stented Left Anterior Descending Artery. *Interactive Cardiovascular and Thoracic Surgery*, **8**, 663-665.
<https://doi.org/10.1510/icvts.2008.201194>
- [7] Qureshi, S.A., Halim, M.A., Pillai, R., Smith, P. and Yacoub, M.H. (1985) Endarterectomy of the Left Coronary System: Analysis of a 10-Year Experience. *The Journal of Thoracic and Cardiovascular Surgery*, **89**, 852-859.
[https://doi.org/10.1016/S0022-5223\(19\)38692-1](https://doi.org/10.1016/S0022-5223(19)38692-1)
- [8] Sundt, T.M., Camillo, C.J., Mendeloff, E.N., Barner, H.B. and Gay, W.A.J. (1999) Reappraisal of Coronary Endarterectomy for the Treatment of Diffuse Coronary Artery Disease. *The Annals of Thoracic Surgery*, **68**, 1272-1277.
[https://doi.org/10.1016/S0003-4975\(99\)00693-1](https://doi.org/10.1016/S0003-4975(99)00693-1)