

Simple technique for reconstruction of a bifurcation lesions of diffuse coronary artery disease

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Abstract

We report a technique by which a bifurcation lesion of the first diagonal branch of the left anterior descending coronary artery can be bypassed after endarterectomy. After opening the artery proximally, the incision was extended to involve both limbs of the bifurcation. After complete endarterectomy inverted Y shaped anastomosis was designed using single vein graft. The technique is simple, reproducible and easily performed especially in small sized vessels after endarterectomy. With this technique it is possible to perform 2 distal anastomoses using a single conduit without adding extra bypass time.

Introduction

Increasing numbers of patients with advanced coronary artery disease and diffusely complex atherosclerotic lesions are more often referred now for coronary artery bypass surgery [1]. Under these circumstances, complete revascularization with an adequate distal run off can only be achieved by extensive endarterectomy and reconstructive procedures [2].

Because of the numerous septal and diagonal branches of the left anterior descending coronary artery (LAD) and its great importance as a target graft in myocardial revascularization, grafting of a major diagonal branch is sometimes required for complete revascularization.

Different means of LAD reconstruction using endarterectomy with either long segmental anastomosis and or on-lay patches have been used with encouraging results [3]. However, bifurcation lesions represent some technical difficulties when performing anastomosis specially, if the lesion is long and complex.

We describe a technique of anastomosis by which a bifurcation lesion of any major coronary artery can be anastomosed to a vein graft after endarterectomy.

Description of surgical technique

After standard median sternotomy, LIMA and saphenous vein were harvested. The saphenous vein graft selected for this bypass must be of a good quality vessel with a diameter not less than 4 mm (preferably the thigh vein). Cardiopulmonary bypass was established by cannulating the distal ascending aorta and the right atrium, cold antegrade blood cardioplegia was infused through an aortic root cannula following aortic cross clamp and repeated every 20 minutes.

The target vessels were inspected, palpated and the site of the anastomosis was determined. On exploration of the 1st diagonal branch of the left anterior descending artery, it was found that it is a big artery which bifurcates into two good sized vessels. There was a significant

lesion at the bifurcation site including both vessels. A small incision was performed in the proximal part of the vessel just before bifurcation and extended to both sides of the bifurcation. An atheromatous plaque was found involving both limbs of the bifurcation. After meticulous endarterectomy the size of the incision was 3 cm long on both limbs of the bifurcation.

Vein was incised in the middle to have 2 equal limbs like a pantaloons. Anastomosis was performed with single suture 7/0 polypropylene. Suturing technique begins just before bifurcation at 4 o'clock position of the vein and 2' o'clock position of the artery moving in anti-clockwise direction (Figure 1)

After completion of the planned grafts and before weaning of the cardiopulmonary bypass, flow meter was performed to study the flow across the graft. It was 41 ml / min, with pulsatility index 2.5 (Veri Q Machine – Taiwan).

Coronary angiography was performed before discharge of the patient (Figure 2), which showed a reasonable filling at the site of the anastomosis. The patient had uneventful recovery and was discharged on the 7th postoperative day

Discussion

The clinical profiles of patients referred now for coronary surgery are more complex. Most of the patients are referred with diffuse disease [4].

Bypass grafting of the diffusely diseased vessels usually require some complex surgical procedures like on-lay patches, endarterectomies with

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Figure 1. Intra-operative photo of our inverted Y graft to the first diagonal artery



Figure 2. Postoperative Coronary Angiography showing a reasonable filling (Arrow) at the site of the anastomosis

longer anastomosis and sometimes more than one graft for the same vessel, however many surgeons are still reluctant to use these techniques because of its high perioperative and postoperative mortality rates [5].

Coronary endarterectomy is usually the technique of choice in patients presenting with diffuse and extensive coronary artery disease [6]. However, modifications of conventional techniques are usually needed to achieve satisfactory long-term results or to solve unexpected intraoperative events.

Grafting of a bifurcation lesion has usually the advantage of supplying both limbs of the bifurcation with a single graft; however, the presence of multiple atheromatous plaques usually complicates the surgical procedure and adversely influences long term patency [7].

Our technique has the advantage of achieving complete revascularization by combined endarterectomy of both limbs of the diseased artery and grafting of both branches using single conduit. A single conduit has also the advantage of reducing the amount of trauma to the aorta which is equally diseased in this subset of patients without adding extra bypass time.

This Technique tries to find a solution for these complicated atheromatous bifurcation lesion and tries also to find a solution for unexpected intraoperative events which may happen during or after endarterectomy in diffusely diseased medium sized vessels.

There is evidence that coronary bypass surgery for small sized vessels has relatively poor outcome [8], however, increasing the size of the vessel by performing a long and a wide anastomosis may improve the flow to these vessels as proved by flow meter study, and postoperative coronary angiography.

In Conclusion, bypass grafting of bifurcation lesion is possible even after endarterectomy. Our technique is simple, easy to be performed and reproducible. It helps in achieving complete revascularization without adding extra bypass time.

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